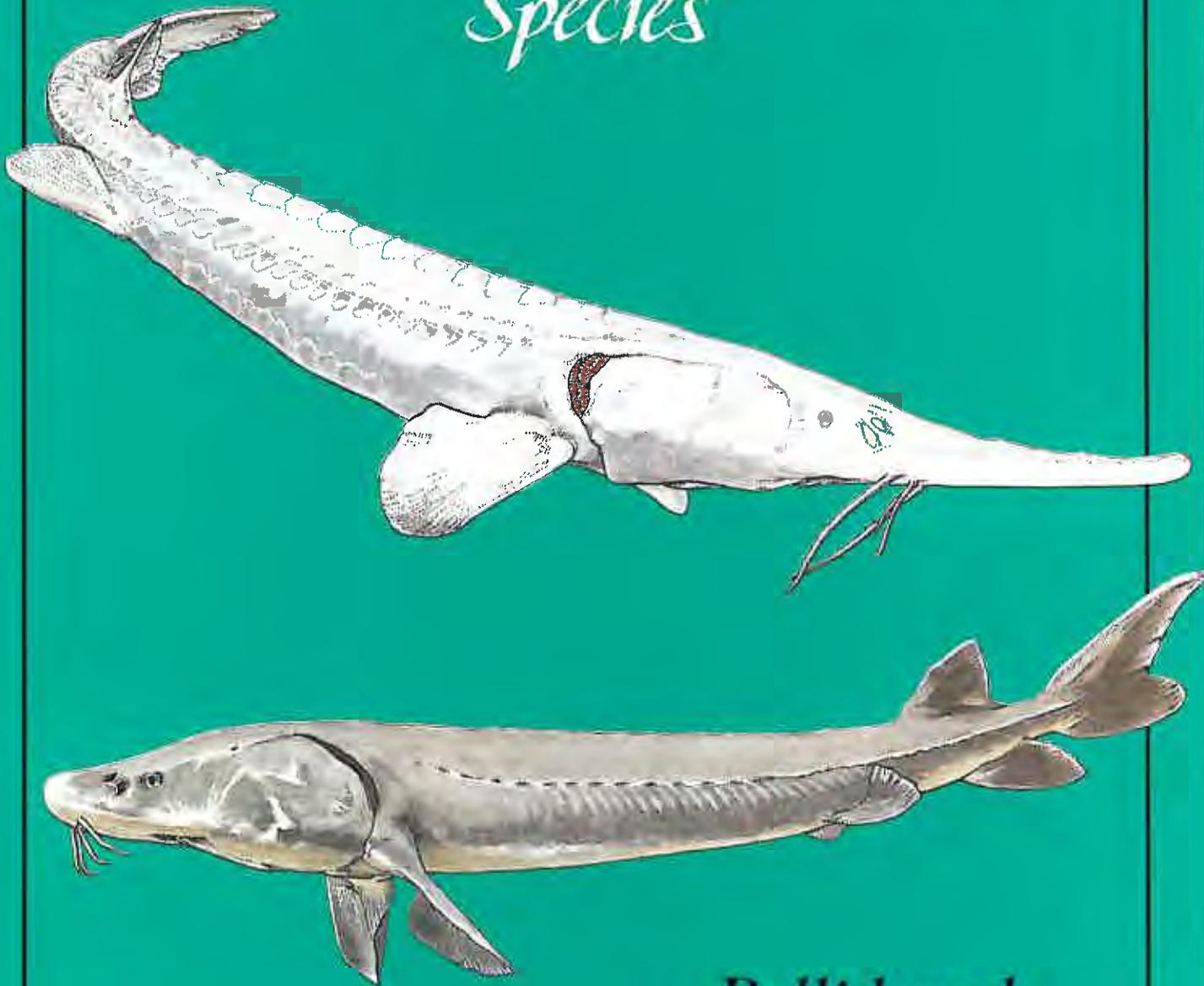


# NEBRASKA'S

## *Threatened and Endangered Species*



*Pallid and  
Lake Sturgeons*

NEBRASKA GAME AND PARKS COMMISSION

# Lake Sturgeon — A threatened species

# Pallid Sturgeon — An endangered species

## Status

Three species of sturgeons live exclusively in fresh water, and all are found in Nebraska. These include the relatively abundant shovelnose sturgeon (*Scaphirhynchus platorynchus*), the very rare pallid sturgeon (*Scaphirhynchus albus*) and the lake sturgeon (*Acipenser fulvescens*). The pallid sturgeon is designated as an endangered species on both the state and federal lists. The lake sturgeon is listed as a state threatened species in Nebraska.

