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The Status of the Blacknose Shiner (*Notropis heterolepis*) in Iowa: A Preliminary Survey

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During the last 45 years, the blacknose shiner (*Notropis heterolepis*) has been restricted to a three county area in northwestern Iowa. We surveyed locations where this siltation-intolerant species had been captured to update the status of the fish in the state. Streams were blocked with nets on both the upstream and downstream ends of sample areas, and fish were collected with a backpack electrofisher and seines. Lakes where the blacknose shiner had been found were also sampled. No blacknose shiners were found and several possible explanations are offered for their absence from historical sites.

INDEX DESCRIPTORS: *Notropis heterolepis,* blacknose shiner, siltation, drought, river habitat, Iowa rivers.

The blacknose shiner (*Notropis heterolepis*), an Iowa state threatened fish (Iowa Code 1994), has a state distribution restricted to Dickinson, Clay, and Osceola Counties (Harlan et al. 1987). In North America, the blacknose shiner historically was known from "Saskatchewan to Nova Scotia, south to Iowa, and eastward through the northern Ohio River drainage" (Eddy and Underhill 1974). Lee et al. (1980) added that glacial relict populations existed as far south as southern Kansas and that isolated populations might still exist in Tennessee. At present, however, the blacknose shiner is rare in all areas immediately adjacent to Iowa (Bailey and Alum 1962, Eddy and Underhill 1974, Pflieger 1975, Smith 1979, Phillips et al. 1982, Becker 1983, Missouri Department of Conservation 1992, Illinois Endangered Species Protection Board 1994). Becker (1983) felt that the most secure populations of blacknose shiners were in Minnesota, Wisconsin, Michigan, and Canada, and the Minnesota and Wisconsin populations are probably located mainly in the northern parts of the states (Becker 1983, Phillips et al. 1982). In his overview of the status of fish in Iowa, Menzel (1981) noted that the fish was considered endangered in Iowa at the time.

The blacknose shiner was apparently widespread during the early history of Iowa, but relatively uncommon, or at least localized, in the twentieth century. While studies by Meek (1892) found the species at various locations in the northern half of Iowa, future records would only be in northwestern Iowa. Larabee (1926, 1927) noted it as uncommon in the region around West and East Lakes Okoboji, and these papers were apparently unknown to Harlan and Speaker (1951, 1956) because they did not list any collections of the species after Meek (1892) until it was found in Trumbull Lake, Clay County, in the fall of 1955. However, within Harlan and Speaker's (1956) book, Cleary (1956) noted Larabee's (1927) paper as well as an unpublished 1941 record from a small stream entering West Okoboji Lake in Dickinson County. Since 1955, Dowell (1962) made several collections in Clay and Dickinson Counties in the summer of 1961; Menzel (unpublished data) collected the blacknose shiner in rivers in Clay, Dickinson, and Osceola Counties in 1983; and Bernstein (unpublished data) found numerous individuals at two of the same locations as Menzel in Clay County in 1987.

Habitat requirements for blacknose shiners are important to understand the fish's distribution. Trautman (1981) noted that in Ohio the blacknose shiner occurred in largest numbers in glacial lakes as well as harbors and bays in Lake Erie, and he also noted that it was adapted to "clear prairie streams of low gradients where the waters were usually very clear, there was some or much aquatic vegetation, and the bottoms were of clean sand, gravel, marl, muck, peat, or organic debris." Trautman (1981) also noted the inability of blacknose shiners to live in turbid waters of streams with bottom siltation. While pre-settlement Iowa probably had clear streams flowing through either tallgrass prairie or woodlands, clear streams without siltation are rare in Iowa (Harlan et al. 1987, Menzel 1987), and the same loss of habitat has been reported for other states (e.g. Karr et al. 1985, Trautman 1981, Phillips et al. 1982, Becker 1983).

This study resurveys historic sites where the blacknose shiner was previously known from three northwestern Iowa counties.

METHODS

Eleven sites in Clay, Dickinson, and Osceola Counties were sampled between 2–11 June, 1998. The locations were chosen from past records of blacknose shiner captures in the last 40 years (Dowell 1962, Menzel unpublished data) (Table 1).

