Summer Fishes of Pigeon Creek Drainage

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Introduction

Pigeon Creek is geographically situated in unglaciated terrain of the Wabash Lowland Region (14) in southwestern Indiana. It flows for approximately 64 kilometers in a southerly direction through the counties of Gibson, Warrick, and Vanderburgh draining an area of 953 square kilometers (4) before entering the Ohio River (Figure 1). Elevations within

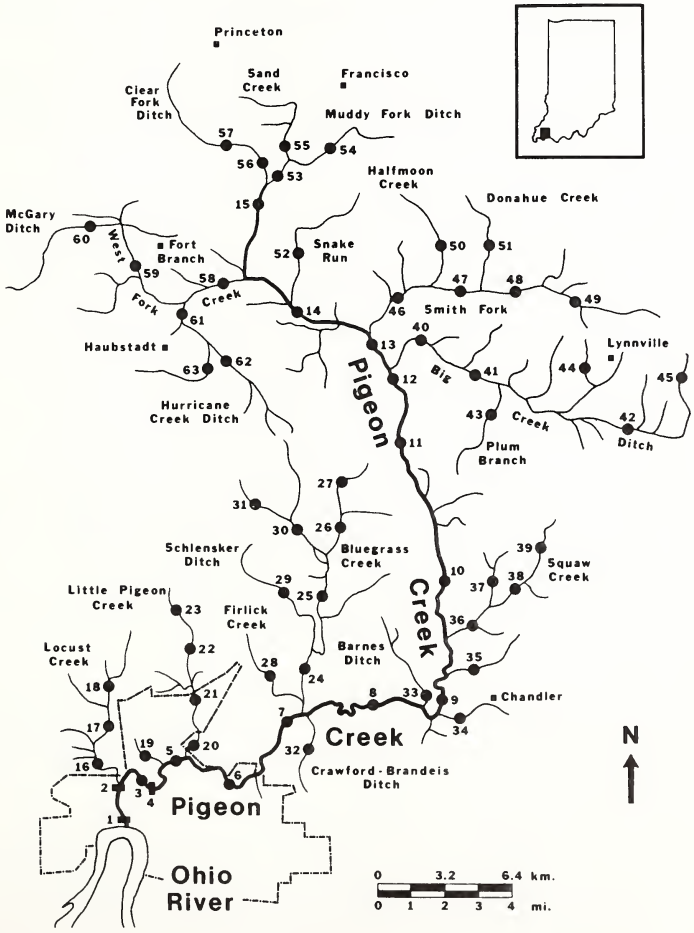

Figure 1. Map of Pigeon Creek depicting collecting stations (● - seined, ▮ - electroshocked), towns ( ), and the city limits of Evansville (—·—·—).

the drainage basin range from 110 to 152 meters above sea level. The major municipality along its course is Evansville.

Pigeon Creek is a slow-flowing, turbid stream. Its substrate is primarily deep calcitic to organic mud with some headwater tributaries displaying streambeds of gravel and sand. Its banks, margined for the most part by cottonwood, sycamore, silver maple, and box elder, are steep throughout its length with submerged downfall common near its mouth.

Pigeon Creek flows through three distinct land types. They are agricultural lands bordering its headwaters, coal mining lands in the middle region of the drainage, and the city of Evansville in the lower region. Pigeon Creek is classified as a legal drain, which allows for dredging and subsequent siltation.

Information on fishes in Pigeon Creek is lacking. The first known record of fishes in Pigeon Creek was in 1888 (5). That investigation sampled only the mouth of Pigeon Creek. In 1942, three stations were sampled within Pigeon Creek drainage (2). To our knowledge no other studies have been completed. Compounded with this lack of information, fish kills in the drainage are not uncommon. For these reasons, a fish study was warranted.

The purpose of this investigation was to provide base-line data on the type, distribution, relative abundance, and species diversity of fishes in Pigeon Creek drainage during the summer. A secondary objective was to compare the results of this study with those of 1942 (2).

Material and Methods

Sixty-three sites were sampled within the Pigeon Creek drainage (Figure 1) from 7 July to 4 August 1986. Fishes were collected using either singly or a combination of a bag seine (2 wings - 3.0 × 1.2 meters and bag - 1.2 × 1.2 meters of 1 cm diamond mesh), a 4.3 × 1.2 meter seine (0.5 cm square mesh), or a 1.7 × 1.1 meter seine (0.6 cm square mesh). Stations 1, 2, and 3 were sampled using a Type VI Electrofisher shocker. Fishes were shocked for 2-4 milliseconds at 8-10 amperes (VDC 420 and 560). Fishes were collected for 30 minutes and following capture were preserved in 10% formalin. Preserved specimens are presently housed within the University of Southern Indiana collection.

