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**STEEL CREEK FISH - L-LAKE/STEEL CREEK BIOLOGICAL
MONITORING PROGRAM JANUARY 1986 - DECEMBER 1991
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NAI-SR-145

STEEL CREEK FISH
L-LAKE/STEEL CREEK
BIOLOGICAL MONITORING PROGRAM
JANUARY 1986 - DECEMBER 1991

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April 1992

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PREFACE

The Savannah River Site (SRS) encompasses 300 sq mi of the Atlantic Coastal Plain in west-central South Carolina. The Savannah River forms the western boundary of the site (Figure 1). Five major tributaries of the Savannah River -- Upper Three Runs Creek, Four Mile Creek, Pen Branch, Steel Creek, and Lower Three Runs Creek -- drain the site. All but Upper Three Runs Creek receive, or in the past received, thermal effluents from nuclear production reactors. In 1985, L Lake, a 400-hectare cooling reservoir, was built on the upper reaches of Steel Creek to receive effluent from the restart of L-Reactor, and protect the lower reaches from thermal impacts. The lake has an average width of approximately 600 m and extends along the Steel Creek valley approximately 7000 m from the dam to the headwaters. Water level is maintained at a normal pool elevation of 58 m above mean sea level by overflow into a vertical intake tower that has multilevel discharge gates. The intake tower is connected to a horizontal conduit that passes through the dam and releases water into Steel Creek.

The Steel Creek Biological Monitoring Program was designed to meet environmental regulatory requirements associated with the restart of L-Reactor and complements the Biological Monitoring Program for L Lake. This extensive program was implemented to address portions of Section 316(a) of the Clean Water Act. The Department of Energy (DOE) must demonstrate that the operation of L-Reactor will not significantly alter the established aquatic ecosystems.

Steel Creek Description

Steel Creek and its main tributary, Meyer's Branch (Figure 1), drain approximately 35 sq mi of the Aiken Plateau before descending to the Coastal

Figure 1. Location of major aquatic systems on Savannah River Site.

Terrace. The headwaters of Steel Creek are located approximately 19 km from the Savannah River. L Lake was created near L-Reactor by construction of a dam across Steel Creek about 5 km upstream of the Steel Creek delta.

Steel Creek received thermal effluents directly from both P- and L-Reactors between 1954 and 1963 (maximum of 835 cfs; Smith et al. 1981; DOE 1984), and then from L-Reactor alone until 1968. The increased flow scoured the upper reaches of Steel Creek and deposited the sediments in a delta where the creek enters the river swamp. The increased sedimentation and the elevated water temperature destroyed all the in-stream vegetation along the upper reaches of the creek and the mature swamp forest at the site of the expanding delta. When thermal discharges ceased in the late 1960s, vegetation became reestablished and ecological succession began. The stream characteristics before the construction of L Lake included shallow braided channels and scrub-shrub or emergent wetland (marsh) communities. Diverse floral and faunal communities existed (Smith et al. 1981 and references therein). Potential influences of L-Reactor on Steel Creek physical parameters include changes in depth, flow, velocity, channel morphology, and water quality.

Biological Monitoring Program

The Steel Creek Biological Monitoring Program is designed to assess various components of the system and identify any changes due to the operation of L-Reactor or discharge from L Lake, the once-through cooling reservoir for the reactor. An intensive ecological assessment program prior to the construction of the lake (Paller et al. 1986; Firth et al. 1986; and others) provided baseline data with which to compare data accumulated after the lake was filled and began discharging into the creek.

This report summarizes the results of five years' data from Steel Creek under the L-Lake/Steel Creek Monitoring Program. L Lake is discussed separately from Steel Creek in Volumes NAI-SR-138 through NAI-SR-143.

Each major component of the Steel Creek portion of the biological monitoring program is presented in a separate volume as follows:

NAI-SR-144 Steel Creek Water Quality

NAI-SR-145 Steel Creek Fish

NAI-SR-146 Steel Creek Macroinvertebrates

NAI-SR-147 Steel Creek Primary Producers: Periphyton and Seston

NAI-SR-148 Steel Creek Habitat Formers and Channel Mapping

EXECUTIVE SUMMARY

1. Low water levels persisted throughout the Steel Creek system during most of 1991. Water levels have remained low since L-Reactor was shut down in 1988 and the associated reduction in available habitat has apparently resulted in reduced abundance and species richness. The reductions in species richness observed in 1990 and 1991 were probably also related to lower probability of capture for rare species as a result of the reduced scope of sampling begun in 1990.
2. The structure of the fish assemblage in the corridor continued to change in 1991, with sunfishes and largemouth bass forming a much larger proportion of the total catch than in previous years. The apparent flux in the fish assemblage of the corridor probably reflected dramatic changes in ecological conditions. Thermal effluent from L Lake was discharged into the corridor from 1986 through mid-1988, causing elevated temperatures and high water levels. Thermal effluents and high discharges from L Lake were stopped in mid-1988 so the corridor has fluctuated between periods of warm, high water levels and cooler, low water levels. The lower CPUE in 1991 may reflect lower habitat availability and an associated reduction in fish abundance.
3. The structure of the fish assemblage in the marsh and swamp did not change appreciably in 1989 and 1990. There was a rather abrupt shift from domination by minnows (pre-1988) to a more diverse fauna, and this continued in 1990. However, the fish assemblage of the marsh was again dominated by minnows and the proportion of suckers increased in the swamp

during 1991. The apparent decline in fish abundance probably reflected decreases in available habitat associated with lower water levels.

4. The composition of the channel fish assemblage showed only minor changes from 1989 to 1990, although total CPUE declined once again. Total CPUE again declined in 1991 and the fish assemblage of the channel was dominated by largemouth bass and minnows. Since the channel habitat was strongly influenced by the Savannah River, it was difficult to determine the precise cause of changes in the channel fish assemblage. The rather severe decline in taxa richness (19 species in 1989 to 9 species in 1990 and 5 species in 1991) was probably due to a combination of lower probability of capture for rare species resulting from the reduced scope of sampling and reduced habitat availability.
5. Taxa richness for ichthyoplankton in 1991 was similar to 1990. The slight decline in taxa richness from 25 in 1989 to 23 in 1991 could reflect a genuine loss of taxa, but is probably related to the reduced scope of sampling begun in 1990. Blackbanded darter larvae were much less abundant in 1991 than in previous years, and warmouth larvae were more abundant than usual. Comparisons of the results from the diurnal and diel sampling program indicated that diurnal samples consistently underestimated taxa richness and that densities in diurnal samples were substantially lower than from diel samples collected during nighttime. Sunfishes (mostly warmouth or pygmy sunfishes), perches (mostly Etheostoma sp. or blackbanded darters), and minnows (mostly ironcolor shiners) were generally the most abundant taxa in diurnal ichthyoplankton samples. Darter larvae formed the majority of the February and March catches.

April and May catches were more diverse including sunfishes, suckers, minnows, darters, and other fishes. Catches were greatest during early-June, when sunfishes and minnows composed most of the catch. Diel ichthyoplankton samples indicated that larval densities were greatest between 2000h and 0800h at all stations and that minnows (ironcolor shiners or other cyprinid species), suckers (chubsuckers), and sunfishes (mostly warmouth and pygmy sunfishes) were the most abundant taxa. Peak abundance varied among stations from March to June and the greatest densities were found at the corridor and channel stations.

6. Although taxa richness declined at all stations in 1990 and 1991, many of the missing species were relatively rare in previous years (i.e., American eel, Atlantic needlefish, striped bass) and were probably missed because of the reduced scope of sampling. The species richness of Steel Creek, although perhaps reduced in 1990 and 1991, remained similar to that of other streams of the southeastern United States.

1.0 INTRODUCTION

Steel Creek is a tributary of the Savannah River, draining the central portion of the Savannah River Site (SRS), a Department of Energy nuclear materials production facility near Aiken, South Carolina. From 1954 to 1968, Steel Creek received high temperature cooling water from L-Reactor, resulting in partial reduction of the cypress-tupelo (Taxodium distichum - Nyssa aquatica) canopy vegetation and sediment erosion from the mid-reaches and deposition in the lower reaches of the stream (Gladden et al. 1985). When L-Reactor was placed on stand-by status in 1968, reactor discharge to the creek ceased for the next 17 years (except for a brief period in the mid-1970s). In preparation for the restart of L-Reactor in 1985, L Lake, a 400-ha cooling reservoir, was constructed by damming Steel Creek approximately 12 km from its confluence with the Savannah River. Cooling water from L-Reactor now enters at the upper end of L Lake and discharges into Steel Creek through a controllable, multiple level outlet near the dam.

During the hiatus in reactor operation, ecological succession resulted in the development of a secondary growth of shrubs, bushes, and emergent and submerged macrophytes which subsequently attracted a variety of aquatic and terrestrial animals (Smith et al. 1981). The Steel Creek marsh/swamp, a 94-ha area formed where Steel Creek enters the Savannah River floodplain, and the channel below the swamp, developed into particularly important habitats supporting a diversity of organisms, including approximately 50 species of fish (McFarlane 1976; Aho et al. 1986).

The fish assemblages in the Steel Creek marsh/swamp have been the subject of numerous investigations. McFarlane (1976) reported that the recovery of the fish community from previous reactor operations was "almost complete" as of 1976, based on comparisons of species richness between Steel Creek and nearby unpacted streams. More recent studies have indicated the stability of the Steel Creek swamp fish assemblage, and provided evidence of its diversity and spatial heterogeneity, the latter being due to variations in habitat, particularly canopy cover and macrophyte bed development (Aho et al. 1986). The macrophyte beds also support large numbers of larval fishes (Paller et al. 1986) and may contribute to the reproductive success of some species by providing solid substrates for egg deposition, and shelter and forage for early life stages. The creek channel below the swamp, while not supporting the high larval densities characteristic of sheltered areas in the marsh, provides spawning areas for anadromous American shad and blueback herring entering from the river (Paller et al. 1986).

The restart of L-Reactor has had several effects on habitat in the mid- and lower reaches of Steel Creek, the most prominent being large increases in flow and moderate alterations in temperature. Changes in flow can indirectly affect fish populations by altering habitat structure and detritus processing, the latter having repercussions through the food chain. Subtle temperature increases can alter the behavior, activity, phenology, and growth of fishes (Brown 1974). The purpose of this report is to evaluate the impact, if any, of L Lake and L-Reactor operations on the fish communities in the mid- and lower reaches of Steel Creek after the impoundment of L-Lake and restart of L-Reactor.

The specific objectives of the fisheries studies in Steel Creek are to:

1. describe and evaluate the fish assemblages occurring in the mid- and lower reaches of Steel Creek after the restart of L-Reactor;

2. compare these assemblages with the fish assemblages present before reactor restart;
3. distinguish seasonal and secondary successional changes resulting from prior impacts from those caused by L-Reactor operation and impoundment of L Lake;
4. assess the "quality" of the fish community in Steel Creek after the restart of L-Reactor by comparing it to fish communities in other regional streams.

While these remain the objectives of the current study, note should be made here that L-Reactor has not operated since July 1988. The attempt to evaluate changes in the Steel Creek fish communities after the 1985 restart should be made with the present outage in mind.

2.0 METHODS AND MATERIALS

Steel Creek below L Lake can be divided into three basic habitats (Figure 2-1):

(1) the corridor, extending from the dam at the downstream end of L Lake to the creek delta at the headwaters of the swamp. The corridor was characterized by swiftly flowing braided channels moving across a broad floodplain that supported an early - mid successional plant community dominated by shrubs and small trees (Breiner 1989);

(2) the swamp and marsh, formed where Steel Creek enters the Savannah River floodplain. This area was characterized by numerous braided channels and broad shallow sheet flows. It can be subdivided into a reduced-canopy zone dominated by a climax forest of cypress and tupelo gum, and an open-canopy marsh dominated by successional herbaceous vegetation. The marsh previously was a climax forest that was killed by thermal effluents that had been released directly into the swamp as recently as 1968;

(3) the lower channel that drains the swamp into the Savannah River. The lower channel was typified by wide channels and high velocity stream flow and steep-sided banks.

2.1 SAMPLING STATIONS AND SCHEDULES

In 1991 there were four sampling stations in the Steel Creek system (Stations 290, 330, 350 and 370; Figure 2-1). Station 290 is in the corridor,

Figure 2-1. Location of fish sampling stations in Steel Creek. 1990 and 1991.

Stations 330 and 350 are in the marsh and swamp, and Station 370 is in the channel draining the swamp. Sampling dates for Steel Creek fish collection are shown in Table 2-1.

Adult, juvenile, and larval fish samples were collected at each station. Adult and juvenile fish were collected quarterly by electrofishing. Drifting ichthyoplankton (i.e., fish larvae and eggs) were sampled with drift nets. Sampling for fish larvae and eggs was conducted biweekly from January through July, and monthly during the rest of the year. Diel ichthyoplankton sampling (at 6-h intervals over a 24-h period) was conducted monthly from February - July.

Water temperature, dissolved oxygen concentration, and pH measurements were taken with a water quality analyzer at each station on each sample date. Current velocity was measured with a General Oceanics (Miami, FL) Model 2030 current meter or a Marsh McBirney electronic flow meter. Depth was measured with a sounding pole calibrated in 10-cm intervals.

2.2 ADULT FISH

2.2.1 Electrofishing

Electrofishing was conducted from an aluminum boat equipped with a 4500-watt, 230-V gasoline-powered generator. A four-electrode anode array was mounted on a boom and suspended in the water approximately 2 m in front of the boat; the cathode array was attached to the bow of the boat. Electrical current was modulated by a Smith-Root Model IV electrofisher set to deliver pulsed direct current (DC) at a frequency of 60 Hz. Electrical discharge was regulated by a foot switch operated by the dip-netter at the bow.

Table 2-1. Sampling dates for Steel Creek fish collection. January-December 1991.

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Electrofishing		1			7			8			18	
Ichthyoplankton												
Diurnal	3,31	14,28	14,28	11,25	9,23	6,20	3,18	8	20	15	21	17
Diel		14-15	14-15	25-26	23-24	20-21	18-19					

See Sayers et al. 1990 for sampling dates prior to 1990 and Sayers et al. 1991 for sampling dates in 1990.

Three consecutive 100-m transects were electrofished at each station. Collections were made by slowly motoring the boat upstream along the banks or along the borders of vegetation beds if submerged vegetation was abundant. Shock times for each 100 m transect were recorded. Stunned fish were lifted from the water with a wooden-handled dipnet and placed in a holding tank until the transect was completely sampled. All collections were made during daylight for safety reasons and to facilitate comparisons with data collected during daylight in previous years.

All fish over 90 mm total length (TL) were measured (to the nearest 1 mm), weighed (to the nearest scale increment), and examined in the field for parasites, disease symptoms, and morphological deformities. Sunfish (Lepomis sp.) between 90 and 150 mm TL and fusiform fishes (e.g., largemouth bass, yellow perch, catfish) between 90 and 200 mm TL were finclipped. Larger fish were tagged with plastic anchor tags (Model FD-68B, Floy Tag & Manufacturing, Inc., Seattle, WA).

Fish under 90 mm TL were measured individually and weighed in aggregate. Small fish occurring as only one specimen of a species in a sample were not weighed. Because large numbers of juvenile sunfish were occasionally collected, it was necessary to subsample specimens under 90 mm TL to expedite processing. For subsamples, 50 individuals of each species were randomly selected, measured, and weighed together. The remaining fish were counted and weighed in aggregate, and the TL range of the remainder was determined. For shiners (Cyprinidae: Notropis spp.) that were occasionally present in large numbers and typically showed little TL variation among individuals, specimens were counted, weighed in aggregate, and the TL range was determined. Since it is difficult to distinguish

among species of shiners² (*Notropis* spp.) in the field, all unknown shiners were placed on ice and returned to the laboratory for identification.

2.3 ICHTHYOPLANKTON

From January through July, ichthyoplankton sampling in Steel Creek consisted of two programs: (1) a biweekly, diurnal sampling program, and (2) a monthly, diel sampling program. For the biweekly sampling program, all stations were sampled between 0900 - 1600-h; station sampling order was randomized to prevent systematic temporal biases. For the monthly diel program, four drift samples were taken at 6-h intervals over a 24-h period from February through July. The intervals were identified as Diel Periods I through IV (I = 0800 - 1359 h, II = 1400 - 1959 h, III = 2000 - 0159 h, and IV = 0200 - 0759 h). Diurnal sampling occurred monthly for the rest of the year (August-December).

Ichthyoplankton samples were collected with paired, conical nets (1.6-m long, 0.5-m diameter, 505- μ m mesh diameter) mounted side by side in an aluminum frame (i.e., bongo configuration). The nets were deployed by suspending them in the current if there was adequate current velocity, or towing until approximately 50 m³ of water was filtered by each net. A flowmeter mounted in the center of each net opening permitted calculation of the amount of water filtered. Near-surface (0.5 - 1.0 m from the surface) samples were taken at all stations. Near-bottom samples (0.5 - 1.0 m from the bottom) were taken at sites where the depth exceeded 2.0 m. If the surface sample could only be collected by towing, a bottom sample was not collected. An 11-kg weight was attached to the bottom of the net frame to keep the nets at the desired depth when taking near-bottom samples.

After collecting a sample, the nets were retrieved and rinsed to flush the contents into 1-L collection bottles attached to the cod end of each net. Enough buffered (pH 7) formalin was added to the bottles to bring the formalin concentration to approximately 5%. The formalin contained rose bengal (0.33 g dye/L formalin) to stain the eggs and larvae for easier separation from detritus.

In the laboratory, ichthyoplankton samples were drained through a #35 sieve (500- μ m mesh) and rinsed with tap water. Fish larvae were separated from associated debris under a dissecting microscope and removed using forceps or an eyedropper. Larvae were identified to the lowest possible taxon under a dissecting microscope and stored in 70% ethanol. Identifications were facilitated with voucher specimens and numerous references (Table 2-2).

2.4 DATA ANALYSES

Catch per unit effort (CPUE) was calculated for adult and juvenile fish sampling methods (no. fish/100 m). Ichthyoplankton density was expressed as no. ichthyoplankton/1000 m³ by dividing the number of larvae and eggs collected in each net by the volume of water filtered and then multiplying by 1000. It should be noted that densities were calculated for each paired net and then averaged to get an overall density. Thus, each net functioned as a split sample taken from the total water volume sampled by the bongo apparatus because the individual nets cannot be considered true replicates. Mean densities for stations where both near-surface and near-bottom samples could be collected were calculated as the average of the near-surface samples and the near-bottom samples. Relative abundance of taxonomic groupings was calculated by dividing the respective mean CPUE or density by the total (i.e., sum of all taxa) CPUE or density and then multiplying by 100.

Table 2-2. References pertinent to the identification of larval fishes.

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3.0 RESULTS AND DISCUSSION

3.1 WATER QUALITY

Mean water temperatures were usually highest at the corridor station (Station 290) during each sampling period, although mean water temperature in the channel was greater than in the corridor during winter (Table 3-1). This phenomenon is probably due to the release of warmer water from L Lake. Mean dissolved oxygen concentrations were also generally higher in the corridor and probably reflect the mixing of gases at the outfall of L Lake. The mean summer dissolved oxygen concentrations observed during 1991 (3.33 to 5.84 mg/L) were similar to the mean concentrations reported for 1990 by Sayers et al. (1991). Mean pH varied moderately over season and station, with spring values exceeding the other seasons.

3.2 ADULT AND JUVENILE FISH

Scientific and common names of all fish taxa collected in Steel Creek are presented in Appendix Table 1. The electrofishing stations in Steel Creek represented a wide range of habitats from relatively deep and swiftly flowing channels, to vegetation-choked marsh areas (Hooker 1990). Accordingly, the species composition and catch per unit effort (CPUE) differed among the habitat types.

Annual mean CPUE was highest at the marsh (Station 330), intermediate at the corridor (Station 290) and swamp (Station 350), and lowest at the channel (Station 370; Table 3-2). A similar pattern was observed in 1990 (Sayers et al. 1991). Spotted suckers, largemouth bass, and redbreast sunfish each formed more than 25% of the total catch in the corridor. The total catch in the marsh was

Table 3-1. Mean, standard deviation (S.E.), minimum (MIN) and maximum (MAX) temperature (°C), dissolved oxygen (mg/L), and pH at each station for each quarter during Steel Creek electrofishing, 1991.

	CORRIDOR				MARSH				SWAMP				CHANNEL			
	WI	SP	SU	FA	WI	SP	SU	FA	WI	SR	SU	FA	WI	SP	SU	FA
TEMP																
MEAN	7.33	22.00	25.87	14.57	7.07	19.27	24.07	14.10	7.23	19.10	24.17	14.03	8.00	18.60	23.10	13.87
S.E.	0.03	0.06	0.07	0.03	0.09	0.15	0.13	0.06	0.03	0.00	0.09	0.03	0.06	0.15	0.06	0.03
MIN	7.30	21.90	25.80	14.50	6.90	19.00	23.80	14.00	7.20	19.10	24.00	14.00	7.90	18.30	23.00	13.80
MAX	7.40	22.10	26.00	14.60	7.20	19.50	24.20	14.20	7.30	19.10	24.30	14.10	8.10	18.80	23.20	13.90
D.O.																
MEAN	10.93	7.00	5.84	8.86	9.87	5.26	3.39	7.68	9.44	5.36	3.33	7.32	7.87	4.99	3.59	7.49
S.E.	0.07	0.02	0.08	0.16	0.30	0.11	0.20	0.06	0.47	0.10	0.19	0.09	0.16	0.12	0.18	0.06
MIN	10.79	6.98	5.76	8.70	9.28	5.11	3.03	7.58	8.53	5.22	2.95	7.15	7.56	4.84	3.40	7.42
MAX	11.01	7.04	6.00	9.18	10.17	5.47	3.72	7.77	10.08	5.55	3.55	7.45	8.08	5.24	3.95	7.61
pH																
MEAN	5.72	6.43	6.07	5.43	5.40	6.28	5.85	5.13	5.24	6.49	5.52	5.19	5.30	6.27	5.46	5.27
S.E.	0.07	0.10	0.04	0.04	0.03	0.12	0.10	0.04	0.01	0.08	0.40	0.06	0.04	0.07	0.22	0.10
MIN	5.63	6.28	6.02	5.35	5.35	6.08	5.66	5.04	5.22	6.37	4.78	5.10	5.23	6.13	5.03	5.13
MAX	5.85	6.63	6.14	5.47	5.46	6.49	5.98	5.17	5.26	6.64	6.16	5.30	5.35	6.35	5.73	5.47

Table 3-2. Annual mean electrofishing catch per unit effort (CPUE), standard error (S.E.), and relative abundance (%) for each station at Steel Creek during 1991.

