

Survey of the Fishes of the St. Joseph River Drainage in St. Joseph and Elkhart Counties, Indiana

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Introduction

The St. Joseph River originates in southern Michigan, passes through northern Indiana and flows northwestward to Lake Michigan at the cities of Benton Harbor and St. Joseph, Michigan. The main channel is 338 km long. The Indiana portion of the river lies entirely within St. Joseph and Elkhart Counties although tributaries extend from Kosciusko, LaGrange, Noble and Steuben Counties.

Gerking (5) in 1945 found 68 species of fish from 38 localities in the St. Joseph River drainage including the main channel, tributaries and lakes. Of these, 53 species were found in St. Joseph and Elkhart Counties.

The St. Joseph River has undergone enormous changes since Gerking's report. Dineen (2) discusses the history of the St. Joseph River and notes changes in the last 30 years in industrial and municipal use, construction of dams and salmon ladders, and efforts to clean up sources of pollutants in the river. Recreational use of the St. Joseph waterways has increased as well as the public's awareness of environmental problems.

An updated survey of the fish of the St. Joseph River drainage is needed to evaluate the impact of past and proposed uses of the river on the fish fauna.

Materials and Methods

Geographic relationships of the seven localities are shown in FIGURE 1, and detailed locality data are as follows: Juday Creek, T38N R3E, center of section 30, St. Joseph County; Christina Creek, T38N R4E, northwestern corner of section 20, Elkhart County; Little Elkhart River, T38N R7E, north central portion of section 33 and south central portion of section 28, Elkhart County; Pine Creek, T37N R6E, west central portion of section 6, and R5E, east central portion of section 1, Elkhart County; Solomon Creek tributary, T35N R7E, center of section 16, Elkhart County; Turkey Creek, T35N R6E, east central portion of section 29, Elkhart County; and Baugo Creek, T37N R4E, southwest portion of section 25 and northwest portion of section 36, Elkhart County.

Three locales, Juday Creek, Pine Creek and Solomon Creek, are small streams 2-2.5 m wide and 500-1500 cm deep. Pine Creek and Solomon Creek, passing through agricultural fields, have silty stream bottoms. Juday Creek passes through a residential area and adjacent scrubby woodland, and the creek bottom ranges from rocky to silty. The remaining locales, Christiana Creek, Little Elkhart River, Turkey Creek and Baugo Creek, are larger streams. Christiana Creek is about 15 m wide at the collecting site, and the other three are all about 8 m wide. All four streams have maximum depths of about 2 m although average water depth is about 1 m. These four streams each had silty pool areas as well as rocky riffles and were associated with agricultural fields. Of the seven streams, only Christiana Creek had luxuriant emergent and submerged vegetation.

All seven streams were sampled in both spring and fall, 1979, by day (time between 1100-1600) seining with a 190 x 408 cm nylon seine with 6.2 mm square mesh.

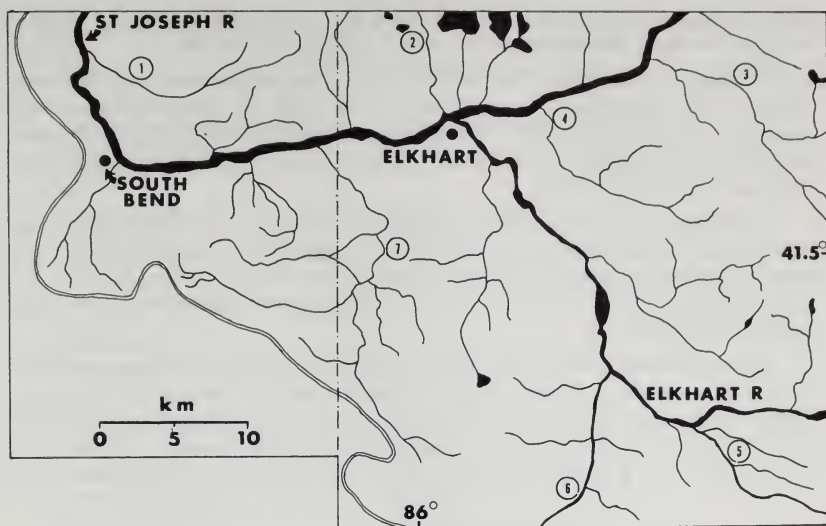


FIGURE 1. Collection localities indicated by numbered circles in the St. Joseph River drainage in St. Joseph and Elkhart Counties, Indiana. Major rivers (R) and cities are shown. Locality 1 = Juday Creek, Locality 2 = Christiana Creek, Locality 3 = Little Elkhart River, Locality 4 = Pine Creek, Locality 5 = tributary of Solomon's Creek, Locality 6 = Turkey Creek, and Locality 7 = Baugo Creek.

