Virginia Journal of Science
Volume 43, Number 1A
Spring 1992

Distribution of the Endangered Glassy Darter, *Etheostoma vitreum*, in Maryland Coastal Plain Streams

Steven A. Fischer, Lenwood W. Hall, Jr., and William D. Killen, Jr.
University of Maryland System, Maryland Agricultural Experiment Station, Wye Research and Education Center, Queenstown, Maryland 21658

ABSTRACT

The glassy darter, *Etheostoma vitreum,* is currently considered an endangered extirpated species in Maryland. Recently, *Etheostoma vitreum* was collected from several streams within the Marshyhope Creek drainage basin on the Delmarva peninsula of Maryland. Although this is a range extension for this species in Maryland, it is most likely the result of a paucity of historical fish taxonomic surveys on the Delmarva peninsula. *Etheostoma vitreum* was collected from only one Maryland stream known to have historical populations. Suitable habitat for *E. vitreum* consisted of first to third-order streams with sand and gravel substrates. Collections of *E. vitreum* were made only from streams with pH greater than 6.5, acid neutralization capacity greater than 250 μeq/L, conductivity greater than 65 μs/cm, turbidity (baseflow) less than 15 NTU, and in waters less than 0.5 m in depth.

INTRODUCTION

The glassy darter, *Etheostoma vitreum*, is currently listed as an endangered extirpated species in Maryland (MDNR, 1991). This classification indicates that viable *E. vitreum* populations previously existed in the State of Maryland, but naturally occurring populations do not presently exist. Lee et al. (1980) indicated that *E. vitreum* historically ranged from the Neuse River drainage of North Carolina, to the Patuxent River drainage (western shore) of Maryland. A population of approximately 1000 *E. vitreum* was reported to inhabit Western Branch Creek in Prince George's County, Maryland, in the late 1950's (Winn and Picciolo, 1960). Mansueti (1950) and Tsai and Golembiewski (1979) reported the collection of *E. vitreum* from several locations in the Patuxent River drainage basin. The collection of *E. vitreum* from Winters Run, Harford County, Maryland, reportedly represented the northern range limit (Lee et al., 1980).

Etheostoma vitreum is most commonly associated with small to medium-sized streams, with sand and gravel substrates (Lee et al., 1980). Winn and Picciolo (1960) reported *E. vitreum* adults spend the majority of their time with their posterior buried in sand. Adults were found to inhabit shifting sand substrates until early fall, at which time they moved into deeper pools for the winter months (Winn and Picciolo, 1960). Several morphological adaptations, such as large pectoral fins, a pellucid and slender body, dorsally positioned eyes, and a scaleless venter, allow *E. vitreum* to inhabit such an environment (Winn and Picciolo, 1960). Unique among percid species, *E. vitreum* exhibits communal spawning (Winn and Picciolo, 1960).

Fisheries surveys conducted for the 1991 Maryland Doser Project resulted in the collection of *E. vitreum* from Faulkner Branch and Tull Branch (Marshyhope Creek drainage) on the Delmarva peninsula (Hall et al., 1992). The objective of this study was to document the current distribution of *E. vitreum* within Maryland's coastal plain streams.

METHODS

Stream sample sites were selected following a review of the Maryland Synoptic Stream Chemistry Survey (Knapp et al.,1988) and specific topographical maps. Sites with historical populations of *E. vitreum,* such as Western Branch (Mansueti, 1950; Tsai and Golembiewski, 1979), Little Patuxent River at Conoways (Mansueti, 1950; Tsai and Golembiewski, 1979), and Patuxent River at Brock Bridge Road (Tsai and Golembiewski, 1979) were also included in the survey.

Backpack electrofishers (Smith-Root Model 15A; Coffelt Model Mark 10) were used to sample potential darter habitat. Depending upon stream width and habitat complexity, survey sites ranged in length between 25 and 100 m. Water temperature, conductivity, pH and dissolved oxygen were measured at all sample locations with portable field instruments. In addition, 125 ml water samples were collected for turbidity and acid neutralizing capacity (ANC) measurements.

RESULTS AND DISCUSSION

A total of 30 streams were surveyed between 1 May and 1 July 1991 (Table 1). *Etheostoma vitreum* was collected from the following streams: Faulkner Branch, Tull Branch, Houston Branch, Sullivan Branch, two locations in Marshyhope Creek, and two locations in the Little Patuxent River. The identity of specimens collected from Faulkner Branch (Caroline County) and Little Patuxent River (Anne Arundel County) were verified by Larry Page (Illinois Natural History Survey). Five streams inhabited by *E. vitreum* were within the Marshyhope Creek/Nanticoke River drainage basin, which is located on the Delmarva peninsula. *Etheostoma vitreum* was not collected during previous fisheries surveys conducted in Maryland streams on the Delmarva Peninsula (Speir et al., 1976). The single western shore stream inhabited by this darter was the Little Patuxent River.