Species diversity was determined using the Shannon-Weaver function (H′): $H' = C/N\ (N \log_{10} N - \Sigma n_i \log_{10} n_i)$, where C = 3.32 (the constant for conversions of logarithms from base 10 to base 2); N = the total number of individuals in the population; and n_i = the number of individuals of a particular species (3). Results are independent of sample size (10).

Fishes were identified to species using standard references (1,7,9,12,13) and all scientific names herein reported are acceptable nomenclature (11).

Results

In this investigation, 39 species of fish from 14 families were collected in Pigeon Creek drainage. Table 1 lists these fishes, their distribution and relative abundance in the drainage. Figure 1 depicts the stations sampled, while Appendix A identifies the location of each collecting site.

The tributaries of Pigeon Creek yielded more fishes per station than the main stream (Table 2; $t = 1.88$; $df = 61$; $p < .05$). Adults accounted for the majority of this intra-drainage difference ($t = 1.69$; $df = 61$; $p < .05$), while young showed a tendency towards greater numbers in the tributaries ($t = 1.36$; $df = 61$; $p < .10$). Of the 39 species collected, young of 24 species (61.5%) were represented, comprising 31% of the total catch.

The distribution of fishes in the drainage showed 6 species from exclusively the main stream including the mouths of larger tributaries. They were the bowfin, gizzard shad, mississippi silvery minnow, emerald shiner, flier, and white crappie. The warmouth and

TABLE 1. List of fishes, their distribution and relative abundance in Pigeon Creek drainage. The number before the parenthesis represents the site followed by the number of individuals collected or seen (*) in parentheses. Followed by a semicolon are the % of total catch and % occurrence (# of stations/63 stations) for each species.

