

FISHES OF THE NEWPORT CHEMICAL DEPOT, VERMILLION COUNTY, INDIANA

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ABSTRACT: Thirty-two species of fishes are known from the Newport Chemical Depot, Vermillion County, Indiana (including its Little Raccoon Creek easement): the American brook lamprey (Petromyzontidae), gizzard shad (Clupeidae), 13 species of minnows (Cyprinidae), five species of suckers (Catostomidae), two species of catfishes (Ictaluridae), five species of darters (Percidae), 3 species of sunfish and the largemouth bass (Centrarchidae), and mottled sculpin (Cottidae). The most abundant species are the red-bellied dace (*Phoxinus erythrogaster*), creek chub (*Semotilus atromaculatus*), black-nosed dace (*Rhinichthys atratulus*), silverjaw minnow (*Notropis buccatus*), central stoneroller (*Campostoma anomalum*), orangethroat darter (*Etheostoma spectabile*), common white sucker (*Catostomus commersoni*), green sunfish (*Lepomis cyanellus*), and bluntnose minnow (*Pimephales notatus*). No federal or state listed species of fish has been observed at the Newport Chemical Depot to date.

KEYWORDS: Fishes, Newport Chemical Depot, Vermillion County, Indiana.

INTRODUCTION

Both the Indiana Academy of Science's Committee on Biodiversity and Conservation and the Indiana Department of Natural Resources' Technical Advisory Committee on Mammals have recommended that the natural areas of Indiana be surveyed for their biotic diversity. The Department of Defense has also recommended that areas under its control be surveyed, especially for federally endangered and threatened species. This study and similar studies at Newport on the mammals (this issue), reptiles and amphibians (this issue), and birds (Chandler and Weiss, 1996) were undertaken to partially fulfill these objectives.

The Newport Chemical Depot (formerly the Newport Army Ammunition Plant) is located in northern Vermillion County, Indiana, and is a former munitions manufacturing facility covering 2,874 ha. The depot has acted as both producer and/or repository for various military munitions since the early 1940's and currently stores VX nerve agent. The VX must be disposed of by 2007 in accordance with the Prohibition of Chemical Weapons Treaty.

Approximately half of the plant is in agricultural land. The remainder is covered by natural habitats, mostly grassland and forest, but with some ponds and a small amount of marsh (Chandler and Weiss, 1996). The main part of the plant is fenced and contains three small streams, offering habitat to freshwater fishes. The depot also includes part of an unnamed stream running toward the Wabash