A size range of 22 to 76 mm standard length was recorded for all darters collected. Lee et al. (1980) reported an adult size range between 39 and 55 mm standard length. Although we did not age any of the darters, the smaller fish may indicate successful reproduction and recruitment.

No published information was available for suitable water quality parameters for *E. vitreum.* During this survey, *E. vitreum* was only collected from streams with pH greater than 6.5, acid neutralization capacity greater than 250 μeq/L, conductivity greater than 65 μs/cm, and baseflow turbidity less than 15 NTU (Table 2). It was also our observation that *E. vitreum* was only collected from waters less than 0.5 m in depth.

Etheostoma vitreum was only collected from one historical collection site on Maryland's western shore (Little Patuxent River). Tsai and Golembiewski (1979) stated that *E. vitreum* populations, which were common in 1966 and 1967, became very rare throughout the Patuxent River drainage basin in 1977. Although our collections of *E. vitreum* from the Delmarva peninsula indicate a range extension

TABLE 1. Maryland coastal plain streams sampled and number (N) of *Etheostoma vitreum* collected during 1991.

Stream	Drainage Basin	Historical Site	1991 Sites	1991 N
Cecil County				
Bynum Run	Bush River		1	0
Kent County				
Mill Creek	Worton Creek		1	0
Queen Anne's County				
Unicorn Branch	Chester River		1	0
Red Lion Branch	Chester River		3	0
Caroline County				
Gravelly Branch	Choptank River		1	0
Chapel Branch	Choptank River		1	0
Houston Branch	Marshyhope Creek		1	7
Sullivan Branch	Marshyhope Creek		1	1
Twifford Meadow Ditch	Marshyhope Creek		1	0
Tull Branch	Marshyhope Creek		2	3
Faulkner Branch	Marshyhope Creek		3	18
Marshyhope Creek	Nanticoke River		2	21
Dorchester County				
North Davis Millpond	Marshyhope Creek		2	0
Skinners Run	Marshyhope Creek		1	0
North Tara Branch	Marshyhope Creek		1	0
Wicomico County				
Rewastico Creek	Nanticoke River		1	0
St. Mary's County				
McIntosh Run	Potomac River		1	0
Charles County				
Rock Creek-Spice Run	Patuxent River		1	0
Mattaponi Creek	Patuxent River		1	0
Mattawoman Creek	Potomac River		2	0
Prince George's County				
Patuxent River	Chesapeake Bay	X	1	0
Anacostia River	Potomac River	X	1	0
Northeast Branch	Anacostia River	X	1	0
Western Branch	Patuxent River	X	1	0
Anne Arundel County				
Lyons Creek	Patuxent River		2	0
Stocketts Run	Patuxent River		1	0
Little Patuxent River	Patuxent River	X	2	10
Severn Run	Chesapeake Bay		1	0
Bacon Ridge Branch	South River		2	0
North River	South River		2	0

TABLE 2. Water quality parameters measured in streams sampled for *Etheostoma vitreum* during 1991 (nc = not collected).

Stream	Temp C°	pH	Cond µs/cm	DO mg/L	Turb NTU	ANC µeq/L
Bynum Run	nc	nc	nc	nc	nc	nc
Mill Creek	19.0	6.20	90	8.4	40.0	256
Unicorn Branch	22.5	7.13	149	9.6	3.5	476
Red Lion Branch - 1	23.0	7.13	139	6.2	nc	nc
Red Lion Branch - 2	22.8	7.03	140	6.7	nc	nc
Red Lion Branch - 3	22.2	7.04	110	7.2	nc	nc
Gravelly Branch	18.2	7.16	121	8.7	17.1	439
Chapel Branch	22.0	6.54	100	7.4	7.3	nc
Houston Branch	24.0	6.57	67	6.7	11.0	302
Sullivan Branch	21.1	6.57	130	6.7	7.0	551
Twifford Meadow	18.6	6.48	45	6.6	23.0	176
Tull Branch - 1	17.5	6.68	145	7.2	5.0	nc
Tull Branch - 2	15.0	6.70	132	7.8	11.0	nc
Faulkner Branch - 1	18.8	6.80	161	7.4	4.2	nc
Faulkner Branch - 2	16.0	6.77	149	7.6	8.0	290
Faulkner Branch - 3	21.0	6.88	130	6.5	6.0	nc
Marshyhope Creek	25.5	6.58	109	6.5	7.0	321
North Davis	22.1	6.12	122	7.0	nc	215
Skinners Run	18.5	6.25	155	8.6	4.0	220
North Tara Branch	16.5	6.33	52	7.9	6.0	84
Rewastico Creek	23.0	6.28	118	4.6	11.0	nc
McIntosh Run	23.1	7.11	119	6.5	13.0	727
Rock Creek	20.5	6.14	110	7.0	13.5	308
Mattaponi Creek	21.0	6.68	220	6.5	14.5	274
Mattawoman Creek - 1	17.0	nc	70	7.8	29.0	nc
Patuxent River	nc	nc	nc	nc	nc	nc
Anacostia River	nc	nc	nc	nc	nc	nc
Northeast Branch	nc	nc	nc	nc	nc	nc
Western Branch	22.0	7.23	208	5.7	20.8	1066
Lyons Creek - 1	19.9	nc	165	7.2	43.0	460
Lyons Creek - 2	21.0	7.14	150	7.8	25.0	308
Stocketts Run	18.5	7.04	148	9.1	8.5	489
Little Patuxent	19.0	7.05	313	7.0	9.5	1468
Severn Run	24.0	6.33	108	6.0	6.5	nc
Bacon Ridge Branch-1	17.3	7.03	100	8.4	13.0	nc
Bacon Ridge Branch-2	19.0	7.04	100	8.6	11.0	nc
North River	19.1	6.47	80	7.8	11.0	nc

