

STREAM SURVEYS RESULTS FOR THE

GRAVEL CHUB (*ERIMYSTAX X-PUNCTATUS*),

SLENDER MADTOM (*NOTURUS EXILIS*),

AND BLUNTNOSE DARTER (*ETHEOSTOMA CHLOROSOMUM*)

IN SOUTHEASTERN MINNESOTA

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ABSTRACT

In 1998 and 1999 stream surveys were conducted in the following major watersheds of southeastern Minnesota: Shell Rock, Cedar, Upper Iowa, Root, Zumbro Rivers; and larger tributaries to the lower Mississippi River. The gravel chub was found at 13 localities in two streams. The slender madtom and bluntnose darter were not found during the study, but have been collected in Minnesota waters in 1991 and 1997, respectively. Special Concern and recently delisted species collected during the study include: pirate perch (*Aphredoderus sayanus*), crystal darter (*Crystallaria asprella*), least darter (*Etheostoma microperca*) northern brook lamprey (*Ichthyomyzon fossor*), American brook lamprey (*Lampetra appendix*), Ozark minnow (*Notropis nubilus*), pugnose minnow (*Opsopoeodus emiliae*), and black redhorse (*Moxostoma duquesnei*). Other species collected that have limited distributions in Minnesota or reported for the first time from a stream or major watershed include: largescale stoneroller (*Campostoma oligolepis*), mud darter (*Etheostoma asprigene*), banded darter (*Etheostoma zonale*), redfin shiner (*Lythrurus umbratilis*), spotted sucker (*Minytrema melanops*), greater redhorse (*Moxostoma valenciennesi*), and suckermouth minnow (*Phenacobius mirabilis*).

INTRODUCTION

Fish surveys were conducted during 1998 and 1999 in medium to large streams in southeastern Minnesota which encompass the counties of Fillmore, Freeborn, Houston, Mower, Olmsted, Wabasha, and Winona. Streams surveyed include the Shell Rock River, Cedar River, Rose Creek, Orchard Creek, Otter Creek, Little Cedar River, Upper Iowa River, Beaver Creek, South Fork Zumbro River, North Branch Root River, Bear Creek, Root River, East Indian Creek, Garvin Brook, Big Trout Creek, Dakota Creek, Pine Creek, Crooked Creek, Wildcat Creek, Winnebago Creek, and several backwater localities of the Mississippi River in Reno Bottoms.

METHODS AND MATERIALS

The gravel chub and slender madtom sites were sampled with electrofishing gear. A Smith-Root backpack shocker was used on wadable streams (Figure 13). A boat mini-boom shocker was used in larger streams with deep pools, but wadable reaches were always walked while dragging the mini-boom as a tow barge behind the dipnetters

(Figure 14). This technique greatly aided the dipnetters working on a stationary streambed rather than floating platform when dislodging stunned fish from rocky crevices. Netters always wore polarized sunglasses to reduce surface glare which helps in seeing stunned fish. The bluntnose darter surveys were conducted with a backpack shocker and separately with kicknets and seines because of the turbid waters present in Pine Creek and Reno bottoms. At least one specimen of each listed or limited distribution species was preserved in formalin and cataloged into the James Ford Bell Museum of Natural History at the University of Minnesota in St. Paul. A Garmin 12 channel parallel receiver GPS was used to obtain latitude and longitude coordinates. Survey records were compiled in a database and information on listed species was provided to the Minnesota Natural Heritage Program where Element Occurrence Records (EORs) will be transcribed and mapped. Distribution maps for special concern and delisted species were produced using ArcView GIS software.

RESULTS AND DISCUSSION

Six special concern, three delisted, and five limited distribution species were collected during the two year survey period. Two species were collected for the first time from Minnesota waters of two streams. The slender madtom and bluntnose darter were not found during this study, but both were collected in the 1990s and will be covered in the following species accounts.

Special Concern and Delisted Species

Pirate Perch (*Aphredoderus sayanus*): Localities of pirate perch collections at James Ford Bell Museum of Natural History include lower tributaries, backwaters, and sloughs of the Mississippi River in southeastern Minnesota. During this study, ten pirate perch

were collected at two localities in Houston County. One specimen was electrofished with a mini-boom in an old channel of the Root River south of the junction of highways 16 & 26. The habitat at the site consisted of soft substrates (muck and silt) with submerged vegetation. Nine pirate perch were collected with dipnets at the new mouth of Winnebago Creek where dense beds of lotus lily carpet several braided channels (Figures 11, 15, and 16).

