

NOTES

Critical Swimming Speed and Behavior of Juvenile Shovelnose Sturgeon and Pallid Sturgeon

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Abstract.—The swimming performance of hatchery-reared, juvenile shovelnose sturgeon *Scaphirhynchus platyrhynchus* and pallid sturgeon *S. albus* was studied in a laboratory swim tunnel at 20°C and 10°C. The mean 30-min critical swimming speed was not significantly different between species at either temperature (36.9 cm/s for shovelnose sturgeon and 35.9 cm/s for pallid sturgeon at 20°C, 19.4 cm/s for shovelnose sturgeon and 15.0 cm/s for pallid sturgeon at 10°C). Free swimming (swimming without contact with the substrate) was observed less than 18% of the time at speeds greater than 15 cm/s. As speed increased, pallid sturgeon swam significantly less in the water column at 20°C; however, speed had no effect on percent free swimming among shovelnose sturgeon at 20°C. The results of this study indicate that, over the temperature and size range tested, shovelnose sturgeon and pallid sturgeon probably do not segregate in rivers due to different swimming or station-holding abilities.

Shovelnose sturgeon *Scaphirhynchus platyrhynchus* and pallid sturgeon *S. albus* are sympatric in the main-stem Mississippi and Missouri rivers and are generally associated with flowing water habitats in or near the main channel (Bailey and Cross 1954). Adults of both species are known to use relatively low-velocity areas associated with dike fields, sand bars, and islands (Carlson et al. 1985; Hurley et al. 1987, 1999; Bramblett 1996; Curtis et al. 1997). Collections of young river sturgeons (*Scaphirhynchus* spp.) in the wild are infrequent, and young pallid sturgeon have only recently been sampled. Juvenile (5.0–21.0 cm) shovelnose sturgeon and pallid sturgeon have been collected by

bottom trawling on the sand flats of the Mississippi River, primarily in main channel border areas where velocities 20 cm above the bottom ranged from 20 to 80 cm/s; sand troughs were usually present in general capture locations (M. Petersen and D. Herzog, Missouri Department of Conservation—U.S. Geological Survey Long-Term Resource Monitoring Program, personal communication). The extent of overlap in habitat use by river sturgeons remains relatively unknown (particularly for the early life stages), but a potential consequence of sharing habitat would be an interspecific competition for resources.

Fish occupying similar habitats partition resources along a trophic gradient or through differences in the temporal or spatial use of the habitat (Ross 1986). Closely related, sympatric species may segregate spatially in lotic environments through limits in their ability to occupy increased velocities (e.g., Peake et al. 1997). While most available information suggests that river sturgeons at a given life stage occupy the same general habitats, in some field studies adult pallid sturgeon were found to occupy faster currents and to be more abundant in swift, channel habitats than shovelnose sturgeon (Forbes and Richardson 1905; Carlson et al. 1985). However, the interpretation of adult and juvenile capture data is hindered by uncertainty in identification, the difficulties associated with measuring the focal point velocity of fish in large, turbid rivers, and the differences in fish body size. Also, river sturgeons can maintain station against current by actively swimming or by station-holding (Adams et al. 1997, 1999). The relative abilities of fish to withstand and negotiate currents can be examined in laboratory flumes where fish are subjected to known velocities and behaviors readily observed.

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