At all but one river site, the upstream end was blocked with a 5 mm mesh seine unless there was a natural obstruction preventing upstream escape of fish (e.g. a culvert). The exception to this was the spillway outlet from Trumbull Lake which was too wide, deep, and fast to block with a seine. The downstream end of rivers was either blocked with a five cm mesh fyke net in streams that were large enough or a five mm mesh seine in smaller streams. Lengths sampled at each site were subjectively based on an attempt to adequately sample all the habitats at a location (i.e. riffles, pools, undercut banks). All the riverine areas were surrounded by pasture and/ or planted fields, and all had grassy slopes descending to the river.

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Table 1. Locations and characteristics of sites where fish were sampled.

NAME	LOCATION	COUNTY	LENGTH (m)	AVERAGE WIDTH (m)	AVERAGE DEPTH (m)	HABITAT CHARACTERISTICS
Unnamed Creek	T98N R37W S25/26	Dickinson	59.8	3.13	0.41	Pools, riffles, backwater. Mud, silt, gravel, sand bottom. No overhangs or undercuts.
Dan Green Slough Outlet	T96N R35W S27	Clay	46.4	2.31	0.38	Clear water. Sand and rock bottom. Undercut banks with some overhangs.
Big Meadow Creek	T97N R36W S25	Clay	65.0	8.80	0.44	Mud and gravel bottom. Some undercut banks but no overhangs.
Stony Creek	T97N R35W	Clay	33.8	8.80	0.40	Sand, silt, and rock bottom. No undercuts or overhangs.
Trumbull Lake Outlet	T97N R35W S27	Clay	40.2	15.90	0.27	Overhanging, steep banks. Outlet to lake with fast water through spillway. Gravel, sand, and rock bottom with some silt.
Trumbull Lake West Shore	T97N R35W S22	Clay	73.0	—	0.50	Mud, sand, and gravel bottom. Cattails along shore with woody overhangs. No undercuts.
Trumbull Lake East Shore	T97N R35W S23	Clay	50.0	—	0.50	Mud, sand, and gravel bottom. Cattails along shore with woody overhangs. No undercuts.
Prairie Creek	T95W R36W S31	Clay	105.0	5.76	0.32	Clear water. Riffles and pools. Gravel, sand, mud and silt bottom. Overhanging banks with some undercutting. Possibly channelized at one time.
Lexington Creek	T95N R36W S2	Clay	49.5	1.85	0.28	Sand and mud bottom. Muddy water. Some banks with overhanging banks.
Elk Creek	T95N R35W S26[a]	Clay	42.0	2.56	0.10	Rock, gravel, and mud bottom. Channelized. No overhangs or undercutting. Riffles. Clear water.
Ocheyedan River	T99N R40W S15	Osceola	92.0	7.80	0.28	Gravel, sand, rock, and mud bottom. No overhangs or undercutting. Riffles and pools.

[a]Due to an error, we sampled upstream from Menzel's (unpublished data 1983) site at S19

Table 2. Rainfall (cm) for Clay and Dickinson counties: May and June, 1998.[a]

	May	June
Dickinson County		
Lake Park	5.36 (−2.62)[b]	9.75 (−1.09)
Iowa Lakeside Laboratory	7.26 (−1.50)	10.29 (−0.41)
Clay County		
Spencer	10.74 (+1.68)	11.23 (+1.40)

[a]Data are from Iowa State Climatologist's Office
[b]Numbers in parentheses are the differences from average

All the riverine sites were also adjacent to a bridge over a roadway or a culvert under a roadway.

Once the blocking seines were placed, we worked upstream from the downstream net using a Coffelt Mark 10 backpack electrofisher set between 300–350 volts. The person with the electroshocker walked upstream sampling all habitats while followed by a person with a dip net. The shocker was also followed by two people with either a five mm mesh or a one mm mesh seine of approximately two m, and the small seine was usually followed by two people with a one mm mesh bag seine of approximately six m. Fish collected by the dip nets and seines were placed in a bucket for later identification and counting. Holding the fish in buckets also prevented capturing the same individual twice.

