

**MOVEMENT AND HABITAT USE OF PADDLEFISH
IN THE UPPER MISSISSIPPI RIVER AND SELECTED TRIBUTARIES**

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Dredging, flow modification, and the construction of dams and reservoirs on large river systems such as the Mississippi River have altered traditional paddlefish *Polyodon spathula* habitat and may impede paddlefish movements. Consequently, paddlefish have been extirpated from four states and Canada; furthermore, 9 of 22 states within the species range have reported significant declines in paddlefish populations. Paddlefish are listed as endangered or threatened in six states and are listed as a species of special concern by the U.S. Fish and Wildlife Service. Restoration or protection of depleted paddlefish populations is a goal of several state and federal natural resource agencies in the upper Mississippi River basin in the United States. Knowledge of paddlefish movements and habitat use is important for determining the effects of dams on paddlefish and for defining the spatial scale necessary to effectively manage depleted paddlefish stocks.

From November 1994 until March 1996, we evaluated movement and habitat use of paddlefish in the upper Mississippi River and two tributary rivers. In fall 1994 and spring 1995, paddlefish were captured in Pool 8 on the main stem of the upper Mississippi River; in the Wisconsin River downstream of a hydroelectric dam; and in the Chippewa River. We implanted 75 or 150 gram radio transmitters broadcasting at 49 MHz into the peritoneal cavities of these fish. Radio-marked paddlefish were located two to four times monthly from the time of receiving an implant until March 1996.

For most of the year, radio-tagged paddlefish stayed within a 1 to 4 km reach of the river that included the location at which they were captured. Habitats used by fish within these reaches was characterized by deep water and low current velocity as compared to other areas within these reaches. In spring 1995, about half (25 of 56) of the radio-tagged paddlefish migrated from their tagging locations, presumably for spawning. At each study site, this migration occurred when water temperature was near 10° C and discharge was high. Paddlefish in the Chippewa and Wisconsin Rivers migrated downstream from 20 to 90 km. Six of the 12 radio-tagged paddlefish in the Chippewa River migrated to Pool 4 of the main stem of the upper Mississippi River. Eleven of 24 paddlefish tagged in the

Wisconsin River migrated downstream within that river but did not enter into the Mississippi River. Paddlefish in Pool 8 of the Mississippi River remained in the upper portion of that Pool throughout the spring. Only 3 of 20 paddlefish tagged in Pool 8 made significant movements during spring; these 3 paddlefish moved upstream about 5 km to a navigation dam. Paddlefish that migrated during spring did not pass through any dams. At each study area, most paddlefish that migrated during spring returned to the river reach near their capture location by early summer.

In early fall 1995, 7 paddlefish moved long distances (90 to 250 km) from their capture site. This movement occurred when discharge in the main stem of the upper Mississippi River and its tributaries was high due to a period of high precipitation. Three paddlefish from the Chippewa River moved downstream about 90 km into the Mississippi River; one fish continued downstream, moving through a navigation dam into Pool 5 of the Mississippi River. All three of the paddlefish that moved from the Chippewa River returned to that river in late fall. One paddlefish radio-tagged in the Wisconsin River migrated downstream about 100 km into Pool 10 of the Mississippi River in early fall. As well, 3 paddlefish radio-tagged in Pool 8 of the Mississippi River moved downstream about 150 km to Pool 10; these fish moved through 2 navigation dams. One of these fish then moved up the Wisconsin River about 100 km.

In summary, paddlefish radio-tagged in the upper Mississippi River and its major tributaries spent most of the year in a 1 to 4 km reach of river which included the site at which they were radio-tagged. The habitat at fish locations within those 1 to 4 km reaches was characterized by deep water and low current velocity as compared to other habitat within those reaches. Paddlefish from all three radio-tagging sites made long (20 to 250 km) spring and fall migrations. These migrations occurred during periods of high discharge. Most of the paddlefish that participated in the spring and fall migrations returned to the reach of the river from which they were captured within a few weeks. During migrations, navigation dams on the upper Mississippi River may have impeded upstream movement of paddlefish more so than downstream movement. In our study 5 paddlefish moved downstream through navigation dams, whereas only 1 paddlefish moved upstream through a navigation dam. Our study suggests that large spatial scales are appropriate for managing depleted paddlefish stocks in the upper Mississippi River.