SPECIES	CORRIDOR			MARSH			SWAMP			CHANNEL		
	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%
longnose gar	0.00	0.00	0.00	0.33	0.26	3.57	0.08	0.08	2.50	0.00	0.00	0.00
bowfin	0.00	0.00	0.00	0.33	0.19	3.57	0.25	0.18	7.50	0.00	0.00	0.00
American eel	0.08	0.08	6.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
gizzard shad	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	7.50	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.25	0.13	2.68	0.08	0.08	2.50	0.00	0.00	0.00
golden shiner	0.00	0.00	0.00	0.33	0.19	3.57	0.00	0.00	0.00	0.17	0.11	22.22
dusky shiner	0.00	0.00	0.00	0.67	0.67	7.14	0.08	0.08	2.50	0.00	0.00	0.00
whitefin shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	11.11
coastal shiner	0.00	0.00	0.00	4.92	4.83	52.68	0.50	0.42	15.00	0.00	0.00	0.00
creek chubsucker	0.00	0.00	0.00	0.33	0.19	3.57	0.42	0.34	12.50	0.00	0.00	0.00
lake chubsucker	0.00	0.00	0.00	0.33	0.14	3.57	0.75	0.25	22.50	0.00	0.00	0.00
spotted sucker	0.33	0.26	26.67	0.17	0.11	1.79	0.25	0.18	7.50	0.17	0.11	22.22
white catfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	11.11
yellow bullhead	0.00	0.00	0.00	0.08	0.08	0.89	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	2.50	0.00	0.00	0.00
mosquitofish	0.00	0.00	0.00	0.08	0.08	0.89	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.33	0.19	3.57	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.33	0.14	26.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluegill	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	2.50	0.00	0.00	0.00
spotted sunfish	0.08	0.08	6.67	0.42	0.19	4.46	0.08	0.08	2.50	0.00	0.00	0.00
largemouth bass	0.42	0.15	33.33	0.58	0.29	6.25	0.17	0.17	5.00	0.25	0.13	33.33
yellow perch	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.18	7.50	0.00	0.00	0.00
striped mullet	0.00	0.00	0.00	0.17	0.11	1.79	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	1.25	0.41	100.0	9.33	6.00	100.0	3.33	0.82	100.0	0.75	0.22	100.0

more diverse, with only coastal shiners forming more than 10% of the catch. However, several species formed between 4% and 8% of the total. Coastal shiners, creek chubsuckers, and lake chubsuckers each composed at least 10% of the catch at the swamp station. Golden shiners, whitefin shiners, spotted suckers, white catfish, and largemouth bass each formed more than 10% of the total catch at the channel station.

Temporal changes in the fish assemblage of the corridor included differences in relative abundance and total CPUE. Quarterly CPUE was highest in the fall (2.33 fish/100 m), lowest in summer (0.33 fish/100 m), and intermediate during winter (1.33 fish/100 m) and spring (1.00 fish/100 m; Figure 3-1). Spotted suckers and largemouth bass were the only species collected in winter (Table 3-3). American eels, redbreast sunfish, and largemouth bass each accounted for one-third of the spring catch. Largemouth bass was the only species collected in summer samples. Fall catches were predominantly redbreast sunfish (43%), largemouth bass (29%), spotted sunfish (14%), and spotted sucker (14%).

The 1991 fish assemblage of the corridor was rather different from that of previous years. Total CPUE was the lowest since the study began in 1986. Largemouth bass and sunfishes formed a much larger portion of the catch in 1991 than in recent years (Figure 3-2). The proportion of minnows has shown considerable fluctuation since 1986 and was very low in 1991. The apparent flux in the fish assemblage of the corridor probably reflects dramatic changes in ecological conditions. Prior to impoundment of L Lake, the fish assemblage of the Steel Creek corridor was predominantly minnows (Aho et al. 1986). From 1986 through 1988, L-Reactor was discharging thermal effluent into L Lake and warmer

Figure 3-1. Quarterly electrofishing catch per unit effort for selected taxa at the corridor (Station 290) during 1990 and 1991.

Table 3-3. Mean electrofishing catch per unit effort (CPUE), standard error (S.E.), and relative abundance (%) for each station during each quarter at Steel Creek during 1991.

SPECIES	CORRIDOR			MARSH			SWAMP			CHANNEL		
	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%
<u>Winter</u>												
longnose gar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bowfin	0.00	0.00	0.00	1.00	0.58	3.61	0.33	0.33	5.56	0.00	0.00	0.00
American eel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
gizzard shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.67	0.33	2.41	0.00	0.00	0.00	0.00	0.00	0.00
golden shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
dusky shiner	0.00	0.00	0.00	2.67	2.67	9.64	0.33	0.33	5.56	0.00	0.00	0.00
whitefin shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
coastal shiner	0.00	0.00	0.00	19.33	19.33	69.88	1.67	1.67	27.78	0.00	0.00	0.00
creek chubsucker	0.00	0.00	0.00	1.33	0.33	4.82	1.33	1.33	22.22	0.00	0.00	0.00
lake chubsucker	0.00	0.00	0.00	0.67	0.33	2.41	1.00	0.58	16.67	0.00	0.00	0.00
spotted sucker	1.00	1.00	75.00	0.67	0.33	2.41	1.00	0.58	16.67	0.33	0.33	50.00
white catfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
yellow bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
mosquitofish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.67	0.67	2.41	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluegill	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	5.56	0.00	0.00	0.00
spotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.33	0.33	25.00	0.67	0.67	2.41	0.00	0.00	0.00	0.33	0.33	50.00
yellow perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
striped mullet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	1.33	1.33	100.0	27.67	23.67	100.0	6.00	1.73	100.0	0.67	0.67	100.0

Table 3-3 (continued). Mean electrofishing catch per unit effort (CPUE), standard error (S.E.), and relative abundance (%) for each station during each quarter at Steel Creek during 1991.

SPECIES	CORRIDOR			MARSH			SWAMP			CHANNEL		
	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%
<u>Spring</u>												
longnose gar	0.00	0.00	0.00	1.33	0.88	50.00	0.33	0.33	14.29	0.00	0.00	0.00
bowfin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American eel	0.33	0.33	33.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
gizzard shad	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	42.86	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
golden shiner	0.00	0.00	0.00	0.33	0.33	12.50	0.00	0.00	0.00	0.33	0.33	100.0
dusky shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
whitefin shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
coastal shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	14.29	0.00	0.00	0.00
creek chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
lake chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.33	28.57	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
white catfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
yellow bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
mosquitofish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.33	0.33	33.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluegill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
spotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.33	0.33	33.33	0.33	0.33	12.50	0.00	0.00	0.00	0.00	0.00	0.00
yellow perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
striped mullet	0.00	0.00	0.00	0.67	0.33	25.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	1.00	0.58	100.0	2.67	0.33	100.0	2.33	1.45	100.0	0.33	0.33	100.0

Table 3-3 (continued). Mean electrofishing catch per unit effort (CPUE), standard error (S.E.), and relative abundance (%) for each station during each quarter at Steel Creek during 1991.

SPECIES	CORRIDOR			MARSH			SWAMP			CHANNEL		
	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%
<u>Summer</u>												
longnose gar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bowfin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American eel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
gizzard shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.33	0.33	25.00	0.33	0.33	100.0	0.00	0.00	0.00
golden shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
dusky shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	50.00
whitefin shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
coastal shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
creek chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
lake chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
white catfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
yellow bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
mosquitofish	0.00	0.00	0.00	0.33	0.33	25.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.33	0.33	25.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluegill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
spotted sunfish	0.00	0.00	0.00	0.33	0.33	25.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.33	0.33	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
yellow perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
striped mullet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.33	0.33	100.0	1.33	0.67	100.0	0.33	0.33	100.0	0.67	0.33	100.0

Table 3-3 (continued). Mean electrofishing catch per unit effort (CPUE), standard error (S.E.), and relative abundance (%) for each station during each quarter at Steel Creek during 1991.

SPECIES	CORRIDOR			MARSH			SWAMP			CHANNEL		
	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%	CPUE	S.E.	%
<u>Fall</u>												
longnose gar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bowfin	0.00	0.00	0.00	0.33	0.33	5.88	0.67	0.67	14.29	0.00	0.00	0.00
American eel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
gizzard shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
golden shiner	0.00	0.00	0.00	1.00	0.58	17.65	0.00	0.00	0.00	0.00	0.00	0.00
dusky shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
whitefin shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
coastal shiner	0.00	0.00	0.00	0.33	0.33	5.88	0.00	0.00	0.00	0.00	0.00	0.00
creek chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	7.14	0.00	0.00	0.00
lake chubsucker	0.00	0.00	0.00	0.67	0.33	11.76	1.33	0.67	28.57	0.00	0.00	0.00
spotted sucker	0.33	0.33	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	25.00
white catfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
yellow bullhead	0.00	0.00	0.00	0.33	0.33	5.88	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	7.14	0.00	0.00	0.00
mosquitofish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.33	0.33	5.88	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	1.00	0.00	42.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluegill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
spotted sunfish	0.33	0.33	14.29	1.33	0.33	23.53	0.33	0.33	7.14	0.00	0.00	0.00
largemouth bass	0.67	0.33	28.57	1.33	0.88	23.53	0.67	0.67	14.29	0.67	0.33	50.00
yellow perch	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.58	21.43	0.00	0.00	0.00
striped mullet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	2.33	0.67	100.0	5.67	1.45	100.0	4.67	0.33	100.0	1.33	0.33	100.0

Figure 3-2. Percent composition of the catch for selected taxa at the corridor (Station 290) from 1986 through 1991.

water was being discharged into Steel Creek. During this time period the fish assemblage alternated between domination by minnows or sunfishes. In late 1988, water levels began to drop throughout the Steel Creek system (Heuer and Kissick 1989) and remained low through 1989 (Sayers et al. 1990). L-Reactor did not discharge heated effluents during 1989, 1990, or 1991 so the water temperatures in the corridor were not as warm as during 1986, 1987, and 1988. Thus, the fish assemblage of the corridor has been exposed to a wide range of environmental factors that have undoubtedly influenced its composition and probably explain the fluctuations in species composition. Taxa richness declined from 13 species in 1989 (Sayers et al. 1990) to 11 in 1990 (Sayers et al. 1991) and 5 in 1991 (Table 3-4). These changes could reflect natural variation or could be due to failure to capture rare species under the reduced sampling effort employed in 1990 and 1991.

Quarterly CPUE varied widely at the marsh station during 1991, ranging from 1.33 in summer to 27.67 in winter (Table 3-3; Figure 3-3). Minnows, primarily coastal shiners, formed 70% of the winter catch, with the remaining portion divided among bowfin, chain pickerel, suckers, brook silversides, and largemouth bass. Spring and summer catches were sharply lower and were composed mostly of miscellaneous taxa such as longnose gar, chain pickerel, striped mullet, mosquitofish, and brook silverside. Fall CPUE was slightly higher and was divided among numerous species including bowfin, golden shiner, coastal shiner, lake chubsucker, yellow bullhead, brook silverside, spotted sunfish, and largemouth bass.

The composition of the fish assemblage of the marsh was rather diverse during the early years of the study, with minnows, suckers, and sunfishes all

Table 3-4. List of adult/juvenile fishes collected from four stations in Steel Creek during 1991. (+ denotes species was present).

SPECIES	CORRIDOR	MARSH	SWAMP	CHANNEL
longnose gar		+	+	
bowfin		+	+	
American eel	+			
gizzard shad			+	
chain pickerel		+	+	
golden shiner		+		+
dusky shiner		+	+	
whitefin shiner				+
coastal shiner		+	+	
creek chubsucker		+	+	
lake chubsucker		+	+	
spotted sucker	+	+	+	+
white catfish				+
yellow bullhead		+		
pirate perch			+	
mosquitofish		+		
brook silverside		+		
redbreast sunfish	+			
bluegill			+	
spotted sunfish	+	+	+	
largemouth bass	+	+	+	+
yellow perch			+	
striped mullet		+		
TOTAL SPECIES PRESENT	5	15	14	5
TOTAL SPECIES PRESENT FOR ALL STATIONS: 23

Figure 3-3. Quarterly electrofishing catch per unit effort for selected taxa at the marsh (Station 330) during 1990 and 1991.

being well represented (Figure 3-4). However, from 1988 through 1990, minnows formed a rather small proportion of the total catch while the proportion of suckers, catfishes, and sunfishes expanded. These changes were coincidental with an extended period of low water levels in Steel Creek. The fish assemblage observed in 1991 reverted to one that was largely minnows, despite continued low water levels for much of the year. Taxa richness at the marsh declined from 23 species in 1989 (Sayers et al. 1990) to 14 species in 1990 (Sayers et al. 1991) and 15 species in 1991 (Table 3-4).

Total CPUE at the swamp also varied widely, ranging from 0.33 fish/100 m during summer to 6 fish/100 m during winter (Figure 3-5; Table 3-3). The winter catch was composed largely of coastal shiners, creek chubsuckers, lake chubsuckers, and spotted suckers and also included bowfin, dusky shiner, and bluegill. The spring catch was dominated by gizzard shad but also included lake chubsuckers, longnose gar, and coastal shiners. Chain pickerel was the only species collected in the swamp during summer. The fall catch was quite diverse, including bowfin, creek chubsucker, lake chubsucker, pirate perch, spotted sunfish, largemouth bass, and yellow perch.

The composition of the fish assemblage of the swamp has remained relatively stable since 1988, showing minor shifts in species composition (Figure 3-6). The decline in percent composition for minnows from 1987 to 1988 was probably related to low water levels. Taxa richness declined from 25 species in 1989 (Sayers et al. 1990) to 13 species in 1990 (Sayers et al. 1991) and 14 species in 1991 (Table 3-4). This decline in taxa richness is undoubtedly related to the reduced scope of sampling that was begun in 1990.

Figure 3-4. Percent composition of the catch for selected taxa at the marsh (Station 330) from 1986 through 1991.

Figure 3-5. Quarterly electrofishing catch per unit effort for selected taxa at the swamp (Station 350) during 1990 and 1991.

Figure 3-6. Percent composition of the catch for selected taxa at the swamp (Station 350) from 1986 through 1991.

Total CPUE in the channel showed moderate variation over the quarterly sampling periods, ranging from 0.33 fish/100 m in spring to 1.33 fish/100 m in fall (Figure 3-7). The winter catch was evenly distributed between spotted sucker and largemouth bass (Table 3-3). Spring and summer catches were composed entirely of minnows; golden shiners in spring and golden shiners or whitefin shiners in summer. Largemouth bass formed 50% of the fall catch with spotted suckers and white catfish completing the remainder.

Annual mean CPUE in the channel has declined each year since 1987, reaching an all-time low of 0.75 fish/100 m in 1991 (Figure 3-8). The composition of the fish assemblage of the channel changed rather sharply from 1990 to 1991, with minnows, suckers, and largemouth bass accounting for most of the 1991 catch. Abrupt year-to-year changes in species composition have been previously observed (e.g., 1988 to 1989) and were probably due to the dramatic effects of fluctuations in the Savannah River. Taxa richness in the channel declined from 19 species in 1989 (Sayers et al. 1990) to 9 species in 1990 (Sayers et al. 1991) and 5 species in 1991 (Table 3-4).

3.3 ICHTHYOPLANKTON

In previous studies of the fish assemblage of Steel Creek (Paller et al. 1988; Heuer and Kissick 1989), larval darters of the genus Percina were collectively termed black-sided darters. It is presumed that all larval Percina were black-banded darters inasmuch as black-banded darters were the only species of Percina captured as adults in Steel Creek. The taxon, darter, refers to unspecialized specimens of the genus Etheostoma; the taxon, darters-general, refers to eggs of the genera Etheostoma or Percina. All scientific and common names of taxa collected in Steel Creek are listed in Appendix Table 1. Bottom ichthyo-

Figure 3-7. Quarterly electrofishing catch per unit effort for selected taxa at the channel (Station 370) during 1990 and 1991.

Figure 3-8. Percent composition of the catch for selected taxa at the channel (Station 370) from 1986 through 1991.

plankton samples could not be collected at most stations due to low water levels or low current velocities during much of the year (see Appendix Table 2 for a list of missed samples).

At least 23 unique taxa of fish larvae were collected in the diurnal and diel sampling program during 1991 (Table 3-5; see Appendix Tables 3 and 4 for a complete listing of ichthyoplankton catches during 1991). Taxa richness in the corridor increased from 14 in 1989 and 1990 (Sayers et al. 1990, 1991) to 17 in 1991, but remains well below the 21 taxa reported in 1988 by Heuer and Kissick (1989). The 12 to 14 taxa observed in the marsh and swamp are much lower than values from earlier years. Taxa richness in the channel increased slightly from 15 in 1990 (Sayers et al. 1991) to 16 in 1991 (Table 3-5) and appears to have stabilized after declining from 22 taxa in 1988 (Heuer and Kissick 1989) to 16 taxa in 1989 (Sayers et al. 1990). Total ichthyoplankton richness has declined from 29 taxa in 1989 (Sayers et al. 1990) to 24 taxa in 1990 (Sayers et al. 1991) and 23 taxa in the present study. Low water levels, the accompanying loss of habitat, a greatly reduced scope of sampling in 1990 and 1991, and lower productivity in L Lake are probably responsible for the reduction in taxa richness between 1988 and 1991.

From late-February through late-March, perches (mostly blackbanded darters of darter eggs) were the most common ichthyoplankton when averaged over all stations for diurnal samples (Figure 3-9; Table 3-6). Total larval densities increased steadily from late-February through mid-May, and peak densities were observed in early-June when sunfishes (largely warmouth, unidentified sunfish, and largemouth bass) and minnows (largely ironcolor shiner) were the most abundant taxa. Total ichthyoplankton densities diminished greatly after the

Table 3-5. List of ichthyoplankton taxa collected at four stations in Steel Creek during 1991. (+ denotes taxon was present).

TAXON	CORRIDOR	MARSH	SWAMP	CHANNEL
herrings	+			+
American shad				+
threadfin shad		+	+	+
chain pickerel			+	
unknown minnow	+	+	+	+
ironcolor shiner	+	+	+	+
unknown sucker				+
chubsucker	+	+	+	+
spotted sucker	+			
unknown bullhead	+			
swampfish			+	
pirate perch	+	+	+	+
unknown topminnow				+
brook silverside	+	+	+	+
unknown sunfish	+	+	+	+
pygmy sunfish	+	+	+	+
bluespotted sunfish	+			+
redbreast sunfish	+			
warmouth	+	+	+	+
largemouth bass	+	+	+	+
black crappie	+	+		+
unknown darter	+	+	+	+
blackbanded darter	+		+	
TOTAL TAXA PRESENT	17	12	14	16
TOTAL TAXA PRESENT FOR ALL STATIONS: 23

Figure 3-9. Mean larval density of selected taxa (averaged over all stations) collected from Steel Creek during 1990 and 1991.

Table 3-6. Mean density averaged over all stations and reps for each species for each diurnal period for Steel Creek ichthyoplankton during 1991.

SPECIES	03JAN91			18JAN91			31JAN91			14FEB91		
	DENSITY	S.E.	Z	DENSITY	S.E.	Z	DENSITY	S.E.	Z	DENSITY	S.E.	Z
herrings	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
American shad	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
shad	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
threadfin shad	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
chain pickerel	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
minnow	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
ironcolor shiner	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
chubsucker	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
pirate perch	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
brook silverside	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
sunfishes	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
pygmy sunfish	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
bluespotted sunfish	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
sunfish	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
warmouth	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
largemouth bass	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
black crappie	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
darter	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
blackbanded darter	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
darters-general	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
unknown	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
TOTAL	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.

Table 3-6 (continued). Mean density averaged over all stations and reps for each species for each diurnal period for Steel Creek ichthyoplankton during 1991.

SPECIES	28FEB91			14MAR91			28MAR91			11APR91		
	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
threadfin shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.06	11.28	38.73
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.48	2.48	5.98
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	2.44	2.44	24.54	0.00	0.00	0.00	5.07	5.07	26.36	2.18	2.18	5.25
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	4.78	4.78	28.11	0.00	0.00	0.00	2.25	2.25	5.43
darter	2.33	2.33	23.42	7.45	4.80	43.78	11.35	7.84	59.00	1.55	1.55	3.73
blackbanded darter	2.49	2.49	25.02	4.78	4.78	28.10	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	2.69	2.69	27.02	0.00	0.00	0.00	2.82	2.82	14.64	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.95	11.16	40.89
TOTAL	9.95	3.91	100.0	17.02	6.08	100.0	19.24	5.08	100.0	41.45	19.38	100.0

Table 3-6 (continued). Mean density averaged over all stations and reps for each species for each diurnal period for Steel Creek ichthyoplankton during 1991.

SPECIES	25APR91			09MAY91			23MAY91			06JUN91		
	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%
herrings	0.00	0.00	0.00	1.37	1.37	1.79	28.82	28.82	39.09	0.00	0.00	0.00
American shad	2.14	2.14	4.37	1.22	1.22	1.59	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	9.48	7.99	12.40	0.00	0.00	0.00	0.00	0.00	0.00
threadfin shad	0.00	0.00	0.00	6.51	2.68	8.51	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	2.87	2.87	5.86	5.32	5.32	6.96	0.00	0.00	0.00	4.17	4.17	2.88
ironcolor shiner	9.77	8.41	19.96	1.06	1.06	1.39	2.45	2.45	3.32	55.08	44.98	38.09
chubsucker	6.22	3.65	12.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	5.64	5.64	11.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	2.71	2.71	5.54	2.70	2.70	3.53	0.00	0.00	0.00	8.01	8.01	5.54
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	4.28	4.28	8.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	2.74	2.74	3.59	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.03	13.91	15.93
warmouth	0.00	0.00	0.00	26.28	10.55	34.38	29.17	29.17	39.56	35.15	35.15	24.31
largemouth bass	0.00	0.00	0.00	2.65	2.65	3.46	0.00	0.00	0.00	19.18	14.28	13.26
black crappie	3.49	3.49	7.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	6.77	5.13	13.83	4.83	2.83	6.31	2.45	2.45	3.32	0.00	0.00	0.00
blackbanded darter	2.35	2.35	4.79	12.30	12.30	16.08	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	2.71	2.71	5.54	0.00	0.00	0.00	10.84	10.84	14.70	0.00	0.00	0.00
TOTAL	48.95	14.59	100.0	76.45	7.94	100.0	73.74	16.09	100.0	144.61	79.93	100.0

Table 3-6 (continued). Mean density averaged over all stations and reps for each species for each diurnal period for Steel Creek ichthyoplankton during 1991.

