

Great Migrations: By Land, Air...and Water



A case for 'swimways' in large rivers

by Robert A. Hrabik

Wildlife movements or migratory pathways are well known. In North America, two notable migrations continue to capture our attention: the journey of American bison and that of birds. While American Bison once roamed vast regions of North America in tremendously large numbers (the largest reported herd covered 1,355 square miles!), they are now functionally extinct. Birds on the other hand—despite stressed populations—still make annual, epic migrations through what are known as flyways.

Often a means of survival invoked by seasonal changes or breeding patterns, migration plays an important role in an animal's life cycle. Such movements prevent the depletion of resources from portions of a species' territory. In addition, they offer access to breeding grounds that are often more rich in resources and better protected than areas where animals live during other times of the year.

Fish have been known to make long-distance movements or migrations as well. For example, salmon are mostly anadromous (meaning they live in the oceans but spawn in freshwater rivers, often the same river in which they were born). Recent advances in radio and ultrasonic telemetry have shed new light on the movements of fishes in our large rivers (the [Mississippi](#), Missouri and Ohio rivers, in particular). Most notable are the sturgeons, paddlefish and American eel—which have been documented traveling hundreds of river miles from where they were tagged. Some tagged individuals at Gavin's Point Dam, South Dakota, for example, moved down the Missouri River, into the Mississippi River downstream, and then up through systems like the Arkansas River. These massive movements rival the great migrations of American Bison, and the waterfowl and songbirds of North American flyways.

On a smaller scale, but equally interesting, are the cyprinids (minnows). Evidence has emerged in Great Plains rivers that minnows also make remarkable long-distance journeys. In both large rivers and the Great Plains, a common reproductive strategy in fish is to release buoyant eggs that float and disperse scores to hundreds of miles downstream to appropriate habitats where they hatch and

where young then find refugia (or safe areas in habitats having some semblance of natural function). The process is repeated as the young fish become adults and migrate upstream to spawning areas and release their own eggs.

Unfortunately, this process isn't so easy in today's manipulated and disrupted rivers. Our large rivers are laced with dams or have been functionally channelized for [flood control](#) or to improve [commercial navigation](#). The main channels of these regulated rivers flow more swiftly than they did historically, and there are fewer zones where migratory fish can rest or feed. This means that the energetic cost of migration is likely much higher today than in the past. On the Great Plains, prairie rivers are diverted to irrigate crops and the upper reaches of many tributaries have become dry due to over-allocation of groundwater pumping. The lower-than-normal flows in downstream reaches have reduced suitable rearing sites and refugia for the young.

The concept of swimways for large rivers and Great Plains streams has recently emerged as a corollary to terrestrial migrations and flyways. ([Download this science paper from U.S. Geological Survey, published by the Ecological Society of America.](#)) Many native fish species and other aquatic animals rely heavily on unobstructed watery pathways to move from place to place because of season and to breed (i.e. to survive!). Carefully planned research and management should be undertaken to lessen the impacts of dams, water withdrawal, channelization and other activities that disrupt the processes and energetic costs of migration. The establishment of a recognized system of swimways should be created that parallels the avian flyways of North America, in terms of an ecological necessity and as a public education tool.

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Bob Hrabik supervised the Open Rivers and Wetlands Field Station located near Cape Girardeau, Missouri (U.S.), for the last 21 years, and has worked on both the Missouri and Mississippi Rivers for over 30 years.

During his tenure with the field station, he was part of a scientific exchange program between the U.S. Geological Survey (representing the Mississippi River) and The Peoples Republic of China (Yangtze River). On April 1, he was appointed to update and revise The Fishes of Missouri book — this on the heels of completing his first book on the Fishes of Nebraska (in press). Hrabik's professional interests include fish distribution, taxonomy, systematics and lotic ecology. He also travels extensively across the United States collecting fish and other aquatic animals.

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