Lepisosteidae
Lepisosteus platostomus (Shortnose Gar) — 2(1); <0.1, 1.6
Amiidae
Amia calva (Bowfin) — 2(1), 34(1); <0.1, 3.2
Clupeidae
Dorosoma cepedianum (Gizzard Shad) — 1(15), 2(3), 3(34), 4(25), 5(5), 6(1), 7(10), 8(2), 14(1), 24(3), 34(5); 1.5, 17.5
Esocidae
Esox americanus (Grass Pickerel) — 26(1), 33(2), 35(1), 41(2), 43(1); 0.1, 7.9
Cyprinidae
Campostoma anomalum (Central Stoneroller) — 47(1), 48(7), 49(1); 0.1, 4.8
Cyprinus carpio (Common Carp) — 2(9), 4(3), 7(1), 8(1), 14(1), 32(2), 35(2), 57(2), 58(4), 60(1); 0.4, 15.9
Ericymba buccata (Silverjaw Minnow) — 5(5), 13(1), 14(4), 15(3), 18(16), 21(13), 22(85), 23(22), 25(1), 28(2), 29(60), 42(3), 47(134), 48(58), 49(37), 50(27), 54(8), 55(61), 56(53), 57(39), 61(7), 63(7); 9.6, 34.9
Hybognathus nuchalis (Mississippi Silvery Minnow) — 5(2), 20(1); <0.1, 3.2
Notemigonus crysoleucas (Golden Shiner) — 7(7), 12(2), 22(1), 30(11), 31(8), 41(106), 42(2), 45(2), 48(2), 50(1), 60(2); 2.1, 17.5
Notropis atherinoides (Emerald Shiner) — 3(70), 5(213), 20(1); 4.2, 4.8
Notropis umbratilis (Redfin Shiner) — 8(2), 9(5), 12(23), 13(3), 14(5), 15(40), 40(4), 47(3), 52(12), 53(2), 54(34), 55(2), 56(11), 57(12), 58(17), 59(173), 60(38), 61(260), 62(2), 63(85); 10.9, 31.7
Phenacobius mirabilis (Suckermouth Minnow) — 5(2), 12(7), 13(2), 15(17), 18(1), 21(6), 22(3), 25(1), 36(1), 37(4), 38(2), 40(2), 47(10), 48(16), 50(2), 56(37), 57(1), 59(5), 61(3), 63(7), 1.9, 31.7
Pimephales notatus (Bluntnose Minnow) — 3(1), 5(5), 7(4), 9(2), 14(10), 15(11), 17(5), 18(3), 19(35), 21(42), 22(16), 23(13), 24(3), 25(8), 27(1), 28(1), 29(8), 30(2), 31(14), 32(105), 33(4), 36(1), 47(1), 48(1), 49(1), 50(4), 52(8), 53(2), 54(19), 55(12), 56(25), 57(41), 58(14), 59(10), 60(5), 61(36), 62(16), 63(105); 8.8, 60.3
Pimephales promelas (Fathead Minnow) — 7(6), 12(1), 13(1), 14(45), 19(1), 23(1), 25(5), 27(1), 50(1), 52(12), 54(10), 55(1), 56(4), 57(6), 58(39), 59(8), 60(9), 61(38), 62(191), 63(244); 9.2, 31.7
Semotilus atromaculatus (Creek Chub) — 15(7), 17(3), 18(9), 19(3), 21(1), 22(84), 23(12), 25(3), 26(35), 27(36), 28(8), 29(9), 30(2), 31(1), 32(4), 33(5), 35(1), 36(1), 37(32), 38(31), 42(12), 43(12), 45(8), 47(19), 48(20), 49(14), 50(45), 51(29), 52(26), 54(32), 55(34), 56(44), 57(42), 58(3), 59(87), 60(1), 61(133), 62(347), 63(59); 18.6, 61.9
Catostomidae
Carpiodes cyprinus (Quillback) — 12(1); <0.1, 1.6
Catostomus commersoni (White Sucker) — 24(1); <0.1, 1.6
Erimyzon oblongus (Creek Chubsucker) — 17(1), 25(1), 31(3); 0.1, 4.8
Ictiobus bubalus (Smallmouth Buffalo) — 1(1); <0.1, 1.6
Ictiobus niger (Black Buffalo) — 1(3); <0.1, 1.6
Ictaluridae
Ictalurus melas (Black Bullhead) — 7(35), 24(1), 27(78), 30(77), 32(6), 34(5), 35(1), 39(2), 52(1), 54(3), 62(2); 3.1, 17.5
Ictalurus natalis (Yellow Bullhead) — 7(3), 13(1), 26(1), 32(6), 33(1), 35(4), 54(1), 57(2), 58(4), 62(4); 0.4, 15.9
Ictalurus punctatus (Channel Catfish) — 5(1), 6(3), 13(1), 14(1), 36(1), 38(5), 39(1), 58(7); 0.3, 12.7
Aphredoderidae
Aphredoderus sayanus (Pirate Perch) — 7(2), 8(1), 21(1), 24(3), 25(8), 26(2), 30(6), 34(1), 41(2), 53(1), 54(1), 56(1); 0.4, 19.0
Cyprinodontidae
Fundulus notatus (Blackstripe Topminnow) — 5(1), 7(2), 9(1), 11(2), 12(1), 13(1), 14(9), 15(15), 16(*), 17(12), 18(34), 21(12), 22(4), 23(5), 24(1), 25(5), 26(5), 27(42), 28(13), 30(1), 31(11), 32(13), 33(23), 34(8), 35(14), 36(10), 37(5), 38(13), 39(13), 42(53), 43(9), 44(16), 45(4), 46(7), 47(28), 48(19), 49(11), 50(44), 51(5), 53(4), 54(55), 55(36), 56(15), 57(4), 58(12), 59(6), 60(16), 61(5), 62(1), 63(18); 9.6, 79.4
Poeciliidae
Gambusia affinis (Mosquitofish) — 1(*), 7(5), 8(7), 11(4), 14(1), 20(1), 21(13), 24(5), 25(4), 28(2), 32(65), 33(19), 35(1), 50(1), 55(1), 56(4); 2.0, 25.4
Percichthyidae
Morone chrysops (White Bass) — 1(6); 0.1, 1.6
Centrarchidae
Centrarchus macropterus (Flier) — 7(1), 10(5); 0.1, 3.2
Lepomis cyanellus (Green Sunfish) — 4(2), 6(2), 7(20), 8(2), 9(1), 10(1), 14(1), 15(2), 17(1), 19(3), 21(11), 22(7), 23(1), 24(21), 25(18), 26(13), 27(1), 28(2), 29(1), 30(1), 31(2), 32(8), 33(15), 35(9), 36(8), 37(109), 38(40), 39(119), 41(5), 42(3), 44(4), 45(2), 47(3), 48(15), 49(20), 50(8), 51(8), 52(5), 53(2), 54(13), 56(1), 58(1), 59(2), 60(1), 61(7), 62(3), 63(1); 7.8, 74.6

