

ASSESSMENT OF THE RANGE OF THE THREATENED DARTER, *AMMOCRYPTA PELLUCIDA* (PUTNAM), FROM THE MAUMEE RIVER BASIN, INDIANA

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ABSTRACT: The range of the eastern sand darter, *Ammocrypta pellucida*, in the Maumee River drainage was evaluated by historical assessment of museum collections and resurvey. Survey efforts during 1991 included all known historical localities and previous sampling stations. A total of 98 stations were sampled in the Maumee basin, Indiana, to assess the status of *A. pellucida* (Agassiz) in the St. Joseph, St. Mary's, and Maumee River basins. *Ammocrypta pellucida* was historically restricted to the large river habitat associated with the St. Joseph, St. Mary's, and Maumee River basin. Recent efforts resulted in a single collection from the St. Joseph River adjacent to Johnny Applesed Park. This record is the first from the Maumee basin for this species in fifty years. *Ammocrypta pellucida* prefers clean sand and gravel substrates with moderate current in large river habitat. Due to the rarity of this species in the Lake Erie drainage, areas where *A. pellucida* is found should be designated as critical habitat. The threat of siltation, habitat degradation, non-point runoff, and point source toxic contributions has reduced the range and makes the future persistence of this species less than optimistic.

INTRODUCTION

The eastern sand darter, *Ammocrypta pellucida*, is currently recognized as threatened in Indiana based on its limited presence in the Wabash River drainage (Simon, *et al.*, 1992). To date, critical habitat for this species has not been identified. Although *A. pellucida* is known to persist in the State (Seegert, 1987; Simon, unpub. data), the last reported Indiana collection from the Maumee River was over 50 years ago (Kirsch, 1895; Gerking, 1945). Kirsch (1895) was the first to discover *A. pellucida* in the Maumee basin, while Gerking (1945) revealed two additional localities in the St. Joseph River. The listing of the species as State threatened and possibly extirpated from the Maumee system was suggested (Whitaker and Gammon, 1988), since no recent specimens had been collected, and the construction of a series of reservoirs has virtually eliminated sand darter habitat in the St. Joseph River. Historically, the Maumee River was important to the species, serving as an outlet for post-glacial dispersal into the Wabash River (Gerking, 1945; Burr and Page, 1986).

Although there is an effort among some ichthyologists to place the eastern sand darter in the genus *Etheostoma* (*sensu* Simons, 1992), its traditional placement in the genus *Ammocrypta* (Williams, 1975) is retained in this paper. Evidence derived from the study of its ontogenetic development suggests that the retention of genus *Ammocrypta* is warranted (Simon, *et al.*, 1992).

The primary focus of this paper is to present an assessment of the historical and present distribution of *A. pellucida* in the Maumee River basin, Indiana, as judged from a critical examination of extant museum specimens and the published literature. In addition, the results of a recent survey of the Huron-Erie Lake Plain to assess the status of *A. pellucida* in the Maumee River basin are discussed.