Today, pallid sturgeons and lake sturgeons occur only very rarely in Nebraska, in the waters of the Missouri River from the South Dakota-Nebraska border to the Nebraska-Kansas border. One or both of these sturgeons may also be found in the

lower reaches of major tributaries such as the Niobrara, Platte, Elkhorn and Little Nemaha rivers.

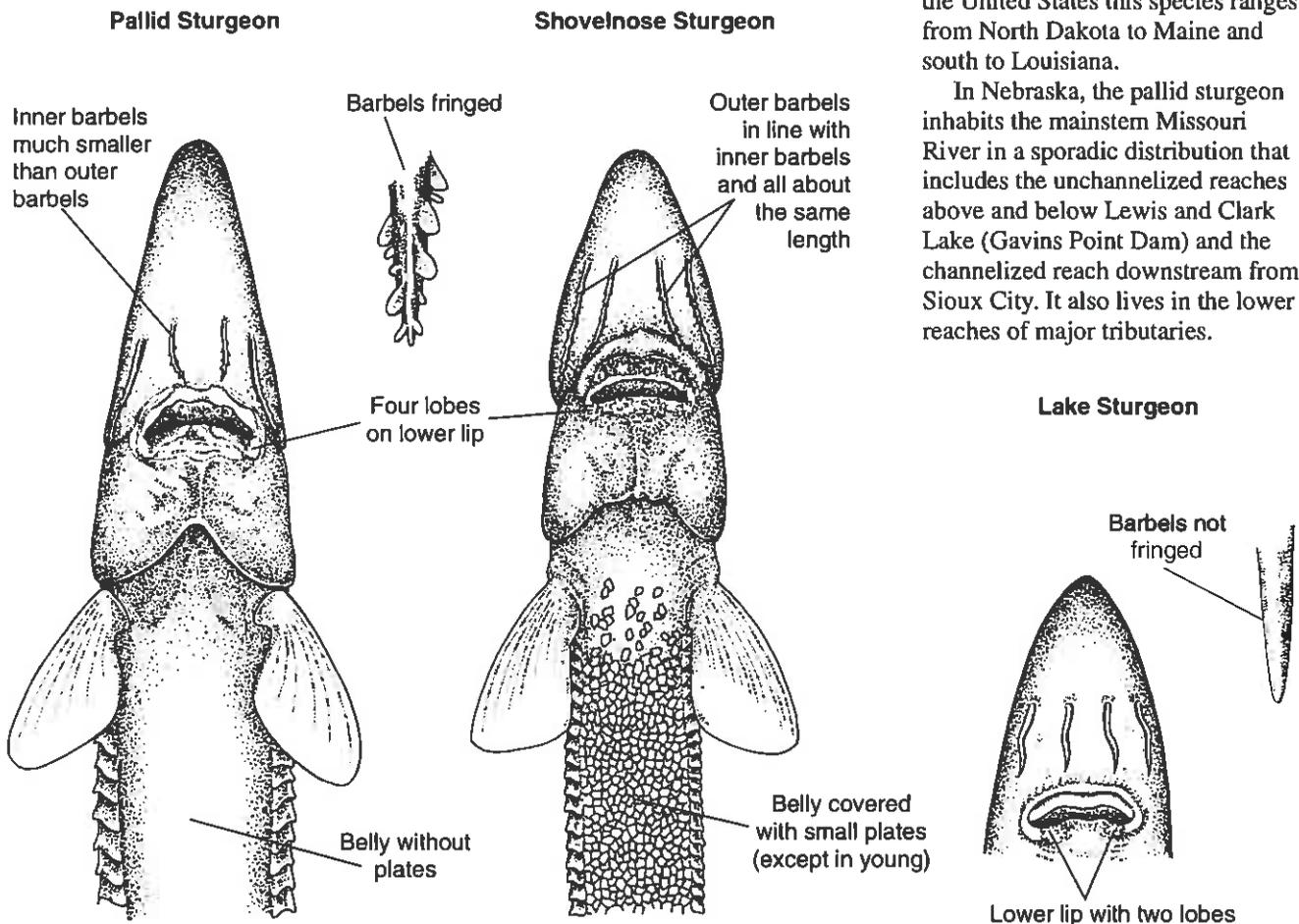
Both species have declined significantly since the 1900s. Since 1970, only 17 pallid sturgeons have been reported, most near the mouths of the Niobrara, Platte, Elkhorn and Little Nemaha rivers. The lake sturgeon, although once more common, is today even more scarce than the pallid sturgeon. Only four have been documented since 1970.

