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The Effect of Domestic Effluent on Two Spring Surveys Of Fishes in Lost Creek, Craighead County, Arkansas

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ABSTRACT

Lost Creek is representative of deltonic streams of the St. Francis Basin possessing characteristics of being turbid. It has a low flow velocity except during the annual spring rains. Lost Creek meanders approximately 18 km. before receiving effluents and empties into Big Creek approximately 4 km. west of Jonesboro, Arkansas. Five collecting stations were studied in 1966 while six stations were sampled in 1970.

Some fishes have been found to tolerate moderate amounts of domestic effluents and it is probable that the two species *Lepomis cyanellus* and *Ictalurus melas*, collected within the effluents, were more resistant than the other species of fish collected from Lost Creek.

The fishes of Lost Creek, Craighead County, Arkansas, were studied from five collecting stations in 1966 (Jackson and Beadles, 1966) and from six collecting stations in this study. Many stations above the effluent outfalls were intermittent during certain times of the year; however, during these sampling periods, March 27 through April 10, there was moderate flow. During 1966, the daily discharge of sewage effluent was approximately 3,780,000 liters (Jackson and Beadles, 1966). The daily discharge during this investigation was approximately 4,762,800 liters.

Lost Creek is representative of deltonic streams of the St. Francis Basin possessing characteristics of being turbid, and it has a low flow velocity except during the

annual spring rains when its flow increases markedly. Lost Creek meanders approximately 21 km. and empties into Big Creek approximately 4 km. west of Jonesboro, Arkansas. It is located on Crowley's Ridge within the Mississippi River alluvial valley. The continuity of the valley floor is broken by various ridges, the longest and northernmost being Crowley's Ridge. Crowley's Ridge, which rises about 62 m. above the valley floor, consists of a bedrock core with rocks of Eocene age plus a small amount of Cretaceous rocks. Pliocene gravels (Lafayette) and loess overlay the bedrock (Croneis, 1930; Thornbury, 1965).

The stream is turbid with a very small volume of flow except where moderate amounts of effluents from a

TABLE I. FISHES OF LOST CREEK RANKED IN DECREASING ORDER OF ABUNDANCE, INCLUDED IN THE COLLECTIONS OF JACKSON AND BEADLES, 1966 (J) BEADLES, 1970 (B).

	STATION I		STATION II		STATION III		STATION IV		STATION V	
	J	B	J	B	J	B	J	B	J	B
<i>Lepomis cyanellus</i>	.	10	.	1	.	3	16	51	6	1
<i>Notropis umbratilis</i>	43	48	.	.
<i>Notemigonus crysoleucas</i>	33	4	.	.
<i>Fundulus olivaceus</i>	.	2	20	.	.
<i>Ictalurus melas</i>	12	1	3
<i>Semotilus atromaculatus</i>	3	.	.	.
<i>Erimyzon oblongus</i>	1	1	.	.	.
<i>Gambusia affinis</i>	1	.	.

slaughterhouse and domestic effluent enter the stream. There has not been much detectable change in the stream between the two sampling periods. The average daily sewage load has increased approximately 982,800 liters over the 1966 sampling period. In 1966, Jackson and Beadles collected six species of fishes, and seven species were collected in 1970. A total of eight species was taken between the two sampling periods (Table 1).

The stream was divided into five sampling stations. A "common-sense" minnow seine was utilized in taking these samples.

Station I: Located at S35T15NR4E (Fig. 1) was in the headwaters and had moderate flow with a large amount of sand, mud, and parent material.

Station II: Located at S3T15NR4E (Fig. 1) had moderate flow, and the stream bottom was clay and parent material.

Station III: Located at S22T14NRAE (Fig. 1) had moderate flow, and the stream bottom was sand, clay, and parent material.

Station IV: Located at S8T14NR4E (Fig. 1) had moderate flow, and the stream bottom was clay, mud, and parent material.

Station V: Located at S13T14NR3E (Fig. 1) and continued to the confluents of Big Creek. The stream bottom was sand, mud, clay, and parent material.

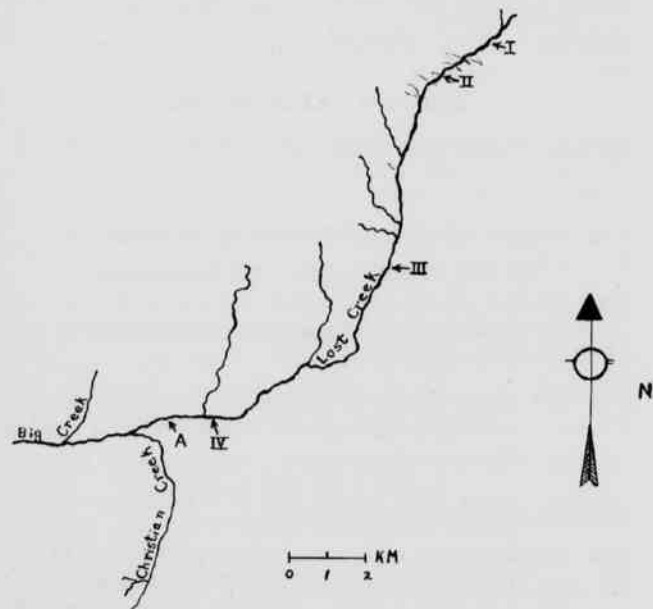


Fig. 1. Lost Creek, Craighead County, Arkansas. Stations I, II, III and IV are above the effluent outfalls. Station A represents the area of effluent outfalls. Station V is from Station A to the confluence of Lost and Big Creeks.

The two species of fishes collected in the headwaters of Lost Creek were *Lepomis cyanellus* and *Fundulus olivaceus*. Since *F. olivaceus* and *Gambusia affinis* can utilize surface oxygen, and *L. cyanellus* appears to be acclimated to harsh environmental conditions, these fishes were probably immigrating upstream utilizing more of the available habitats.

Notropis umbratilis and *Notemigonus crysoleucas* were abundant directly above the effluent outfalls at Station IV, and it would appear that they had less tolerance than *L. cyanellus* and *F. olivaceus* to the heavier silt load in the headwaters.

Ictalurus melas was found at Station IV directly above the effluent outfalls; however, like *L. cyanellus* they were the only species that were tolerating the sewage and slaughterhouse effluents.

Three specimens of *Semotilus atromaculatus* were collected by Jackson and Beadles (1966); however, this species was not found during the 1970 sampling period. A single specimen of *Erimyzon oblongus* was taken from Station III in 1970 and from Station IV in 1966.

Many of the fishes utilizing Lost Creek enter from Big Creek during heavy discharges of runoff water. This increased flow dilutes the effect of the effluents; however, some of the immigrating fishes become trapped as the water recedes following the heavy rains.

Since there were two small farm ponds within the water shed above the effluent outfalls, *L. cyanellus*, *N. crysoleucas* and *I. melas* could have escaped from the ponds and been trapped above the effluent outfalls. Some fishes have been found to tolerate moderate amounts of domestic effluents, and it is possible that the two species, *L. cyanellus* and *I. melas* collected within the effluents, were more resistant than the other species of fish collected within Lost Creek.

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