TABLE 1 (continued)

Lepomis gibbosus (Pumpkinseed) — 10(1), 23(1), 30(1), 34(2), 44(1), 45(1), 47(1); 0.1, 11.1
Lepomis gulosus (Warmouth) . 7(12), 10(3), 11(4), 34(2), 49(1); 0.3, 7.9
Lepomis humilis (Orangespotted Sunfish) — 34(2); <0.1, 1.6
Lepomis macrochirus (Bluegill) — 7(29), 8(2), 9(2), 10(11), 11(1), 14(2), 17(12), 18(3), 20(3), 21(80), 22(35), 23(19), 24(2), 25(2), 28(2), 29(1), 30(6), 31(2) 33(1), 34(9), 35(7), 36(2), 37(9), 38(4), 39(16), 42(1), 43(57), 44(9), 45(7), 46(18), 48(3), 49(4), 50(8), 51(9), 53(1), 54(6), 63(2); 5.7, 58.7
Lepomis megalotis (Longear Sunfish) — 15(5), 17(1), 23(1), 30(1), 36(1), 37(1), 38(1), 39(1), 42(1), 43(3), 45(2), 46(6), 48(14), 49(2), 54(1), 56(3), 58(1), 60(9), 61(3), 63(3); 0.9, 30.2
Micropterus punctulatus (Spotted Bass) — 11(1), 14(1), 17(2), 21(3), 25(2), 29(4), 30(1), 31(1), 32(1), 35(7), 39(1), 43(1), 44(9), 45(1), 47(1), 48(9), 49(2), 50(2), 53(1), 54(2), 57(2); 0.8, 33.3
Pomoxis annularis (White Crappie) — 7(1), 9(1), 14(1), 34(5), 53(1); 0.1, 6.3
Pomoxis nigromaculatus (Black Crappie) — 10(2), 11(3), 12(1), 34(6), 49(1); 0.2, 7.9
Percidae
Etheostoma gracile (Slough Darter) — 7(1), 24(5), 35(2), 36(4), 37(7); 0.3, 7.9
Sciaenidae
Aplodinotus grunniens (Freshwater Drum) — 5(2); <0.1, 1.6

APPENDIX A. Location of collecting stations in Pigeon Creek drainage, Indiana.