It was not possible to block off the lake sites. We electroshocked

Table 3. Species collected at the sites.[a]

	Unnamed Creek	Dan Green Slough Outlet	Big Meadow Creek	Stoney Creek	Trumbull Lake Outlet	Trumbull Lake West Shore	Trumbull Lake East Shore	Prairie Creek	Lexington Creek	Elk Creek	Ocheyedan River
Esox lucius	0	0	2	0	0	0	0	0	0	0	0
Carpiodes cyprinus	0	0	1	0	0	0	0	0	0	0	0
Moxostoma macrolepidotum	0	0	3	0	0	0	0	0	0	0	2
Catostomus commersoni	0	0	22	19	0	0	0	23	0	4	19
Cypinus carpio	0	0	3	3	1	0	0	0	0	0	1
Notemigonus crysoleucas	0	6	0	0	3	0	0	0	0	3	0
Semotilus atrocmaculatus	158	0	21	21	0	0	0	219	121	9	66
Rhinichthys atratulus	0	0	3	3	0	0	0	44	3	0	4
Luxilus cornutus	0	0	256	7	0	0	0	50	3	0	24
Notropis hudsonius	0	0	0	61	0	0	0	0	0	0	0
Notropis dorsalis	214	0	0	0	0	0	0	0	0	0	6
Cyprinella lutrensis	0	0	0	0	7	0	0	0	0	0	0
Notropis stramineus	0	0	193	23	10	6	0	25	0	0	49
Hybognathus hankinsoni	1	2	2	0	0	0	4	0	0	0	2
Pimephales notatus	0	3	74	139	10	61	26	27	0	1	17
Pimephaes promelas	0	0	4	0	11	15	10	10	0	24	61
Campostoma anomalum	0	0	1	17	0	0	0	0	0	0	1
Ameiurus nebulosus	0	0	0	0	1	0	0	0	0	1	0
Ameiurus melas	0	233	3	0	30	1	1	0	0	1	0
Noturus flavus	0	1	4	0	9	2	0	0	0	2	9
Lepomis cyanellus	0	24	12	0	8	0	0	0	0	24	0
Lepomis gibbosus	0	0	0	0	0	0	0	0	0	0	1
Lepomis humilus	0	0	2	0	7	0	9	0	0	8	0
Perca flavescens	0	0	0	0	58[b]	83[b]	147[b]	0	0	5	0
Etheostorma nigrum	2	0	2	1	0	0	0	13	8	0	3
Etheostoma exile	0	0	0	0	1	0	0	0	0	1	0
Etheostoma flabellare	3	0	0	0	0	0	0	2	1	0	0
Umbra limi	0	1	0	0	0	0	1	0	0	0	0
Culaea inconstans	2	0	0	0	0	0	0	0	0	0	0
Total	380	270	608	294	156	168	198	413	436	83	265

[a]Scientific names of species are from Robins et al. (1991)
[b]All but one or two of these were under 2.0 cm

along the shorelines for 50–75 m followed by the dip net and seines, and we then moved 15–20 m offshore to deeper water and walked the same distance back to where we started. Thus, we made a loop from along the shoreline to offshore. Some seining was also done along the shorelines, and the electroshocker was set to 600–650 volts for the lakes.

Most fish were released unharmed, but some were taken back to the laboratory for identification.

At each site, several measures of width and depth were taken, the length sampled was measured, and notes were taken of bottom type, water clarity, and habitats present (Table 1). The number of depth and width measurements varied with the size and diversity of the habitat. For instance, a channelized river of relatively uniform depth and width was measured fewer times than a river that contained both pools, backwaters, and riffles.

While no past measures of average flow or depth are available for the river sites to compare with the conditions in which we collected, the streams were flowing well, and there were no areas too deep for us to sample. The area had received relatively average precipitation prior to our sampling, and conditions were also average during our study (Table 2).