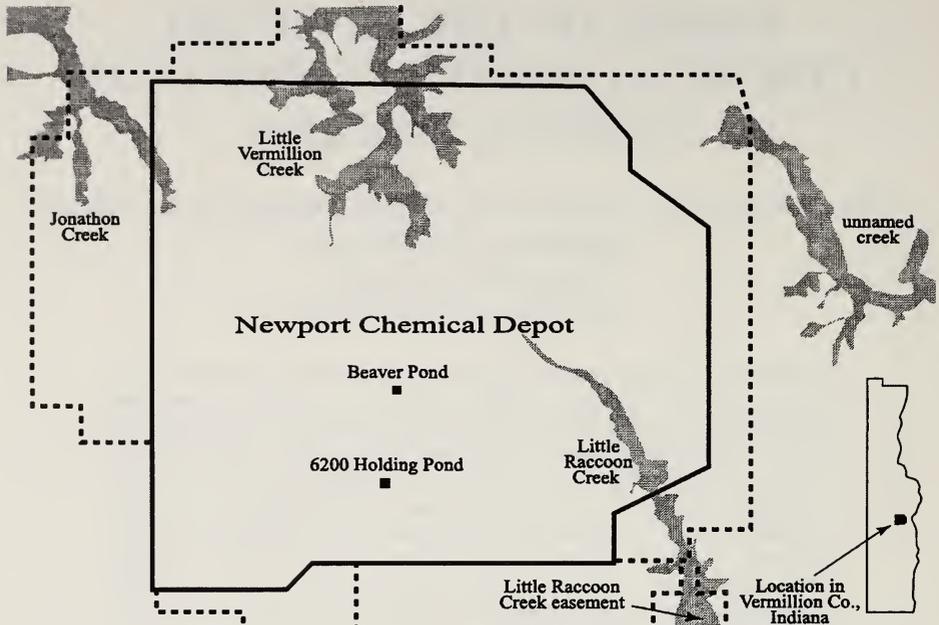


Fig. 1. Map of Newport Chemical Depot study area, Vermillion Co., Indiana. Dashed lines indicate the property boundaries, and solid lines indicate the position of the perimeter fence. Location of major seining areas are included as shaded areas: Little Vermillion Creek, Jonathon Creek, Little Raccoon Creek, and the unnamed creek. The beaver pond and 6200 holding pond are shown to indicate minnow trap sites (see text). The Little Raccoon Creek easement is also shown, which extends further south.

River east of State Route 63. In addition, the depot has easement rights for 388 ha of land that includes Little Raccoon Creek (Figure 1).

Two previous surveys in this area yielded a total of 19 species of fishes (Table 1). Gammon, *et al.* (1974) collected 10 species in Little Raccoon Creek, approximately 6.5 km south of the depot. Bender and Pearson (1975) reported sixteen species of fishes from the Newport Chemical Depot. Whitaker (1994) listed four species, two state endangered and two of state special concern, respectively, as potentially present: *Notropis ariommus*, *Etheostoma camuram*, *Moxostoma valenciennesi*, and *Ammocrypta pellucida*. *Notropis ariommus* is currently listed as extirpated from Indiana. *Ammocrypta pellucida* was present earlier in Vigo County (Whitaker and Wallace, 1973) but had not been seen in the County in a number of years until two were taken in Prairie Creek in 1999. We undertook this study to assess the distribution and abundance of the fishes present at the Newport Chemical Depot.

STUDY SITE

Habitat for fishes consists of four main water courses: Little Vermillion Creek, Little Raccoon Creek, and Jonathon Creek within the fenced area and

Table 1. Summary of the fishes taken in or near the Newport Chemical Depot.

	Whitaker (1994) and Current Study						Totals ^e
	LRC Easement ^a	Bender & Pearson ^a	L. Raccoon Creek	Jonathon Creek	L. Vermillion Creek	Unnamed Creek	
PETROMYZONTIDAE							
<i>Lampetra appendix</i>		•					
CLUPEIDAE							
<i>Dorosoma cepedianum</i>			1				1
CYPRINIDAE							
<i>Phoxinus erythrogaster</i>		•	1837	114	1633		3584
<i>Semotilus atromaculatus</i>	8	•	691	311	1485	384	2871
<i>Rhinichthys atratulus</i>	20	•	1482	60	154	236	1932
<i>Campostoma anomalum</i>	11	•	130	39	128	428	725
<i>Notropis buccatus</i>	65	•	188	381	136		705
<i>Luxilus chrysocephalus</i>	8	•	55	15	2	27	99
<i>Pimephales notatus</i>	3		89		4		93
<i>Lythrurus umbratilis</i>			60				60
<i>Notropis stramineus</i>			9				9
<i>Cyprinella spiloptera</i>	4	•	2	1	3	1	7
<i>Notropis atherinoides</i>			6				6
<i>Phenacobius mirabilis</i>		•		4			4
<i>Cyprinus carpio</i>			3			3	
CATOSTOMIDAE							
<i>Catostomus commersoni</i>	3	•	139	60	63	1	263
<i>Carpiodes velifer</i>			12			12	
<i>Hypentelium nigricans</i>		•		3	1		4
<i>Moxostoma erythrurum</i>			1	2	1		4
<i>Moxostoma duquesnei</i>				1			1
ICTALURIDAE							
<i>Ameiurus melas</i> ^b							1 ^b
<i>Ameiurus natalis</i> ^a	1						
PERCIDAE							
<i>Etheostoma spectabile</i>		•	49	21	370	16	456
<i>Etheostoma nigrum</i>		•	58	3	2		63
<i>Etheostoma flabellare</i>			11				11
<i>Etheostoma blennioides</i>				3			3
<i>Percina caprodes</i>			1				1
CENTRARCHIDAE							
<i>Lepomis cyanellus</i> ^b	2					5	118 ^b
<i>Micropterus salmoides</i>				3		3	6
<i>Lepomis macrochirus</i>		•	1	2	1		4
<i>Lepomis gulosus</i>		•					
COTTIDAE							
<i>Cottus bairdi</i>		•	40		1		41
Total Species	10	16	22	17	15	9	32 ^d
Total Individuals	125	?	4859	1029	3984	1101	11170 ^e

^aSpecies taken only on the depot's Little Raccoon Creek easement or reported by Bender and Pearson (1975).