Station	Location
1	Vand. Co., Pigeon Twp., PIGEON CREEK — Columbia St. Bridge (Evansville S. Quad.: T6S, R11W, S24)
2	Vand. Co., Pigeon/Center Twp., PIGEON CREEK — Confluence with Locust Creek (Evansville S. Quad.: T6S, R11W, S13)
3,4	Vand. Co., Pigeon/Center Twp., PIGEON CREEK — First Ave. Bridge (Evansville S. Quad.: T6S, R10W, S18)
5	Vand. Co., Center/Knight Twp., PIGEON CREEK — Stringtown Rd. Bridge (Evansville N. Quad.: T6S, R10W, S8)
6	Vand. Co., Center/Knight Twp., PIGEON CREEK — Oak Hill Rd. Bridge (Evansville S. Quad.: T6S, R10W, S15)
7	Vand. Co., Center/Knight Twp., PIGEON CREEK — N. Green River Rd. Bridge (Daylight Quad.: T6S, R10W, S1/2)
8	Warrick Co., Ohio Twp., PIGEON CREEK — W. 1025 Rd. Bridge (Daylight Quad.: T5S, R9W, S32)
9	Warrick Co., Campbell/Ohio Twp., PIGEON CREEK — N. 50 Rd. Bridge (Daylight Quad.: T5S, R9W, S34)
10	Warrick Co., Campbell Twp., PIGEON CREEK — Booneville-New Harmony Rd. Bridge (Daylight Quad.: T5S, R9W, S10)
11	Warrick Co., Greer Twp., PIGEON CREEK — N. 875 Rd. Bridge (Elberfeld Quad.: T4S, R9W, S21)
12	Warrick Co., Greer Twp., PIGEON CREEK — Highway 68 Bridge (Elberfeld Quad.: T4S, R9W, S4)
13	Gibson Co., Barton Twp., PIGEON CREEK — Highway 57 Bridge (Elberfeld Quad.: T3S, R9W, S32)
14	Gibson Co., Union Twp., PIGEON CREEK — N. 1350 Rd. Bridge (Elberfeld Quad.: T3S, R10W, S25/26)
15	Gibson Co., Union Twp., PIGEON CREEK — N. 1650 Rd. Bridge (Princeton Quad.: T3S, R10W, S10)
16	Vand. Co., Perry/German Twp., LOCUST CREEK — Allen Lane Bridge (Evansville N. Quad.: T6S, R11W, S11/14))
17	Vand. Co., Center Twp., LOCUST CREEK — Mill Rd. Bridge (Evansville N. Quad.: T6S, R11W, S1/12)
18	Vand. Co., Center Twp., LOCUST CREEK — Mohr Rd. Bridge E. of N.Y. Central Railroad Tracks (Evansville N. Quad.: T5S, R11W, S25/36)
19	Vand. Co., Center Twp., UNNAMED TRIB. — North Park, 200 yds. S. of Buena Vista Rd. (Evansville N. Quad.: T6S, R10W, S7)
20	Vand. Co., Center Twp., LITTLE PIGEON CREEK — Kentucky Ave. Bridge (Evansville N. Quad.: T6S, R10W, S8)
21	Vand. Co., Center Twp., LITTLE PIGEON CREEK — Old Petersburg Rd. Bridge (Evansville N. Quad.: T5S, R10W, S33)
22	Vand. Co., Center Twp., LITTLE PIGEON CREEK — Mt. Pleasant Rd. Bridge (Evansville N. Quad.: T5S, R10W, S29)
23	Vand. Co., Center/Scott Twp., LITTLE PIGEON CREEK — Hillsdale Rd. Bridge (Evansville N. Quad.: T5S, R10W, S7/20)
24	Vand. Co., Center Twp., BLUEGRASS CREEK — Millersburg Rd. Bridge (Daylight Quad: T5S, R10W, S25/36)
25	Vand. Co., Scott Twp., BLUEGRASS CREEK — County Line Rd. Bridge (Daylight Quad.: T5S, R10W, S13/18)
26	Warrick Co., Campbell Twp., BLUEGRASS CREEK — N. 600 Rd. Bridge (Daylight Quad.: T4S/T5S, R9W, S6/31)
27	Warrick Co., Greer Twp., BLUEGRASS CREEK — N. 750 Rd. Bridge (Elberfeld Quad.: T4S, R9W, S30)

