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Observations on the Distribution and Status of Western Sand Darter, Spotted Gar, and Skipjack Herring in Iowa Rivers

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This paper describes new records of western sand darter (*Ammocrypta clara*), spotted gar (*Lepisosteus oculatus*), and skipjack herring (*Alosa chrysochloris*) in Iowa's interior rivers. A western sand darter was collected from the Cedar River, Benton County, in 2007. Western sand darters are occasionally collected from the upper Mississippi River (UMR), but have not been sampled in interior rivers since 1958. Two spotted gar were collected from the Des Moines River, Polk and Wapello counties, in 2007. Two spotted gar were sampled from the UMR in 2000, but no spotted gar have been previously recorded from Iowa's interior rivers. A skipjack herring was sampled from the Des Moines River, Wapello County, in 2007. Skipjack herring are occasionally sampled in the UMR and the middle Missouri River, but have not been recorded beyond the lower extremes of Iowa's interior rivers since the early 1900s. All three species are listed as species of greatest conservation need in Iowa.

INDEX DESCRIPTORS: western sand darter, *Ammocrypta clara*, spotted gar, *Lepisosteus oculatus*, skipjack herring, *Alosa chrysochloris*, Iowa, endangered species, species of greatest conservation need, SGCN, fish distribution.

Native fish assemblages are generally declining throughout North America due to degradation of aquatic ecosystems. Of the approximately 140 species native to Iowa, 68 are listed as species of greatest conservation need (SGCN), nine are listed as state threatened, eight are listed as state endangered, and two are federally endangered (Iowa Administrative Code 2002, Zoher 2006). The importance of recording collections of Iowa's native fish species is well understood (Menzel 1981, Paragamian 1990). Changes in fish distribution can be an indication of climate change (Rahel et al. 1996), physical habitat alterations (Rieman and McIntyre 1995), interactions with non-native species (Nico and Fuller 1999), or changes in water quality (Scott and Hall 1997, Araugo et al. 2000). To better understand these changes, accurate records of fish distributions must be maintained. Complete distribution records are especially important for non-game species that may be understudied or misidentified.

The purpose of this paper is to describe the distribution and status of two extremely rare species in Iowa, the western sand darter (*Ammocrypta clara*, Jordan and Meek) and the spotted gar (*Lepisosteus oculatus*, Linnaeus). The distribution and status of the skipjack herring (*Alosa chrysochloris*, Rafinesque) is also discussed. The western sand darter is listed both as a state threatened species and a SGCN in Iowa (Iowa Administrative Code 2002, Zoher 2006). The last record of western sand darters from an interior Iowa river was a collection from the West Fork Cedar River in Butler County in 1958 by professor Virgil Dowell of the University of Northern Iowa (J. Olson, Iowa Department of Natural Resources, pers. comm.). Currently, this species is occasionally collected in the upper Mississippi River (UMR; Iowa's Natural Areas Inventory Database 2007). Harlan et al. (1987) speculated that western sand darters are restricted mainly to the Mississippi River.

The spotted gar has only recently been documented in Iowa. Bowler (2003) reported two specimens collected in the UMR in 2000. Both specimens were collected from Pool 13 downstream of Bellevue, Iowa. No other collections are reported by Harlan et al. (1987) or the Iowa Rivers Information System (2007). The spotted gar is listed as a SGCN in Iowa (Iowa Administrative Code 2002, Zoher 2006).

Skipjack herring are occasionally collected from the middle Missouri and upper Mississippi rivers; however, they have not been documented in the interior rivers of Iowa since the early 1900s (Coker 1930b, Harlan et al. 1987, Iowa Rivers Information System 2007). The skipjack herring was once listed as threatened in Iowa (Harlan et al. 1987), but its designation has since been downgraded to a SGCN (Iowa Administrative Code 2002, Zoher 2006).

METHODS

Fishes were collected between 12 June and 14 August 2007 from 10 sites on nine non-wadeable rivers throughout Iowa. Non-wadeable rivers are defined as any river where fish sampling cannot be conducted safely or effectively using methods typically used in wadeable streams (i.e., backpack- or barge-mounted electrofishing equipment; Flotemersch et al. 2006). Sites were selected by Iowa Department of Natural Resources (IDNR) and Iowa State University (ISU) personnel based on knowledge of the systems and proximity to viable access points. Reaches, 3 to 5 km long, were divided into 100-m long sections, with half being sampled with boat-mounted electrofishing and the other half sampled with trawling and seining.

Fishes were sampled using two standardized gears. Boat-mounted electrofishing used Smith-Root Inc. (Vancouver, Washington) equipment with the output standardized to 3,000 W based on water conductivity and dropper exposure (Burkhardt and Gutreuter 1995). Electrofishing proceeded in a downstream direction with two netters, sampling both thalweg and side-channel habitats. Fish were processed after each 100 m section.