^b1 *Ameiurus melas* and 113 of 118 *Lepomis cyanellus* were taken in minnow traps set at two ponds (Figure 1).

^cTotals include individuals from Whitaker (1994) and the current study.

^dTotal number of species known to date from the study area.

an unnamed creek east of State Route 63 which is also part of the depot (Figure 1). Each of these streams is relatively small, averaging approximately 5 m in width and typically under 1/2 m in depth. As the creeks branch outside the depot, they tend to increase in width and, at some points, reach nearly 10 m. The depth remains relatively constant. The bottom types associated with these creeks include sand/silt, gravel, and stone. The current is moderate in late spring and early summer. Flow becomes much slower toward late summer as water levels decrease, and, ultimately, the creeks become dry except for isolated pools, averaging 2-4 m in width and up to 1 m in depth.

MATERIALS AND METHODS

Sixteen seine collections were made in 1993-1994 (Whitaker, 1994) and 135 in 1998. Four areas were seined in 1993-1994, and 3 of those 4 were seined again in 1998 (Little Vermillion Creek, Little Raccoon Creek, and Jonathon Creek). The number of seinings per area varied according to the area's size and location: 94 collections were made along Little Vermillion Creek; 38 collections along Little Raccoon Creek; 17 collections along Jonathon Creek; and 2 collections along the unnamed creek.

Of the 16 collections made in 1994, 11 were from outside the depot's perimeter fence but within 2.5 km of the site. All collections were made on depot property or on land under easement rights. The majority of the collections made in 1998 (112 of 135) were from within the perimeter fence; therefore, all were made on depot property.

Collections were made using a 15- or 30-foot, 1/4-inch mesh seine. A few fishes were collected in minnow traps set for salamanders at a beaver pond and at a man-made pond (6200 holding pond) on depot property.

RESULTS

A total of 32 species of fishes has been taken to date from the Newport Chemical Depot and its Little Raccoon Creek easement (Table 1). Four of these species, *Etheostoma flabellare*, *Notropis atherinoides*, *Cyprinus carpio*, and *Ameiurus natalis*, have not been taken in the depot proper but were captured only in the Little Raccoon Creek easement downstream from the depot. The 16 species reported by Bender and Pearson (1975) included 2 species, the warmouth (*Lepomis gulosus*) and the American brook lamprey (*Lampetra appendix*), not taken on depot property during the current study. In addition, the yellow bullhead (*Ameiurus natalis*) was collected by Gammon, *et al.* (1974) in the Little Raccoon Creek easement but was not observed during the current survey.

The Fish Species

Petromyzontidae (Lampreys). The American brook lamprey (*Lampetra appendix*) was reported by Bender and Pearson (1975) but was not taken on depot property by Whitaker (1994) or in 1998. One specimen was taken in the Little Vermillion River near the depot in 1994 (Whitaker, 1994).

Clupeidae (Herrings). The gizzard shad (*Dorosoma cepedianum*) was uncommon at Newport; just one individual was observed in Little Raccoon Creek. The gizzard shad is a river species and should rarely be found in the small streams at Newport.

Cyprinidae (Minnows). Thirteen species of cyprinids were found during the present study, the most abundant being the redbelly dace (*Phoxinus erythrogaster*; 3,584 individuals), creek chub (*Semotilus atromaculatus*; 2,871), blacknose dace (*Rhinichthys atratulus*; 1,932), central stoneroller (*Campostoma anomalum*; 725), silverjaw minnow (*Notropis buccatus*; 705), striped shiner (*Luxilus chrysocephalus*; 99), and bluntnose minnow (*Pimephales notatus*; 93). Of these, the creek chub, blacknose dace, stoneroller, and striped shiner occurred in all four streams, whereas the redbelly dace and silverjaw minnow occurred in all but the unnamed creek. Four of these species (the creek chub, central stoneroller, silverjaw minnow, and bluntnose minnow) are among the most abundant cyprinids in adjacent Vigo County (Whitaker and Wallace, 1973); the redbelly and blacknose dace are found only in northern Vigo County west of the Wabash River; and the striped shiner is localized about Otter Creek in northern Vigo County (Whitaker and Wallace, 1973).