Station	Location
28	Vand. Co., Center Twp., FIRLICK CREEK — Millersburg Rd. Bridge (Evansville N. Quad.: T5S, R10W, S26/35)
29	Vand. Co., Scott Twp., SCHLENSKER DITCH — Highway 57 Bridge (Daylight Quad.: T5S, R10W, S14)
30	Vand. Co., Scott Twp., UNNAMED TRIB. OF BLUEGRASS CREEK — Old Petersburg Rd. Bridge (Daylight Quad.: T4S, R10W, S35/36)
31	Vand. Co., Scott Twp., UNNAMED TRIB. OF BLUEGRASS CREEK — Volkman Rd. Bridge (Haubstadt Quad.: T4S, R10W, S35)
32	Vand. Co., Knight Twp., CRAWFORD-BRANDEIS DITCH — Hirsch Rd. Bridge (Daylight Quad.: T6S, R10W, S1/12)
33	Warrick Co., Campbell Twp., BARNES DITCH — N. 50 Rd. Bridge (Daylight Quad.: T5S, R9W, S34)
34	Warrick Co., Ohio Twp., STOLLBERG DITCH — Highway 62 Bridge (Daylight Quad.: T5S, R9W, S35)
35	Warrick Co., Campbell Twp., UNNAMED TRIB. — W. 700 Rd. Bridge (Daylight Quad.: T5S, R9W, S25/26)
36	Warrick Co., Campbell Twp., SQUAW CREEK — W. 700 Rd. Bridge (Daylight Quad.: T5S, R9W, S23/24)
37	Warrick Co., Campbell Twp., N. TRIB. OF SQUAW CREEK — N. 400 Rd. Bridge (Booneville Quad.: T5S, R9W, S12/13)
38	Warrick Co., Campbell Twp., SQUAW CREEK — N. 400 Rd. Bridge (Booneville Quad.: T5S, R8W, S7/18)
39	Vand. Co., Boon/Campbell Twp., SQUAW CREEK — Peabody Coal Co. Rd. Bridge (Booneville Quad.: T5S, R8W, S6)
40	Gibson Co., Barton Twp., BIG CREEK — W. 900 Rd. Bridge (Elberfeld Quad.: T3S, R9W, S33/34)
41	Warrick Co., Greer Twp., BIG CREEK — Highway 68 Bridge (Lynnville Quad.: T4S, R9W, S2/11)
42	Warrick Co., Hart Twp., BIG CREEK — Highway 61 Bridge (Lynnville Quad.: T4S, R8W, S15)
43	Warrick Co., Greer Twp., PLUM BRANCH — W. 675 Rd. Bridge (Lynnville Quad.: T4S, R9W, S13)
44	Warrick Co., Hart Twp., UNNAMED TRIB. OF BIG CREEK — Highway 68 Bridge (Lynnville Quad.: T4S, R8W, S4/9)
45	Warrick Co., Hart Twp., BIG CREEK — N. 1100 Rd. Bridge (Lynnville Quad.: T4S, R8W, S1/12)
46	Gibson Co., Barton Twp., SMITH FORK — W. 950 Rd. Bridge (Elberfeld Quad.: T3S, R9W, S21)
47	Gibson Co., Barton Twp., SMITH FORK — W. 800 Rd. Bridge (Elberfeld Quad.: T3S, R9W, S22/23)
48	Gibson Co., Barton Twp., SMITH FORK — W. 650 Rd. Bridge (Lynnville Quad.: T3S, R9W, S24)
49	Gibson Co., Barton Twp., SMITH FORK — N. 1400 Rd. Bridge (Lynnville Quad.: T3S, R8W, S20/29)
50	Gibson Co., Barton Twp., HALFMOON CREEK — Highway 68 Bridge (Francisco Quad.: T3S, R9W, S15)
51	Gibson Co., Barton Twp., DONAHUE CREEK — Highway 168 Bridge (Francisco Quad.: T3S, R9W, S14)
52	Gibson Co., Union Twp., SNAKE RUN — Highway 168 Bridge (Francisco Quad.: T3S, R10W, S14)
53	Gibson Co., Center/Union Twp., SAND CREEK — N. 1800 Rd. Bridge (Francisco Quad.: T2S/T3S, R10W, S2/35)
54	Gibson Co., Center Twp., MUDDY FORK DITCH — N. 1900 Rd. Bridge (Francisco Quad.: T2S, R10W, S25/36)
55	Gibson Co., Center Twp., SAND CREEK — N. 1900 Rd. Bridge (Francisco Quad.: T2S, R10W, S26/35)
56	Gibson Co., Union Twp., CLEAR FORK DITCH — N. 1800 Rd. Bridge (Princeton Quad.: T2S/T3S, R10W, S3/34)
57	Gibson Co., Patoka Twp., CLEAR FORK DITCH — N. 1900 Rd. Bridge (Princeton Quad.: T2S, R10W, S29)
58	Gibson Co., Union Twp., WEST FORK OF PIGEON CREEK — W. 1550 Rd. Bridge (Haubstadt Quad.: T3S, R10W, S21)
59	Gibson Co., Union Twp., WEST FORK OF PIGEON CREEK — Coal Mine Rd. Bridge (Haubstadt Quad.: T3S, R11W, S24)
60	Gibson Co., Union Twp., MCGARY DITCH — W. 1975 Rd. Bridge (Princeton Quad.: T3S, R11W, S14)
61	Gibson Co., Union Twp., HURRICANE CREEK DITCH — N. 1325 Rd. Bridge (Haubstadt Quad.: T3S, R10W, S29)
62	Gibson Co., Union Twp., HURRICANE CREEK DITCH — Highway 68 Bridge (Haubstadt Quad.: T4S, R10W, S4)
63	Gibson Co., Johnson Twp., UNNAMED TRIB. OF HURRICANE CREEK DITCH — Highway 68 Bridge (Haubstadt Quad.: T4S, R10W, S4)

TABLE 2. Comparison of young and adult fishes in Pigeon Creek drainage. Results are presented as an average followed by the standard error of the mean. Numbers in parentheses depict number of collecting stations.