Crystal Darter (*Crystallaria asprella*): The crystal darter has been collected from the St. Croix River downstream of Taylors Falls, Mississippi River downstream of Lake Pepin, and lower Zumbro River (Schmidt 1995). The preferred habitat of the species consists of shifting sand and gravel substrate which is often embedded with large woody debris. This study collected one crystal darter with a mini-boom shocker from the Root River upstream of the Houston canoe access (Figures 5 and 17). This occurrence is the first time the species has been reported from the Root River.

Gravel Chub (*Erimystax x-punctatus*): Collections are restricted to the Upper Iowa and Root Rivers in southeastern Minnesota. This study collected 56 gravel chub at seven localities in the Upper Iowa River (Howard County, IA and Fillmore County) and six localities in the North Branch Root River (Olmsted County). The species had been collected previously from the Upper Iowa River in 1966, but not from the North Branch Root River in Olmsted County. Gravel chubs were not found in the Mower County reach of the Upper Iowa which appears to have suitable habitat. However the species was collected approximately 100 meters downstream of the Lidtke Mill dam north of Lime Springs, IA. The dam was constructed in 1857 and has a head of approximately 8-10 feet which is likely a total barrier to fish migrating upstream. Historically, gravel chubs likely inhabited the reach at least upstream to Le Roy, MN but may have been extirpated from pesticides, sewage, or sedimentation of rocky substrates. Even though

there is no bioassay data available on this species to identify sensitivity to contaminants, this hypothesis is more than speculation. At the town of Granger, a creamery discharges effluent into the Upper Iowa virtually on the state line with Iowa. One of the most abundant sites for gravel chubs found in the Upper Iowa is approximately 100 meters upstream of the this outfall. However, despite intensive sampling, the species could not be found for three miles downstream and never at the abundance upstream of the outfall. The Iowa Department of Natural Resources and the Minnesota Pollution Control Agency and Department of Natural Resources were all informed of the discharge, but no action could be taken under existing laws. In the North Branch of the Root River, gravel chubs were collected from Olmsted County Road 19 to approximately 1.5 miles west of High Forest. Upstream of this site, the forest riparian becomes sparse, gradient decreases, and substrates are dominated with sand and silt. In both the Upper Iowa and North Branch Root River, gravel chubs were most often found in long, flat runs with cobble and small boulders. However, a few were taken in shorter runs between the tail of rapids and head of pools (Figures 6, and 18-22).

Bluntnose Darter (*Etheostoma chlorosomum*): The bluntnose darter was not found during this study, but a single specimen was collected from Pine Creek (Houston County) in 1997 which was the first time it has been reported in Minnesota for 52 years. Due to the rarity of this species, the specimen was sent to Dr. David Etnier (University of Tennessee - Knoxville) who confirmed the identification. The bluntnose darter was collected using a kicknet along the bank lined with overhanging vegetation. The water was extremely turbid, submerged aquatic vegetation was sparse, and substrates consisted of silt and sand (Figures 3, 23, and 24).

Least Darter (*Etheostoma microperca*): Collections of the least darter in Minnesota include the Crow Wing, Pine, and Rum River systems in the Upper Mississippi

drainage; Otter Tail River in the Red River of the North drainage; Yellow Medicine River in the Minnesota River drainage; and Otter Creek in the Cedar River drainage. During the study, 12 least darters were collected at four localities in Otter Creek (Mower County) and were always found in beds of buttercup (*Ranunculus sp.*). At one site in the Lena Larson Wildlife Management Area, this normally sensitive species was found in drainage tile outlet, but the bed was densely carpeted with buttercup (Figures 7, 25 and 26). These were the first collections from Otter Creek since 1964.