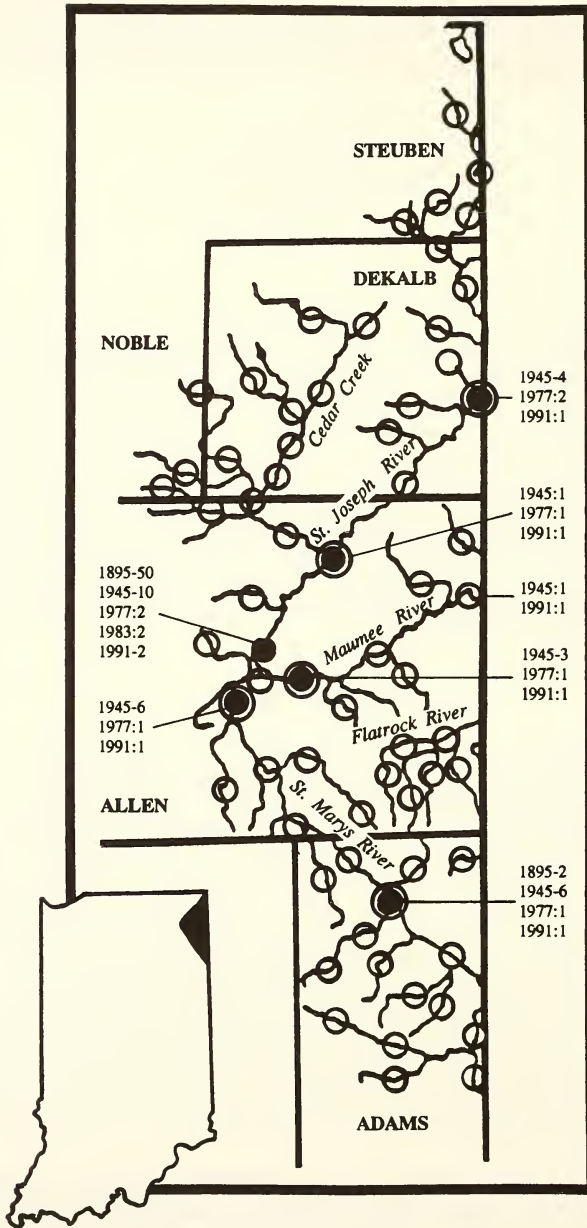


Figure 1. Geochronology of *Ammocrypta pellucida* in the Maumee River basin, Indiana. Solid dots represent localities with extant vouchered material but not necessarily extant populations. Extant populations are denoted by a hollow ring around a solid dot. Hollow dots represent sites sampled but not providing specimens. Data provided are: year of collection(s) followed by (1) the number of specimens taken (this number is separated by a hyphen) or (2) the number of collections not yielding specimens (this number is separated by a colon).

Table 1. Collection data for all known specimens of *A. pellucida* from the Maumee River basin, Indiana.

County	Catalog Number*	Number of Specimens	Range in Standard Length (mm)	Location	Collector	Citation
Allen	CAS 8997	50+	35-55	Maumee River	P.H. Kirsch, 1890	
	UMMZ 197720	18		Maumee River at Fort Wayne	P.H. Kirsch, 1893	
				St. Joseph River at Fort Wayne	P.H. Kirsch, 1893	Kirsch, 1895
				St. Mary's River at Fort Wayne	P.H. Kirsch, 1893	Kirsch, 1895
	OSU			St. Joseph River at Cedarville	S.D. Gerking, 1941	
	IUN (uncatalogued)	2	35-38	St. Joseph River at Johnny Appleseed Park at Fort Wayne	T. Simon, A. Ellis, and D. Campbell, 1991	
Adams	USNM 69231	3	53-59	St. Mary's River at Decatur	P.H. Kirsch, 15 August 1893	
Dekalb	OSU			St. Joseph River one mile West of the Ohio State Line	S.D. Gerking, 1941	

* CAS = California Academy of Science; IUN = Indiana University Northwest; OSU = Ohio State University; and USNM = U.S. National Museum.

METHODS AND MATERIALS

The distribution of *A. pellucida* is shown in Figure 1. Each positive record is based on the examination of an extant specimen or published literature records (Kirsch, 1895; Gerking, 1945). Collection data are summarized on the map in a geochronological format (after Cashner and Jenkins, 1982; Warren and Burr, 1988). This map shows locations, years, numbers of collections, and results of collections at or near sites known to have yielded *A. pellucida*. The data were taken from the records of the University of Michigan Museum of Zoology and the U.S. National Museum and were augmented by

field searches for *A. pellucida* (denoted 1991). Resurveys of historical sites were not included if they apparently were made in uncharacteristic habitats or only contained species unlikely to be associated with *A. pellucida*. Locality data for all *A. pellucida* records are given Table 1.