	Young	Adult	Total
Pigeon Creek (15)	12.7 ± 4.4	44.0 ± 7.7	56.7 ± 8.1
Tributaries (48)	41.2 ± 9.0	81.8 ± 9.0[1]	123.0 ± 11.2[1]

[1] t-test, $p < .05$

black crappie showed a similar main stream preference, but were found in the tributaries too. In contrast, the grass pickerel, stoneroller, creek chub, creek chubsucker, and longear sunfish were found exclusively in the tributaries. The creek chub was especially common in the drainage and collected in 61.9% of the collections. Other fishes residing primarily in the tributaries were the silverjaw minnow, golden shiner, suckermouth minnow, bluntnose minnow, fathead minnow, black bullhead (young), yellow bullhead (young), pirate perch, pumpkinseed, spotted bass, and slough darter. The mosquitofish displayed a spotty distribution with the majority of collections in the lower reaches of the drainage. Carp and channel catfish demonstrated a similarly spotty distribution, but they were not restricted to any particular region. The redfin shiner preferred the headwaters of Pigeon Creek, while the blackstripe topminnow, green sunfish, and bluegill were distributed throughout the drainage. The latter three species were collected in 79.4%, 74.6%, and 58.7% of the 63 sites sampled respectively. Bluegill were especially concentrated in Little Pigeon Creek. Eight species were collected at but one location in Pigeon Creek. These incidental species were the shortnose gar, quillback, white sucker, smallmouth buffalo, black buffalo, white bass, orangespotted sunfish, and freshwater drum.

The most abundant fishes in the drainage were the creek chub, redfin shiner, blackstripe topminnow, silverjaw minnow, fathead minnow, bluntnose minnow, green sunfish, and bluegill respectively. These eight species comprised 80.4% of the collection, while the remaining 31 species made up 19.6%. The six major families represented in the drainage were the minnow (66.0%), sunfish (18.5%), killifish (9.7%), catfish (3.8%), livebearer (2.0%), and herring (1.5%) families. These families made up 99.5% of the total catch. Twelve species from 8 families accounted for the remaining 0.5%. The sucker family was poorly represented.

In this summer study, the blackstripe topminnow outnumbered mosquitofish by a 5 to 1 ratio. The blackstripe topminnow was found less often with the mosquitofish in the upper region (Station 11 and above) than in the lower region of the drainage (2×2 Chi Square = 9.6; df = 1; $p < .005$).

Species diversity within the drainage ranged from 0 to 3.2 with an average of 2.0 ± 0.7. Stations 16, 39, and 41 had particularly low species diversity indexes (0.5 or less). A fish kill consisting of grass pickerel, bluntnose minnow, creek chub, black bullhead, channel catfish, bluegill, and longear sunfish was found at Station 16. These fishes were found lodged between rocks and partially decomposed. The only living fish observed at this station was the blackstripe topminnow.

Discussion

Pigeon Creek is a base to low-gradient stream. Even though it is the largest drainage in southwestern Indiana (4), it has received little scientific attention. Historically, it's been considered by most residents as polluted, and fish kills, most of which go unreported, are common occurrences. It is classified as a legal drain which makes dredging an acceptable method of channelizing the stream. Stream channelization increases soil erosion, turbidity (with siltation), water temperature, risks to public health, and degradation to habitat and water quality. These factors along with sewage, agricultural, mine acid, and landfill run-off depict Pigeon Creek as a drainage in need of investigation and protection.

In this study, young comprised 31% of the total catch. They were represented in 24 of the 39 species (61.5%) collected in the drainage. This high frequency depicts Pigeon Creek as a valuable breeding tributary of the Ohio River, some species of which are gamefish. The gamefish in the drainage are for the most part within but two families, the catfish and sunfish families. Seventy-nine percent of the catfish collected were young, while 46.8% of the sunfish were young. The black bullhead was the most abundant catfish, while the green sunfish was the most abundant centrarchid. Both of these species are tolerant of turbidity (13).

The tributaries contained a higher number of fishes (both young and adult) than Pigeon Creek. This intradrainage difference may be attributed to the collecting practices employed or habitat differences. The latter is suspected for Pigeon Creek displayed more impermanent bottoms of deep calcitic and organic mud than its tributaries. Due to the greater flow of the mainstream, these sediments are mixed and compounded with erosion of its open banks generates a higher suspended load, more turbid conditions, and thus, more siltation. Siltation was especially notable south of Elberfeld (Station 12) to Millersburg (Station 10). This region exhibited a palustrine, not riverine, habitat. The waters were choked with emergent and floating vegetation. Algal blooms were common here as well as throughout Pigeon Creek.