for this species within Maryland (Speir et al., 1976; Lee et al., 1980), it is most likely that this species has existed on the Delmarva peninsula but was either not collected or incorrectly identified. The site at Western Branch, which contained a significant population of *E. vitreum* during the 1950's (Winn and Picciolo, 1960), has been dramatically altered. The U.S. Geologic Survey weir was removed in 1975 and currently the substrate is laden with silt. The Patuxent River site also has been impacted from anthropogenic sources (e.g., silt, illegal dumping). This recent discovery and extended range for *E. vitreum* merits consideration for a change in status of this species, which is presently classified as an endangered extirpated species within Maryland. The future existence of this darter species in Maryland is dependent upon a stable and protected environment. Increasing population growth and resulting changes in land-use activities (e.g., increased urban development and loss of forest and agricultural land), agricultural practices, stream maintenance projects (e.g., channelization, sediment traps), and the impacts of beaver impoundments need to be closely monitored to avoid adverse impacts on *E. vitreum* habitat.

ACKNOWLEDGEMENTS

S.A. Fischer (Research Assistant) was the field supervisor; L.W. Hall, Jr. (Principal Investigator) was project supervisor; W.D. Killen, Jr. (Technician) assisted with the data collection. This study was sponsored by the Maryland Department of Natural Resources (MDNR; Contract number CB91-003-002). We are grateful to Paul Miller (MDNR) and Ronald J. Klauda (MDNR) for their contributions to the study design. John Cooper, Nick Carter, and Ray Morgan are acknowledged for their insight and comments.

LITERATURE CITED

Hall, L.W., Jr., S.A. Fischer, W.D. Killen, Jr., M.C. Ziegenfuss, and R.D. Anderson. 1992. 1991 Maryland Doser Study in Maryland Coastal Plain Streams: Use of Lime Dosers to Mitigate Stream Acidification. Maryland Dept. Nat. Resour., Chesapeake Bay Res. Monit., Annapolis.

Knapp, C.M., W.P. Saunders, Jr., D.G. Heimbuch, H.S. Greening, and G.J. Filbin. 1988. Maryland Synoptic Stream Chemistry Survey: Estimating the Number and Distribution of Streams affected by or at Risk from Acidification. Maryland Dept. Nat. Resour., Power Plant Res. Prog., Annapolis.

Lee, D.S., R.E. Jenkins, and C.R. Gilbert. 1980. *Etheostoma vitreum* (Cope), glassy darter, p. 708. *In*: Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister and J.R. Stauffer, Jr. Atlas of North American Freshwater Fishes. N. C. State Mus. Nat. Hist., Raleigh.

Mansueti, R. 1950. An Ecological and Distributional Study of the Fishes of the Patuxent River Watershed, Maryland. M.S. thesis. University of Maryland, College Park, MD.

Maryland Dept. of Natural Resources (MDNR). 1991. Rare, Threatened, and Endangered Animals of Maryland. Maryland Nat. Heritage Prog., Dept. of Nat. Resour., Annapolis.

Speir, H.J, D.R. Weinrich, and W.R. Carter, III. 1976. Evaluation of the Effects of Channelization on Small Coastal Plain Streams of Maryland. Maryland Dept. Nat. Resour. Rep. F-24-R. Annapolis, MD.

Tsai, C. and S.L. Golembiewski. 1979. Changes in Fish Communities in the Upper Patuxent River from 1966 to 1977. Maryland Dept. Nat. Resour., Annapolis.
Winn, H.E. and A.R. Picciolo. 1960. Communal Spawning of the Glassy Darter *Etheostoma vitreum* (Cope). Copeia 1960(3):186-192.