The spotfin shiner (*Cyprinella spiloptera*) is common in Vigo County (Whitaker and Wallace, 1973), and we were surprised that it was not more common at Newport. Both the redbelly shiner (*Lythrurus umbratilis*) and suckermouth minnow (*Phenacobius mirabilis*) occur in relatively low numbers in Vigo County and, likewise, at the Newport Chemical Depot. River species such as the emerald shiner (*Notropis atherinoides*), sand shiner (*Notropis stramineus*), and common carp (*Cyprinus carpio*) were taken in low numbers at the plant because of the small size and intermittent nature of the streams.

Catostomidae (Suckers). Five species of suckers have been found at or near Newport, but the common white sucker (*Catostomus commersoni*) was the only common one. White suckers were found in all four streams. We were surprised that more northern hog suckers (*Hypentelium nigricans*) were not taken as they are common in Vigo County (Whitaker and Wallace, 1973). The species of *Moxostoma* and *Carpiodes* are larger stream or river species, explaining their low abundance.

Ictaluridae (Catfish). Only two individual ictalurids were taken at the Newport Chemical Depot. A black bullhead (*Ameiurus melas*) was taken in a minnow trap in a beaver pond in the center of the study area (Figure 1), and a yellow bullhead (*Ameiurus natalis*) was taken in the Little Raccoon Creek easement by Gammon, *et al.* (1974). Surprisingly, the brindled madtom (*Noturus miurus*) was not taken although it occurs in the rocky streams of this area. The madtom's absence is probably a result of the intermittent nature of the streams.

Percidae (Darters and Perch). Five species of percids were observed at Newport. The orangethroat darter (*Etheostoma spectabile*) and johnny darter (*Etheostoma nigrum*) were the two most widespread and abundant. These two species were also the most common darters in adjacent Vigo County (Whitaker

and Wallace, 1973). We observed low numbers of fantail darters (*Etheostoma flabellare*) and greenside darters (*Etheostoma blennioides*). These species are both inhabitants of rocky-bottomed streams, and their presence is due to the abundance of this habitat at Newport. We observed one log perch (*Percina caprodes*) in Little Raccoon Creek. The log perch is not abundant in adjacent Vigo County (Whitaker and Wallace, 1973), and its distribution at Newport is probably limited both by the small size and intermittent nature of the streams.

Centrarchidae (Sunfishes and Bass). Three species of centrarchids were taken during our studies: the bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), and largemouth bass (*Micropterus salmoides*). All are common in the larger streams of Vigo County, but none are small stream species, explaining their low numbers at the depot. Most (113 of 118) of the green sunfish were caught in minnow traps in a beaver pond and man-made pond (6100 holding pond). The warmouth (*Lepomis gulosus*) was reported by Bender and Pearson (1975), but this species was not taken during our survey.

Cottidae (Sculpins). The mottled sculpin (*Cottus bairdi*) is relatively abundant at Newport, a reflection, in part, of the amount of stony bottom stream habitat. Whitaker and Wallace (1973) did not report this species from Vigo County, and its distribution in Indiana is concentrated in the northern and eastern portions of the State (Gerking and Lagler, 1945).

DISCUSSION

The four streams differed somewhat in species diversity. The numbers of established species in each (as indicated by ten or more individuals being taken) are summarized in Table 2. Fourteen of 22 species taken in Little Raccoon Creek were well-established species. Since Little Eagle Creek was the largest creek in terms of length sampled, greater habitat variation might be the reason for the greater number of species. The presence of eight transient species indicates the constant movement of individuals into smaller streams, giving plenty of opportunity for the establishment of additional species should conditions change.

Jonathon Creek and Little Vermillion Creek each had the same eight well-established species, indicating the similarity of these two streams. The 6 established species that dropped out from the community at Little Raccoon Creek were: 2 minnows (*Pimephales notatus* and *Lythrurus umbratilis*), 2 darters (*Etheostoma nigrum* and *E. flabellare*), 1 sucker (*Carpionodes velifer*), and the sculpin (*Cottus bairdi*). A few johnny darters, blunt-nosed minnows, and a sculpin were taken in Little Vermillion Creek, and 3 johnny darters were taken in Jonathon Creek.