Siltation as a negative influence is indicated by a comparison of the results of this study with a previous investigation in Pigeon Creek in 1942 (2). The 1942 investigation demonstrated 35 species of fish from 10 families, of which 12 species were not collected in the present study. Thirty-four percent of the fish in Pigeon Creek in 1942 no longer inhabit the drainage. Seven of these twelve (bigeye chub, mimic shiner, pugnose shiner, steelcolor shiner, bluntnose darter, johnny darter, spotted sucker) are adversely affected by siltation (6,9,12); 3 species (bullhead minnow, brown bullhead, and blackside darter) prefer clear water (9,12,13); and 1 species (swamp darter) is out of its range (1,6,12). The last species, the cypress minnow, was collected in only four stations in southwestern Indiana (2) and little is known of its sensitivity or tolerance to siltation. It is commonly found with the silvery minnow (9) which is sensitive to siltation (1). In 1942, 4 darters were collected. Only one darter was found in this study, the slough darter. The slough darter tolerates murky water and silt-bedded pools, but it favors areas with aquatic vegetation (6). The reduction in darters since 1942 suggests a decrease in riffles and silting of the stream. Suckers were not well represented in this study for the same reason. Nevertheless, 23 of the 35 (66%) fishes found in 1942 still occur in Pigeon Creek drainage today. They are the gizzard shad, quillback, creek chubsucker, creek chub, golden shiner, emerald shiner, redfin shiner, carp, suckermouth minnow, bluntnose minnow, mississippi silvery minnow, black bullhead, yellow bullhead, blackstripe topminnow, grass pickerel, pirate perch, green sunfish, warmouth, longear sunfish, bluegill, white crappie, black crappie, and freshwater drum.

Since 1942 there has been an increase in turbidity tolerant fishes, including bluntnose minnow, redfin shiner, black bullhead, and green sunfish. These 4 species comprised 30.6% of the total catch. In addition, 16 new species contributed 41% of the 1986 catch. This difference was expected since we concentrated our efforts throughout the drainage, while in 1942 only 3 stations were sampled. Three of these 16 new species (black buffalo, smallmouth buffalo, white bass) are Ohio River fishes (8) and were collected only at the mouth of Pigeon Creek. The mouth was not sampled in 1942. Four new species were found in the tributaries. They were the silverjaw minnow, stoneroller, fathead minnow, and spotted bass. Likewise, these tributaries were not sampled in 1942. Seven new and incidental species collected in this study were the bowfin, shortnose gar, white sucker, flier, pumpkinseed, orangespotted sunfish, and slough darter. They would not be expected in the 1942 study due to their low frequencies in the drainage. However, two species occurred in higher numbers in the drainage. They were the channel catfish and mosquitofish. The channel catfish was sampled at the mouth of Pigeon Creek in 1888 (5). It is possible that the channel catfish was missed in 1942 since it made up but 0.3% of the total catch in 1986. However, mosquitofish were in sufficient numbers and in the area of the three stations sampled in 1942. This lack of mosquitofish in 1942 suggests a habitat change and/or recent colonization today.

The blackstripe topminnow and mosquitofish are ecological equivalents. The blackstripe topminnow was distributed virtually throughout the drainage and outnumbered the mosquitofish by a ratio of 5 to 1. Even though the blackstripe topminnow was clearly the most dominant species of the two in the drainage, it was found more often with

the mosquitofish in the lower than upper regions. A recent colonization by the mosquitofish caused by a change in habitat in Pigeon Creek is suggested. The mosquitofish prefers slower, deeper, more vegetated waters than the blackstripe topminnow. Follow-up studies on their distributions and frequencies in the drainage is warranted.

Even though the majority of Pigeon Creek drainage is murky with deep mud bottoms, Smith Fork displayed clear waters with a sand and gravel substrate. This tributary contained populations of longear sunfish, spotted bass, bluegill, silverjaw minnow, and creek chub. Clearer streams such as Smith Fork were probably more abundant in the 1940s than now and thus promoted more siltation sensitive fishes (2). Siltation appears to be the most influential factor affecting populations and community structure of fishes in Pigeon Creek today.

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