The second gear used to sample fish was a modified Missouri trawl, which is a benthic trawl that has proven to be especially

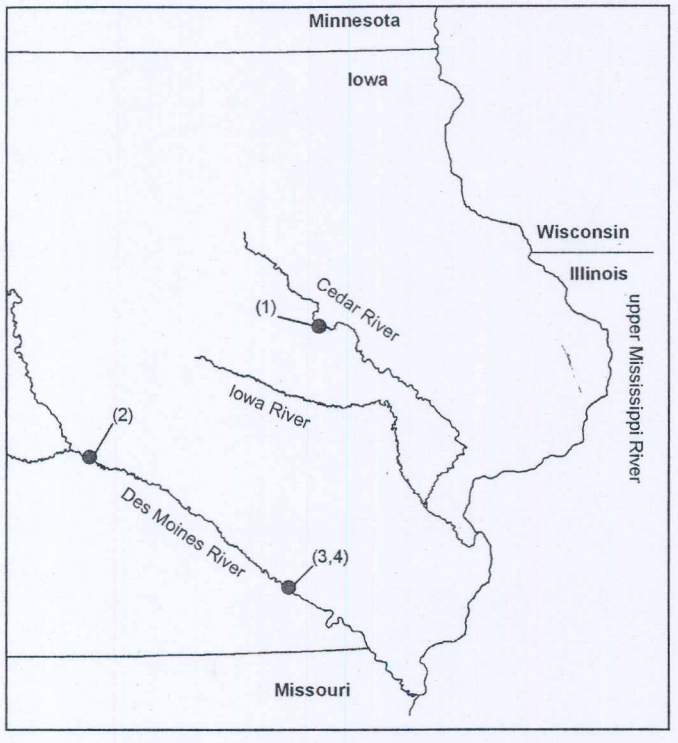

Fig. 1. Upper Mississippi River and select tributaries in Iowa, with summer 2007 collection locations of western sand darter (1), spotted gar (2,3), and skipjack herring (4).

effective in sampling large river systems (Herzog et al. 2005). The headrope length of the trawl was 2.4 m, the footrope was 3.7 m in length, and the uprights were 0.6 m in length. The inner trawl body was constructed of 34.9-mm stretch bar mesh and the outer cover was made of 6.3-mm delta-style, knotless mesh. Further detail on the design and development of this style of trawl can be found in Herzog et al. (2005). Three, 50-m long trawl hauls were completed in each section, and each haul was processed separately.

All fish were identified in the field, measured to the nearest millimeter (total length), and weighed to the nearest 0.5 g. When a specimen could not be identified in the field, it was euthanized, fixed in formalin, and transported to ISU for identification. Fish were identified using keys presented in Pflieger (1997) and Becker (1983).

RESULTS AND DISCUSSION

Western sand darter

A single western sand darter was collected on 8 August 2007 in the Cedar River near Vinton, Iowa (Fig. 1; UTM coordinates 4669693 N, 581178 E, zone 15). The specimen was collected using the modified Missouri trawl in the main channel, where the water depth was 2.2 m and substrate was dominated by sand. The specimen was 48 mm in length, weighed 0.5 g, and is the first documented collection of a western sand darter in an interior Iowa river since 1958 (Iowa's Natural Areas Inventory Database 2007). This specimen is preserved and archived at Iowa State University.

The western sand darter is often associated with clear to moderately turbid water, areas of current, and substrates of coarse sand (Pflieger 1997). The type locality for this species was the Des Moines River, Ottumwa, Iowa (Jordan and Meek 1885). During the 1980s, three separate searches were made for the western sand darter by the IDNR. Sample sites focused on both the type locality and historic sites where the species had been found in the 1940s and 1950s, using gears previously known to sample the species; however, no western sand darters were sampled (J. Olson, Iowa Department of Natural Resources, pers. comm.).

In Illinois, the western sand darter is found in the Mississippi, Sugar, and Kaskaskia rivers (Smith 1979). In Missouri, the western sand darter has been found predominantly in the UMR and its tributaries in the southeast portion of the state (Pflieger 1997). In Wisconsin, the western sand darter is common in the lower Wisconsin River, the UMR, and the St. Croix River (Becker 1983). Populations of western sand darters have been declining throughout its range since the early 1940s, but to a lesser degree in northern states.

A single record in over half a century is insufficient to make decisions about the status of a species. The western sand darter is rare in the UMR (12 records in 30 years; Iowa's Natural Areas Inventory Database 2007) and very rare in interior rivers. The limited distribution of western sand darters in Iowa suggest that it should retain its status as a state threatened species, and possibly be considered for listing as a state endangered species.

