

William R. Gould

A SUMMARY OF INFORMATION ON STURGEON CHUB IN MONTANA

ABSTRACT

The sturgeon chub (*Macrhybopsis gelida*) is a Montana species of special concern and a candidate species for federal listing. It has been reported as having limited distribution and numbers in Montana. However, recent surveys show sturgeon chub are present in long reaches in the Powder, Yellowstone and Missouri rivers in Montana and number in the hundreds. Chub were collected at sites with average depths of 0.1 - 6.4 m over bottoms composed of sand to cobble. Most of the presumed ripe fish were collected in July. Forty eight species of fish are reported as associates of sturgeon chub with flathead chub (*Platygobio gracilis*) the most frequent. The average fin ray and lateral line scale numbers of specimens from the Powder, Yellowstone and Missouri rivers, respectively, were within one unit of each other and indicated no subspecific differentiation in chub among rivers. I concluded that sturgeon chub in Montana are more widespread in secure habitats and are not as rare as earlier believed.

Key Words: sturgeon chub, distribution, habitat, biology, meristics.

INTRODUCTION

The sturgeon chub (*Macrhybopsis gelida*) is indigenous to the Missouri and Mississippi river basins (Bailey and Allum 1962, Brown 1971, Lee *et al.* 1980, Baxter and Stone 1995). It was designated a species of special concern in Montana because it appeared to be rare, have a limited distribution and little was known about its biology (Holton 1980, Hunter 1994, Holton and Johnson 1996). It is also a candidate for federal listing (Werdon 1993). Recently Werdon (1993) reported sturgeon chub seemed to have declined in abundance and appeared to have been eliminated from parts of its former range in southeastern Montana.

Since Werdon's (1993) assessment, important information has been collected on sturgeon chub in Montana. Some of these data are presented in a variety of reports and some were obtained only recently from specimens

in collections at Montana State University (MSU) and have not been presented elsewhere. The purpose of this summary is to consolidate and update the data on sturgeon chub in Montana. This will permit interested parties to evaluate the status of sturgeon chub in Montana and the needs for further studies.

MATERIALS AND METHODS

I obtained information on the distribution and habitat of sturgeon chub in Montana from the literature, reports and by seining 26 sites in Montana in 1994 (Gould 1994). Additional information on the distribution and biology of sturgeon chub was obtained from examination of collections in the Vertebrate Museum of MSU.

I measured specimens to the nearest 1 mm in total length (TL), and dissected them to obtain data on sex ratios, sexual condition and evaluate size at sexual maturity. Meristic values were obtained following the methods of Hubbs and Lagler (1964).

William R. Gould, Biology Dept., MT State Univ.,
Bozeman, MT 59717-3460

RESULTS AND DISCUSSION

Distribution

Prior to 1978, sturgeon chub were known only from four sites in Montana: one at an unknown location in the Milk River (Bailey and Allum 1962), one each at the mouths of the Tongue and Powder rivers, (Bailey and Allum 1962, Brown 1971) and one in the lower Yellowstone River (Brown 1971). Since then, biologists have extended the sturgeon chub's known range significantly. In southeastern Montana, Rehwinkle (1978), Elser *et al.* (1980) and Gould (1994) found sturgeon chub throughout the Powder River and Tews (1993), Bramblett (unpublished collection records) and Liebelt (1996) have extended the known range down the Yellowstone River into North Dakota (Figure 1).

In northcentral Montana, Gardner and Berg (1982) reported sturgeon chub near the mouth of the Teton River and in the middle Missouri River from Great

Falls to Fort Peck Reservoir. Subsequently, Grisak (1996) extended their Missouri River distribution downstream to Fort Peck Reservoir and Tews (1993) and Liebelt (1996) lengthened it from the Missouri River below that reservoir to Lake Sakakawea in North Dakota (lower Missouri River), which isolates Montana headwater populations from those downstream. Taken together, the collection sites are situated over 600 km in the Powder, lower Yellowstone (Miles City to mouth) and middle and lower Missouri rivers. This is a much greater distance than Werdon (1993) cited in her species status report of sturgeon chub in Montana.

In addition to the distribution presented in Figure 1, Elser *et al.* (1980) also reported sturgeon chub from the Little Missouri River drainage in Montana. I have not included this record in the known distribution of sturgeon chub in Montana because I consider it dubious. I examined the site and found it had a mud bottom and