In the spring, collections were made on 10 May at Christiana Creek, Pine Creek, and Baugo Creek; on 15 May at Juday Creek; and on 16 May at Little Elkhart River, Solomon Creek and Turkey Creek. In the fall, collections were made on 7 September at Christiana Creek, Pine Creek and Little Elkhart River and on 14 September at Juday Creek, Solomon Creek, Turkey Creek and Baugo Creek. Night (time between 2000-0400) seining collections were made on 23 September at Christiana Creek, Little Elkhart River and Turkey Creek. These three streams on 28 September plus Juday Creek on 21 September were also sampled by day electroshocking with a Smith-Root Type VII backpack Electrofisher.

Generally collections were made over a 90-130 m stretch of the stream which required approximately 90 minutes. All streams were sufficiently shallow that collections could be made across most of the length and width of each site.

All specimens were immediately preserved in 10% formalin. After sorting and identification, specimens were rinsed 24 hours in water and transferred to 60% isopropanol for permanent storage.

Results

Collection data for each species are summarized in Table 1. A total of 3741 specimens were collected in the 26 samples. These represented 12 families and 41 species plus several hybrid populations of *Notropis cornutus* X *chrysocephalus*. No single species was collected at all seven localities, but *Esox americanus* was taken at all localities except Baugo Creek, *Catostomous commersoni* was taken at all localities except Christiana Creek, and either *N. cornutus* or *N. chrysocephalus* were present at all localities but Juday Creek. *Semotilus atromaculatus*,

Pimephales notatus and *Etheostoma nigrum* were present at 5 of the 7 localities, and the remaining 34 species were present at 4 localities or less.

In total numbers, the most abundant species or populations were: *Notropis cornutus* (756 specimens), *Etheostoma nigrum* (504), *N. chrysocephalus* (445), *Semotilus atromaculatus* (440), *Pimephales notatus* (294), *Catostomus commersoni* (288), *Rhinichthys atratulus* (182), *Notropis cornutus* X *chrysocephalus* (119), and *Nocomis biguttatus* (95).

There were 14 species collected at only one locality, and 5 of these species are represented by single specimens (Table 1). All localities but Juday Creek had at least one unique species. Six unique species occurred at Turkey Creek; two at the Little Elkhart River, Christiana Creek and Baugo Creek; and one at Pine Creek and Solomon Creek.

In the streams in which only two collections were made, 802 specimens of 19 species were taken at Baugo Creek, 118 specimens of 9 species were taken at Solomon Creek, and 98 specimens of 12 species were taken at Pine Creek. At Juday Creek where three collections were made, 50 specimens of 7 species were collected. At localities where 4 collections were made, 1148 specimens of 23 species were

TABLE 1. Collection data for the 3741 specimens collected in 21 samples from seven localities in the St. Joseph River drainage in St. Joseph and Elkhart Counties, Indiana. If a species was collected at only one locality, that locality is indicated by one of these abbreviations: CC = Christiana Creek, LE = Little Elkhart River, PC = Pine Creek, SC = Solomon Creek, TC = Turkey Creek, and BC = Baugo Creek. A single asterisk (*) indicates the species has not previously been recorded from the St. Joseph River drainage in St. Joseph or Elkhart Counties, and double asterisks (**) indicate that the species also has not been reported from this drainage in any other county.