SPECIES	20JUN91			03JUL91			18JUL91			08AUG91		
	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	2.21	2.21	100.0	0.00	0.00	0.00
threadfin shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	7.19	3.60	70.56	0.00	0.00	0.00	4.95	4.95	100.0
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	3.00	3.00	29.44	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	2.87	2.87	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	2.87	2.87	100.0	10.18	5.59	100.0	2.21	2.21	100.0	4.95	4.95	100.0

Table 3-6 (continued). Mean density averaged over all stations and reps for each species for each diurnal period for Steel Creek ichthyoplankton during 1991.

SPECIES	20SEP91			15OCT91			21NOV91			17DEC91		
	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%	DENSITY	S.E.	%
herrings	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
American shad	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
shad	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
threadfin shad	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
chain pickerel	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	2.86	2.86	100.0
minnow	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
chubsucker	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
pirate perch	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
brook silverside	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
sunfishes	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
sunfish	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
warmouth	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
largemouth bass	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
black crappie	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
darter	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
blackbanded darter	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
darters-general	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
unknown	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	0.00	0.00	0.00
TOTAL	0.00	0.00	.	0.00	0.00	.	0.00	0.00	.	2.86	2.86	100.0

early-June peak and remained low for the rest of the year. The timing of peak larval densities for many taxa occurred later in 1991 than in 1990 and several taxa that were relatively abundant in 1991 (i.e., warmouth or chubsucker) were rare in 1990 collections (see Table 3-6 in Sayers et al. 1991). The cause of these differences remains unknown but they probably reflect natural year-to-year variation in both the timing of occurrence and the relative abundance of ichthyoplankton throughout the Steel Creek system.

3.3.1 Corridor

Mean annual ichthyoplankton density in the corridor (Station 290) during 1991 was 10.78 larvae/1000 m³, with blackbanded darters, darters (Etheostoma sp.), and herrings (Clupeidae) accounting for more than 80% of the larvae that were collected (Table 3-7). Shad (Dorosoma sp.), pygmy sunfishes (Elassoma sp.), largemouth bass, and black crappie formed the remainder of the catch. Perches, primarily darters, dominated most of the 1991 diurnal ichthyoplankton catches from the corridor, although sunfishes (black crappie or pygmy sunfishes) and other fishes (herrings) were occasionally abundant also (Figure 3-10; Appendix Table 5). Darters have been the most common larval taxa at Station 290 for several years (Heuer and Kissick 1989; Sayers et al. 1990, 1991), probably because the sand and gravel substrates provide highly favorable spawning habitat for blackbanded darters (Mathur 1973; Lee et al. 1980; Page 1984).

The diel results indicated that peak densities of ichthyoplankton in the corridor occurred between 2000 and 0159 h daily during most months and that the greatest densities during 1991 occurred in April (Figure 3-11). Results of the diel sampling in the corridor conflicted somewhat with the diurnal results. As an example, the April diel samples were composed largely of minnows and suckers

Table 3-7. Annual mean density, standard error (S.E.), range, and relative abundance (%) at each station for each species collected in diurnal ichthyoplankton samples from Steel Creek during 1991.

SPECIES	Corridor					Marsh				
	DENSITY	S.E.	MIN	MAX	%	DENSITY	S.E.	MIN	MAX	%
herrings	2.88	2.88	0.00	57.65	26.73	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.44	0.44	0.00	8.84	4.10	1.95	1.95	0.00	33.23	5.78
threadfin shad	0.00	0.00	0.00	0.00	0.00	0.66	0.66	0.00	11.26	1.96
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	0.74	0.74	0.00	12.50	2.17
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	8.48	8.48	0.00	144.20	25.08
chubsucker	0.00	0.00	0.00	0.00	0.00	3.54	2.93	0.00	49.36	10.47
pirate perch	0.00	0.00	0.00	0.00	0.00	1.33	1.33	0.00	22.55	3.92
brook silverside	0.00	0.00	0.00	0.00	0.00	2.05	1.51	0.00	24.03	6.07
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.44	0.44	0.00	8.70	4.04	0.57	0.57	0.00	9.76	1.70
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	2.83	2.83	0.00	48.07	8.36
warmouth	0.00	0.00	0.00	0.00	0.00	1.30	1.30	0.00	22.15	3.85
largemouth bass	0.53	0.53	0.00	10.58	4.91	2.77	2.77	0.00	47.10	8.19
black crappie	0.45	0.45	0.00	9.00	4.17	1.13	1.13	0.00	19.14	3.33
darter	1.66	1.66	0.00	33.23	15.41	2.39	1.43	0.00	21.69	7.08
blackbanded darter	4.38	2.61	0.00	49.18	40.65	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.66	0.66	0.00	11.27	1.96
unknown	0.00	0.00	0.00	0.00	0.00	3.41	2.80	0.00	47.07	10.07
TOTAL	10.78	4.17	0.00	59.77	100.0	33.82	16.89	0.00	275.91	100.0

Table 3-7 (continued). Annual mean density, standard error (S.E.), range, and relative abundance (%) at each station for each species collected in diurnal ichthyoplankton samples from Steel Creek during 1991.

SPECIES	Swamp					Channel				
	DENSITY	S.E.	MIN	MAX	%	DENSITY	S.E.	MIN	MAX	%
herrings	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.00	5.48	1.12
American shad	0.00	0.00	0.00	0.00	0.00	0.67	0.48	0.00	8.56	2.74
shad	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	4.68	0.96
threadfin shad	0.62	0.62	0.00	10.50	4.64	0.21	0.21	0.00	4.26	0.87
chain pickerel	0.67	0.67	0.00	11.45	5.06	0.00	0.00	0.00	0.00	0.00
minnow	1.93	1.39	0.00	21.30	14.49	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	2.65	2.10	0.00	34.81	19.93	2.78	1.23	0.00	21.02	11.38
chubsucker	0.58	0.58	0.00	9.91	4.38	0.95	0.73	0.00	14.05	3.89
pirate perch	0.58	0.58	0.00	9.91	4.38	0.00	0.00	0.00	0.00	0.00
brook silverside	0.63	0.63	0.00	10.79	4.77	0.00	0.00	0.00	0.00	0.00
sunfishes	0.53	0.53	0.00	8.99	3.97	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	1.87	1.29	0.00	20.28	7.65
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.55	0.55	0.00	10.96	2.24
sunfish	0.00	0.00	0.00	0.00	0.00	1.62	1.17	0.00	21.02	6.65
warmouth	1.90	1.90	0.00	32.38	14.31	10.72	6.24	0.00	105.45	43.85
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.52	0.52	0.00	10.43	2.13
black crappie	0.00	0.00	0.00	0.00	0.00	0.70	0.70	0.00	13.95	2.85
darter	1.35	0.93	0.00	12.18	10.15	2.26	1.11	0.00	20.11	9.22
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.63	0.63	0.00	10.75	4.75	0.00	0.00	0.00	0.00	0.00
unknown	1.22	1.22	0.00	20.73	9.16	1.08	1.08	0.00	21.68	4.43
TOTAL	13.31	5.72	0.00	85.77	100.0	24.45	9.62	0.00	157.92	100.0

Other fishes
 Sunfishes
 Suckers
 Minnows
 Perches

Figure 3-10. Mean larval density of selected taxa at the corridor (Station 290) collected in diurnal samples during 1990 and 1991.

Figure 3-11. Mean larval density of selected taxa at the corridor (Station 290) collected in monthly diel samples during 1990 and 1991. Period 1 = 0800-1359 h; Period 2 = 1400-1959 h; Period 3 = 2000-0159 h; Period 4 = 0200-0759 h.

(Figure 3-11) but the diurnal samples were mostly perches or sunfishes (pygmy sunfishes or black crappie; see Appendix Table 5 for a listing of diurnal samples arranged by date and station and Appendix Table 6 for a listing of diel samples arranged by date and station). These results indicate behavioral differences among the various species of larvae such that examination of both methods is required to assess the status of the larval fish assemblage of Steel Creek.

In the past, larvae of bluegill and threadfin shad entered the corridor from L Lake and were a major component of the diurnal ichthyoplankton (Heuer and Kissick 1989; Sayers et al. 1990). This phenomenon was most pronounced at the stations near the dam (275 and 280). Only the most downstream station in the corridor (Station 290) was sampled during 1990 and 1991 and as a result, the influence of larvae discharged from L Lake was minimal. However, the moderately high density of shad larvae observed on 23 May 1991 (Figure 3-10) could be the result of larval threadfin shad flushing out of L Lake. In addition, several species of fish that are common in L Lake were collected as larvae only from the corridor (e.g., redbreast sunfish, herrings, and bullheads; Table 3-5); suggesting that L Lake still influences the larval fish assemblage of the corridor.

The periods of occurrence for larval darters were similar in 1990 and 1991, but densities tended to be higher in 1990 in diurnal samples (Figure 3-10). The species composition of diurnal samples from 1990 and 1991 were generally similar, with darters composing the majority of the catch during both years. Ichthyoplankton densities in diel samples were generally higher in 1991 than in 1990 and showed a narrower period of occurrence (March through June in 1991 versus February through July in 1990; Figure 3-11). The species composition of the 1990

and 1991 diel samples was rather dissimilar. Perches, sunfishes, and minnows were most common in 1990 but minnows, suckers, and sunfishes were most common in 1991 (Figure 3-11).

3.3.2 Marsh

Annual mean diurnal ichthyoplankton density in the marsh (Station 330) was 33.82 larvae/1000 m³ in 1991 (Table 3-7), very similar to the 1990 annual mean of 30.91 larvae/1000 m³ (Sayers et al. 1991). Numerous taxa, including shad, ironcolor shiner, chubsucker (Erimyzon sp.), brook silverside, sunfish (Lepomis sp.), largemouth bass, darter, and unknown larvae each composed at least 5% of the total catch. The period of occurrence for larvae in 1991 extended from late-February (when darters and black crappies predominated) through early-June (when ironcolor shiners, largemouth bass, and sunfish larvae were most abundant; Figure 3-12 and Appendix Table 5). Chubsucker larvae were relatively common in mid-April samples and the remaining larvae were unidentifiable. Pirate perch, brook silverside, and shad larvae composed much of the late-April and early-May catches and warmouth larvae were also common in early-May. The late-May and August samples could not be collected because heavy vegetation prevented towing the sampling nets and low current velocities precluded collection of stationary (set) samples.

Diel ichthyoplankton densities in the marsh were greatest between 2000 and 0759 h (Figure 3-13). As at the corridor, species composition of the diel samples often differed from that of the diurnal samples. This was particularly true in April when suckers, perches, and other fishes predominated in diurnal samples (Figure 3-12) but minnows, suckers, sunfishes, and other fishes were most common in diel catches (Figure 3-13). Darters, black crappies, and pygmy sun-

Figure 3-12. Mean larval density of selected taxa at the marsh (Station 330) collected in diurnal samples during 1990 and 1991.

Figure 3-13. Mean larval density of selected taxa at the marsh (Station 330) collected in monthly diel samples during 1990 and 1991. Period 1 = 0800-1359 h; Period 2 = 1400-1959 h; Period 3 = 2000-0159 h; Period 4 = 0200-0759 h.

fishes formed most of the March diel catch (Appendix Table 6). Unidentified minnows, ironcolor shiners, chubsuckers, and pygmy sunfishes formed the majority of the April diel samples. Ironcolor shiners, unidentified minnows, and sunfishes composed most of the June catches.

Densities of larval sunfishes and perches in diurnal samples were sharply lower in early 1991 compared with 1990 in the marsh (Figure 3-12) and these taxa were primarily composed of blackbanded darters, unidentified darters, and black crappies (Appendix Table 5). Other fishes (primarily shad, pirate perch, and brook silverside) were generally more abundant in 1991 samples while topminnows, which were abundant in May 1990 (Sayers et al. 1991), were missing in 1991. The 1990 and 1991 diel results were also rather disparate, particularly in April (Figure 3-13). Minnows, suckers, sunfishes, and other fishes (mostly pirate perch) were most common in 1991, but 1990 catches were largely sunfishes and other fishes (primarily pirate perch; Sayers et al. 1991).

3.3.3 Swamp

Annual mean density of ichthyoplankton in diurnal samples from the swamp (Station 350) was 13.3 larvae/1000 m³ with threadfin shad, chain pickerel, unidentified minnows, ironcolor shiners, brook silversides, warmouths, darters, and unidentified larvae each comprising at least 5% of the total catch (Table 3-7). The annual mean density for 1991 was substantially lower than the 1990 value of 34.5 larvae/1000 m³ (Sayers et al. 1991) but was similar to values observed in 1988 (19.9 larvae/1000 m³; Heuer and Kissick 1989) and 1989 (13.2 larvae/1000 m³; Sayers et al. 1990). All taxa showed relatively brief periods of occurrence in the swamp (see Appendix Table 5 and Figure 3-14). The missed samples were due

Figure 3-14. Mean larval density of selected taxa at the swamp (Station 350) collected in diurnal samples during 1990 and 1991.

to large amounts of vegetation which prevented towing the nets and low current velocities which precluded collecting set samples.

As at the other stations, diel ichthyoplankton samples in the swamp were typically greatest and most diverse during periods 3 (2000-0159 h) or 4 (0200-0759 h; Figure 3-15). Densities observed in samples collected during periods 3 or 4 were much greater than in diurnal samples, which are typically collected in period 1 (0800-1359 h; Figures 3-14 and 3-15). Pirate perch, pygmy sunfishes, and darters formed most of the diel catch in March (Appendix Table 6). April catches consisted primarily of chubsuckers, pirate perch, ironcolor shiners, and pygmy sunfishes. Warmouths, ironcolor shiners, unidentified sunfishes, or unidentified minnows composed most of the June catches.

The periods of occurrence for larvae were generally later in 1991 than in 1990 and species composition was rather different also. (Figures 3-14 and 3-15). Sunfishes and other fishes composed most of the 1990 diurnal catches but minnows were more common in 1991. Minnows also composed more of the 1991 diel catches, although the absence of May data obscures the extent of these differences. Peak densities for ichthyoplankton were substantially higher in 1990 in both the diurnal and diel sampling programs; a pattern that is consistent with the corrdior and marsh stations.

3.3.4 Channel

Annual mean ichthyoplankton density in diurnal samples from the channel (Station 370) was 24.45 larvae/1000 m³ in 1991 (Table 3-7). Only ironcolor shiner, pygmy sunfishes, unidentified sunfishes, warmouth, and unidentified darters formed more than 5% of the total and warmouth was clearly the most

Figure 3-15. Mean larval density of selected taxa at the swamp (Station 350) collected in monthly diel samples during 1990 and 1991. Period 1 = 0800-1359 h; Period 2 = 1400-1959 h; Period 3 = 2000-0159 h; Period 4 = 0200-0759 h.

abundant taxa, forming 44% of the total catch. Darters and pygmy sunfishes composed the early catches (Figure 3-16; Appendix Table 5). Black crappies, pygmy sunfishes, American shad, and chubsuckers were all relatively common in late-April samples. Warmouth or bluespotted sunfishes predominated in May and June samples, and the July and August samples were composed entirely of ironcolor shiners. Total mean density in diurnal ichthyoplankton samples from 1991 was very similar to 1990 (23.5 larvae/1000 m³; Sayers et al. 1991) but substantially lower than the 44.1 larvae/1000 m³ observed in 1989 (Sayers et al. 1990) or the 48.8 larvae/1000 m³ observed in 1988 (Heuer and Kissick 1989).

Three species, American shad, pirate perch, and brook silverside, were collected in diel samples from the channel but not from diurnal samples (Appendix Tables 5 and 6). Also, as at the other stations, ichthyoplankton densities in diel samples were substantially higher than in diurnal samples (Figures 3-16 and 3-17). March diel catches were relatively low and were composed primarily of American shad, pirate perch, pygmy sunfishes, or darters (Appendix Table 6). April diel catches were quite diverse but were dominated by ironcolor shiner and warmouth larvae (Figure 3-17; Appendix Table 6). May diel catches were less diverse than April but were again composed primarily of ironcolor shiners and warmouths.

The period of occurrence for larvae was earlier in 1990 for diurnal samples, and peak densities also occurred earlier in the diel samples from 1990 (Figures 3-16 and 3-17). Peak ichthyoplankton densities were substantially greater in diel samples than in diurnal samples, but for each sample method the total densities were similar in 1990 and 1991.

Figure 3-16. Mean larval density of selected taxa at the channel (Station 370) collected in diurnal samples during 1990 and 1991.

Figure 3-17. Mean larval density of selected taxa at the channel (Station 370) collected in monthly diel samples during 1990 and 1991. Period 1 = 0800-1359 h; Period 2 = 1400-1959 h; Period 3 = 2000-0159 h; Period 4 = 0200-0759 h.

3.4 CHARACTERIZATION OF FISH ASSEMBLAGES IN STEEL CREEK

Paller et al. (1988) characterized the Steel Creek fish assemblage as representing three broad habitat types, corridor, marsh/swamp, and channel, based on differences in taxonomic occurrence and abundance. These differences were attributed to general environmental gradients of current speed, depth, macrophyte development, and proximity to the outflow of L Lake.

Paller et al. (1988) described the corridor habitat as a distinctly lotic environment with relatively high current speeds and well-defined channels. They concluded that the fish assemblage of the corridor was influenced by emigration of bluegill and redbreast sunfish from L Lake and by loss of habitat for species associated with small, slow-flowing streams. Monitoring activities during 1990 and 1991 did not confirm the description of the corridor fish assemblage as previously reported (Paller et al. 1988; Heuer and Kissick 1989). The relative importance of fish being washed out of L Lake into the corridor appears to have declined during the suspension of operation for L-Reactor (L-Reactor has not been operational since the middle of 1988). Species richness in the corridor decreased from 30 species in 1989 to 15 species in 1990 and 13 species in 1991 based on all methods of collection (Table 3-8). This decline in species richness is probably due in part to the reduced scope of sampling employed in 1990 and 1991. Only the lower corridor was sampled and several species that were present in the upper corridor in 1989 (i.e., bluegill, threadfin shad, and yellow perch) were probably missed by sampling the lower station only. Nevertheless, the decline in species richness probably also reflects the fact that the corridor is no longer affected by discharges of large volumes of heated water from L Lake. The lower water levels that resulted from suspension of reactor operation have

Table 3-8. Occurrence of fishes in three habitats within Steel Creek (corridor, marsh/swamp, and channel) and Meyer's Branch during 1986 - 1991. (Lower case letters indicate those years the taxon was collected in each habitat; a = 1986, b = 1987, c = 1988, d = 1989, e = 1990, f = 1991).

	Steel Creek			Meyer's Branch*
	Corridor	Swamp	Channel	
bowfin	a,b,c,e	a,b,c,d,e,f	a,b,c,d,e	a
longnose gar	a,b,c,d,e	a,b,c,d,e,f	a,b,c,d,e	
Florida gar	a,d	a,b,c,d	b,c,d	
American eel	a,b,c,d,f	a,b,c,d	a,b,c	a,b,c,d
blueback herring		a,c,d	a,b,c,d	
hickory shad		e		
American shad		a,c	a,b,c,d,e,f	
gizzard shad	b,d	a,b,d,f	a,b,d	
eastern mudminnow	a	b,c	b	
redfin pickerel	a	a,b,c,d,e	a,b	a,c,d
chain pickerel	a,b,c,d,e	a,b,c,d,e,f	a,b,c,d	
common carp			d	
bluehead chub	a,b,			b
golden shiner	b,d	a,b,c,d,e,f	f	
ironcolor shiner	a,b,d,e,f	a,b,c,d,e,f	a,b,d,e,f	
dusky shiner	a,b,c	a, f	a,c	a,c
spottail shiner	b		b	
yellowfin shiner	a,b,c	c		a,c
whitefin shiner			c,f	
coastal shiner	a,b,c,e	a,b,c,e,f	b,c	a,b,c
creek chubsucker	a,b,c,d	a,b,c,d,e,f	a,b,c	a,b,c,d
lake chubsucker	a,b	a,b,c,d,e,f	d	d
carpsucker	a			
northern hogsucker	a,b,c,d	a	a,b,c	a,b,c,d
spotted sucker	a,b,c,d,e,f	a,b,c,d,e,f	a,b,c,d,e,f	c
silver redhorse	d	a,b,d	a	
snail bullhead		b	a,c,d,e	
white catfish		a,c	a,b,c,d,f	
yellow bullhead	a,b,c,d	a,b,c,d,e,f	a,c	a,b,c,d
brown bullhead	a	a,c	a	
flat bullhead	a,b,c,d,e	a,b,c,d	a,b,c,d	b,c,d
channel catfish		a,c	a,b,c,d	
tadpole madtom	c,d	a,b,c	c	c
marginated madtom		a		
speckled madtom	a,b,c,d,e	c,d	a,b,c	a,c,d
swampfish	b	a,b,c,d,e,f		
pirate perch	a,b,c,d,e,f	a,b,c,d,e,f	a,b,e,f	a,b,c,d
Atlantic needlefish		c	a,c	
golden topminnow		c		
lined topminnow		a,d	a	
mosquitofish	a,c	a,b,d,f	a,b	
brook silverside	a,b,d,f	a,b,c,d,f	a,b,c,d,f	

Table 3-8 (continued). Occurrence of fishes in three habitats within Steel Creek (corridor, marsh/swamp, and channel) and Meyer's Branch during 1986 - 1991. (Lower case letters indicate those years the taxon was collected in each habitat; a = 1986, b = 1987, c = 1988, d = 1989, e = 1990, f = 1991).