Northern Brook Lamprey (*Ichthyomyzon fossor*): The occurrence of the northern brook lamprey was not confirmed from Minnesota waters until the mid-1980s when specimens were collected from the Nemadji River system in the Lake Superior drainage. It has since been reported from the Warroad, Winter Road, Rapid, Big Fork, Little Fork, Vermilion, and Echo Rivers in the Rainy River/Lake of the Woods drainage; and the Zumbro River drainage. During the study, one specimen was collected in the Upper Iowa River (Mower County) near Le Roy, MN (Figures 8 and 27). This was the first record for the species from the Upper Iowa River drainage and only the second stream it has been found in southeastern Minnesota.

American Brook Lamprey (*Lampetra appendix*): The American brook lamprey has been collected from the Cannon, Zumbro, Whitewater, Root, and Upper Iowa River drainages; and Valley Branch (Washington County) in the St. Croix drainage. It was formerly abundant in tributaries of the Minnesota drainage into the late 1930s, but was not reported again in the drainage until the 1990s when it was collected in Eagle Creek (Scott County) and Assumption Creek (Carver County). During the study, 58 American brook lampreys were collected at ten localities in the Upper Iowa River (Howard County, IA and Fillmore and Mower Counties, MN), four localities in the Root River (Houston County); and one locality in Bear Creek (Mower County), Wildcat Creek (Houston

County), Dakota Creek (Winona County), and Big Trout Creek (Winona County) (Figures 1 and 28). The last four localities are the first time the species have been reported from these streams.

Black Redhorse (*Moxostoma duquesnei*): Drainages where the black redhorse has been collected include the Zumbro, Root, and Upper Iowa River drainages in southeastern Minnesota. During the study, 21 black redhorse were collected at four localities in the Upper Iowa River (Fillmore and Mower Counties), two localities in the North Branch Root River (Olmsted County), and one locality in the South Fork Zumbro River (Olmsted County) (Figures 4 and 29). The species was found in pools with woody debris and deep runs with cobble and boulder substrates.

Ozark Minnow (*Notropis nubilis*): The Ozark minnow has been collected from the Zumbro, Root, and Cedar River drainages. During the study, 108 Ozark minnows were collected at seven localities in Otter Creek (Mower County) and one locality in the South Fork Zumbro River (Olmsted County) (Figures 9 and 30).

Slender Madtom (*Noturus exilis*): Until the 1990s, the slender madtom had been collected once in 1954 from Otter Creek (Mower County). It was not collected during this study, but in 1990 was found in Otter Creek (Mitchell County, IA) about two miles south of the Minnesota state line in the Nelson Paradise Wildlife Area (Schmidt 1991). In 1991, two slender madtoms were collected in Minnesota waters of Otter Creek where a road culvert had been rip-rapped with concrete slabs. This site has since been sampled several times, but no additional specimens have been found and most of the rip-rap has been buried under several inches of sand. The Iowa site had the best habitat found over the entire length of Otter Creek. The riparian was very wide, fully intact, and

comprised of natural vegetation. The substrates were diverse ranging from sand and silt in deep pools to large boulders in runs and riffles (Figures 12 and 31-33).

Pugnose Minnow (*Opsopoeodus emiliae*): The range of this species includes the St. Croix River downstream of Taylors Falls and lower tributaries, backwaters, and sloughs of the Mississippi River in southeastern Minnesota. During the study, 11 pugnose minnows were collected at four localities: Mississippi River and Crooked Creek (Houston County) and Dakota and Big Trout Creeks (Winona County) (Figures 10 and 34).

Limited Distribution Species and New Occurrences

Largescale Stoneroller (*Campostoma oligolepis*): The largescale stoneroller has been collected from the St. Croix drainage upstream of Taylors Falls, Yellow Medicine and Redwood Rivers in the Minnesota River drainage, Zumbro and Root River drainages, and Otter Creek in the Cedar River drainage. During the study, nine largescale stonerollers were collected at six localities in the North Branch Root River (Olmsted County), and one locality each in Bear Creek (Mower County) and South Fork Zumbro River (Olmsted County) (Figure 35).

Mud Darter (*Etheostoma asprigene*): The mud darter has been collected from the St. Croix River downstream of Taylors Falls and sloughs, backwaters, and lower tributaries of the Mississippi River from Lake Pepin to the Iowa state line. During the study, 39 mud darters were collected at one locality in Crooked Creek (Houston County), two localities in the Mississippi River (Houston County), three localities in Pine Creek (Houston County), two localities in Winnebago Creek (Houston County), and one locality each in Dakota and Big Trout Creeks (Winona County) (Figure 36).