Family	N	N	N
Species	Localities	Samples	Specimens
Petromyzontidae			
<i>Ichthyomyzon</i> sp.*	2	2	2
<i>Lampetra lamottei</i> **	1 (TC)	1	2
Salmonidae			
<i>Salmo trutta</i>	2	3	5
Umbridae			
<i>Umbra limi</i>	2	3	4
Esocidae			
<i>Esox americanus</i>	6	14	49
<i>Esox lucius</i>	1 (SC)	2	3
Cyprinidae			
<i>Cyprinus carpio</i>	1 (BC)	1	1
<i>Notemigonus crysoleucas</i>	2	3	63
<i>Semotilus atromaculatus</i>	5	14	440
<i>Nocomis biguttatus</i>	4	12	95
<i>Rhinichthys atratulus</i>	4	10	182
<i>Notropis chrysocephalus</i>	4	10	445
<i>Notropis cornutus</i>	5	12	756
<i>N. cornutus</i> X <i>chrysocephalus</i>			
<i>alus</i>	3	5	119
<i>Notropis rubellus</i>	1 (TC)	3	7
<i>Notropis stramineus</i>	1 (LE)	1	1
<i>Ericymba buccata</i>	1 (BC)	2	38
<i>Pimephales notatus</i>	5	13	294
<i>Pimephales promelas</i> **	1 (PC)	1	1
<i>Camptostoma anomalum</i>	3	7	54

TABLE 1—Continued

Family	N	N	N
Species	Localities	Samples	Specimens
Catostomidae			
<i>Moxostoma erythrum</i>	2	3	41
<i>Hypentelium nigricans</i>	3	5	10
<i>Catostomus commersoni</i>	6	16	288
Ictaluridae			
<i>Ictalurus natalis</i>	1 (CC)	2	10
<i>Noturus flavus</i> *	1 (CC)	1	5
<i>Noturus gyrinus</i>	2	5	47
Aphredoderidae			
<i>Aphredoderus sayanus</i> *	1 (TC)	1	4
Atherinidae			
<i>Labidesthes sicculus</i>	2	2	3
Cottidae			
<i>Cottus baridi</i> *	2	7	38
Centrarchidae			
<i>Micropterus dolomieu</i>	3	6	40
<i>Micropterus salmoides</i>	4	4	10
<i>Lepomis cyanellus</i>	4	5	7
<i>Lepomis gibbosus</i>	3	4	5
<i>Lepomis macrochirus</i>	2	2	5
<i>Lepomis megalotis</i>	1 (TC)	1	1
<i>Ambloplites rupestris</i>	4	8	50
<i>Pomoxis nigromaculatus</i>	1 (TC)	1	3
Percidae			
<i>Perca flavescens</i>	1 (TC)	1	1
<i>Percina caprodes</i>	1 (LE)	1	1
<i>Percina maculata</i>	4	8	65
<i>Etheostoma caeruleum</i>	4	11	42
<i>Etheostoma nigrum</i>	5	14	504

taken at Little Elkhart River, 916 specimens of 25 species were taken at Turkey Creek, and 609 specimens of 12 species were taken at Christiana Creek.

The composite of characters used by Gilbert (6) was followed in separating *Notropis cornutus* and *N. chrysocephalus* and determining hybrids. Only *N. chrysocephalus* was found of the two in Christiana Creek and only *N. cornutus* in Solomon Creek and Turkey Creek. Pine Creek, Baugo Creek and Little Elkhart River had both *N. cornutus* and *N. chrysocephalus* plus specimens we referred to as hybrids of the two species. At Pine Creek, only eight specimens of the complex were collected; two were referred to *N. cornutus*, four to *N. chrysocephalus*, and two were considered hybrids. At Baugo Creek, 274 specimens were referred to *N. cornutus*, 32 to *N. chrysocephalus*, and 29 were called hybrids. At the Little Elkhart River, 441 *N. cornutus*, 53 *N. chrysocephalus* and 88 hybrids were collected.

Our data are inadequate to comment for most species on the effect of season (spring/fall), time (day/night) or collecting method (seine/electrofishing) on relative abundance. However, both species diversity and total abundance were lower in samples collected by electrofishing when compared to all other samples taken at the four localities involved. All of the more common species were less frequent in electrofishing collections than in seining collections at a locality, except that *Semotilus atromaculatus* was equally common (32:32) when the electrofishing collection and the fall day seining collection are compared for Turkey Creek. *Notropis cornutus*, *N. chrysocephalus*, *Etheostoma nigrum* and *Pimephales notatus* were

especially poorly represented in electrofishing collections when such samples are compared to fall day seining collections at the localities where these species occur.