	Steel Creek			Meyer's Branch*
	Corridor	Swamp	Channel	
striped bass			b,c,d	
mud sunfish	a		b	
flier	a,b			
Everglades pygmy sunfish		b		
banded pygmy sunfish	a,f	a,b,d,e,f	a,b,d,e,f	
bluespotted sunfish	a,b,c,d,f	a,b,d,e	a,b,d,e,f	
redbreast sunfish	a,b,c,d,e,f	a,b,c,d	a,b,c,d	a,b,c,d
green sunfish			a	
warmouth	a,b,e,f	a,b,c,d,f	a,b,c,d,e,f	a
bluegill	a,b,c,d	a,b,c,d,f	a,b,c,d	a,b,c,d
dollar sunfish	a,b	a	a,c	b,c,d
redear sunfish	a,d	a,b,c,d	a,b,c,d	
spotted sunfish	a,b,c,d,e,f	a,b,c,d,f	a,b,c,d,e	a,b,c,d
largemouth bass	a,b,c,d,e,f	a,b,c,d,f	a,b,c,d,e,f	a,c,d
black crappie	a,d,e,f	a,b,c,d,f	a,b,f	
Savannah darter	d			c
swamp darter		a		c
Christmas darter	a			
tessellated darter	a,b,c,d	a,c,d	a,b,c	a,b,c,d
yellow perch	a,b,d	a,b,c,d,e,f	a,c,d,e	a,b
blackbanded darter	a,b,c,d,e,f	a,b,c,d,e,f	a,b,c,d,e	a,b,c,d
blackside darter	b,d	b,c,d	b,c	b
striped mullet	d	a,b,c,d,f	b,c,d	
Total				
1986	39	45	40	19
1987	33	37	38	16
1988	23	41	35	24
1989	30	36	28	16
1990	15	24	17	*
1991	13	25	13	*

*Meyer's Branch was not sampled in 1990 or 1991.

substantially reduced the amount of physical habitat available for fish and this has undoubtedly affected species richness in the corridor.

The marsh/swamp area of Steel Creek is part of the Savannah River floodplain and typically shows diminished current speed, variable depth, division of the channel into numerous narrow channels, and an abundance of submerged and emergent macrophytes (Paller et al. 1988). The fish assemblage of the marsh/swamp is more diverse than that of the corridor, including species typical of swamps and slow-moving streams (Paller et al. 1988). However, the abundance of several typical swamp species such as banded pygmy sunfish, lined topminnow, bluespotted sunfish, and dollar sunfish decreased during 1988 (Heuer and Kissick 1989) and generally did not rebound in 1989 (Sayers et al. 1990), 1990 (Sayers et al. 1991), or 1991. These changes were probably the result of an extended period of low water levels such that habitat conditions favor other taxa such as suckers.

The channel habitat consists of a single, large, well-defined channel located just above the confluence of Steel Creek with the Savannah River (Paller et al. 1988). This area is characterized by moderate current speeds, a lack of abundant macrophyte growth, and occasional log and brush snags (Firth 1987; Firth et al. 1988). Paller et al. (1988) reported that the channel area was an important spawning area for anadromous species such as American shad or blueback herring and for riverine species such as channel catfish or white catfish. Total fish abundance was generally low in the channel during 1991 with suckers, minnows, and largemouth bass accounting for the majority of the fish collected. Use of the channel area by catfish and migratory species was limited in 1991 although larval American shad were collected.

Paller et al. (1988) stated that increased flows in Steel Creek, due to operation of L-Reactor, had a major influence on the physical and biological characteristics reported during 1986 and 1987. During the latter half of 1988, most of Steel Creek within the monitoring area experienced a major change in physical habitat that probably influenced results in 1988, 1989, 1990, and 1991. L-Reactor was not operational from June 1988 through December 1991. The shutdown of L-Reactor, coupled with decreased natural runoff due to regional drought conditions that persisted through 1989, and changes in reservoir operation procedures for L Lake, resulted in greatly diminished reservoir releases to Steel Creek beginning in late May 1988 and continuing through 1991. Depths and current speeds decreased during this period of reduced flows, especially in the corridor and channel sites. The reduced depths made access to some sampling stations in the marsh/swamp, such as Stations 300 and 320 (and to a lesser extent Stations 310 and 330), difficult or impossible. The decreased sampling efforts undoubtedly affected the collection of rare species and, possibly, monthly estimates of species richness. Thus, both long-term and seasonal changes were confounded with the effects of lower flows.

3.5 EFFECTS OF L-REACTOR RESTART AND L-LAKE IMPOUNDMENT ON STEEL CREEK FISH ASSEMBLAGES

Increased flows and the release of large numbers of sunfish from L Lake were identified as the major factors contributing to observed changes in the fish assemblage of Steel Creek following restart of L-Reactor (Paller et al. 1988). These effects were most pronounced in the corridor sites but were also evident in the marsh/swamp and the channel sites.

The influence of emigration of sunfish from L Lake was indicated by large catches of bluegill in the corridor during 1986 and to a lesser extent, in the marsh/swamp during 1986 and 1987. The magnitude of this influence diminished during 1987 (Paller et al. 1988); however, data collected in 1989 indicated that emigration of bluegill and shad larvae continued to affect the corridor sites. Data from 1990 and 1991 suggest that emigration of fish from L Lake continues but does not strongly affect the fish assemblages of the lower corridor, the marsh, swamp, or channel.

Changes that were associated with increased flows included loss of species (eastern mudminnow, mud sunfish, banded pygmy sunfish, and Christmas darter) in the corridor and reduced abundance of other species (primarily brook silverside) in the marsh/swamp (Paller et al. 1988). Increased use of the channel area for spawning sites by blueback herring was suggested as another likely result of increased flows in the Steel Creek system (Jones et al. 1978; Paller et al. 1988). Paller et al (1988) further noted that the fish assemblages in Steel Creek had not reached equilibrium by the end of 1987, and that further changes should be expected.

Changes in the fish assemblage of the corridor continued in 1988, as evidenced by a reduction in species richness. Bluegill emigration from L Lake apparently decreased, yet populations of bluegill in the marsh/swamp remained similar to 1987, suggesting the species is provisionally established in these habitats (Heuer and Kissick 1989). Additional changes in the marsh/swamp fish assemblage included further reduction in abundance and distribution of brook silverside and Florida gar as well as expansion of chain pickerel. These changes were probably linked to increased flow and depth created by the impoundment of

L Lake (Heuer and Kissick 1989). However, the decrease in Florida gar abundance may reflect stochastic change, as Bennett and McFarlane (1983) described the Florida gar as rare in the vicinity of the Savannah River Site.

The low-flow conditions that persisted in 1989 could be responsible for the rebound of some fish taxa in the marsh/swamp that decreased during 1986 and 1987, but overall fish abundance was generally lower in 1989, probably due to a decrease in the total amount of available habitat due to lower flows. Although there were no gross changes in the relative abundance of the most abundant taxa, taxa richness declined sharply between 1988 and 1989 (Table 3-8). Abundance of juvenile and adult fishes was sharply lower in all four habitat types in 1990 and 1991, presumably in response to reduced habitat availability. Ichthyoplankton densities and taxa richness in 1990 and 1991 was also greatly reduced compared to 1989 levels. The continuing decline in ichthyoplankton densities was probably related to the general decline in abundance of adult and juvenile fishes that has occurred in recent years. The sharp decline in total species richness from 1989 levels (Table 3-8) was also due in part to a greatly reduced sampling effort in 1990 and 1991.

Heuer and Kissick (1989) concluded that despite additional changes in the fish fauna of Steel Creek in 1988, the effects of reactor operation were largely confined to the corridor habitat. Inasmuch as L-Reactor did not operate in 1989, 1990, or 1991, the changes in the fish assemblages of Steel Creek that were observed during that period were probably in response to an extended period of low water rather than directly related to reactor operation.

3.6 SIMILARITY OF STEEL CREEK WITH OTHER STREAMS

Paller et al. (1988) compared species richness and relative abundance results from Steel Creek in 1986 and 1987 with similar data from other streams in the southeastern United States. They found that Steel Creek supported an unusually rich fish assemblage characterized by several species of catfishes, sunfishes, and minnows and that the dominant taxonomic groups of fish in Steel Creek were typical for the streams of this region. Species richness in Steel Creek declined by 10 species from 1986 through 1989 but minnows and sunfishes continued to dominate the catches (Table 3-9).

The 1991 results suggest that the adult/juvenile fish assemblage of Steel Creek was predominantly sunfishes, minnows, and suckers. Species richness was sharply lower in 1990 and 1991 and this could reflect the effects of an extended period of low water levels. However, many of the species that were missing in 1990 and 1991 catches were relatively rare in the past (i.e., topminnows, American eel, Atlantic needlefish, striped bass) and were probably missed because of the reduced scope of sampling. Species richness in 1990 and 1991 was lower than that of many other southern streams (Table 3-9), but Steel Creek continued to support a relatively diverse fish assemblage that is typical of streams of the southeastern United States.

Table 3-9. Species number and relative abundance (% composition) of fishes in nine southeastern streams. Relative abundances are based on the number of individual fish in each family.

Family	Otter Creek, IN ^a		Shoal Creek, AL ^b		Barbaree Creek, AL ^c		Tombigbee Waterway, TN ^d		Duke Swamp NC ^e		Haggard Mill Creek, NC ^f	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
bowfin									1	1	1	<1
gars							1	<1	1	<1		
freshwater eels									1	2	1	6
herrings	1	1 ^f	1	<1			1	<1			1	1
mudminnow									1	4	1	10
piques	1	<1	1	<1					2	28	2	11
suckers	4	3	3	7	2	3	4	2	1	10	1	3
minnows	16	86	14	55	10	81	18	72	1	3	2	1
catfishes	2	2	2	1	1	<1	4	4	3	10	3	
needlefishes												
killifishes	1	1	1	<1			2	2				
livebearers							1	5	1	<1	1	8
pirate perch									1	21	1	24
cavefishes									1	2	1	8
silversides	1	<1										
temperate basses												
sunfishes &												
black basses	7	2	11	22	6	2	6	7	9	18	11	22
perches	6	8	7	9	5	11	11	6	1	<1	2	4
drums							1	2				
mulletts												
sculpins			1	5	1	3						
TOTAL	39		41		25		49		24		28	

^aGrossman et al. 1982.

^bKelly et al. 1981.

^cBoschung and O'Neil 1981.

^dMundy and Boschung 1981.

^ePardue and Huish 1981.

^fValue quoted directly from original paper.

Table 3-9 (continued). Species number and relative abundance (% composition) of fishes in nine southeastern streams. Relative abundances are based on the number of individual fish in each family.

Family	Steel Creek 1986 ^s		Steel Creek 1987 ^s		Steel Creek 1988 ^s		Steel Creek 1989 ^s		Steel Creek 1990 ^s		Steel Creek 1991		Lower Three Runs ^h		Upper Three Runs ^h	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
bowfin	1	2	1	1	1	2.4	1	3	1	7	1	3	1	1	1	3
gars	2	3	2	1	2	1.5	2	2	1	4	1	2	1	<1		
freshwater eels	1	1	1	1	1	2.1	1	4	1	1	1	2	1	6	1	10
herrings	3	1	2	<1	1	0.2	3	1	3	<1	1	2	1	2		
mudminnow	1	<1	1	<1	1	<0.1	1	<1				1	1	<1		
pike	2	2	1	1	2	2.6	2	3	2	4	1	1	1	1	1	2
suckers	4	9	4	6	5	7.4	5	11	3	27	3	25	3	8	3	13
minnows	10	26	10	40	9	30.7	3	24	3	9	4	29	5	1	2	16
catfishes	9	2	9	2	8	5.7	8	5	3	7	2	3	5	2	2	2
needlefishes	1	<1	1	<1	1	<0.1	0	<1	1	<1		1	1	<1		
killifishes	2	<1	2	<1	1	<0.1	2	<1				1	1	2		
livebearers	1	1	1	2	1	2.1	1	<1				1	1	1		
pirate perch	1	1	1	2	1	0.5	1	8	1	<1	1	1	1	4	1	4
cavefishes	1	<1	1	<1	1	<0.1	1	<1	1	<1						
silversides	1	2	1	1	1	0.5	1	<1	1	1	1	1	1	<1	1	1
temperate basses	1	1	<1	-			1	<1								
sunfishes & blackbasses	12	47	13	39	9	39.1	11	31	7	31			9	69	7	46
perches	6	3	6	3	6	5.1	5	4	2	8	1	2	4	6		
drums					-		0									
mulletts	1	<1	1	<1	1	0.2	1	4			1	<1				
sculpins							0									
TOTAL	60		60		52		50		27		22		35		21	

^sSayers et al. 1991.
^hPaller and Saul 1986.

4.0 SUMMARY AND CONCLUSIONS

Low water levels persisted throughout the Steel Creek system during most of 1991. Water levels have remained low since L-Reactor was shut down in 1988 and the associated reduction in available habitat has apparently resulted in reduced abundance and species richness. The reductions in species richness observed in 1990 and 1991 are probably also related to lower probability of capture for rare species as a result of the reduced scope of sampling begun in 1990.

The structure of the fish assemblage in the corridor continued to change in 1991, with sunfishes and largemouth bass forming a much larger proportion of the total catch than in previous years. The apparent flux in the fish assemblage of the corridor probably reflected dramatic changes in ecological conditions. Thermal effluent from L Lake was discharged into the corridor from 1986 through mid-1988, causing elevated temperatures and high water levels. Thermal effluents and high discharges from L Lake were stopped in mid-1988 so the corridor has fluctuated between periods of warm, high water levels and cooler, low water levels. The lower CPUE in 1991 may reflect lower habitat availability and an associated reduction in fish abundance.

The structure of the fish assemblage in the marsh and swamp did not change appreciably in 1989 and 1990. There was a rather abrupt shift from domination by minnows (pre-1988) to a more diverse fauna and this continued in 1990. However, the fish assemblage of the marsh was again dominated by minnows and the proportion of suckers increased in the swamp during 1991. The apparent decline

in fish abundance probably reflected decreases in available habitat associated with lower water levels.

The composition of the channel fish assemblage showed only minor changes from 1989 to 1990, although total CPUE declined once again. Total CPUE again declined in 1991 and the fish assemblage of the channel was dominated by largemouth bass and minnows. Since the channel habitat is strongly influenced by the Savannah River, it was difficult to determine the precise cause of changes in the channel fish assemblage. The rather severe decline in taxa richness of adult fishes in the channel (19 species in 1989 to 9 species in 1990 and 5 species in 1991) was probably due to a combination of lower probability of capture for rare species resulting from the reduced scope of sampling and reduced habitat availability.

Taxa richness for ichthyoplankton in 1991 was similar to 1990. The slight decline in taxa richness from 25 in 1989 to 23 in 1991 could reflect a genuine loss of taxa, but is probably related to the reduced scope of sampling begun in 1990. Blackbanded darter larvae were much less abundant in 1991 than in previous years and warmouth larvae were more abundant than usual. Comparisons of the results from the diurnal and diel sampling program indicated that diurnal samples consistently underestimated taxa richness and that densities in diurnal samples were substantially lower than from diel samples collected during nighttime. Sunfishes (mostly warmouth or pygmy sunfishes), perches (mostly Etheostoma sp. or blackbanded darters), and minnows (mostly ironcolor shiners) were generally the most abundant taxa in diurnal ichthyoplankton samples. Darter larvae formed the majority of the February and March catches. April and May catches were more diverse including sunfishes, suckers, minnows, darters, and other fishes.

Catches were greatest during early-June, when sunfishes and minnows composed most of the catch. Diel ichthyoplankton samples indicated that larval densities were greatest between 2000h and 0800h at all stations and that minnows (ironcolor shiners or other cyprinid species), suckers (chubsuckers), and sunfishes (mostly warmouth and pygmy sunfishes) were the most abundant taxa. Peak abundance varied among stations from March to June and the greatest densities were found at the corridor and channel stations.

Although taxa richness declined at all stations in 1990 and 1991, many of the missing species were relatively rare (i.e., American eel, Atlantic needlefish, striped bass) and were probably missed because of the reduced scope of sampling. The species richness of Steel Creek, although perhaps reduced in 1990 and 1991, remained similar to that of other streams of the southeastern United States.

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Appendix Table 1.

Scientific and common names of fishes collected from
Steel Creek and Meyer's Branch. January 1986 - December 1991.*

<u>Lepisosteus osseus</u>	longnose gar
<u>L. platyrhincus</u>	Florida gar
<u>Amia calva</u>	bowfin
<u>Anguilla rostrata</u>	American eel
<u>Alosa aestivalis</u>	blueback herring
<u>A. sapidissima</u>	American shad
<u>A. mediocris</u>	hickory shad
<u>Dorosoma cepedianum</u>	gizzard shad
<u>D. petenense</u>	threadfin shad
<u>Umbra pygmaea</u>	eastern mudminnow
<u>Esox americanus</u>	redfin pickerel
<u>E. niger</u>	chain pickerel
<u>Cyprinella nivea</u>	whitefin shiner
<u>Cyprinus carpio</u>	common carp
<u>Nocomis leptcephalus</u>	bluehead chub
<u>Notemigonus crysoleucas</u>	golden shiner
<u>Notropis chalybaeus</u>	ironcolor shiner
<u>N. cummingsae</u>	dusky shiner
<u>N. emilaiae</u>	pugnose shiner
<u>N. hudsonius</u>	spottail shiner
<u>N. lutipinnis</u>	yellowfin shiner
<u>N. maculatus</u>	taillight shiner
<u>N. petersoni</u>	coastal shiner
<u>Carpiodes carpio</u>	river carpsucker
<u>Erimyzon oblungus</u>	creek chubsucker
<u>E. sucetta</u>	lake chubsucker
<u>Moxostoma anisurum</u>	silver redhorse
<u>Hypentelium nigricans</u>	northern hog sucker
<u>Minytrema melanops</u>	spotted sucker
<u>Ameiurus brunneus</u>	snail bullhead
<u>A. natalis</u>	yellow bullhead
<u>A. nebulosus</u>	brown bullhead
<u>A. platycephalus</u>	flat bullhead
<u>Ictalurus catus</u>	white catfish
<u>I. punctatus</u>	channel catfish
<u>Noturus gyrinus</u>	tadpole madtom
<u>N. insignis</u>	marginated madtom
<u>N. leptacanthus</u>	speckled madtom
<u>Chologaster cornuta</u>	swampfish
<u>Aphredoderus sayanus</u>	pirate perch
<u>Stronglura marina</u>	Atlantic needlefish
<u>Fundulus chrysotus</u>	golden topminnow
<u>F. lineolatus</u>	lined topminnow
<u>F. notti</u>	starhead topminnow
<u>Gambusia affinis</u>	mosquitofish
<u>Labidesthes sicculus</u>	brook silverside

*Robins et al. 1991

Appendix Table 1 (continued).

Scientific and common names of fishes collected from
Steel Creek and Meyer's Branch. January 1986 - December 1991.

<u>Morone saxatilis</u>	striped bass
<u>Acantharchus pomotis</u>	mud sunfish
<u>Centrarchus macropterus</u>	flier
<u>Elassoma evergladei</u>	Everglades pygmy sunfish
<u>E. zonatum</u>	banded pygmy sunfish
<u>Enneacanthus gloriosus</u>	bluespotted sunfish
<u>Lepomis auritus</u>	redbreast sunfish
<u>L. cyanellus</u>	green sunfish
<u>L. gulosus</u>	warmouth
<u>L. macrochirus</u>	bluegill
<u>L. marginatus</u>	dollar sunfish
<u>L. microlophus</u>	redeer sunfish
<u>L. punctatus</u>	spotted sunfish
<u>Micropterus salmoides</u>	largemouth bass
<u>Pomoxis nigromaculatus</u>	black crappie
<u>Etheostoma fricksium</u>	Savannah darter
<u>E. fusiforme</u>	swamp darter
<u>E. hopkinsi</u>	Christmas darter
<u>E. olmstedii</u>	tessellated darter
<u>E. serrifer</u>	sawcheek darter
<u>Perca flavescens</u>	yellow perch
<u>Percina nigrofasciata</u>	blackbanded darter
<u>Mugil cephalus</u>	striped mullet

Appendix Table 2.

List of missed ichthyoplankton samples from four stations in Steel Creek during 1991.

MONTH	DIURNAL				DIEL			
	CORRIDOR	MARSH	SWAMP	CHANNEL	CORRIDOR	MARSH	SWAMP	CHANNEL
January	0	0	0	2	a	a	a	a
February	0	0	0	2	0	0	0	8
March	0	0	0	2	0	0	0	8
April	0	0	0	0	0	0	0	0
May	0	2	2	0	0	8	8	0
June	0	2	2	0	0	0	0	8
July	0	2	0	2	0	4	0	8
August	0	2	2	2	a	a	a	a
September	0	0	0	2	a	a	a	a
October	0	0	0	2	a	a	a	a
November	0	0	0	0	a	a	a	a
December	0	0	0	0	a	a	a	a

*Diel samples are collected monthly from February through July.

Appendix Table 3.

Listing of individual diurnal ichthyoplankton samples.

MONTH	STATION	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
01/03/91	Corridor	T	A	45.58	0	0.00	empty sample
01/03/91	Corridor	T	B	52.91	0	0.00	empty sample
01/03/91	Marsh	T	A	50.83	0	0.00	empty sample
01/03/91	Marsh	T	B	55.12	0	0.00	empty sample
01/03/91	Swamp	T	A	52.82	0	0.00	empty sample
01/03/91	Swamp	T	B	50.81	0	0.00	empty sample
01/03/91	Channel	T	A	57.19	0	0.00	empty sample
01/03/91	Channel	T	B	52.39	0	0.00	empty sample
01/18/91	Corridor	T	A	50.72	0	0.00	empty sample
01/18/91	Corridor	T	B	51.37	0	0.00	empty sample
01/18/91	Marsh	T	A	50.59	0	0.00	empty sample
01/18/91	Marsh	T	B	51.76	0	0.00	empty sample
01/18/91	Swamp	T	A	51.42	0	0.00	empty sample
01/18/91	Swamp	T	B	50.13	0	0.00	empty sample
01/18/91	Channel	T	A	53.34	0	0.00	empty sample
01/18/91	Channel	T	B	51.64	0	0.00	empty sample
01/31/91	Corridor	T	A	48.30	0	0.00	empty sample
01/31/91	Corridor	T	B	47.34	0	0.00	empty sample
01/31/91	Marsh	T	A	44.19	0	0.00	empty sample
01/31/91	Marsh	T	B	40.93	0	0.00	empty sample
01/31/91	Swamp	T	A	42.17	0	0.00	empty sample
01/31/91	Swamp	T	B	41.89	0	0.00	empty sample
01/31/91	Channel	T	A	51.62	0	0.00	empty sample
01/31/91	Channel	T	B	48.76	0	0.00	empty sample
02/14/91	Corridor	T	A	52.29	0	0.00	empty sample
02/14/91	Corridor	T	B	45.23	0	0.00	empty sample
02/14/91	Marsh	T	A	50.80	0	0.00	empty sample
02/14/91	Marsh	T	B	52.48	0	0.00	empty sample
02/14/91	Swamp	T	A	53.51	0	0.00	empty sample
02/14/91	Swamp	T	B	46.58	0	0.00	empty sample
02/14/91	Channel	T	A	52.85	0	0.00	empty sample
02/14/91	Channel	T	B	50.44	0	0.00	empty sample
02/28/91	Corridor	T	A	47.34	0	0.00	empty sample
02/28/91	Corridor	T	B	50.21	1	19.92	blackbanded darter
02/28/91	Marsh	T	A	53.65	1	18.64	darter
02/28/91	Marsh	T	B	51.21	1	19.53	pygmy sunfish
02/28/91	Swamp	T	A	54.43	0	0.00	empty sample
02/28/91	Swamp	T	B	46.50	1	21.51	darters-general
02/28/91	Channel	T	A	47.95	0	0.00	empty sample
02/28/91	Channel	T	B	46.30	0	0.00	empty sample
03/14/91	Corridor	T	A	52.27	2	38.26	blackbanded darter
03/14/91	Corridor	T	B	49.49	0	0.00	empty sample
03/14/91	Marsh	T	A	52.93	1	18.89	black crappie
03/14/91	Marsh	T	B	51.59	1	19.38	black crappie
03/14/91	Marsh	T	B	51.59	1	19.38	darter

Appendix Table 3 (continued).

