Transactions of the Illinois State Academy of Science
(2002), Volume 95, #4, pp. 327-333
received 5/7/02
accepted 8/25/02

Recent Changes in the Distribution of River Redhorse (*Moxostoma carinatum*) and Greater Redhorse (*Moxostoma valenciennesi*) (Cypriniformes: Catostomidae) in Illinois and Comments on Their Natural History

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ABSTRACT

River redhorse (*Moxostoma carinatum*) and greater redhorse (*Moxostoma valenciennesi*) are suckers that are widely distributed across the eastern United States. Others (Becker, 1983; Yoder and Beaumier, 1986) suggest that the distributions of both species have contracted over the past century in Illinois and elsewhere. However, in recent years, *Moxostoma valenciennesi* has increased its known range and abundance in Illinois and *M. carinatum* appears abundant in northeastern Illinois. Since 1980, 27 specimens of *M. carinatum* from 10 localities have been recorded for Illinois. These records are all restricted to the upper Illinois River basin and the Vermilion River basin of the Wabash River. Since 1980, 26 specimens of *M. valenciennesi* from 13 localities have been recorded in the upper Illinois River basin. These records significantly increase the known range of *M. valenciennesi* in Illinois.

INTRODUCTION

The river redhorse (*Moxostoma carinatum*) and greater redhorse (*Moxostoma valenciennesi*) are suckers that are widely distributed across the eastern United States. However, both species have declined in distribution over the past century (Becker, 1983; Yoder and Beaumier, 1986; Parker, 1988).

The river redhorse is listed as threatened (Illinois Endangered Species Protection Board, 1999) and is considered to be more common than the greater redhorse in Illinois (Smith, 1979). During the 1960s and 1970s, *M. carinatum* was known to occur in three rivers in Illinois: the Fox, Kankakee and Salt Fork of the Vermilion River (Fig. 1). The former two rivers are tributaries of the upper Illinois River and the latter a tributary of the Wabash River.

The greater redhorse was considered to be extirpated from the state as recently as 1979 (Smith, 1979). Seegert (1986) reported the collection of a single large individual (403 mm total length) from the upper Illinois River. This record was only the second for Illinois; the other record was that of a single individual collected in 1901 (Seegert, 1986). Currently, *M. valenciennesi* is listed as endangered (Illinois Endangered Species Protection Board, 1999). Basin surveys and general collections across Illinois by biologists with the Illinois Department of Natural Resources (IDNR) and the Illinois Natural History Survey (INHS) since 1980 have provided additional data on the distribution of these two rare species.

METHODS

We searched the INHS database for records of vouchered specimens of *M. carinatum* and *M. valenciennesi* from Illinois. Identifications of specimens were then verified according to characters commonly used to identify the species (Smith, 1979; Page and Burr, 1991). The standard length (SL) and total length (TL) of each specimen was measured and the presence of tubercles on breeding males noted. Field notes, if any, were also reviewed for habitat information, collection methods and other biological information.

RESULTS

Since 1980, 27 specimens of *M. carinatum* from 10 localities have been recorded for Illinois. These records are all restricted to the upper Illinois River basin and the Salt Fork Vermilion River basin of the Wabash River (Fig. 1). Since 1980, 26 specimens of *M. valenciennesi* from 13 localities have been recorded from the state. All of these records are from the upper Illinois River basin (Fig. 1) and they significantly increase the known range of *M. valenciennesi* in Illinois.

The *M. carinatum* mean TL was 389 mm and ranged from 71-665 mm. The *M. valenciennesi* mean TL was 229 mm and ranged from 105-560 mm. For both species, the large range of body sizes indicated that both juvenile and adult specimens were present in samples vouchered (Table 1).

Three male *M. carinatum* had well developed breeding tubercles; one male was collected in May, another in September and the collection date of the third male was unknown. Four males with poorly developed tubercles were found among the specimens examined. Their collection dates were in August, September and November. These males ranged from 382-653 mm TL. No specimens of *M. valenciennesi* had breeding tubercles.