Sampling of representative habitats in the Maumee River basin was undertaken to determine representative fish community attributes for evaluating water resources of the Huron-Erie Lake Plain ecoregion. A total of 98 localities from the Maumee River drainage was sampled during 1991. The number of stations suspected of possessing adequate habitat for *A. pellucida* numbered 66. Specimens were collected over a distance of 1000 m in large river habitat or 15 times the river width in moderate-sized streams and rivers. Sampling was conducted in all available habitats usually by wading with a pulsed DC T&J electroshocker capable of 300 volt output. The generator was floated in a self-contained Sport-Yak. Small to moderate sized streams (<10 m) were sampled with a long line utilizing the same generator. Physical habitat characteristics were evaluated for each of the localities sampled. These included documenting the dominant substrate composition, instream cover, riparian habitat, and stream morphology.

RESULTS AND DISCUSSION

Historical Distribution (Pre-1977). Jordan (1877) was among the first to complete a series of documented collections from the Maumee River basin. Jordan's collections were from three locations in the St. Joseph River and an unnamed location in the Maumee River. The St. Joseph sites included Henderson Lake and Creek, Sawyer Creek, and Bixel Lake Outlet. No eastern sand darters were collected by Jordan from the Maumee basin. However, 150 specimens from the White River basin in the vicinity of Indianapolis were reported.

Kirsch (1895) collected *A. pellucida* from three localities in Allen County. His collections were from the Maumee, St. Joseph, and St. Mary's Rivers in the vicinity of Fort Wayne in Allen County; and from the St. Mary's River at Decatur in Adams County. All of Kirsch's *A. pellucida* collections were from the mainstem rivers.

Meek (1908), although not providing any new localities, indicated that the species was not rare in Indiana. In his list of fishes known to occur in Indiana, he described the eastern sand darter as occurring from northern Ohio to Minnesota and Texas.

Gerking (1945), during his statewide survey of Indiana, collected at eight localities in the Maumee River basin. He reported the eastern sand darter from two localities in the St. Joseph River; one location was a mile west of the Ohio State line, and the second was near Cedarville.

Recent Distribution (1977-1991). The Indiana Department of Natural Resources collected electroshocked fish from 10 stations in the St. Joseph River, St. Mary's River, and Maumee River during 1977 (Pearson and Shipman, 1978). The Johnny Appleseed Park site was one of four sites sampled on the St. Joseph River (the remaining three sites were in upstream reservoirs). The only darter collected at any of the four St. Joseph sites was the logperch (*Percina caprodes*), although adequate dissolved oxygen levels were present throughout the basin to support other species. Additional localities from the basin included three stations on the Maumee and three St. Mary's River stations. None of the St. Mary's or Maumee River stations yielded any darters.

In 1983, the Indiana Department of Natural Resources surveyed the St. Joseph River adjacent to Johnny Appleseed Park, immediately downstream of Coliseum Boulevard

(Pearson, 1984). The purpose of this study was to evaluate the potential walleye (*Stizostedion vitreum*) fishery believed to be increasing in the St. Joseph River. During their survey, no reports of eastern sand darter or walleye were noted, although the two are not usually sympatric.

Collection at 98 sites in the Huron-Erie Lake Plain during 1991 resulted in a single site which still possessed a remnant population of *Ammocrypta pellucida* in northeastern Indiana (Figure 1). Collections were attempted at all of the historic localities where the eastern sand darter had been reported. All of the other localities were either degraded through the loss of lotic habitat or were impacted from agricultural erosional runoff and point source pollution.

The eastern sand darter was collected from the mainstem St. Joseph River in downtown Fort Wayne adjacent to the Johnny Appleseed Park, Allen County. The single site was located immediately above a large dam at the junction of the two tributaries forming the Maumee River and downstream from a series of reservoirs on the St. Joseph River. Although the dams are detrimental, causing isolation and inhibition of migration and colonization, the species obviously benefited from the reservoirs. The reservoirs immediately upstream from the Johnny Appleseed Park act as a silt trap, removing a considerable amount of the silt load of the St. Joseph River.