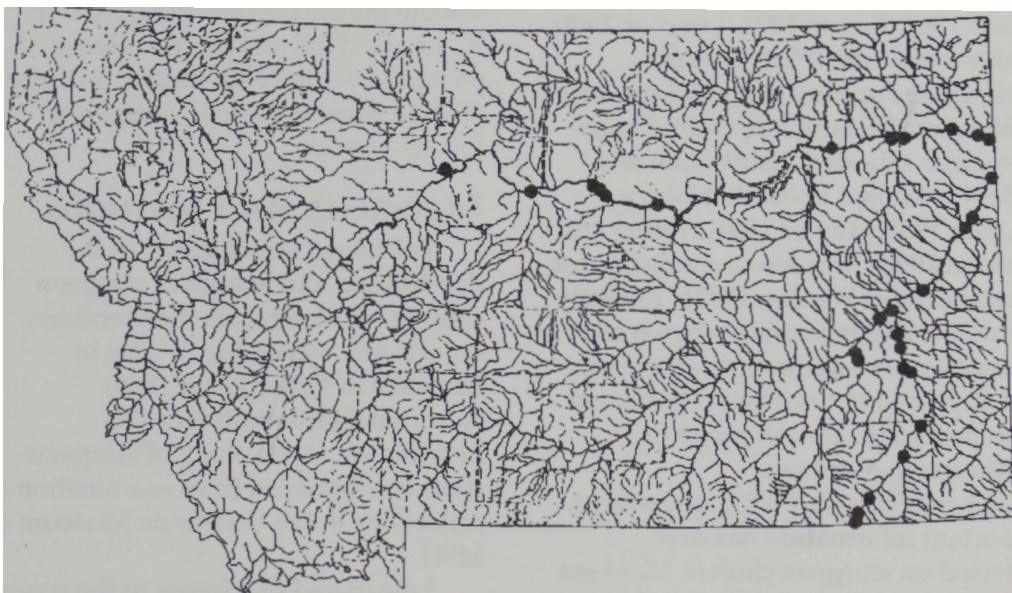


Figure 1. Collection sites of sturgeon chub in Montana reported by Brown (1971), Elser *et al.* (1977, 1980), Rehwinkle (1978), Gardner and Berg (1982), Werdon (1993), Gould (1994), Tews (1994), Liebelt (1996) and in fish collections at Montana State University. There are more actual collection sites than circles show because one circle may cover the location of two adjacent collection sites.

little current. These conditions make it an unlikely site for sturgeon chub (Stewart 1981). Also, Barfoot (1993) and Guzevich (1993) surveyed two Little Missouri River tributaries in Montana and did not find sturgeon chub.

The distribution of sturgeon chub in the Powder, Yellowstone, and Missouri rivers represents a secure, core habitat for the species in Montana. Specimens differing in sizes have been collected in these areas over several years (including some drought years) showing continued reproduction and recruitment. The rivers are located in different areas of Montana such that the species is not at risk from a catastrophic event occurring in one area. Furthermore, the above mentioned rivers are not likely to be dammed further, thereby reducing sturgeon chub habitat.

In addition to the core area populations, emigrants apparently invade areas adjacent to the core areas such as the mouths of the Tongue and Teton rivers as conditions permit, but do not establish permanent populations there. Neither of these sites included chubs in my 1994 sampling, probably because of dewatering and drought.

Abundance

Our baseline knowledge of the abundance of sturgeon chub has improved with recent surveys. Brown (1971), Holton (1990) and Holton and Johnson (1996) considered sturgeon chub to be rare to uncommon in Montana. In quantitative assessments using electrofishing and seining, Rehwinkel (1978) found sturgeon chub composed 3.8 percent (95 specimens) and 1.5 percent (11 specimens) of fish samples on the Powder River during 1975 and 1976, respectively. Tews (1994) captured 47 sturgeon chub in 18 seine hauls on the lower Missouri River in 1993. On the middle Missouri River, Grisak (1996) found sturgeon chub made up only 0.2 percent (8 specimens) of the seining catch in 1994. However, when he sampled by trawling he

discovered sturgeon chub composed 19 percent (260 specimens) in the same area. In collections from netting the Intake Canal in 1996, the Bureau of Reclamation (memo) reported sturgeon chub made up 12.9 percent of the catch. Whereas no numbers of specimens were given in the memo, Mark Albers (Bureau of Reclamation, personal communication) stated several hundred specimens of sturgeon chub had been taken. In the Yellowstone River below Intake, Mike Ruggles (Montana Fish, Wildlife and Parks, memo) reported sturgeon chub made up 7.2 percent (230 specimens) of the fish taken in his survey. These recent surveys show sturgeon chub are much more abundant in the Missouri and Yellowstone rivers than previously believed.

Habitat and Biology

Sturgeon chub inhabit areas with current, rocky and sandy substrates and substantial turbidities (Table 1). This is consistent with other reports of sturgeon chub habitat in the northern part of their range (Bailey and Allum 1962, Cross 1967, Brown 1971, Stewart 1981, Werdon 1992).

Sturgeon chub seem to be negatively phototopic. Stewart (1981) found chub were absent from a clear water section of the Powder River in Wyoming but common in otherwise similar turbid areas. Liebelt (1994) did not collect sturgeon chub in the clearest and coldest section he sampled on the lower Missouri River although he did in sections with higher turbidities. Gould (1994) reported taking them from shallow water in the extremely turbid Powder River but Grisak (1996) reported sturgeon chub were rare in the shallow, less-turbid waters of the middle Missouri River and more abundant in deeper water.