Listing of individual diurnal ichthyoplankton samples.

MONTH	STATION	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
03/14/91	Swamp	T	A	53.51	0	0.00	empty sample
03/14/91	Swamp	T	B	51.41	0	0.00	empty sample
03/14/91	Channel	T	A	52.40	0	0.00	empty sample
03/14/91	Channel	T	B	49.72	2	40.22	darter
03/28/91	Corridor	T	A	45.14	3	66.46	darter
03/28/91	Corridor	T	B	43.10	0	0.00	empty sample
03/28/91	Marsh	T	A	54.99	0	0.00	empty sample
03/28/91	Marsh	T	B	44.37	1	22.54	darters-general
03/28/91	Swamp	T	A	45.79	0	0.00	empty sample
03/28/91	Swamp	T	B	41.05	1	24.36	darter
03/28/91	Channel	T	A	51.23	0	0.00	empty sample
03/28/91	Channel	T	B	49.30	2	40.57	pygmy sunfish
04/11/91	Corridor	T	A	55.55	1	18.00	black crappie
04/11/91	Corridor	T	B	57.45	1	17.41	pygmy sunfish
04/11/91	Marsh	T	A	53.12	3	56.48	chubsucker
04/11/91	Marsh	T	A	53.12	5	94.13	unknown
04/11/91	Marsh	T	B	47.35	2	42.24	chubsucker
04/11/91	Swamp	T	A	50.47	1	19.82	chubsucker
04/11/91	Swamp	T	A	50.47	1	19.82	pirate perch
04/11/91	Swamp	T	B	48.24	2	41.46	unknown
04/11/91	Channel	B	A	56.19	0	0.00	empty sample
04/11/91	Channel	B	B	40.42	1	24.74	darter
04/11/91	Channel	T	A	50.44	1	19.83	chubsucker
04/11/91	Channel	T	B	43.25	0	0.00	empty sample
04/25/91	Corridor	T	A	53.28	1	18.77	blackbanded darter
04/25/91	Corridor	T	B	47.90	0	0.00	empty sample
04/25/91	Marsh	T	A	46.11	1	21.69	brook silverside
04/25/91	Marsh	T	A	46.11	1	21.69	chubsucker
04/25/91	Marsh	T	A	46.11	2	43.37	darter
04/25/91	Marsh	T	A	46.11	1	21.69	pirate perch
04/25/91	Marsh	T	A	46.11	1	21.69	unknown
04/25/91	Marsh	T	B	42.70	1	23.42	pirate perch
04/25/91	Swamp	T	A	42.16	1	23.72	ironcolor shiner
04/25/91	Swamp	T	B	43.57	2	45.90	ironcolor shiner
04/25/91	Swamp	T	B	43.57	1	22.95	minnow
04/25/91	Channel	B	A	58.48	1	17.10	American shad
04/25/91	Channel	B	A	58.48	1	17.10	ironcolor shiner
04/25/91	Channel	B	A	58.48	2	34.20	pygmy sunfish
04/25/91	Channel	B	B	58.35	1	17.14	American shad
04/25/91	Channel	B	B	58.35	2	34.28	black crappie
04/25/91	Channel	B	B	58.35	2	34.28	chubsucker
04/25/91	Channel	B	B	58.35	2	34.28	pygmy sunfish
04/25/91	Channel	T	A	46.43	1	21.54	black crappie
04/25/91	Channel	T	A	46.43	1	21.54	darter
04/25/91	Channel	T	B	45.61	1	21.93	chubsucker

Appendix Table 3 (continued).

Listing of individual diurnal ichthyoplankton samples.

MONTH	STATION	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
05/09/91	Corridor	T	A	51.81	4	77.21	blackbanded darter
05/09/91	Corridor	T	B	47.25	1	21.16	blackbanded darter
05/09/91	Corridor	T	B	47.25	1	21.16	largemouth bass
05/09/91	Marsh	T	A	45.14	3	66.46	shad
05/09/91	Marsh	T	A	45.14	2	44.31	warmouth
05/09/91	Marsh	T	B	44.39	1	22.53	threadfin shad
05/09/91	Swamp	T	A	47.60	1	21.01	minnow
05/09/91	Swamp	T	A	47.60	1	21.01	threadfin shad
05/09/91	Swamp	T	B	46.33	1	21.59	brook silverside
05/09/91	Swamp	T	B	46.33	1	21.59	darter
05/09/91	Swamp	T	B	46.33	1	21.59	minnow
05/09/91	Swamp	T	B	46.33	3	64.76	warmouth
05/09/91	Channel	B	A	58.69	2	34.08	darter
05/09/91	Channel	B	A	58.69	1	17.04	ironcolor shiner
05/09/91	Channel	B	A	58.69	1	17.04	threadfin shad
05/09/91	Channel	B	A	58.69	3	51.12	warmouth
05/09/91	Channel	B	B	53.37	1	18.74	shad
05/09/91	Channel	B	B	53.37	6	112.42	warmouth
05/09/91	Channel	T	A	45.60	2	43.86	bluespotted sunfish
05/09/91	Channel	T	A	45.60	1	21.93	herrings
05/09/91	Channel	T	B	51.43	1	19.44	American shad
05/09/91	Channel	T	B	51.43	2	38.89	warmouth
05/23/91	Corridor	T	A	52.04	6	115.30	herrings
05/23/91	Corridor	T	B	48.70	0	0.00	empty sample
05/23/91	Channel	B	A	42.20	1	23.70	unknown
05/23/91	Channel	B	A	42.20	4	94.79	warmouth
05/23/91	Channel	B	B	42.02	1	23.80	unknown
05/23/91	Channel	B	B	42.02	5	118.99	warmouth
05/23/91	Channel	T	A	50.98	1	19.62	darter
05/23/91	Channel	T	A	50.98	1	19.62	ironcolor shiner
05/23/91	Channel	T	A	50.98	2	39.23	unknown
05/23/91	Channel	T	A	50.98	1	19.62	warmouth
05/23/91	Channel	T	B	51.60	0	0.00	empty sample
06/06/91	Corridor	T	A	51.39	0	0.00	empty sample
06/06/91	Corridor	T	B	45.33	0	0.00	empty sample
06/06/91	Marsh	T	A	43.35	1	23.07	brook silverside
06/06/91	Marsh	T	A	43.35	6	138.41	ironcolor shiner
06/06/91	Marsh	T	A	43.35	3	69.20	largemouth bass
06/06/91	Marsh	T	A	43.35	2	46.14	sunfish
06/06/91	Marsh	T	B	40.00	1	25.00	brook silverside
06/06/91	Marsh	T	B	40.00	6	150.00	ironcolor shiner
06/06/91	Marsh	T	B	40.00	1	25.00	largemouth bass
06/06/91	Marsh	T	B	40.00	1	25.00	minnow
06/06/91	Marsh	T	B	40.00	2	50.00	sunfish
06/06/91	Channel	T	A	47.95	1	20.86	ironcolor shiner

Appendix Table 3 (continued).

Listing of individual diurnal ichthyoplankton samples.

MONTH	STATION	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
06/06/91	Channel	T	A	47.95	1	20.86	largemouth bass
06/06/91	Channel	T	A	47.95	1	20.86	sunfish
06/06/91	Channel	T	A	47.95	3	62.57	warmouth
06/06/91	Channel	T	B	47.19	1	21.19	ironcolor shiner
06/06/91	Channel	T	B	47.19	1	21.19	sunfish
06/06/91	Channel	T	B	47.19	7	148.34	warmouth
06/20/91	Corridor	T	A	43.60	0	0.00	empty sample
06/20/91	Corridor	T	B	43.81	0	0.00	empty sample
06/20/91	Marsh	T	A	43.07	0	0.00	empty sample
06/20/91	Marsh	T	B	47.38	0	0.00	empty sample
06/20/91	Swamp	T	A	48.12	0	0.00	empty sample
06/20/91	Swamp	T	B	43.08	0	0.00	empty sample
06/20/91	Channel	T	A	43.58	1	22.95	sunfish
06/20/91	Channel	T	B	43.75	0	0.00	empty sample
07/03/91	Corridor	T	A	47.74	0	0.00	empty sample
07/03/91	Corridor	T	B	45.98	0	0.00	empty sample
07/03/91	Swamp	T	A	55.60	1	17.99	sunfishes
07/03/91	Swamp	T	B	48.68	1	20.54	ironcolor shiner
07/03/91	Channel	T	A	44.31	1	22.57	ironcolor shiner
07/03/91	Channel	T	B	49.58	0	0.00	empty sample
07/18/91	Corridor	T	A	56.57	1	17.68	shad
07/18/91	Corridor	T	B	47.11	0	0.00	empty sample
07/18/91	Marsh	T	A	44.81	0	0.00	empty sample
07/18/91	Marsh	T	B	44.60	0	0.00	empty sample
07/18/91	Swamp	T	A	48.34	0	0.00	empty sample
07/18/91	Swamp	T	B	46.21	0	0.00	empty sample
07/18/91	Channel	T	A	47.77	0	0.00	empty sample
07/18/91	Channel	T	B	49.43	0	0.00	empty sample
08/08/91	Corridor	T	A	46.33	0	0.00	empty sample
08/08/91	Corridor	T	B	41.87	0	0.00	empty sample
08/08/91	Channel	T	A	50.51	1	19.80	ironcolor shiner
08/08/91	Channel	T	B	51.89	0	0.00	empty sample
09/20/91	Corridor	T	A	53.35	0	0.00	empty sample
09/20/91	Corridor	T	B	53.55	0	0.00	empty sample
09/20/91	Marsh	T	A	41.62	0	0.00	empty sample
09/20/91	Marsh	T	B	51.65	0	0.00	empty sample
09/20/91	Swamp	T	A	40.42	0	0.00	empty sample
09/20/91	Swamp	T	B	46.94	0	0.00	empty sample
09/20/91	Channel	T	A	46.92	0	0.00	empty sample
09/20/91	Channel	T	B	44.09	0	0.00	empty sample
10/15/91	Corridor	T	A	45.81	0	0.00	empty sample
10/15/91	Corridor	T	B	52.12	0	0.00	empty sample
10/15/91	Marsh	T	A	43.09	0	0.00	empty sample
10/15/91	Marsh	T	B	50.82	0	0.00	empty sample
10/15/91	Swamp	T	A	58.09	0	0.00	empty sample

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Appendix Table 3 (continued).

Listing of individual diurnal ichthyoplankton samples.

MONTH	STATION	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
10/15/91	Swamp	T	B	49.71	0	0.00	empty sample
10/15/91	Channel	T	A	43.39	0	0.00	empty sample
10/15/91	Channel	T	B	43.25	0	0.00	empty sample
11/21/91	Corridor	T	A	45.18	0	0.00	empty sample
11/21/91	Corridor	T	B	43.10	0	0.00	empty sample
11/21/91	Marsh	T	A	48.73	0	0.00	empty sample
11/21/91	Marsh	T	B	47.29	0	0.00	empty sample
11/21/91	Swamp	T	A	52.07	0	0.00	empty sample
11/21/91	Swamp	T	B	47.69	0	0.00	empty sample
11/21/91	Channel	T	A	48.10	0	0.00	empty sample
11/21/91	Channel	T	B	48.14	0	0.00	empty sample
12/17/91	Corridor	T	A	51.28	0	0.00	empty sample
12/17/91	Corridor	T	B	48.61	0	0.00	empty sample
12/17/91	Marsh	T	A	43.88	0	0.00	empty sample
12/17/91	Marsh	T	B	51.81	0	0.00	empty sample
12/17/91	Swamp	T	A	48.31	0	0.00	empty sample
12/17/91	Swamp	T	B	43.65	1	22.91	chain pickerel
12/17/91	Channel	T	A	47.22	0	0.00	empty sample
12/17/91	Channel	T	B	45.83	0	0.00	empty sample

Appendix Table 4.

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
FEB	Corridor	1	T	A	52.29	0	0.00	empty sample
FEB	Corridor	1	T	B	45.23	0	0.00	empty sample
FEB	Corridor	2	T	A	43.35	0	0.00	empty sample
FEB	Corridor	2	T	B	50.74	0	0.00	empty sample
FEB	Corridor	3	T	A	51.94	1	19.25	unknown
FEB	Corridor	3	T	B	44.48	0	0.00	empty sample
FEB	Corridor	4	T	A	56.29	0	0.00	empty sample
FEB	Corridor	4	T	B	56.74	0	0.00	empty sample
FEB	Marsh	1	T	A	50.80	0	0.00	empty sample
FEB	Marsh	1	T	B	52.48	0	0.00	empty sample
FEB	Marsh	2	T	A	53.75	0	0.00	empty sample
FEB	Marsh	2	T	B	47.28	0	0.00	empty sample
FEB	Marsh	3	T	A	53.73	1	18.61	darter
FEB	Marsh	3	T	B	43.02	2	46.49	darter
FEB	Marsh	4	T	A	53.66	0	0.00	empty sample
FEB	Marsh	4	T	B	50.52	0	0.00	empty sample
FEB	Swamp	1	T	A	53.51	0	0.00	empty sample
FEB	Swamp	1	T	B	46.58	0	0.00	empty sample
FEB	Swamp	2	T	A	43.75	0	0.00	empty sample
FEB	Swamp	2	T	B	49.55	0	0.00	empty sample
FEB	Swamp	3	T	A	51.97	2	38.48	darter
FEB	Swamp	3	T	B	44.57	1	22.44	darter
FEB	Swamp	4	T	A	49.78	1	20.09	pickerel
FEB	Swamp	4	T	B	41.52	2	48.17	darter
FEB	Channel	1	T	A	52.85	0	0.00	empty sample
FEB	Channel	1	T	B	50.44	0	0.00	empty sample
FEB	Channel	2	T	A	50.20	0	0.00	empty sample
FEB	Channel	2	T	B	50.18	0	0.00	empty sample
FEB	Channel	3	T	A	45.18	0	0.00	empty sample
FEB	Channel	3	T	B	50.78	0	0.00	empty sample
FEB	Channel	4	T	A	49.83	1	20.07	darter
FEB	Channel	4	T	B	55.75	2	35.87	darter
MAR	Corridor	1	T	A	52.27	2	38.26	blackbanded darter
MAR	Corridor	1	T	B	49.49	0	0.00	empty sample
MAR	Corridor	2	T	A	50.09	1	19.96	blackbanded darter
MAR	Corridor	2	T	A	50.09	2	38.99	darter
MAR	Corridor	2	T	B	45.36	3	60.00	darter
MAR	Corridor	3	T	A	44.12	1	22.67	blackbanded darter
MAR	Corridor	3	T	B	46.36	0	0.00	empty sample
MAR	Corridor	4	T	A	55.96	1	17.87	blackbanded darter
MAR	Corridor	4	T	B	42.88	1	23.32	blackbanded darter
MAR	Marsh	1	T	A	52.93	1	18.89	black crappie
MAR	Marsh	1	T	B	51.59	1	19.38	black crappie
MAR	Marsh	1	T	B	51.59	1	19.38	darter
MAR	Marsh	2	T	A	52.70	0	0.00	empty sample

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
MAR	Marsh	2	T	B	51.99	0	0.00	empty sample
MAR	Marsh	3	T	A	48.38	2	41.34	black crappie
MAR	Marsh	3	T	A	48.38	4	82.68	darther
MAR	Marsh	3	T	A	48.38	2	41.34	pirate perch
MAR	Marsh	3	T	A	48.38	1	20.67	pygmy sunfish
MAR	Marsh	3	T	B	48.66	1	20.55	darther
MAR	Marsh	3	T	B	48.66	2	41.10	pygmy sunfish
MAR	Marsh	4	T	A	45.76	3	65.56	darther
MAR	Marsh	4	T	A	45.76	1	21.85	pygmy sunfish
MAR	Marsh	4	T	B	50.72	2	39.43	black crappie
MAR	Marsh	4	T	B	50.72	9	177.44	darther
MAR	Swamp	1	T	A	53.51	0	0.00	empty sample
MAR	Swamp	1	T	B	51.41	0	0.00	empty sample
MAR	Swamp	2	T	A	55.62	0	0.00	empty sample
MAR	Swamp	2	T	B	53.27	1	18.77	darther
MAR	Swamp	3	T	A	47.28	1	21.15	darther
MAR	Swamp	3	T	A	47.28	1	21.15	pirate perch
MAR	Swamp	3	T	A	47.28	4	84.60	pygmy sunfish
MAR	Swamp	3	T	B	47.97	4	83.39	darther
MAR	Swamp	3	T	B	47.97	3	62.54	pirate perch
MAR	Swamp	3	T	B	47.97	1	20.85	swampfish
MAR	Swamp	4	T	A	44.95	2	44.49	darther
MAR	Swamp	4	T	B	47.57	1	21.02	blackbanded darther
MAR	Swamp	4	T	B	47.57	2	42.04	darther
MAR	Swamp	4	T	B	47.57	2	42.04	pygmy sunfish
MAR	Channel	1	T	A	52.40	0	0.00	empty sample
MAR	Channel	1	T	B	49.72	2	40.22	darther
MAR	Channel	2	T	A	50.32	0	0.00	empty sample
MAR	Channel	2	T	B	50.12	0	0.00	empty sample
MAR	Channel	3	T	A	51.70	2	38.68	American shad
MAR	Channel	3	T	A	51.70	4	77.37	darther
MAR	Channel	3	T	A	51.70	1	19.34	pirate perch
MAR	Channel	3	T	B	51.80	1	19.31	American shad
MAR	Channel	3	T	B	51.80	1	19.31	darther
MAR	Channel	3	T	B	51.80	2	38.61	pygmy sunfish
MAR	Channel	4	T	A	50.06	2	39.95	darther
MAR	Channel	4	T	A	50.06	1	19.98	pirate perch
MAR	Channel	4	T	B	50.41	2	39.67	darther
MAR	Channel	4	T	B	50.41	2	39.67	pirate perch
MAR	Channel	4	T	B	50.41	1	19.84	pygmy sunfish
APR	Corridor	1	T	A	53.28	1	18.77	blackbanded darther
APR	Corridor	1	T	B	47.90	0	0.00	empty sample
APR	Corridor	2	T	A	48.13	1	20.78	blackbanded darther
APR	Corridor	2	T	A	48.13	1	20.78	spotted sucker
APR	Corridor	2	T	A	48.13	1	20.78	unknown

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
MAR	Marsh	2	T	B	51.99	0	0.00	empty sample
MAR	Marsh	3	T	A	48.38	2	41.34	black crappie
MAR	Marsh	3	T	A	48.38	4	82.68	darther
MAR	Marsh	3	T	A	48.38	2	41.34	pirate perch
MAR	Marsh	3	T	A	48.38	1	20.67	pygmy sunfish
MAR	Marsh	3	T	B	48.66	1	20.55	darther
MAR	Marsh	3	T	B	48.66	2	41.10	pygmy sunfish
MAR	Marsh	4	T	A	45.76	3	65.56	darther
MAR	Marsh	4	T	A	45.76	1	21.85	pygmy sunfish
MAR	Marsh	4	T	B	50.72	2	39.43	black crappie
MAR	Marsh	4	T	B	50.72	9	177.44	darther
MAR	Swamp	1	T	A	53.51	0	0.00	empty sample
MAR	Swamp	1	T	B	51.41	0	0.00	empty sample
MAR	Swamp	2	T	A	55.62	0	0.00	empty sample
MAR	Swamp	2	T	B	53.27	1	18.77	darther
MAR	Swamp	3	T	A	47.28	1	21.15	darther
MAR	Swamp	3	T	A	47.28	1	21.15	pirate perch
MAR	Swamp	3	T	A	47.28	4	84.60	pygmy sunfish
MAR	Swamp	3	T	B	47.97	4	83.39	darther
MAR	Swamp	3	T	B	47.97	3	62.54	pirate perch
MAR	Swamp	3	T	B	47.97	1	20.85	swampfish
MAR	Swamp	4	T	A	44.95	2	44.49	darther
MAR	Swamp	4	T	B	47.57	1	21.02	blackbanded darther
MAR	Swamp	4	T	B	47.57	2	42.04	darther
MAR	Swamp	4	T	B	47.57	2	42.04	pygmy sunfish
MAR	Channel	1	T	A	52.40	0	0.00	empty sample
MAR	Channel	1	T	B	49.72	2	40.22	darther
MAR	Channel	2	T	A	50.32	0	0.00	empty sample
MAR	Channel	2	T	B	50.12	0	0.00	empty sample
MAR	Channel	3	T	A	51.70	2	38.68	American shad
MAR	Channel	3	T	A	51.70	4	77.37	darther
MAR	Channel	3	T	A	51.70	1	19.34	pirate perch
MAR	Channel	3	T	B	51.80	1	19.31	American shad
MAR	Channel	3	T	B	51.80	1	19.31	darther
MAR	Channel	3	T	B	51.80	2	38.61	pygmy sunfish
MAR	Channel	4	T	A	50.06	2	39.95	darther
MAR	Channel	4	T	A	50.06	1	19.98	pirate perch
MAR	Channel	4	T	B	50.41	2	39.67	darther
MAR	Channel	4	T	B	50.41	2	39.67	pirate perch
MAR	Channel	4	T	B	50.41	1	19.84	pygmy sunfish
APR	Corridor	1	T	A	53.28	1	18.77	blackbanded darther
APR	Corridor	1	T	B	47.90	0	0.00	empty sample
APR	Corridor	2	T	A	48.13	1	20.78	blackbanded darther
APR	Corridor	2	T	A	48.13	1	20.78	spotted sucker
APR	Corridor	2	T	A	48.13	1	20.78	unknown