Banded Darter (*Etheostoma zonale*): The range of the banded darter in Minnesota includes the lower Blue Earth, Le Sueur, Cottonwood, Pomme de Terre, and Yellow Medicine Rivers in the Minnesota River drainage; and the Cannon, Zumbro, Root, and Upper Iowa River drainages. During the study, 8 banded darters were collected at two localities in the Shell Rock River (Freeborn County) (Figures 2 and 37). This is the first time the species has been collected in Minnesota waters of the Shell Rock and approximately 80 miles north of the most upstream locality in Iowa.

Redfin Shiner (*Lythrurus umbratilis*): The redfin shiner has been collected from the Zumbro, Root, Upper Iowa, and Cedar River drainages. During the study, two redfin shiners were collected at one locality in the Cedar River in Austin and one in the headwaters of the North Branch Root River (Mower County) (Figure 38).

Spotted Sucker (*Minytrema melanops*): The range of the spotted sucker includes the St. Croix River downstream of Taylors Falls and the lower Mississippi River in southeastern Minnesota. Historically, the species was found in the Minnesota River, but has not been collected there since 1899. During the study, three spotted suckers were collected at one locality in Crooked Creek (Houston County) (Figure 39).

Greater Redhorse (*Moxostoma valenciennesi*): Greater redhorse have been reported from the St. Croix, Minnesota, Red River of the North, upper Mississippi, Cannon, and Root River drainages. During the study, two greater redhorse were collected at two localities in the North Branch Root River (Olmsted County) (Figure 40).

Weed Shiner (*Notropis texanus*): The range of the weed shiner includes the Red River of the North, Minnesota, Zumbro, Root River drainages; and lower reaches of

tributaries and backwaters and sloughs of the lower Mississippi River in the southeastern Minnesota. During the study, 67 weed shiners were collected at one locality each in Crooked, Pine, and Wildcat Creeks (Houston County); Garvin Brook and Big Trout and Dakota Creek (Winona County); and East Indian Creek (Wabasha County) (Figure 41).

Suckermouth Minnow (*Phenacobius mirabilis*): The suckermouth minnow has been collected from the Cannon, Root, and Upper Iowa River drainages. During the study, 30 suckermouth minnows were collected at five localities in the Upper Iowa River (Howard County, IA and Fillmore and Mower Counties), six localities in the North Branch Root River (Mower and Olmsted Counties), and one locality in the Little Cedar River (Mower County) (Figure 42). The last locality is a first time occurrence from Minnesota waters of that stream.

Additional Rare and Unusual Occurrences

Mudpuppy (*Necturus maculosus*): Mudpuppies are rarely reported in southeastern Minnesota drainages, however, one specimen was collected with a backpack shocker and in the North Branch Root River (Olmsted County) at a road crossing 1.2 km downstream of I-90 (Figure 43). Unfortunately, the significance of this occurrence was not known and the mudpuppy was released without photo documentation.

Crayfish: Two unusual species were collected during the survey. (*Procambarus acutus acutus*) had previously been reported once from the Mississippi River in Houston County (Helgen 1990). The species was collected from three localities in Houston County: Pigeon Slough, mouth of Winnebago Creek, and Crooked Creek

downstream of Hwy. 26 (Figure 44). Gary Montz (MDNR St. Paul) identified and saved two specimen for the Biology Lab collection.

One brilliant blue crayfish was collected from Pine Creek (Houston County). However, the specimen was not identified and could merely be a color morph of a species known to occur in Minnesota (Figure 45).

Mussels: Empty mussel shells were collected at almost every site surveyed and forwarded to Mike Davis (MDNR Lake City) for identification and later deposited in the James Ford Bell Museum of Natural History mussel collection. The collections included four threatened species, four special concern species, and the flat floater which has only been reported from Minnesota waters once before (Table 1). Mike also noted on a spread sheet whether the shells were fresh indicating a rare mussel was likely present in a stream or very old which would provide proof of a species' historical occurrence. Mike was not certain the shells collected from Otter Creek were mucket. Final word will have to wait for the curators to catalog the specimens into the collection.

Table 1. Mussel Shells Identified from Southeastern Minnesota Streams.