Forty eight species of fish have been reported captured with or in areas near sturgeon chub collection sites (Elser *et al.* 1977, Rehwinkel 1978, Elser *et al.* 1980, Tews 1993, Gould 1994, Grisak 1996,

Table 1. *Habitat characteristics at sites or sections in which sturgeon chub have been collected in Montana.*

Site and date	Average depth (cm) (capture method)	Bottom velocities (cm/s)	Turbidity	Temperature (C)	Substrate	Source
Powder River (4 sites) July, 1994	15-30 (seining)	27-34 ^a	>1000 JTU at all stations	point measurements 20-25	rocks and sand	Gould 1994
Middle Missouri River (4 sections) July-August, 1995	92-641 (trawling)	27-112	28 ^b cm Secchi disk	22 ^b	rocks and sand	Grisak 1996
Lower Missouri River July and August, 1995	3.7, 3.3 (trawling)		averages 16, 13 cm Secchi disk		sand, gravel, cobble, boulder	Liebelt 1996
Lower Yellowstone River July and August, 1995	1.8, 3.3, 2.7 (trawling)		17, 11, 16 cm Secchi disk		sand, gravel and cobble	Liebelt 1996
Lower Missouri and Yellowstone rivers, 1994 and 1995	< 150 (seining)					Liebelt 1996

^a Three averages.

^b Point measurement at one site.

Liebelt 1996). The most frequently collected associates were flathead chub (*Platygobio gracilis*) (Rehwinkle 1978, Werdon 1992, Gould 1994, Tews 1993, Grisak 1994), (*Hybognathus* sp.) (Rehwinkle 1978), longnose dace (*Rhinichthys cataractae*) (Werdon 1992) and suckers (Liebelt 1996).

The 59 sturgeon chub from the collections at MSU that I dissected consisted of 31 males and 28 females, indicating a 1.1:1.0 sex ratio.

Nine males had swollen testes with widths of 0.9 mm or greater and 22 males had testes widths of less than 0.5 mm. Fish in the former group were designated as probably ripe. They were 42-85 mm TL; eight were collected in July and one in August. The group with narrower testes contained specimens 43-88 mm TL and were considered to be non-ripe. They also were collected in July and August.

A few randomly chosen sturgeon

chub stomachs were examined for food contents. Most of the materials were classified only as insect parts. However, some were identified as simuliid and chironomid parts. Stewart (1981) only listed insects as sturgeon chub food.

Meristic

The ranges of comparable measured meristic features were within 2 units of each other (Table 2) and similar to those reported by Bailey and Allum (1962) in South Dakota, Cross (1967) in Kansas, Pflieger (1975) in Missouri, and Stewart (1981) and Baxter and Simon (1995) in Wyoming. Application of the 75 percent rule (Mayr 1969) to the samples from the Powder, Yellowstone and middle Missouri Rivers (Table 2) showed they were not distinctive from each other. The 75 percent rule requires that 75 percent of the individuals of one population must be distinctive from "all" (=97%) the individuals in the

Table 2. Selected meristics of sturgeon chub *Macrhybopsis gelida* from three rivers in Montana. Number of specimens in parentheses.

Statistic	Pectoral fin rays	Pelvic fin rays	Dorsal fin rays	Anal fin rays	Lateral line scales	Pharyngeal teeth
Powder River						
RANGE	15-16 (18)	8-9 (18)	8 (18)	8-9 (18)	39-46 (18)	1,4-4,1 (8)
AVE.	15.7	8.1	8.0	8.1	42.7	1,4-4,1
S.D.	0.5	0.2	0.0	0.2	2.0	0.0
Yellowstone River						
RANGE	14-17 (32)	8 (33)	8 (33)	7-8 (33)	40-45 (30)	1,4-4,1 (22)
AVE.	15.3	8.0	8.0	7.9	41.8	1,4-4,1
S.D.	0.7	0.0	0.0	0.2	1.4	0.0
Middle Missouri River						
RANGE	14-17 (14)	7-8 (14)	8 (14)	8-9 (14)	40-45 (12)	1,4-4,1 (12)
AVE.	15.1	7.8	8.0	8.1	42.3	1,4-4,1
S.D.	0.7	0.4	0.0	0.3	1.6	0.0

compared population for them to be designated different subspecies. The sample (N=5) from the lower Missouri River was considered to be too small for comparison.

CONCLUSIONS

Newly obtained baseline information shows sturgeon chub populations in Montana are more widely distributed and often contain more individuals than previous reports indicated. Many of the populations appear to be located in secure habitat because they are situated in rivers unlikely to be altered further. The new information on population sizes and the additional evidence that populations are self sustaining require that the status of sturgeon chub in Montana be re-evaluated.

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