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
APR	Corridor	2	T	B	44.98	1	22.23	blackbanded darter
APR	Corridor	3	T	A	46.27	3	64.84	blackbanded darter
APR	Corridor	3	T	A	46.27	38	821.27	chubsucker
APR	Corridor	3	T	A	46.27	2	43.22	darter
APR	Corridor	3	T	A	46.27	3	64.84	ironcolor shiner
APR	Corridor	3	T	A	46.27	5	108.06	largemouth bass
APR	Corridor	3	T	A	46.27	16	345.80	minnow
APR	Corridor	3	T	A	46.27	3	64.84	pirate perch
APR	Corridor	3	T	A	46.27	1	21.61	spotted sucker
APR	Corridor	3	T	A	46.27	1	21.61	unknown
APR	Corridor	3	T	B	46.33	2	43.17	blackbanded darter
APR	Corridor	3	T	B	46.33	69	1489.32	chubsucker
APR	Corridor	3	T	B	46.33	1	21.58	darter
APR	Corridor	3	T	B	46.33	16	345.35	ironcolor shiner
APR	Corridor	3	T	B	46.33	7	151.09	largemouth bass
APR	Corridor	3	T	B	46.33	49	1057.63	minnow
APR	Corridor	3	T	B	46.33	6	129.51	pirate perch
APR	Corridor	3	T	B	46.33	2	43.17	spotted sucker
APR	Corridor	3	T	B	46.33	1	21.58	unknown
APR	Corridor	4	T	A	46.10	6	130.15	chubsucker
APR	Corridor	4	T	A	46.10	1	21.69	darters-general
APR	Corridor	4	T	A	46.10	5	108.46	minnow
APR	Corridor	4	T	B	42.51	1	23.52	bluespotted sunfish
APR	Corridor	4	T	B	42.51	8	188.19	chubsucker
APR	Corridor	4	T	B	42.51	1	23.52	darters-general
APR	Corridor	4	T	B	42.51	1	23.52	ironcolor shiner
APR	Corridor	4	T	B	42.51	6	141.14	minnow
APR	Marsh	1	T	A	46.11	1	21.69	brook silverside
APR	Marsh	1	T	A	46.11	1	21.69	chubsucker
APR	Marsh	1	T	A	46.11	2	43.37	darter
APR	Marsh	1	T	A	46.11	1	21.69	pirate perch
APR	Marsh	1	T	A	46.11	1	21.69	unknown
APR	Marsh	1	T	B	42.70	1	23.42	pirate perch
APR	Marsh	2	T	A	53.19	1	18.80	brook silverside
APR	Marsh	2	T	B	47.70	1	20.96	ironcolor shiner
APR	Marsh	2	T	B	47.70	1	20.96	pygmy sunfish
APR	Marsh	3	T	A	41.32	4	96.81	chubsucker
APR	Marsh	3	T	A	41.32	2	48.40	darter
APR	Marsh	3	T	A	41.32	13	314.62	ironcolor shiner
APR	Marsh	3	T	A	41.32	8	193.61	minnow
APR	Marsh	3	T	A	41.32	1	24.20	pirate perch
APR	Marsh	3	T	A	41.32	4	96.81	pygmy sunfish
APR	Marsh	3	T	B	46.40	12	258.62	chubsucker
APR	Marsh	3	T	B	46.40	22	474.14	ironcolor shiner
APR	Marsh	3	T	B	46.40	14	301.72	minnow

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
APR	Marsh	3	T	B	46.40	1	21.55	pirate perch
APR	Marsh	3	T	B	46.40	6	129.31	pygmy sunfish
APR	Marsh	4	T	A	46.88	1	21.33	chubsucker
APR	Marsh	4	T	A	46.88	6	127.99	ironcolor shiner
APR	Marsh	4	T	A	46.88	1	21.33	minnow
APR	Marsh	4	T	A	46.88	9	191.98	pirate perch
APR	Marsh	4	T	A	46.88	2	42.66	pygmy sunfish
APR	Marsh	4	T	B	57.43	1	17.41	black crappie
APR	Marsh	4	T	B	57.43	1	17.41	brook silverside
APR	Marsh	4	T	B	57.43	8	139.30	chubsucker
APR	Marsh	4	T	B	57.43	13	226.36	ironcolor shiner
APR	Marsh	4	T	B	57.43	2	34.83	largemouth bass
APR	Marsh	4	T	B	57.43	8	139.30	minnow
APR	Marsh	4	T	B	57.43	17	296.01	pirate perch
APR	Marsh	4	T	B	57.43	6	104.48	pygmy sunfish
APR	Marsh	4	T	B	57.43	1	17.41	unknown
APR	Marsh	4	T	B	57.43	1	17.41	warmouth
APR	Swamp	1	T	A	42.16	1	23.72	ironcolor shiner
APR	Swamp	1	T	B	43.57	2	45.90	ironcolor shiner
APR	Swamp	1	T	B	43.57	1	22.95	minnow
APR	Swamp	2	T	A	41.00	0	0.00	empty sample
APR	Swamp	2	T	B	44.45	2	44.99	brook silverside
APR	Swamp	2	T	B	44.45	1	22.50	pygmy sunfish
APR	Swamp	3	T	A	42.38	1	23.60	brook silverside
APR	Swamp	3	T	A	42.38	1	23.60	darter
APR	Swamp	3	T	A	42.38	6	141.58	ironcolor shiner
APR	Swamp	3	T	A	42.38	1	23.60	minnow
APR	Swamp	3	T	A	42.38	2	47.19	pirate perch
APR	Swamp	3	T	A	42.38	3	70.79	pygmy sunfish
APR	Swamp	3	T	B	50.00	2	40.00	chubsucker
APR	Swamp	3	T	B	50.00	8	160.00	ironcolor shiner
APR	Swamp	3	T	B	50.00	1	20.00	largemouth bass
APR	Swamp	3	T	B	50.00	1	20.00	minnow
APR	Swamp	3	T	B	50.00	1	20.00	pygmy sunfish
APR	Swamp	4	T	A	43.30	2	46.19	chubsucker
APR	Swamp	4	T	A	43.30	1	23.09	darter
APR	Swamp	4	T	A	43.30	5	115.47	ironcolor shiner
APR	Swamp	4	T	A	43.30	2	46.19	pirate perch
APR	Swamp	4	T	B	40.10	1	24.94	brook silverside
APR	Swamp	4	T	B	40.10	3	74.81	chubsucker
APR	Swamp	4	T	B	40.10	4	99.75	ironcolor shiner
APR	Swamp	4	T	B	40.10	3	74.81	pirate perch
APR	Swamp	4	T	B	40.10	1	24.94	pygmy sunfish
APR	Channel	1	B	A	58.48	1	17.10	American shad
APR	Channel	1	B	A	58.48	1	17.10	ironcolor shiner

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
APR	Channel	1	B	A	58.48	2	34.20	pygmy sunfish
APR	Channel	1	B	B	58.35	1	17.14	American shad
APR	Channel	1	B	B	58.35	2	34.28	black crappie
APR	Channel	1	B	B	58.35	2	34.28	chubsucker
APR	Channel	1	B	B	58.35	2	34.28	pygmy sunfish
APR	Channel	1	T	A	46.43	1	21.54	black crappie
APR	Channel	1	T	A	46.43	1	21.54	darter
APR	Channel	1	T	B	45.61	1	21.93	chubsucker
APR	Channel	2	B	A	50.75	2	39.41	American shad
APR	Channel	2	B	B	47.29	1	21.15	American shad
APR	Channel	2	B	B	47.29	1	21.15	black crappie
APR	Channel	2	B	B	47.29	1	21.15	ironcolor shiner
APR	Channel	2	T	A	42.74	2	46.79	black crappie
APR	Channel	2	T	A	42.74	1	23.40	brook silverside
APR	Channel	2	T	A	42.74	1	23.40	darter
APR	Channel	2	T	A	42.74	1	23.40	pygmy sunfish
APR	Channel	2	T	B	44.09	1	22.68	darter
APR	Channel	2	T	B	44.09	1	22.68	pygmy sunfish
APR	Channel	3	B	A	44.72	1	22.36	bluespotted sunfish
APR	Channel	3	B	A	44.72	10	223.61	chubsucker
APR	Channel	3	B	A	44.72	1	22.36	darter
APR	Channel	3	B	A	44.72	31	693.20	ironcolor shiner
APR	Channel	3	B	A	44.72	1	22.36	largemouth bass
APR	Channel	3	B	A	44.72	5	111.81	minnow
APR	Channel	3	B	A	44.72	5	111.81	pygmy sunfish
APR	Channel	3	B	A	44.72	3	67.08	warmouth
APR	Channel	3	B	B	42.51	33	776.29	American shad
APR	Channel	3	B	B	42.51	6	141.14	chubsucker
APR	Channel	3	B	B	42.51	1	23.52	darter
APR	Channel	3	B	B	42.51	26	611.62	ironcolor shiner
APR	Channel	3	B	B	42.51	4	94.10	minnow
APR	Channel	3	B	B	42.51	6	141.14	pygmy sunfish
APR	Channel	3	B	B	42.51	5	117.62	warmouth
APR	Channel	3	T	A	44.28	10	225.84	American shad
APR	Channel	3	T	A	44.28	1	22.58	brook silverside
APR	Channel	3	T	A	44.28	17	383.92	chubsucker
APR	Channel	3	T	A	44.28	40	903.34	ironcolor shiner
APR	Channel	3	T	A	44.28	6	135.50	minnow
APR	Channel	3	T	A	44.28	1	22.58	pirate perch
APR	Channel	3	T	A	44.28	5	112.92	pygmy sunfish
APR	Channel	3	T	A	44.28	4	90.33	warmouth
APR	Channel	3	T	B	41.91	11	262.47	American shad
APR	Channel	3	T	B	41.91	1	23.86	bluespotted sunfish
APR	Channel	3	T	B	41.91	1	23.86	brook silverside
APR	Channel	3	T	B	41.91	15	357.91	chubsucker

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
APR	Channel	3	T	B	41.91	2	47.72	darther
APR	Channel	3	T	B	41.91	54	1288.48	ironcolor shiner
APR	Channel	3	T	B	41.91	1	23.86	largemouth bass
APR	Channel	3	T	B	41.91	5	119.30	minnow
APR	Channel	3	T	B	41.91	4	95.44	pygmy sunfish
APR	Channel	3	T	B	41.91	4	95.44	warmouth
APR	Channel	4	B	A	45.70	8	175.05	American shad
APR	Channel	4	B	A	45.70	1	21.88	black crappie
APR	Channel	4	B	A	45.70	1	21.88	bluespotted sunfish
APR	Channel	4	B	A	45.70	1	21.88	chubsucker
APR	Channel	4	B	A	45.70	11	240.70	ironcolor shiner
APR	Channel	4	B	A	45.70	1	21.88	minnow
APR	Channel	4	B	A	45.70	5	109.41	pygmy sunfish
APR	Channel	4	B	A	45.70	4	87.53	warmouth
APR	Channel	4	B	B	44.09	4	90.72	American shad
APR	Channel	4	B	B	44.09	3	68.04	chubsucker
APR	Channel	4	B	B	44.09	8	181.45	ironcolor shiner
APR	Channel	4	B	B	44.09	3	68.04	minnow
APR	Channel	4	B	B	44.09	5	113.40	pirate perch
APR	Channel	4	B	B	44.09	5	113.40	pygmy sunfish
APR	Channel	4	B	B	44.09	2	45.36	warmouth
APR	Channel	4	T	A	45.40	1	22.03	American shad
APR	Channel	4	T	A	45.40	4	88.11	chubsucker
APR	Channel	4	T	A	45.40	1	22.03	darther
APR	Channel	4	T	A	45.40	19	418.50	ironcolor shiner
APR	Channel	4	T	A	45.40	6	132.16	minnow
APR	Channel	4	T	A	45.40	1	22.03	pirate perch
APR	Channel	4	T	A	45.40	3	66.08	pygmy sunfish
APR	Channel	4	T	A	45.40	1	22.03	unknown
APR	Channel	4	T	A	45.40	6	132.16	warmouth
APR	Channel	4	T	B	42.61	3	70.41	American shad
APR	Channel	4	T	B	42.61	3	70.41	bluespotted sunfish
APR	Channel	4	T	B	42.61	4	93.87	chubsucker
APR	Channel	4	T	B	42.61	1	23.47	darther
APR	Channel	4	T	B	42.61	25	586.72	ironcolor shiner
APR	Channel	4	T	B	42.61	2	46.94	minnow
APR	Channel	4	T	B	42.61	1	23.47	pygmy sunfish
APR	Channel	4	T	B	42.61	43	1009.15	warmouth
MAY	Corridor	1	T	A	52.04	6	115.30	herrings
MAY	Corridor	1	T	B	48.70	0	0.00	empty sample
MAY	Corridor	2	T	A	50.59	0	0.00	empty sample
MAY	Corridor	2	T	B	45.95	0	0.00	empty sample
MAY	Corridor	3	T	A	48.52	7	144.27	bullhead catfishes
MAY	Corridor	3	T	A	48.52	6	123.66	ironcolor shiner
MAY	Corridor	3	T	A	48.52	5	103.05	minnow

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
MAY	Corridor	3	T	A	48.52	5	103.05	redbreast sunfish
MAY	Corridor	3	T	A	48.52	41	845.01	sunfishes
MAY	Corridor	3	T	B	42.81	1	23.36	blackbanded darter
MAY	Corridor	3	T	B	42.81	1	23.36	chubsucker
MAY	Corridor	3	T	B	42.81	9	210.23	ironcolor shiner
MAY	Corridor	3	T	B	42.81	1	23.36	largemouth bass
MAY	Corridor	3	T	B	42.81	8	186.87	minnow
MAY	Corridor	3	T	B	42.81	5	116.80	redbreast sunfish
MAY	Corridor	3	T	B	42.81	37	864.28	sunfishes
MAY	Corridor	3	T	B	42.81	1	23.36	unknown
MAY	Corridor	3	T	B	42.81	6	140.15	unknown bullhead
MAY	Corridor	4	T	A	52.86	1	18.92	minnow
MAY	Corridor	4	T	A	52.86	3	56.75	redbreast sunfish
MAY	Corridor	4	T	A	52.86	1	18.92	sunfishes
MAY	Corridor	4	T	A	52.86	1	18.92	unknown
MAY	Corridor	4	T	A	52.86	1	18.92	unknown bullhead
MAY	Corridor	4	T	A	52.86	2	37.84	warmouth
MAY	Corridor	4	T	B	56.06	1	17.84	largemouth bass
MAY	Corridor	4	T	B	56.06	1	17.84	minnow
MAY	Corridor	4	T	B	56.06	1	17.84	redbreast sunfish
MAY	Corridor	4	T	B	56.06	3	53.51	sunfishes
MAY	Corridor	4	T	B	56.06	1	17.84	unknown
MAY	Corridor	4	T	B	56.06	2	35.68	warmouth
MAY	Channel	1	B	A	42.20	1	23.70	unknown
MAY	Channel	1	B	A	42.20	4	94.79	warmouth
MAY	Channel	1	B	B	42.02	1	23.80	unknown
MAY	Channel	1	B	B	42.02	5	118.99	warmouth
MAY	Channel	1	T	A	50.98	1	19.62	darter
MAY	Channel	1	T	A	50.98	1	19.62	ironcolor shiner
MAY	Channel	1	T	A	50.98	2	39.23	unknown
MAY	Channel	1	T	A	50.98	1	19.62	warmouth
MAY	Channel	1	T	B	51.60	0	0.00	empty sample
MAY	Channel	2	B	A	42.79	1	23.37	unknown
MAY	Channel	2	B	A	42.79	1	23.37	warmouth
MAY	Channel	2	B	B	42.16	2	47.44	warmouth
MAY	Channel	2	T	A	50.58	1	19.77	warmouth
MAY	Channel	2	T	B	50.19	1	19.92	warmouth
MAY	Channel	3	B	A	45.96	5	108.79	ironcolor shiner
MAY	Channel	3	B	A	45.96	1	21.76	unknown
MAY	Channel	3	B	A	45.96	3	65.27	warmouth
MAY	Channel	3	B	B	43.31	5	115.45	ironcolor shiner
MAY	Channel	3	B	B	43.31	2	46.18	minnow
MAY	Channel	3	B	B	43.31	18	415.61	unknown
MAY	Channel	3	B	B	43.31	1	23.09	unknown sucker
MAY	Channel	3	B	B	43.31	2	46.18	warmouth

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
MAY	Channel	3	T	A	41.63	6	144.13	ironcolor shiner
MAY	Channel	3	T	A	41.63	1	24.02	minnow
MAY	Channel	3	T	A	41.63	2	48.04	unknown
MAY	Channel	3	T	B	49.66	11	221.51	ironcolor shiner
MAY	Channel	3	T	B	49.66	9	181.23	minnow
MAY	Channel	3	T	B	49.66	1	20.14	unknown
MAY	Channel	3	T	B	49.66	1	20.14	warmouth
MAY	Channel	4	B	A	46.42	1	21.54	American shad
MAY	Channel	4	B	A	46.42	7	150.80	ironcolor shiner
MAY	Channel	4	B	A	46.42	1	21.54	minnow
MAY	Channel	4	B	A	46.42	21	452.39	warmouth
MAY	Channel	4	B	B	48.41	1	20.66	brook silverside
MAY	Channel	4	B	B	48.41	19	392.48	ironcolor shiner
MAY	Channel	4	B	B	48.41	5	103.28	minnow
MAY	Channel	4	B	B	48.41	28	578.39	warmouth
MAY	Channel	4	T	A	45.61	1	21.93	bluespotted sunfish
MAY	Channel	4	T	A	45.61	1	21.93	darter
MAY	Channel	4	T	A	45.61	46	1008.55	ironcolor shiner
MAY	Channel	4	T	A	45.61	4	87.70	minnow
MAY	Channel	4	T	A	45.61	1	21.93	sunfishes
MAY	Channel	4	T	A	45.61	1	21.93	unknown
MAY	Channel	4	T	A	45.61	46	1008.55	warmouth
MAY	Channel	4	T	B	53.12	3	56.48	bluespotted sunfish
MAY	Channel	4	T	B	53.12	1	18.83	brook silverside
MAY	Channel	4	T	B	53.12	2	37.65	darter
MAY	Channel	4	T	B	53.12	45	847.14	ironcolor shiner
MAY	Channel	4	T	B	53.12	3	56.48	minnow
MAY	Channel	4	T	B	53.12	1	18.83	sunfish
MAY	Channel	4	T	B	53.12	1	18.83	unknown
MAY	Channel	4	T	B	53.12	56	1054.22	warmouth
JUN	Corridor	1	T	A	43.60	0	0.00	empty sample
JUN	Corridor	1	T	B	43.81	0	0.00	empty sample
JUN	Corridor	2	T	A	47.67	1	20.98	blackside darters
JUN	Corridor	2	T	B	45.79	0	0.00	empty sample
JUN	Corridor	3	T	A	44.59	1	22.43	ironcolor shiner
JUN	Corridor	3	T	A	44.59	1	22.43	redbreast sunfish
JUN	Corridor	3	T	A	44.59	3	67.28	shiner
JUN	Corridor	3	T	A	44.59	21	470.96	sunfishes
JUN	Corridor	3	T	A	44.59	1	22.43	unknown
JUN	Corridor	3	T	B	44.80	1	22.32	blackbanded darter
JUN	Corridor	3	T	B	44.80	3	66.96	ironcolor shiner
JUN	Corridor	3	T	B	44.80	1	22.32	minnow
JUN	Corridor	3	T	B	44.80	1	22.32	shiner
JUN	Corridor	3	T	B	44.80	25	558.04	sunfishes
JUN	Corridor	3	T	B	44.80	1	22.32	unknown

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
JUN	Corridor	3	T	B	44.80	1	22.32	warmouth
JUN	Corridor	4	T	A	48.89	3	61.36	sunfishes
JUN	Corridor	4	T	A	48.89	1	20.45	warmouth
JUN	Corridor	4	T	B	47.16	2	42.41	ironcolor shiner
JUN	Corridor	4	T	B	47.16	1	21.20	shiner
JUN	Marsh	1	T	A	43.07	0	0.00	empty sample
JUN	Marsh	1	T	B	47.38	0	0.00	empty sample
JUN	Marsh	2	T	A	45.17	1	22.14	warmouth
JUN	Marsh	2	T	B	44.68	0	0.00	empty sample
JUN	Marsh	3	T	A	51.40	3	58.37	brook silverside
JUN	Marsh	3	T	A	51.40	2	38.91	ironcolor shiner
JUN	Marsh	3	T	A	51.40	5	97.28	minnow
JUN	Marsh	3	T	A	51.40	1	19.46	sunfishes
JUN	Marsh	3	T	B	53.60	1	18.66	brook silverside
JUN	Marsh	3	T	B	53.60	8	149.25	ironcolor shiner
JUN	Marsh	3	T	B	53.60	3	55.97	minnow
JUN	Marsh	3	T	B	53.60	1	18.66	sunfish
JUN	Marsh	4	T	A	43.70	1	22.88	minnow
JUN	Marsh	4	T	A	43.70	3	68.65	sunfishes
JUN	Marsh	4	T	B	54.90	8	145.72	minnow
JUN	Marsh	4	T	B	54.90	3	54.64	sunfishes
JUN	Swamp	1	T	A	48.12	0	0.00	empty sample
JUN	Swamp	1	T	B	43.08	0	0.00	empty sample
JUN	Swamp	2	T	A	42.47	0	0.00	empty sample
JUN	Swamp	2	T	B	47.75	0	0.00	empty sample
JUN	Swamp	3	T	A	40.75	1	24.54	brook silverside
JUN	Swamp	3	T	A	40.75	12	294.48	ironcolor shiner
JUN	Swamp	3	T	A	40.75	3	73.62	minnow
JUN	Swamp	3	T	A	40.75	9	220.86	sunfishes
JUN	Swamp	3	T	B	52.94	1	18.89	brook silverside
JUN	Swamp	3	T	B	52.94	22	415.56	ironcolor shiner
JUN	Swamp	3	T	B	52.94	4	75.56	minnow
JUN	Swamp	3	T	B	52.94	5	94.45	sunfishes
JUN	Swamp	4	T	A	42.56	1	23.50	ironcolor shiner
JUN	Swamp	4	T	A	42.56	6	140.98	minnow
JUN	Swamp	4	T	A	42.56	1	23.50	sunfishes
JUN	Swamp	4	T	A	42.56	1	23.50	unknown
JUN	Swamp	4	T	A	42.56	15	352.44	warmouth
JUN	Swamp	4	T	B	47.35	5	105.60	ironcolor shiner
JUN	Swamp	4	T	B	47.35	5	105.60	minnow
JUN	Swamp	4	T	B	47.35	2	42.24	sunfishes
JUN	Swamp	4	T	B	47.35	1	21.12	unknown
JUN	Swamp	4	T	B	47.35	7	147.84	warmouth
JUN	Channel	1	T	A	43.58	1	22.95	sunfish
JUN	Channel	1	T	B	43.75	0	0.00	empty sample