The unnamed creek, the smallest of the four streams in terms of both width and depth, contained the fewest species (9) and the lowest number of well-established species (6). Eight species that were well established in at least one of the other streams were not taken here. The unnamed creek differed from the other three in having less variation in bottom substrate; it was the only stream with a mostly rocky, flat bottom. Also, only two collections were made from this stream,

Table 2. Well-established species (10 or more individuals taken) in each stream at the Newport Chemical Depot, Vermillion County, Indiana. A number indicates the species' presence, but less than 10 individuals were taken. Data are from Whitaker (1994) and the current survey.

Species	Streams			
	Unnamed Creek	Jonathon Creek	Little Vermillion Creek	Little Raccoon Creek
<i>Semotilus atromaculatus</i>	•	•	•	•
<i>Phoxinus erythrogaster</i>	•	•	•	•
<i>Rhinichthys atratulus</i>	•	•	•	•
<i>Campostoma anomalum</i>	•	•	•	•
<i>Luxilus chrysocephalus</i>	•	•	•	•
<i>Etheostoma spectabile</i>	•	•	•	•
<i>Catostomus commersoni</i>	1	•	•	•
<i>Notropis buccatus</i>		•	•	•
<i>Etheostoma nigrum</i>		3	2	•
<i>Pimephales notatus</i>			4	•
<i>Cottus bairdi</i>			1	•
<i>Notropis umbratilis</i>				•
<i>Carpionodes velifer</i>				•
<i>Etheostoma flabellare</i>				•
Number of Collections	2	17	94	39
Total Species	9	17	15	22
Established Species	6	8	8	14

which, coupled with low habitat variation, probably explains the low species diversity.

As previously noted, Gammon, *et al.* (1974) found one yellow bullhead (*Ameiurus natalis*) 6.5 km south of the depot in Little Raccoon Creek. Bender and Pearson (1975) found 2 species at Newport which were not found during the present study — the warmouth (*Lepomis gulosus*) and American brook lamprey (*Lampetra appendix*). The warmouth is most abundant in permanent ponds, and the American brook lamprey typically inhabits large, clear creeks and small rivers. We would not expect either species to occur in the shallow streams in and near the depot.

A few species which were not found in the immediate vicinity of Newport were found downstream in Little Raccoon Creek or in its tributary, Buck Creek, which enters Little Raccoon Creek over 6.5 km downstream from the plant. Four samples were taken in nearby Buck Creek (Whitaker, 1994), two by Whitaker via seining and two by Thomas Simon of the Environmental Protection Agency in 1994 using an electroshocker. The creek chubsucker (*Erimyzon oblongus*; 2 individuals) and yellow bullhead (*Ameiurus natalis*; 5 individuals) were taken in Buck Creek. The yellow bullhead was taken only in the Little Raccoon Creek easement, probably because of the small size and intermittent nature of the streams at Newport. Other species taken in Buck Creek were (in decreasing order):

- Cyprinidae: the creek chub (197 individuals), central stoneroller minnow (156), redbelly dace (74), blacknose dace (73), silverjaw minnow (65), bluntnose minnow (54), and common carp (9);
 Catostomidae: the white sucker (21);
 Percidae: the orangethroat darter (60), johnny darter (25), and fantail darter (9);
 Centrarchidae: the green sunfish (1); and
 Cottidae: the mottled sculpin (1).

Newport has relatively little diversity in its fish fauna—only 32 species. In contrast, 56 species have been taken at another locality, Otter Creek, in Vigo County. Nevertheless, an interesting fish community exists at the depot, including the redbelly dace, blacknose dace, and mottled sculpin. The depot may serve as a possible refuge for these and other species as man's impact on the environment continues to result in habitat loss, fragmentation, and degradation. No federal or state listed fish species have been observed at the depot to date.

A necessary ingredient in preserving biodiversity is the setting aside of large natural areas. The 2,874 ha which make up the Newport Chemical Depot provide an opportunity to do exactly that. We recommend that once the military completes its mission, the portions of the Newport Chemical Depot that currently are natural habitats be set aside as a natural area/preserve.

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