Species	North Branch Root River	Mississippi River	Upper Iowa River	Cedar River	Otter Creek	Minnesota Status
mucket						
<i>Actinonaisas ligamentina</i>			X	X	?	TH
elktoe						
<i>Alasmidonta marginata</i>	X		X	X		TH
flat floater						
<i>Anodota suborbiculata</i>		X				N/A
spike						
<i>Elliptio dilatata</i>		X			X	SC
creek heelsplitter						
<i>Lasmigona compressa</i>			X			SC
fluted-shell						
<i>Lasmigona costata</i>			X	X		SC
black sandshell						
<i>Ligumia recta</i>					X	SC
monkeyface						
<i>Quadrula metanerva</i>		X				TH
ellipse						
<i>Venustaconcha ellipsiformis</i>	X		X		X	TH

RECOMMENDATIONS

MDNR Fisheries staff should be informed of these findings and encouraged to report rare and unusual species encountered during scheduled stream surveys.

Watersheds and riparian areas should be protected and restored. Future efforts should focus on Otter Creek, North Branch Root River, Upper Iowa River, and South Fork Zumbro River because most of the rare and limited distribution fishes found in Minnesota inhabit these streams. The creamery effluent at Granger, through enforcement or incentive, must be replaced with an effective waste water treatment system.

Natural reestablishment of gravel chubs in the Upper Iowa upstream of the Lidtke Mill dam will only be possible by removal of this barrier. A less controversial option would be reintroducing the species near Le Roy, MN. Reintroductions should continue until surveys reveal natural reproduction is occurring.

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LITERATURE CITED

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Figure 13. Backpack Shocker.



Figure 14. Miniboom Shocker.



Figure 15. Pirate Perch.

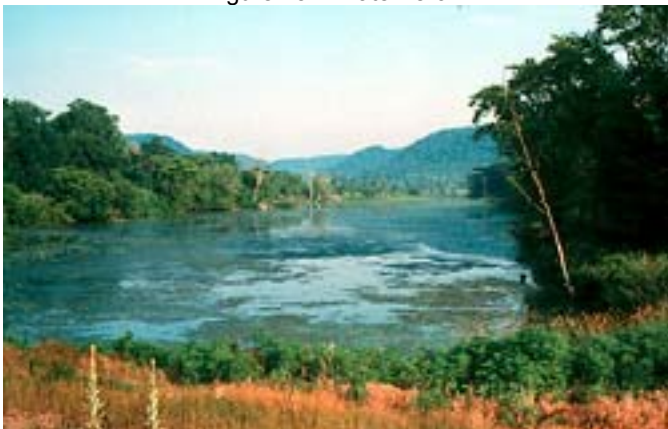


Figure 16. Pirate Perch Habitat (Bluff Slough).



Figure 17. Crystal Darter.



Figure 18. Gravel Chub.



Figure 19. Lidtke Mill Dam (Fish Barrier).



Figure 20. Creamery Outfall at Granger, MN.



Figure 23. Bluntnose Darter.



Figure 24. Bluntnose Darter Habitat (Pine Creek).



Figure 21. Impacted Reach of the North Branch Root River 2.5 Miles West of High Forest, MN.



Figure 25. Least Darter.



Figure 22. Gravel Chub Habitat (North Branch Root River upstream of Olmsted County Road 19).



Figure 26. Least Darter Habitat (Otter Creek).



Figure 27. Northern Brook Lamprey.



Figure 31. Slender Madtom.



Figure 28. American Brook Lamprey.



Figure 29. Black Redhorse.



Figure 30. Ozark Minnow.



Figure 32. Slender Madtom Habitat (Otter Creek - Nelson Paradise Wildlife Area, IA).



Figure 33. Slender Madtom Habitat (Otter Creek, MN).



Figure 34. Pugnose Minnow.



Figure 37. Banded Darter.



Figure 35. Largescale Stoneroller.



Figure 38. Redfin Shiner.



Figure 36. Mud Darter.



Figure 39. Spotted Sucker.



Figure 40. Greater Redhorse.



Figure 43. Mudpuppy.



Figure 41. Weed Shiner.



Figure 44. *Procambarus acutus acutus*.



Figure 42. Suckermouth Minnow.



Figure 45. Blue Crayfish.