The substrate at the Johnny Appleseed Park site was composed primarily of gravel and cobble (30% each), sand (20%), and large boulders (20%). The site has a series of riffle-pool (1:1 ratio) sequences, providing adequate cover comprised primarily of slab and boulder rock interstitial spaces, fine gravel, and clean sand substrates. The site possesses limited woody debris and poor riparian bank stabilization. The bank is eroded on the left shore (moderate riparian width, 10-50 m). Cement-steel pilings and a beach access occur on the right shore (very narrow riparian width, 1-5 m). A large sand-gravel riffle exists during low water. Current velocity and water clarity during 1991 was moderate, visibility was to the bottom, and water depth was typically 1.0 m. Only two specimens were collected after extensive electroshocking effort. The two specimens were 32-34 mm in standard length and 36-38 mm in total length.

The fish community on the St. Joseph River at Johnny Appleseed Park included a total of 731 individuals divided among 33 species. Species sympatric with *A. pellucida* included logperch (*Percina caprodes caprodes* (20.1%)), rosyface shiner (*Notropis rubellus* (12.4%)), suckermouth minnow (*Phenacobius mirabilis* (3.9%)), northern hogsucker (*Hypentilium nigricans* (2.1%)), smallmouth bass (*Micropterus dolomieu* (1.6%)), spotfin shiner (*Cyprinella spiloptera* (1.6%)), johnny darter (*Etheostoma nigrum* (1.5%)), stonecat (*Noturus flavus* (0.3%)), golden redbhorse (*Moxostoma erythrurum* (0.3%)), and smallmouth buffalo (*Ictiobus bubalus* (0.3%)).

Conservation and Environmental Preservation Efforts. The eastern sand darter has suffered range reduction through degradation of clean sand substrates in moderate to large rivers. Reliance on large rivers for a multitude of human uses, ranging from recreation, industrial and municipal wastewater, and agricultural needs, has put an increased demand on the environment. This demand limits the potential to maintain a functional and balanced biological community. The loss of critical habitats for northeastern Indiana fish species is due to habitat modification through excessive siltation (Trautman, 1981; Burr and Page, 1986), dredging and channel modification, nutrient enrichment, and other habitat modifications associated with land clearing, drainage, and development.

Concurrent with the loss of critical habitat is the occurrence of degradation through bank instability and erosion, agricultural non-point source runoff of pesticides and her-

bicides, and irresponsible toxic discharge from industrial and municipal dischargers. All eight localities in this drainage where *A. pellucida* was known to occur were surveyed with concentrated efforts in the Maumee and St. Mary's River basins. The continued presence of the species could not be documented in any of the streams surveyed (Figure 1).

The reduction of species diversity through the loss of the most sensitive community members is a warning sign to the environmental regulatory community. The direct measure of biological integrity is the only method which evaluates and assesses the impacts to the receiving stream. Unfortunately, the protection of surface waters is often undertaken without the assistance of a biologist knowledgeable about the long-term impacts on and the causes of stream degradation. Most management decisions are made within a short-term, goal-oriented framework, resulting in the decline of the waters towards lower biological integrity classes.

The protection of critical habitat is a fundamental part of the Endangered Species Act. Species recovery depends on the identification of bottlenecks and habitat features which hinder or enhance species survival and fitness. Unfortunately, regulatory roles and resource stewardship are conducted through separate agencies and usually are not coordinated. Likewise, species undergoing range reduction, such as the eastern sand darter, are not protected until listed, often requiring drastic measures to preserve the species' continued existence. When will prevention become our policy rather than a corrective measure?

As judged from the present field work, the destruction of appropriate habitat, and the historical distribution of *A. pellucida* in Indiana, the continued presence of viable populations of this species in the Maumee basin is doubtful. If the species continues to persist at all, it will be in very low numbers. The specimens collected from the St. Joseph River may afford some hope that the species might occur elsewhere in the large river habitat.

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