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
JUN	Channel	2	T	A	48.73	0	0.00	empty sample
JUN	Channel	2	T	B	48.72	0	0.00	empty sample
JUN	Channel	3	T	A	45.58	1	21.94	brook silverside
JUN	Channel	3	T	B	46.00	0	0.00	empty sample
JUN	Channel	4	T	A	49.74	8	160.85	ironcolor shiner
JUN	Channel	4	T	A	49.74	1	20.11	minnow
JUN	Channel	4	T	A	49.74	4	80.43	sunfishes
JUN	Channel	4	T	A	49.74	1	20.11	unknown
JUN	Channel	4	T	A	49.74	3	60.32	warmouth
JUN	Channel	4	T	B	51.13	4	78.23	ironcolor shiner
JUN	Channel	4	T	B	51.13	1	19.56	minnow
JUN	Channel	4	T	B	51.13	5	97.79	sunfishes
JUN	Channel	4	T	B	51.13	3	58.68	warmouth
JUL	Corridor	1	T	A	56.57	1	17.68	shad
JUL	Corridor	1	T	B	47.11	0	0.00	empty sample
JUL	Corridor	2	T	A	55.73	1	17.94	brook silverside
JUL	Corridor	2	T	B	50.65	0	0.00	empty sample
JUL	Corridor	3	T	A	44.54	1	22.45	ironcolor shiner
JUL	Corridor	3	T	B	42.47	0	0.00	empty sample
JUL	Corridor	4	T	A	41.96	0	0.00	empty sample
JUL	Corridor	4	T	B	47.74	1	20.95	ironcolor shiner
JUL	Corridor	4	T	B	47.74	1	20.95	redbreast sunfish
JUL	Marsh	1	T	A	44.81	0	0.00	empty sample
JUL	Marsh	1	T	B	44.60	0	0.00	empty sample
JUL	Marsh	2	T	A	41.24	0	0.00	empty sample
JUL	Marsh	2	T	B	41.08	0	0.00	empty sample
JUL	Swamp	1	T	A	48.34	0	0.00	empty sample
JUL	Swamp	1	T	B	46.21	0	0.00	empty sample
JUL	Swamp	2	T	A	50.63	1	19.75	blackbanded darter
JUL	Swamp	2	T	B	45.60	0	0.00	empty sample
JUL	Swamp	3	T	A	41.31	1	24.21	ironcolor shiner
JUL	Swamp	3	T	A	41.31	1	24.21	minnow
JUL	Swamp	3	T	B	41.54	2	48.15	ironcolor shiner
JUL	Swamp	4	T	A	51.51	1	19.41	brook silverside
JUL	Swamp	4	T	A	51.51	1	19.41	ironcolor shiner
JUL	Swamp	4	T	B	49.06	1	20.38	ironcolor shiner
JUL	Channel	1	T	A	47.77	0	0.00	empty sample
JUL	Channel	1	T	B	49.43	0	0.00	empty sample
JUL	Channel	2	T	A	48.73	0	0.00	empty sample
JUL	Channel	2	T	B	50.22	0	0.00	empty sample
JUL	Channel	3	T	A	47.75	1	20.94	brook silverside
JUL	Channel	3	T	A	47.75	2	41.88	sunfishes
JUL	Channel	3	T	A	47.75	1	20.94	topminnows
JUL	Channel	3	T	B	45.81	1	21.83	brook silverside
JUL	Channel	3	T	B	45.81	1	21.83	minnow

Appendix Table 4 (continued).

Listing of individual diel ichthyoplankton samples.

MONTH	STATION	PERIOD	TOPBOT	REPLICA	VOLUME	COUNT	DENSITY	COMMON NAME
JUL	Channel	4	T	A	46.06	1	21.71	brook silverside
JUL	Channel	4	T	A	46.06	1	21.71	topminnows
JUL	Channel	4	T	B	48.64	4	82.24	ironcolor shiner
JUL	Channel	4	T	B	48.64	1	20.56	sunfishes
JUL	Channel	4	T	B	48.64	2	41.12	topminnows
JUL	Channel	4	T	B	48.64	3	61.68	warmouth

Appendix Table 5.

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>03JAN91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	.
American shad	0.00	.	0.00	.	0.00	.	0.00	.
shad	0.00	.	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	.
minnow	0.00	.	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	.
chubsucker	0.00	.	0.00	.	0.00	.	0.00	.
pirate perch	0.00	.	0.00	.	0.00	.	0.00	.
brook silverside	0.00	.	0.00	.	0.00	.	0.00	.
sunfishes	0.00	.	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	.
sunfish	0.00	.	0.00	.	0.00	.	0.00	.
warmouth	0.00	.	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	.
black crappie	0.00	.	0.00	.	0.00	.	0.00	.
darter	0.00	.	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	.
darters-general	0.00	.	0.00	.	0.00	.	0.00	.
unknown	0.00	.	0.00	.	0.00	.	0.00	.
TOTAL	0.00	.	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>18JAN91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	.
American shad	0.00	.	0.00	.	0.00	.	0.00	.
shad	0.00	.	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	.
minnow	0.00	.	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	.
chubsucker	0.00	.	0.00	.	0.00	.	0.00	.
pirate perch	0.00	.	0.00	.	0.00	.	0.00	.
brook silverside	0.00	.	0.00	.	0.00	.	0.00	.
sunfishes	0.00	.	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	.
sunfish	0.00	.	0.00	.	0.00	.	0.00	.
warmouth	0.00	.	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	.
black crappie	0.00	.	0.00	.	0.00	.	0.00	.
darter	0.00	.	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	.
darters-general	0.00	.	0.00	.	0.00	.	0.00	.
unknown	0.00	.	0.00	.	0.00	.	0.00	.
TOTAL	0.00	.	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>31JAN91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	.
American shad	0.00	.	0.00	.	0.00	.	0.00	.
shad	0.00	.	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	.
minnow	0.00	.	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	.
chubsucker	0.00	.	0.00	.	0.00	.	0.00	.
pirate perch	0.00	.	0.00	.	0.00	.	0.00	.
brook silverside	0.00	.	0.00	.	0.00	.	0.00	.
sunfishes	0.00	.	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	.
sunfish	0.00	.	0.00	.	0.00	.	0.00	.
warmouth	0.00	.	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	.
black crappie	0.00	.	0.00	.	0.00	.	0.00	.
darter	0.00	.	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	.
darters-general	0.00	.	0.00	.	0.00	.	0.00	.
unknown	0.00	.	0.00	.	0.00	.	0.00	.
TOTAL	0.00	.	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>14FEB91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	.
American shad	0.00	.	0.00	.	0.00	.	0.00	.
shad	0.00	.	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	.
minnow	0.00	.	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	.
chubsucker	0.00	.	0.00	.	0.00	.	0.00	.
pirate perch	0.00	.	0.00	.	0.00	.	0.00	.
brook silverside	0.00	.	0.00	.	0.00	.	0.00	.
sunfishes	0.00	.	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	.
sunfish	0.00	.	0.00	.	0.00	.	0.00	.
warmouth	0.00	.	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	.
black crappie	0.00	.	0.00	.	0.00	.	0.00	.
darter	0.00	.	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	.
darters-general	0.00	.	0.00	.	0.00	.	0.00	.
unknown	0.00	.	0.00	.	0.00	.	0.00	.
TOTAL	0.00	.	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	%
<u>28FEB91</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
threadfin shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
pygmy sunfish	0.00	0.00	9.76	51.16	0.00	0.00	0.00	.
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
darter	0.00	0.00	9.32	48.84	0.00	0.00	0.00	.
blackbanded darter	9.96	100.0	0.00	0.00	0.00	0.00	0.00	.
darters-general	0.00	0.00	0.00	0.00	10.75	100.0	0.00	.
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.
TOTAL	9.96	100.0	19.08	100.0	10.75	100.0	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	CORRIDOR		MARSH		SWAMP		CHANNEL	
	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	% DENSITY
<u>14MAR91</u>								
herrings	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
threadfin shad	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
chubsucker	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
black crappie	0.00	0.00	19.14	66.38	0.00	.	0.00	0.00
darter	0.00	0.00	9.69	33.62	0.00	.	20.11	100.0
blackbanded darter	19.13	100.0	0.00	0.00	0.00	.	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00
TOTAL	19.13	100.0	28.83	100.0	0.00	.	20.11	100.0

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>28MAR91</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
threadfin shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	20.28	100.0
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	33.23	100.0	0.00	0.00	12.18	100.0	0.00	0.00
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	11.27	100.0	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	33.23	100.0	11.27	100.0	12.18	100.0	20.28	100.0

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	CORRIDOR		MARSH		SWAMP		CHANNEL	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>11APR91</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
threadfin shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chubsucker	0.00	0.00	49.36	51.19	9.91	24.44	4.96	44.49
pirate perch	0.00	0.00	0.00	0.00	9.91	24.44	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	8.70	49.16	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	9.00	50.84	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	0.00	0.00	0.00	6.19	55.51
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	47.07	48.81	20.73	51.13	0.00	0.00
TOTAL	17.70	100.0	96.43	100.0	40.54	100.0	11.14	100.0

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>25APR91</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	8.56	13.51
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
threadfin shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	11.48	24.79	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	34.81	75.21	4.27	6.75
chubsucker	0.00	0.00	10.84	14.12	0.00	0.00	14.05	22.18
pirate perch	0.00	0.00	22.55	29.38	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	10.84	14.12	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	17.12	27.03
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	13.95	22.03
darter	0.00	0.00	21.69	28.25	0.00	0.00	5.38	8.50
blackbanded darter	9.38	100.0	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	10.84	14.12	0.00	0.00	0.00	0.00
TOTAL	9.38	100.0	76.77	100.0	46.29	100.0	63.34	100.0

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>09MAY91</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	5.48	5.85
American shad	0.00	0.00	0.00	0.00	0.00	0.00	4.86	5.19
shad	0.00	0.00	33.23	49.86	0.00	0.00	4.68	5.00
threadfin shad	0.00	0.00	11.26	16.90	10.50	12.25	4.26	4.55
chain pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	21.30	24.83	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	4.26	4.55
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	10.79	12.58	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	10.96	11.71
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	22.15	33.24	32.38	37.75	50.61	54.05
largemouth bass	10.58	17.71	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	0.00	10.79	12.58	8.52	9.10
blackbanded darter	49.18	82.29	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	59.77	100.0	66.65	100.0	85.77	100.0	93.64	100.0

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>23MAY91</u>								
herrings	57.65	100.0	0.00	0.00				
American shad	0.00	0.00	0.00	0.00				
shad	0.00	0.00	0.00	0.00				
threadfin shad	0.00	0.00	0.00	0.00				
chain pickerel	0.00	0.00	0.00	0.00				
minnow	0.00	0.00	0.00	0.00				
ironcolor shiner	0.00	0.00	4.90	5.46				
chubsucker	0.00	0.00	0.00	0.00				
pirate perch	0.00	0.00	0.00	0.00				
brook silverside	0.00	0.00	0.00	0.00				
sunfishes	0.00	0.00	0.00	0.00				
pygmy sunfish	0.00	0.00	0.00	0.00				
bluespotted sunfish	0.00	0.00	0.00	0.00				
sunfish	0.00	0.00	0.00	0.00				
warmouth	0.00	0.00	58.35	64.95				
largemouth bass	0.00	0.00	0.00	0.00				
black crappie	0.00	0.00	0.00	0.00				
darter	0.00	0.00	4.90	5.46				
blackbanded darter	0.00	0.00	0.00	0.00				
darters-general	0.00	0.00	0.00	0.00				
unknown	0.00	0.00	21.68	24.13				
TOTAL	57.65	100.0	89.84	100.0				

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	CORRIDOR		MARSH		SWAMP		CHANNEL	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>06JUN91</u>								
herrings	0.00	.	0.00	0.00	0.00	0.00	0.00	
American shad	0.00	.	0.00	0.00	0.00	0.00	0.00	
shad	0.00	.	0.00	0.00	0.00	0.00	0.00	
threadfin shad	0.00	.	0.00	0.00	0.00	0.00	0.00	
chain pickerel	0.00	.	0.00	0.00	0.00	0.00	0.00	
minnow	0.00	.	12.50	4.53	0.00	0.00	0.00	
ironcolor shiner	0.00	.	144.20	52.27	21.02	13.31		
chubsucker	0.00	.	0.00	0.00	0.00	0.00	0.00	
pirate perch	0.00	.	0.00	0.00	0.00	0.00	0.00	
brook silverside	0.00	.	24.03	8.71	0.00	0.00		
sunfishes	0.00	.	0.00	0.00	0.00	0.00	0.00	
pygmy sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	
bluespotted sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	
sunfish	0.00	.	48.07	17.42	21.02	13.31		
warmouth	0.00	.	0.00	0.00	105.45	66.77		
largemouth bass	0.00	.	47.10	17.07	10.43	6.60		
black crappie	0.00	.	0.00	0.00	0.00	0.00	0.00	
darter	0.00	.	0.00	0.00	0.00	0.00	0.00	
blackbanded darter	0.00	.	0.00	0.00	0.00	0.00	0.00	
darters-general	0.00	.	0.00	0.00	0.00	0.00	0.00	
unknown	0.00	.	0.00	0.00	0.00	0.00	0.00	
TOTAL	0.00	.	275.91	100.0	157.92	100.0		

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	% DENSITY
<u>20JUN91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	0.00
American shad	0.00	.	0.00	.	0.00	.	0.00	0.00
shad	0.00	.	0.00	.	0.00	.	0.00	0.00
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	0.00
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	0.00
minnow	0.00	.	0.00	.	0.00	.	0.00	0.00
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	0.00
chubsucker	0.00	.	0.00	.	0.00	.	0.00	0.00
pirate perch	0.00	.	0.00	.	0.00	.	0.00	0.00
brook silverside	0.00	.	0.00	.	0.00	.	0.00	0.00
sunfishes	0.00	.	0.00	.	0.00	.	0.00	0.00
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	0.00
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	0.00
sunfish	0.00	.	0.00	.	0.00	.	11.47	100.0
warmouth	0.00	.	0.00	.	0.00	.	0.00	0.00
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	0.00
black crappie	0.00	.	0.00	.	0.00	.	0.00	0.00
darter	0.00	.	0.00	.	0.00	.	0.00	0.00
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	0.00
darters-general	0.00	.	0.00	.	0.00	.	0.00	0.00
unknown	0.00	.	0.00	.	0.00	.	0.00	0.00
TOTAL	0.00	.	0.00	.	0.00	.	11.47	100.0

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	CORRIDOR		MARSH		SWAMP		CHANNEL	
	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	% DENSITY	DENSITY	% DENSITY
<u>03JUL91</u>								
herrings	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
threadfin shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
chain pickerel	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	.	10.27	53.32	11.28	100.0		
chubsucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	.	8.99	46.68	0.00	0.00		
pygmy sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	.	19.26	100.0	11.28	100.0		

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>18JUL91</u>								
herrings	0.00	0.00	0.00	.	0.00	.	0.00	.
American shad	0.00	0.00	0.00	.	0.00	.	0.00	.
shad	8.84	100.0	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	0.00	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	0.00	0.00	.	0.00	.	0.00	.
minnow	0.00	0.00	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	0.00	0.00	.	0.00	.	0.00	.
chubsucker	0.00	0.00	0.00	.	0.00	.	0.00	.
pirate perch	0.00	0.00	0.00	.	0.00	.	0.00	.
brook silverside	0.00	0.00	0.00	.	0.00	.	0.00	.
sunfishes	0.00	0.00	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	0.00	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	0.00	0.00	.	0.00	.	0.00	.
sunfish	0.00	0.00	0.00	.	0.00	.	0.00	.
warmouth	0.00	0.00	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	0.00	0.00	.	0.00	.	0.00	.
black crappie	0.00	0.00	0.00	.	0.00	.	0.00	.
darter	0.00	0.00	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	0.00	0.00	.	0.00	.	0.00	.
darters-general	0.00	0.00	0.00	.	0.00	.	0.00	.
unknown	0.00	0.00	0.00	.	0.00	.	0.00	.
TOTAL	8.84	100.0	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	CORRIDOR	MARSH	SWAMP	CHANNEL
	DENSITY	% DENSITY	% DENSITY	% DENSITY
<u>08AUG91</u>				
herrings	0.00	.	0.00	0.00
American shad	0.00	.	0.00	0.00
shad	0.00	.	0.00	0.00
threadfin shad	0.00	.	0.00	0.00
chain pickerel	0.00	.	0.00	0.00
minnow	0.00	.	0.00	0.00
ironcolor shiner	0.00	.	9.90	100.0
chubsucker	0.00	.	0.00	0.00
pirate perch	0.00	.	0.00	0.00
brook silverside	0.00	.	0.00	0.00
sunfishes	0.00	.	0.00	0.00
pygmy sunfish	0.00	.	0.00	0.00
bluespotted sunfish	0.00	.	0.00	0.00
sunfish	0.00	.	0.00	0.00
warmouth	0.00	.	0.00	0.00
largemouth bass	0.00	.	0.00	0.00
black crappie	0.00	.	0.00	0.00
darter	0.00	.	0.00	0.00
blackbanded darter	0.00	.	0.00	0.00
darters-general	0.00	.	0.00	0.00
unknown	0.00	.	0.00	0.00
TOTAL	0.00	.	9.90	100.0

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
SPECIES	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>20SEP91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	.
American shad	0.00	.	0.00	.	0.00	.	0.00	.
shad	0.00	.	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	.
minnow	0.00	.	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	.
chubsucker	0.00	.	0.00	.	0.00	.	0.00	.
pirate perch	0.00	.	0.00	.	0.00	.	0.00	.
brook silverside	0.00	.	0.00	.	0.00	.	0.00	.
sunfishes	0.00	.	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	.
sunfish	0.00	.	0.00	.	0.00	.	0.00	.
warmouth	0.00	.	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	.
black crappie	0.00	.	0.00	.	0.00	.	0.00	.
darter	0.00	.	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	.
darters-general	0.00	.	0.00	.	0.00	.	0.00	.
unknown	0.00	.	0.00	.	0.00	.	0.00	.
TOTAL	0.00	.	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>15OCT91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	.
American shad	0.00	.	0.00	.	0.00	.	0.00	.
shad	0.00	.	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	.
minnow	0.00	.	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	.
chubsucker	0.00	.	0.00	.	0.00	.	0.00	.
pirate perch	0.00	.	0.00	.	0.00	.	0.00	.
brook silverside	0.00	.	0.00	.	0.00	.	0.00	.
sunfishes	0.00	.	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	.
sunfish	0.00	.	0.00	.	0.00	.	0.00	.
warmouth	0.00	.	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	.
black crappie	0.00	.	0.00	.	0.00	.	0.00	.
darter	0.00	.	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	.
darters-general	0.00	.	0.00	.	0.00	.	0.00	.
unknown	0.00	.	0.00	.	0.00	.	0.00	.
TOTAL	0.00	.	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>21NOV91</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	.
American shad	0.00	.	0.00	.	0.00	.	0.00	.
shad	0.00	.	0.00	.	0.00	.	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	.	0.00	.
chain pickerel	0.00	.	0.00	.	0.00	.	0.00	.
minnow	0.00	.	0.00	.	0.00	.	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	.
chubsucker	0.00	.	0.00	.	0.00	.	0.00	.
pirate perch	0.00	.	0.00	.	0.00	.	0.00	.
brook silverside	0.00	.	0.00	.	0.00	.	0.00	.
sunfishes	0.00	.	0.00	.	0.00	.	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	.
sunfish	0.00	.	0.00	.	0.00	.	0.00	.
warmouth	0.00	.	0.00	.	0.00	.	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	.
black crappie	0.00	.	0.00	.	0.00	.	0.00	.
darter	0.00	.	0.00	.	0.00	.	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	.
darters-general	0.00	.	0.00	.	0.00	.	0.00	.
unknown	0.00	.	0.00	.	0.00	.	0.00	.
TOTAL	0.00	.	0.00	.	0.00	.	0.00	.

Appendix Table 5 (continued).

Mean ichthyoplankton density at each station in Steel Creek for each species during each diurnal sampling period in 1991.

SPECIES	<u>CORRIDOR</u>		<u>MARSH</u>		<u>SWAMP</u>		<u>CHANNEL</u>	
	DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	% DENSITY	%
<u>17DEC91</u>								
herrings	0.00	.	0.00	.	0.00	0.00	0.00	.
American shad	0.00	.	0.00	.	0.00	0.00	0.00	.
shad	0.00	.	0.00	.	0.00	0.00	0.00	.
threadfin shad	0.00	.	0.00	.	0.00	0.00	0.00	.
chain pickerel	0.00	.	0.00	.	11.45	100.0	0.00	.
minnow	0.00	.	0.00	.	0.00	0.00	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	0.00	0.00	.
chubsucker	0.00	.	0.00	.	0.00	0.00	0.00	.
pirate perch	0.00	.	0.00	.	0.00	0.00	0.00	.
brook silverside	0.00	.	0.00	.	0.00	0.00	0.00	.
sunfishes	0.00	.	0.00	.	0.00	0.00	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
warmouth	0.00	.	0.00	.	0.00	0.00	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	0.00	0.00	.
black crappie	0.00	.	0.00	.	0.00	0.00	0.00	.
darter	0.00	.	0.00	.	0.00	0.00	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	0.00	0.00	.
darters-general	0.00	.	0.00	.	0.00	0.00	0.00	.
un. own	0.00	.	0.00	.	0.00	0.00	0.00	.
TOTAL	0.00	.	0.00	.	11.45	100.0	0.00	.

Appendix Table 6.