RESULTS

While we captured 29 different species of fish with over 100 individuals at all but one site, we did not find a blacknose shiner (Table 3). In contrast to past data, Dowell (1962), using a seine, collected an unspecified number of blacknose shiners at Trumbull Lake along with five adults at the Unnamed Creek in Dickinson Co., 16 adults at Big Meadow Creek, and five adults at the Ocheyedan River. Dowell (1962) did not record sites sampled where the fish did not occur, but we can assume that he collected at other streams and lakes within the three counties. Menzel (unpublished data from 1983) found one blacknose shiner at the Unnamed Creek in Dickinson Do., three in Big Meadow Creek, and unspecified number at the Dan Green Slough Outlet (While no numbers were given for this collection, it was listed as unusual), four at Lexington Creek, two in Elk Creek, one in Elk Lake, 10+ in Prairie Creek, two in Stony Creek, and none at either the Ocheyedan River or Trumbull Lake. Menzel also collected with seines, and, unlike Dowell (1962) we know that many other rivers and lakes were sampled within each county. Bernstein (unpublished data from 1987) found blacknose shiners to be common in the Dan Green Slough Outlet and the Big Meadow Creek sites, and specimens of the former site are preserved in the Mount Mercy College vertebrate collection.

DISCUSSION

Is the blacknose shiner extirpated from Iowa? It would be premature to assume this based upon this one-time survey. Although we did a thorough sampling at each river site, fish move up and down streams, and we certainly did not capture all the fish at a site.

Thorough sampling of lakes is more difficult, and it was hoped that the outlet streams might contain blacknose shiners if they existed in the lakes. Clearly, a more thorough sampling of Trumbull and Elk Lakes might find the blacknose shiner as well as additional species we did not capture.

As stated, siltation has made few Iowa streams suitable for blacknose shiners, but habitat destruction from siltation cannot completely explain the scarcity of the blacknose shiner from 1962 to the present for several reasons. Trumbull lake, supposedly the refuge for the species (Dowell 1962), is still a large, glacial lake. If siltation of rivers was the major cause of our failure to capture blacknose shiners, than lake populations should have been less impacted. In addition, Dowell (1962) noted that all the rivers where he collected were turbid at the time of collection, and clarity conditions have not changed drastically enough to eliminate a species since collections by Menzel's (unpublished 1983) and Bernstein's (unpublished 1987). Further, this study collected several species that are adapted to clearer, unsilted waters like the common shiner (*Luxilus cornutus*), the barred fantail darter (*Etheostoma flabellare*) and blacknose dace (*Rhinichthys atratulus*). However, these species were far outnumbered by species more tolerant of siltation, and the blacknose shiner is known to be extremely sensitive to siltation.

There is also the possibility of chemical pollution from farm runoff or manure spills as a potential disruption, but this would be hard to document. It also assumes that far-removed sites were independently subjected to the same high levels of chemical pollution, and that the blacknose shiner was more negatively impacted by these separate, but simultaneous pollution events than were other species of fish.

For the Trumbull Lake populations, yellow perch (*Perca flavescens*) and other predatory fish could diminish a minnow population. Trumbull Lake is occasionally stocked with northern pike (*Esox lucius*) (Jim Christiansen, Iowa Department of Natural Resources, personal communication), and people also dump bait minnows into the lake that could compete with native species or potentially introduce a disease. Again, impacts of predation and competition on a single minnow species would be hard to document after the fact.

A climatic event could have influenced the elimination of the blacknose shiner from the sampled sites, the drought of 1988, 1989. During the drought years of 1988 and 1989, several steams dried or reduced to a trickle in Dickinson and Clay Counties. Bernstein (unpublished data 1990), collecting after the drought in Big Meadow Creek and Dan Green Slough Outlet, did not find any fish, and the same was true for several sites within Dickinson and Clay Counties. During the drought, fish probably moved downstream into larger waters or perished as waters became anoxic or evaporated. Such an event could radically change the distribution of a rare fish. However, drought should not affect the lake populations as much as river populations.

Therefore, the status of the blacknose shiner in Iowa is, at best, precarious, and it has probably declined due to several factors. If it still exists, it is possible that the fish could be in unknown locations or that it will re-populate its historic drainages. If our study is indicative of its status in Iowa, the blacknose shiner is clearly an endangered and potentially extirpated fish.

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