There was no variation in habitat preference from that commonly ascribed to each species (9, 10).

Specimens of all size ranges were collected for the common species except for *Micropterus dolomieu* and *M. salmoides* for which only small individuals (< 20 cm) were found.

Discussion

Two specimens collected by us represent new records for the entire St. Joseph River drainage, and four other species are new records for the portion of the drainage in St. Joseph and/or Elkhart Counties (5). The new drainage records are *Lampetra lamottei* and *Pimephales promelas*. The nearest records for *L. lamottei* are from the Little Kankakee River, Kankakee River drainage, LaPorte County (5) and Winona Lake, Tippecanoe River drainage, Kosciusko County (1). Our two specimens came from the Little Elkhart River. *L. lamottei* was reported as rare with an erratic distribution in Illinois by Smith (9).

The nearest records for *P. promelas* are Hamilton Lake, Maumee River drainage, Steuben County (8) and Fletcher Lake, Tippecanoe River drainage, Fulton County (4). Our sole specimen came from Pine Creek. Gerking (5) states that the concentration of Indiana records for this species in eastern Indiana is not easily explained as suitable habitats seem present in western Indiana. Smith (9) states that *P. promelas* is abundant and widespread in northern Illinois.

The four new county records are *Cottus bairdi* for both St. Joseph and Elkhart Counties, and *Ichthyomyzon fossor* or *I. unicuspis*, *Noturus flavus* and *Aphredoderus sayanus* for Elkhart County. *C. bairdi* was found at Juday Creek and the Little Elkhart River. The only previous record for the drainage is Emma Creek, a tributary of the Little Elkhart River in LaGrange County (5). There are many records from other drainages in northern Indiana.

The *Ichthyomyzon* we collected at Christiana Creek and Turkey Creek are ammocoetes. The one from Christiana Creek has 50 myomeres and the one from Turkey Creek 54 myomeres. According to Trautman (10), individuals with 55 or fewer myomeres could be either *I. fossor* or *I. unicuspis*. Gerking (5) lists records for both species from Turkey Creek, Kosciusko County, the headwaters for the portion of that stream we sampled in Elkhart County. However the record for *I. unicuspis* (7) is listed as questionable. There are few other records for either species in the state. Smith (9) states that *I. fossor* is not common in Illinois, but is found in the northeastern part of that state. Smith also states that *I. unicuspis* is most common in Illinois in the Mississippi River, the extreme northwest portion of the state, and in the Wabash River.

Previous records from the St. Joseph River drainage for *Noturus flavus* are from the south branch of the Elkhart River, Noble County (5) and Turkey Creek, Kosciusko County (3). Our specimens came from Christiana Creek. There are many records for this species from other drainages in northern and central Indiana.

The only prior record for *Aphredoderus sayanus* from the St. Joseph River drainage is from Turkey Creek, Kosciusko County (3). Our specimens came from Turkey Creek, Elkhart County, only a few kilometers downstream from this earlier (1896) record.

Twenty species were reported by Gerking (5) from the St. Joseph River

drainage in St. Joseph or Elkhart Counties, but not collected by us. Of these, 14 species generally occur in lakes, rivers or the pool areas of large streams and would be rarely found in the small streams. The only record of *R. cataractae* in the state is from the St. Joseph River, Elkhart, Elkhart County (5). Smith (9) restricts *R. cataractae* to the shoreline of Lake Michigan in Illinois, and Trautman (10) reports the species only from the eastern Lake Erie region in Ohio. *I. castaneus* was found only in western and southern Illinois by Smith (9), who notes that the range of this species has apparently withdrawn southward in recent times. Most of the rest were reported as sporadic in northern Illinois by Smith (9). A survey of the fish fauna of the lakes, rivers and larger streams of the St. Joseph River drainage is needed to document the current status of these species in this area.

Species associated with smaller streams reported by Gerking (5) in the St. Joseph River drainage of St. Joseph or Elkhart Counties but not found in this study include: *Salvelinus fontinalis*, *Salmo gairdneri*, *Erimyzon oblongus*, *Minytrema melanops*, *Notropis spilopterus*, and *N. umbratilus*. The occurrence of *Salvelinus fontinalis* and *Salmo gairdneri* were attributed to reports (i.e., Gerking did not collect or examine specimens) and were presumably the result of stocking. The only trout collected, *Salmo trutta*, is also commonly stocked and apparently established as a breeding population in Juday Creek.