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Corridor							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>February</u>								
herrings	0.00	.	0.00	.	0.00	0.00	0.00	.
American shad	0.00	.	0.00	.	0.00	0.00	0.00	.
shad	0.00	.	0.00	.	0.00	0.00	0.00	.
pickerel	0.00	.	0.00	.	0.00	0.00	0.00	.
minnow	0.00	.	0.00	.	0.00	0.00	0.00	.
shiner	0.00	.	0.00	.	0.00	0.00	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	0.00	0.00	.
chubsucker	0.00	.	0.00	.	0.00	0.00	0.00	.
spotted sucker	0.00	.	0.00	.	0.00	0.00	0.00	.
unknown sucker	0.00	.	0.00	.	0.00	0.00	0.00	.
bullhead catfishes	0.00	.	0.00	.	0.00	0.00	0.00	.
swampfish	0.00	.	0.00	.	0.00	0.00	0.00	.
pirate perch	0.00	.	0.00	.	0.00	0.00	0.00	.
topminnows	0.00	.	0.00	.	0.00	0.00	0.00	.
brook silverside	0.00	.	0.00	.	0.00	0.00	0.00	.
sunfishes	0.00	.	0.00	.	0.00	0.00	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
redbreast sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
warmouth	0.00	.	0.00	.	0.00	0.00	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	0.00	0.00	.
black crappie	0.00	.	0.00	.	0.00	0.00	0.00	.
darter	0.00	.	0.00	.	0.00	0.00	0.00	.
blackside darters	0.00	.	0.00	.	0.00	0.00	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	0.00	0.00	.
darters-general	0.00	.	0.00	.	0.00	0.00	0.00	.
unknown	0.00	.	0.00	.	9.63	100.0	0.00	.
unknown bullhead	0.00	.	0.00	.	0.00	0.00	0.00	.
TOTAL	0.00	.	0.00	.	9.63	100.0	0.00	.

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Marsh							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>February</u>								
herrings	0.00	.	0.00	.	0.00	0.00	0.00	.
American shad	0.00	.	0.00	.	0.00	0.00	0.00	.
shad	0.00	.	0.00	.	0.00	0.00	0.00	.
pickerel	0.00	.	0.00	.	0.00	0.00	0.00	.
minnow	0.00	.	0.00	.	0.00	0.00	0.00	.
shiner	0.00	.	0.00	.	0.00	0.00	0.00	.
ironcolor shiner	0.00	.	0.00	.	0.00	0.00	0.00	.
chubsucker	0.00	.	0.00	.	0.00	0.00	0.00	.
spotted sucker	0.00	.	0.00	.	0.00	0.00	0.00	.
unknown sucker	0.00	.	0.00	.	0.00	0.00	0.00	.
bullhead catfishes	0.00	.	0.00	.	0.00	0.00	0.00	.
swampfish	0.00	.	0.00	.	0.00	0.00	0.00	.
pirate perch	0.00	.	0.00	.	0.00	0.00	0.00	.
topminnows	0.00	.	0.00	.	0.00	0.00	0.00	.
brook silverside	0.00	.	0.00	.	0.00	0.00	0.00	.
sunfishes	0.00	.	0.00	.	0.00	0.00	0.00	.
pygmy sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
bluespotted sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
redbreast sunfish	0.00	.	0.00	.	0.00	0.00	0.00	.
warmouth	0.00	.	0.00	.	0.00	0.00	0.00	.
largemouth bass	0.00	.	0.00	.	0.00	0.00	0.00	.
black crappie	0.00	.	0.00	.	0.00	0.00	0.00	.
darter	0.00	.	0.00	.	32.55	100.0	0.00	.
blackside darters	0.00	.	0.00	.	0.00	0.00	0.00	.
blackbanded darter	0.00	.	0.00	.	0.00	0.00	0.00	.
darters-general	0.00	.	0.00	.	0.00	0.00	0.00	.
unknown	0.00	.	0.00	.	0.00	0.00	0.00	.
unknown bullhead	0.00	.	0.00	.	0.00	0.00	0.00	.
TOTAL	0.00	.	0.00	.	32.55	100.0	0.00	.

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Swamp							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>February</u>								
herrings	0.00	.	0.00	.	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	.	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	.	0.00	0.00	0.00	0.00
pickerel	0.00	.	0.00	.	0.00	0.00	10.04	29.43
minnow	0.00	.	0.00	.	0.00	0.00	0.00	0.00
shiner	0.00	.	0.00	.	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	.	0.00	.	0.00	0.00	0.00	0.00
chubsucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
spotted sucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown sucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	.	0.00	.	0.00	0.00	0.00	0.00
swampfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
pirate perch	0.00	.	0.00	.	0.00	0.00	0.00	0.00
topminnows	0.00	.	0.00	.	0.00	0.00	0.00	0.00
brook silverside	0.00	.	0.00	.	0.00	0.00	0.00	0.00
sunfishes	0.00	.	0.00	.	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
warmouth	0.00	.	0.00	.	0.00	0.00	0.00	0.00
largemouth bass	0.00	.	0.00	.	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	.	0.00	0.00	0.00	0.00
darter	0.00	.	0.00	.	30.46	100.0	24.08	70.57
blackside darters	0.00	.	0.00	.	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	0.00	.	0.00	0.00	0.00	0.00
darters-general	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown bullhead	0.00	.	0.00	.	0.00	0.00	0.00	0.00
TOTAL	0.00	.	0.00	.	30.46	100.0	34.13	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Channel							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>February</u>								
herrings	0.00	.	0.00	.	0.00	.	0.00	0.00
American shad	0.00	.	0.00	.	0.00	.	0.00	0.00
shad	0.00	.	0.00	.	0.00	.	0.00	0.00
pickerel	0.00	.	0.00	.	0.00	.	0.00	0.00
minnow	0.00	.	0.00	.	0.00	.	0.00	0.00
shiner	0.00	.	0.00	.	0.00	.	0.00	0.00
ironcolor shiner	0.00	.	0.00	.	0.00	.	0.00	0.00
chubsucker	0.00	.	0.00	.	0.00	.	0.00	0.00
spotted sucker	0.00	.	0.00	.	0.00	.	0.00	0.00
unknown sucker	0.00	.	0.00	.	0.00	.	0.00	0.00
bullhead catfishes	0.00	.	0.00	.	0.00	.	0.00	0.00
swampfish	0.00	.	0.00	.	0.00	.	0.00	0.00
pirate perch	0.00	.	0.00	.	0.00	.	0.00	0.00
topminnows	0.00	.	0.00	.	0.00	.	0.00	0.00
brook silverside	0.00	.	0.00	.	0.00	.	0.00	0.00
sunfishes	0.00	.	0.00	.	0.00	.	0.00	0.00
pygmy sunfish	0.00	.	0.00	.	0.00	.	0.00	0.00
bluespotted sunfish	0.00	.	0.00	.	0.00	.	0.00	0.00
sunfish	0.00	.	0.00	.	0.00	.	0.00	0.00
redbreast sunfish	0.00	.	0.00	.	0.00	.	0.00	0.00
warmouth	0.00	.	0.00	.	0.00	.	0.00	0.00
largemouth bass	0.00	.	0.00	.	0.00	.	0.00	0.00
black crappie	0.00	.	0.00	.	0.00	.	0.00	0.00
darter	0.00	.	0.00	.	0.00	.	27.97	100.0
blackside darters	0.00	.	0.00	.	0.00	.	0.00	0.00
blackbanded darter	0.00	.	0.00	.	0.00	.	0.00	0.00
darters-general	0.00	.	0.00	.	0.00	.	0.00	0.00
unknown	0.00	.	0.00	.	0.00	.	0.00	0.00
unknown bullhead	0.00	.	0.00	.	0.00	.	0.00	0.00
TOTAL	0.00	.	0.00	.	0.00	.	27.97	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Corridor							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>March</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
topminnows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	0.00	53.03	84.16	0.00	0.00	0.00	0.00
blackside darters	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	19.13	100.0	9.98	15.84	11.33	100.0	20.60	100.0
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	19.13	100.0	63.01	100.0	11.33	100.0	20.60	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Marsh							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>March</u>								
herrings	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
shiner	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
chubsucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	.	20.67	16.69	0.00	0.00
topminnows	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	.	30.89	24.94	10.93	7.18
bluespotted sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
black crappie	19.14	66.38	0.00	.	20.67	16.69	19.72	12.96
darter	9.69	33.62	0.00	.	51.61	41.68	121.50	79.86
blackside darters	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown bullhead	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
TOTAL	28.83	100.0	0.00	.	123.84	100.0	152.14	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Swamp							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>March</u>								
herrings	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
shiner	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
chubsucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	.	0.00	0.00	10.42	7.10	0.00	0.00
pirate perch	0.00	.	0.00	0.00	41.84	28.50	0.00	0.00
topminnows	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	.	0.00	0.00	42.30	28.81	21.02	28.10
bluespotted sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	.	9.39	100.0	52.27	35.60	43.27	57.84
blackside darters	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	0.00	0.00	0.00	0.00	10.51	14.05
darters-general	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown bullhead	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	.	9.39	100.0	146.84	100.0	74.80	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Channel							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>March</u>								
herrings	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	.	28.99	27.27	0.00	0.00
shad	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
shiner	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
chubsucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	.	9.67	9.10	29.83	37.49
topminnows	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	.	19.31	18.16	9.92	12.47
bluespotted sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
darter	20.11	100.0	0.00	.	48.34	45.47	39.81	50.04
blackside darters	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown bullhead	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
TOTAL	20.11	100.0	0.00	.	106.31	100.0	79.56	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Corridor							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>April</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	701.71	28.89	124.80	37.81
shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	205.09	8.44	11.76	3.56
chubsucker	0.00	0.00	0.00	0.00	1155.29	47.56	159.17	48.22
spotted sucker	0.00	0.00	10.39	24.57	32.39	1.33	0.00	0.00
unknown sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	97.17	4.00	0.00	0.00
topminnows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	11.76	3.56
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	129.58	5.33	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	0.00	32.40	1.33	0.00	0.00
blackside darters	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	9.38	100.0	21.50	50.86	54.00	2.22	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	22.61	6.85
unknown	0.00	0.00	10.39	24.57	21.60	0.89	0.00	0.00
unknown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	9.38	100.0	42.28	100.0	2429.24	100.0	330.10	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Marsh							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>April</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	247.67	25.27	80.32	11.35
shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	10.48	34.52	394.38	40.25	177.17	25.04
chubsucker	10.84	14.12	0.00	0.00	177.71	18.14	80.32	11.35
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	22.55	29.38	0.00	0.00	22.88	2.33	244.00	34.48
topminnows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	10.84	14.12	9.40	30.96	0.00	0.00	8.71	1.23
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	10.48	34.52	113.06	11.54	73.57	10.40
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	8.71	1.23
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	17.41	2.46
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	8.71	1.23
darter	21.69	28.25	0.00	0.00	24.20	2.47	0.00	0.00
blackside darters	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	10.84	14.12	0.00	0.00	0.00	0.00	8.71	1.23
unknown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	76.77	100.0	30.36	100.0	979.89	100.0	707.61	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Swamp							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
April								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	11.48	24.79	0.00	0.00	21.80	7.38	0.00	0.00
shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	34.81	75.21	0.00	0.00	150.79	51.08	107.61	40.59
chubsucker	0.00	0.00	0.00	0.00	20.00	6.78	60.50	22.82
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	23.60	7.99	60.50	22.82
topminnows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	22.50	66.67	11.80	4.00	12.47	4.70
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	11.25	33.33	45.39	15.38	12.47	4.70
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	10.00	3.39	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	0.00	11.80	4.00	11.55	4.36
blackside darters	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	46.29	100.0	33.75	100.0	295.17	100.0	265.10	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Channel							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>April</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	8.56	13.51	15.14	22.83	316.15	17.05	89.55	8.47
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	115.18	6.21	67.26	6.36
shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	4.27	6.75	5.29	7.97	874.16	47.15	356.84	33.74
chubsucker	14.05	22.18	0.00	0.00	276.65	14.92	67.98	6.43
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	5.65	0.30	33.86	3.20
topminnows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	5.85	8.82	11.61	0.63	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	17.12	27.03	11.52	17.38	115.33	6.22	78.09	7.38
bluespotted sunfish	0.00	0.00	0.00	0.00	11.56	0.62	23.07	2.18
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	0.00	92.62	5.00	318.55	30.12
largemouth bass	0.00	0.00	0.00	0.00	11.56	0.62	0.00	0.00
black crappie	13.95	22.03	16.99	25.62	0.00	0.00	5.47	0.52
darter	5.38	8.50	11.52	17.38	23.40	1.26	11.37	1.08
blackside darters	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	5.51	0.52
unknown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	63.34	100.0	66.30	100.0	1853.85	100.0	1057.55	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Corridor							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>May</u>								
herrings	57.65	100.0	0.00	.	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	.	144.96	9.89	18.38	11.11
shiner	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	.	166.95	11.39	0.00	0.00
chubsucker	0.00	0.00	0.00	.	11.68	0.80	0.00	0.00
spotted sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	.	72.14	4.92	0.00	0.00
swampfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
topminnows	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	.	854.65	58.32	36.22	21.90
pygmy sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	.	109.92	7.50	37.30	22.55
warmouth	0.00	0.00	0.00	.	0.00	0.00	36.76	22.22
largemouth bass	0.00	0.00	0.00	.	11.68	0.80	8.92	5.39
black crappie	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
blackside darters	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	.	11.68	0.80	0.00	0.00
darters-general	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	.	11.68	0.80	18.38	11.11
unknown bullhead	0.00	0.00	0.00	.	70.08	4.78	9.46	5.72
TOTAL	57.65	100.0	0.00	.	1465.41	100.0	165.40	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Channel							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>May</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	5.39	0.36
shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	62.86	16.75	67.25	4.45
shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	4.90	5.46	0.00	0.00	147.47	39.28	599.74	39.70
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	0.00	5.77	1.54	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
topminnows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	0.00	0.00	0.00	9.87	0.65
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	5.48	0.36
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	19.60	1.30
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	4.71	0.31
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	58.35	64.95	27.63	82.54	32.90	8.76	773.39	51.20
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	4.90	5.46	0.00	0.00	0.00	0.00	14.89	0.99
blackside darters	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	21.68	24.13	5.84	17.46	126.39	33.67	10.19	0.67
unknown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	89.84	100.0	33.47	100.0	375.38	100.0	1510.51	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Corridor							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>June</u>								
herrings	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	.	0.00	0.00	11.16	1.66	0.00	0.00
shiner	0.00	.	0.00	0.00	44.80	6.68	10.60	14.58
ironcolor shiner	0.00	.	0.00	0.00	44.70	6.66	21.20	29.16
chubsucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
topminnows	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfishes	0.00	.	0.00	0.00	514.50	76.67	30.68	42.19
pygmy sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	.	0.00	0.00	11.21	1.67	0.00	0.00
warmouth	0.00	.	0.00	0.00	11.16	1.66	10.23	14.06
largemouth bass	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
blackside darters	0.00	.	10.49	100.0	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	0.00	0.00	11.16	1.66	0.00	0.00
darters-general	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	0.00	22.37	3.33	0.00	0.00
unknown bullhead	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	.	10.49	100.0	671.06	100.0	72.71	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Marsh							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
June								
herrings	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	.	0.00	0.00	76.62	33.57	84.30	57.76
shiner	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	.	0.00	0.00	94.08	41.21	0.00	0.00
chubsucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
topminnows	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	.	0.00	0.00	38.51	16.87	0.00	0.00
sunfishes	0.00	.	0.00	0.00	9.73	4.26	61.65	42.24
pygmy sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	0.00	9.33	4.09	0.00	0.00
redbreast sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	.	11.07	100.0	0.00	0.00	0.00	0.00
largemouth bass	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
blackside darters	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown bullhead	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	.	11.07	100.0	228.27	100.0	145.95	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Swamp							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>June</u>								
herrings	0.00	.	0.00	.	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	.	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	.	0.00	0.00	0.00	0.00
pickerel	0.00	.	0.00	.	0.00	0.00	0.00	0.00
minnow	0.00	.	0.00	.	74.59	12.25	123.29	25.00
shiner	0.00	.	0.00	.	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	.	0.00	.	355.02	58.30	64.55	13.09
chubsucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
spotted sucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown sucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	.	0.00	.	0.00	0.00	0.00	0.00
swampfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
pirate perch	0.00	.	0.00	.	0.00	0.00	0.00	0.00
topminnows	0.00	.	0.00	.	0.00	0.00	0.00	0.00
brook silverside	0.00	.	0.00	.	21.71	3.57	0.00	0.00
sunfishes	0.00	.	0.00	.	157.65	25.89	32.87	6.66
pygmy sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
warmouth	0.00	.	0.00	.	0.00	0.00	250.14	50.72
largemouth bass	0.00	.	0.00	.	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	.	0.00	0.00	0.00	0.00
darter	0.00	.	0.00	.	0.00	0.00	0.00	0.00
blackside darters	0.00	.	0.00	.	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	0.00	.	0.00	0.00	0.00	0.00
darters-general	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	.	0.00	0.00	22.31	4.52
unknown bullhead	0.00	.	0.00	.	0.00	0.00	0.00	0.00
TOTAL	0.00	.	0.00	.	608.98	100.0	493.15	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Channel							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
June								
herrings	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
shad	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	.	0.00	0.00	19.83	6.65
shiner	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	.	0.00	0.00	119.54	40.11
chubsucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
topminnows	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	0.00	.	10.97	100.0	0.00	0.00
sunfishes	0.00	0.00	0.00	.	0.00	0.00	89.11	29.90
pygmy sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
sunfish	11.47	100.0	0.00	.	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
warmouth	0.00	0.00	0.00	.	0.00	0.00	59.50	19.96
largemouth bass	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
blackside darters	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	.	0.00	0.00	10.05	3.37
unknown bullhead	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00
TOTAL	11.47	100.0	0.00	.	10.97	100.0	298.03	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Corridor							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>July</u>								
herrings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shad	8.84	100.0	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	0.00	0.00	0.00	11.23	100.0	10.47	50.00
chubsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
topminnows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	0.00	8.97	100.0	0.00	0.00	0.00	0.00
sunfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	10.47	50.00
warmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackside darters	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
darters-general	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	8.84	100.0	8.97	100.0	11.23	100.0	20.95	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Marsh							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>July</u>								
herrings	0.00	.	0.00	.				
American shad	0.00	.	0.00	.				
shad	0.00	.	0.00	.				
pickerel	0.00	.	0.00	.				
minnow	0.00	.	0.00	.				
shiner	0.00	.	0.00	.				
ironcolor shiner	0.00	.	0.00	.				
chubsucker	0.00	.	0.00	.				
spotted sucker	0.00	.	0.00	.				
unknown sucker	0.00	.	0.00	.				
bullhead catfishes	0.00	.	0.00	.				
swampfish	0.00	.	0.00	.				
pirate perch	0.00	.	0.00	.				
topminnows	0.00	.	0.00	.				
brook silverside	0.00	.	0.00	.				
sunfishes	0.00	.	0.00	.				
pygmy sunfish	0.00	.	0.00	.				
bluespotted sunfish	0.00	.	0.00	.				
sunfish	0.00	.	0.00	.				
redbreast sunfish	0.00	.	0.00	.				
warmouth	0.00	.	0.00	.				
largemouth bass	0.00	.	0.00	.				
black crappie	0.00	.	0.00	.				
darter	0.00	.	0.00	.				
blackside darters	0.00	.	0.00	.				
blackbanded darter	0.00	.	0.00	.				
darters-general	0.00	.	0.00	.				
unknown	0.00	.	0.00	.				
unknown bullhead	0.00	.	0.00	.				
TOTAL	0.00	.	0.00	.				

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Swamp							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>July</u>								
herrings	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pickerel	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
minnow	0.00	.	0.00	0.00	12.10	25.07	0.00	0.00
shiner	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	.	0.00	0.00	36.18	74.93	19.90	67.21
chubsucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
spotted sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown sucker	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
swampfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pirate perch	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
topminnows	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
brook silverside	0.00	.	0.00	0.00	0.00	0.00	9.71	32.79
sunfishes	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
pygmy sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
warmouth	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
largemouth bass	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
darter	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
blackside darters	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	9.88	100.0	0.00	0.00	0.00	0.00
darters-general	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
unknown bullhead	0.00	.	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	.	9.88	100.0	48.28	100.0	29.61	100.0

Appendix Table 6 (continued).

Monthly density, S.E., and relative abundance (%) for shoreline
Steel Creek ichthyoplankton - 1991.

SPECIES	Channel							
	1		2		3		4	
	DENSITY	%	DENSITY	%	DENSITY	%	DENSITY	%
<u>July</u>								
herrings	0.00	.	0.00	.	0.00	0.00	0.00	0.00
American shad	0.00	.	0.00	.	0.00	0.00	0.00	0.00
shad	0.00	.	0.00	.	0.00	0.00	0.00	0.00
pickerel	0.00	.	0.00	.	0.00	0.00	0.00	0.00
minnow	0.00	.	0.00	.	10.91	17.13	0.00	0.00
shiner	0.00	.	0.00	.	0.00	0.00	0.00	0.00
ironcolor shiner	0.00	.	0.00	.	0.00	0.00	41.12	33.03
chubsucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
spotted sucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown sucker	0.00	.	0.00	.	0.00	0.00	0.00	0.00
bullhead catfishes	0.00	.	0.00	.	0.00	0.00	0.00	0.00
swampfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
pirate perch	0.00	.	0.00	.	0.00	0.00	0.00	0.00
topminnows	0.00	.	0.00	.	10.47	16.43	31.41	25.23
brook silverside	0.00	.	0.00	.	21.39	33.57	10.86	8.72
sunfishes	0.00	.	0.00	.	20.94	32.87	10.28	8.26
pygmy sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
bluespotted sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
redbreast sunfish	0.00	.	0.00	.	0.00	0.00	0.00	0.00
warmouth	0.00	.	0.00	.	0.00	0.00	30.84	24.77
largemouth bass	0.00	.	0.00	.	0.00	0.00	0.00	0.00
black crappie	0.00	.	0.00	.	0.00	0.00	0.00	0.00
darter	0.00	.	0.00	.	0.00	0.00	0.00	0.00
blackside darters	0.00	.	0.00	.	0.00	0.00	0.00	0.00
blackbanded darter	0.00	.	0.00	.	0.00	0.00	0.00	0.00
darters-general	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown	0.00	.	0.00	.	0.00	0.00	0.00	0.00
unknown bullhead	0.00	.	0.00	.	0.00	0.00	0.00	0.00
TOTAL	0.00	.	0.00	.	63.71	100.0	124.51	100.0

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