DISCUSSION

Distribution

Historically, there are few records of *M. carinatum* and *M. valenciennesi* in Illinois compared to the other redhorses (Forbes and Richardson, 1909; Smith, 1979). Possibly these two species were very rare in the state or were difficult to capture using earlier sampling methods. Yoder and Beaumier (1986) noted a similar situation for these same two species in Ohio. They concluded that newer sampling methods were more effective in de-

tecting the presence of these species and that the species were always present in some areas of Ohio. Although the river and greater redhorses may have been under-sampled in earlier surveys, the use of electroshocking methods since the 1980s in Illinois still indicate that both species are rare in the state.

The distribution of *M. carinatum* was larger in Illinois before 1907 than at present (Fig. 1). Currently, the species is restricted to the upper Illinois River and Vermilion River (of the Wabash River). Despite extensive sampling in the upper Illinois River and Vermilion River (of the Wabash River) basins by Forbes and Richardson (1909), they found no records for these species in these areas. Although their methods may have under-sampled this species, the high number of samples suggests that at least some specimens should have been taken if the species was present.

The greater redhorse was known only from one locality in Illinois prior to 1980. Given that this area was well sampled before 1980 by Forbes and Richardson (1909) and Smith (1979), the species may never have been common in Illinois. It appears that the species is more common now in Illinois than in the last 100 years. This trend is quite unexpected since many species of fishes have declined in abundance during this time period. Some specimens may have been misidentified as another species of redhorse although this seems unlikely because redhorses in the INHS collection have been re-examined by various ichthyologists, including Dr. Robert Jenkins (Roanoke College) who specializes in the systematics of *Moxostoma*. Dr. Jenkins discovered the only previously known specimen of greater redhorse in the INHS collection. It was initially identified as a golden redhorse (*Moxostoma erythrurum*).

Both species have suffered from poor water quality and habitat destruction throughout their range (Becker, 1983). Siltation and other forms of water pollution probably reduced the distribution of the river redhorse in Illinois and the abundance of the greater redhorse in northeastern Illinois. It is surprising that both species have survived in the upper Illinois River system as much of this area has been severely impacted by pollution from the Chicago area. Recently, many parts of this area were largely devoid of fish and mussel life although populations are now recovering (Sietman et al., 2001). Viable populations probably survived in the Fox and Kankakee Rivers, two tributaries just outside of the Chicago region.

Size, Ecology and Life History Observations

Based on age estimates in Wisconsin (Becker, 1983), the smallest specimens of river redhorse (71-115 mm TL) were about 1 year old. The wide and even distribution of specimens suggested a number of overlapping size classes. The largest specimens were likely 11 or 12 years old. The largest specimen (66 cm TL) was less than the largest reported size (77 cm TL, Becker, 1983; Page and Burr, 1991).

Age estimates for the greater redhorse in Wisconsin by Becker (1983) were variable and dependent on where the samples were taken. In light of this, the smallest specimens (105-164 mm TL) were about 2 years old. Again, the wide and even distribution of specimens suggested a number of overlapping size classes. The largest specimens were likely 7 or 8 years old. The largest specimen (56 cm TL) was less than the largest re-

ported sizes (64-80 cm TL, Jenkins and Jenkins, 1980; Becker, 1983; Page and Burr, 1991).

We were unable to obtain field notes associated with any of the river redhorse specimens. However, locations recorded in species records are in medium-sized streams that typically have high gradients and rocky substrates (Fig. 1, Smith, 1971). This stream preference is typical for the species studied in areas outside of Illinois (Becker, 1983; Parker, 1988). The youngest vouchered specimens are from the Kankakee River. These recently collected specimens (1985 and 1989) suggest that the *M. carinatum* is actively reproducing in the river.

Field notes from two collections of greater redhorse gave a fairly detailed description of two sites on Aux Sable Creek, Grundy County. Mean widths of the sites were 9 and 15 m. Width was variable as it reflected the mix of pools and riffles. Both sites were dominated by a hard substrate that consisted primarily of gravel, cobble and bedrock. One site had a minor proportion of sand. Aside from the prominent rocky substrate, both sites had an abundance of water willow, *Justicia americana*. The presence of juveniles suggests that the species reproduces in the area. Juveniles were found in one other basin, the Vermilion River, Livingston County (Fig. 1). Lack of juveniles from other areas suggests that these two areas are important to maintaining the populations of *M. valensiennesi* in Illinois.