Spotted gar

Two specimens of spotted gar were collected from the Des Moines River in 2007 (Fig. 1). A single specimen was collected on 10 July near Yellow Banks County Park, Polk County (UTM coordinates 4598897 N, 459204 E, zone 15). The specimen was collected while electrofishing side channel habitat. Water depth was approximately 2.6 m over a sand and silt substrate. The specimen weighed 47.5 g and was 247 mm in length. This is the first documented collection of a spotted gar from an interior Iowa river (Iowa Rivers Information System 2007). This specimen has been preserved and archived at Iowa State University. A second specimen was collected on 23 July from the Des Moines River, near Eldon, Iowa (UTM coordinates 4530433 N, 564418 E, zone 15). The specimen was sampled during electrofishing of side channel habitat over a predominantly sand substrate in approximately 0.9 m of water. The fish weighed 243 g and was 502 mm in length. The fish was released.

The spotted gar is a species generally restricted to the southern United States (Pflieger 1997). Spotted gar are typically found in slow moving, shallow, vegetated rivers and lakes (Carlander 1969, Page and Burr 1991). A recent telemetry study found that spotted gar use submerged branches as a primary source of cover and that they feed mostly at night (Snedden et al. 1999).

In Missouri, the spotted gar has been recorded infrequently in the UMR, but is rather common and widely distributed in the southeastern portion of the state (Pflieger 1997). In Illinois, the spotted gar has been recorded in the Green and Illinois rivers (Smith 1979). The spotted gar has not been recorded in Wisconsin; however, Becker (1983) speculates that Illinois populations may eventually expand their range into Wisconsin.

Two explanations may account for the recent sampling of spotted gar both in the Mississippi River and inland rivers. First, this species may have always been present in Iowa and is only just now being sampled due to its low population density in Iowa rivers. Alternatively, spotted gar may be expanding its

distribution north into Iowa via the Mississippi River. With regard to colonization of the Des Moines River, in Polk County, Iowa, from the Mississippi River, fish must navigate two major dams (i.e., a small hydroelectric dam at the city of Ottumwa and Red Rock Dam). While neither structure presents a complete barrier to fish passage, it is unlikely that individuals would be able to navigate past these structures. It is also unlikely that individuals are moving up the UMR past Lock and Dam 19 at Keokuk as it is believed to be a major and possibly complete barrier to upstream fish migration (Coker 1930a, Wilcox 1999).

Skipjack herring

A single specimen of skipjack herring was collected on 23 August 2007 in the Des Moines River near Eldon, Iowa (Fig. 1; UTM coordinates 4529899 N, 565054 E, zone 15). The specimen was collected while electrofishing in approximately 3.7 m of water over a sand substrate. The fish was 341 mm in length and was released back into the water. This is the first documented collection of a skipjack herring in an interior Iowa river since the early 1900s (Coker 1930b, Iowa Rivers Information System 2007).

Skipjack herring are found in clear to moderately turbid water in areas with flow (Pflieger 1997). In Wisconsin, skipjack herring were historically found in the UMR and the St. Croix River; however, there have only been four records of skipjack herring in Wisconsin waters since the 1950s (Lyons et al. 2000). Skipjack herring are a migratory species and their movement is often impeded by dams. Records indicate that this species was more abundant before the UMR was impounded, and currently skipjack herring are most abundant in the UMR below the mouth of the Ohio River (Coker 1930b, Pflieger 1997). In recent years, anthropogenic modifications to the middle Missouri River have made conditions more favorable for skipjack herring and their distribution has expanded upstream to the Nebraska-South Dakota border (Cross and Huggins 1975, Tomelleri and Eberle 1990).

Skipjack herring have not been documented in Iowa's interior rivers since the early 1900s. The third and fourth editions of *Iowa Fish and Fishing* (Harlan and Speaker 1956, Harland and Speaker 1969) list one historic record (1892) of skipjack herring in the Cedar River, Lynn County, Iowa; however, this record is not listed in other editions of the publication. Additionally, fisheries databases (e.g., Iowa Rivers Information System) lack records of skipjack herring from Iowa's interior rivers. Coker (1930b) describes skipjack herring as an "early-run" species appearing in high numbers below the dams at Keokuk on the Mississippi River and Ottumwa on the Des Moines River in early spring. Coker also states that in 1926 skipjack herring were plentiful below the Keokuk dam and believed that they may travel into the Des Moines River where they are "known to frequent". These anecdotes are the last documented records of skipjack herring beyond the lower reaches of Iowa's interior rivers until our sampling in 2007.

Skipjack herring are rare in the UMR and are extremely rare in interior rivers (Pitlo et al. 1995, Iowa Rivers Information System 2007). However, due to the migratory behavior of this species, it is not surprising to sample skipjack herring in the Des Moines River downstream of the first major barrier at Ottumwa.

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