Gerking (5) reports localities for the suckers *Erimyzon oblongus* and *Minytrema melanops* from the Kankakee and Maumee River drainages as well as the St. Joseph, although Smith (9) states that *E. oblongus* is sporadically found in northern Illinois and that *M. melanops* is unknown in northeastern Illinois. Both *Notropis spilopterus* and *N. umbratilus* occur statewide in Indiana, and Gerking (5) indicates that both may be common in creeks, and that *N. spilopterus* is especially tolerant of widely different habitats. Smith (9) found these two species to be sporadically distributed in northern Illinois. They were apparently more common in the past in northern Illinois, and Smith attributes their decrease in abundance to habitat alteration.

Species unreported by us or Gerking (5) from the St. Joseph River drainage in Elkhart or St. Joseph Counties but that can reasonably be expected to be found in small streams of this area include: *Fundulus notatus*, *Hybopsis amblopius*, *Notropis chalybeus*, *Etheostoma flabellare*, *E. spectabile*, *E. zonale* and perhaps several others. *F. notatus* is known from the St. Joseph River drainage in Kankakee and LaGrange Counties, and the other species mentioned are known from nearby drainages in northern Indiana (5).

Umbra limi, *Labidesthes sicculus*, *Cyprinus carpio*, *Percina caprodes*, *Perca flavescens* and the sunfish *Lepomis gibbosus*, *L. macrochirus* and *Pomoxis nigromaculatus* were collected in few numbers in our survey, but these fish are usually associated with lakes, rivers or larger streams than we sampled, and they are doubtlessly more common in such habitats in the St. Joseph River drainage. *Notropis stramineus* and *Lepomis megalotis* are often found elsewhere in their range in small streams, and we have no explanation for their scarcity in our collections.

In summary, 3741 specimens representing 41 species and 12 families were collected in our survey of seven tributaries of the St. Joseph River in St. Joseph and Elkhart Counties, Indiana. Two species, *Lampetra lamottei* and *Pimephales promelas*, are new records for the entire drainage, and four species, *Ichthyomyzon fossor* or *I. unicuspis*, *Noturus flavus*, *Aphredoderus sayanus* and *Cottus bairdii*, are new records for the portion of the drainage in St. Joseph and Elkhart Counties.

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Literature Cited

1. BLATCHLEY, W. S. and G. H. ASHLEY. 1901. The lakes of northern Indiana and their associated marl deposits. 25th Ann. Rept. Dept. Geol. and Nat. Res. Ind. 1900:31-321.
2. DINEEN, C. F. 1978. History of a river. Proc. Ind. Acad. Sci. 87:72-80.
3. EIGENMANN, C. L. 1896. Turkey Lake as a unit of environment, and the variation of its inhabitants. First report of the Indiana Biological Station. Proc. Ind. Acad. Sci. 11:204-278.
4. EVERMANN, B. W. and W. H. CLARK. 1910. Fletcher Lake, Indiana, and its flora and fauna. Proc. Biol. Soc. Wash. 13:81-88.
5. GERKING, S. D. 1945. The distribution of the fishes of Indiana. Invest. Ind. Lakes and Streams 3:1-137.
6. GILBERT, C. R. 1961. Hybridization versus integradation: an inquiry into the relationship of two cyprinid fish. Copeia 1961:181-192.
7. HUBBS, C. L. and M. B. TRAUTMAN. 1937. A revision of the lamprey genus *Ichthyomyzon*. Misc. Publ. Mus. Zool. Univ. Mich. 35:1-109.
8. KIRSCH, P. H. 1895. Report upon investigations in the Maumee River basin in the northeastern part of Indiana in the summer of 1892. Bull. U. S. Fish Comm. 1894. 14:31-41.
9. SMITH, P. W. 1979. The fishes of Illinois. Univ. Ill. Press. 314 pp.
10. TRAUTMAN, M. B. 1957. The fishes of Ohio. The Ohio State Univ. Press. 683 pp.