ACKNOWLEDGMENTS

We are grateful for the support of the Illinois Department of Natural Resources, Illinois Department of Transportation, and the Center for Biodiversity and Office of the Chief at the Illinois Natural History Survey. We also wish to acknowledge the many IDNR streams biologists, especially Bob Rung and Steve Pescitelli, who vouchered many of their specimens at INHS and provided copies of their field notes. Rick Phillippe and Rita Klein (INHS) graciously provided helpful comments on the manuscript.

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Figure 1. The distribution of river redhorse (*Moxostoma carinatum*) and greater redhorse (*Moxostoma valenciennesi*) in the state of Illinois, USA.

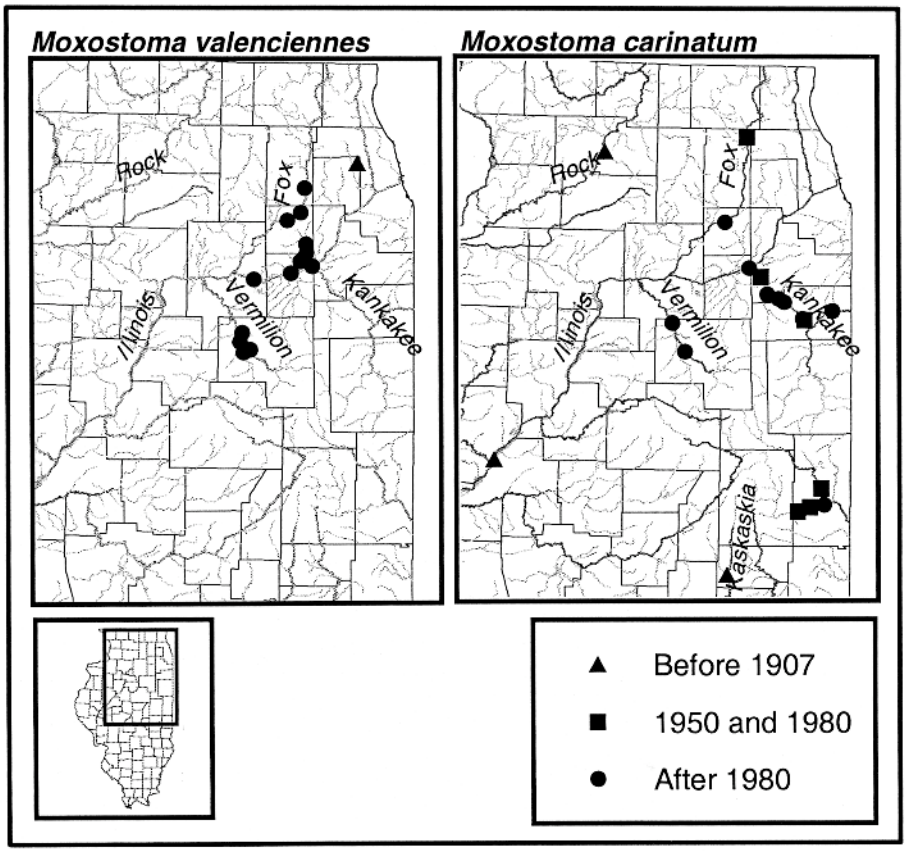

Table 1. Size distribution (total length in mm) of *Moxostoma carinatum* and *Moxostoma valenciennesi* based on specimens examined in the INHS fish collection.

Size in 20 mm increments	Number of Specimens	
	Moxostoma carinatum	*Moxostoma valenciennesi*
0	0	0
20	0	0
40	0	0
60	1	0
80	0	0
100	2	2
120	0	8
140	1	6
160	1	1
180	1	0
200	1	1
220	3	0
240	1	1
260	1	0
280	1	0
300	2	0
320	2	2
340	4	0
360	1	1
380	1	1
400	2	0
420	0	0
440	0	0
460	1	1
480	1	1
500	1	0
520	2	1
540	1	0
560	2	1
580	2	0
600	1	0
620	2	0
640	2	0
660	1	0