Both the pallid sturgeon and lake sturgeon were fairly abundant before commercial over-harvest and habitat modifications brought about their decline. In 1894, commercial fishermen from Iowa and Nebraska caught 7,136 pounds of lake sturgeon in the Missouri River and 810 pounds of lake sturgeon in the Platte River.

Since pallid sturgeon were not differentiated as a separate species until 1905, it is almost certain that pallid sturgeon were included in turn-of-the-century commercial catch statistics for lake sturgeon. According to a commercial fisherman who began fishing the Missouri River in 1927, 15- to 20-pound pallid sturgeon were commonly caught as recently as the 1950s between the mouth of the Niobrara River and Greenwood, South Dakota. The same fisherman recalled catching a 35½ pound specimen near Nebraska City.

The pallid sturgeon originally lived only in the Missouri and lower Mississippi rivers and their larger tributaries, and today it is found only in portions of its former range. In Canada, the lake sturgeon ranged from Alberta east to Quebec and from the Hudson Bay southward. In the United States this species ranges from North Dakota to Maine and south to Louisiana.

In Nebraska, the pallid sturgeon inhabits the mainstem Missouri River in a sporadic distribution that includes the unchannelized reaches above and below Lewis and Clark Lake (Gavins Point Dam) and the channelized reach downstream from Sioux City. It also lives in the lower reaches of major tributaries.



## Description

The three Nebraska sturgeons look very much alike to the untrained eye, but the relatively common shovelnose can be distinguished easily from the two listed species. If the barbels ahead of the mouth are smooth, without any sort of fringe, and if the lower lip of the extendible, tube-like mouth has two lobes, the fish is a lake sturgeon. Those with fringed barbels and four lobes on the lower lip may be either shovelnose or pallid sturgeons, but a look at the belly will differentiate them. Those with hard, bony plates on the belly are shovelnose sturgeons, while those without plates on the belly are pallid sturgeons.

Fin characteristics may also help in identification. The dorsal fin of a pallid sturgeon has 37 or more rays, and the anal fin has 24 or more, while the shovelnose has 36 or fewer rays in the dorsal fin and 23 or fewer in the anal fin. The lake sturgeon has 35 to 40 rays in its dorsal fin and 25 to 30 rays in the anal fin.

Other characteristics also provide clues to a sturgeon's identity. If it is a large fish (weighing five pounds or more) it is almost certainly one of the protected sturgeons, since the more abundant shovelnose has never been known to exceed that size in Nebraska.

The pallid and lake sturgeons are long-lived, slow-growing fish; one lake sturgeon is known to have lived for 152 years. Pallids can grow to six feet in length and can weigh up to 85 pounds, while the larger, more robust lake sturgeon can reach seven feet in length and weigh as much as 300 pounds.

A young lake sturgeon has a flat, pointed snout like the other two sturgeons found in Nebraska, but it is marked with dark blotches. When it grows older, the lake sturgeon loses the blotches, and the snout becomes somewhat blunt or rounded, hence its common name, "rubbernose sturgeon."



Female lake sturgeon spawning in the Wolfe River, Wisconsin, attended by several smaller males.

## Reproduction

Pallid sturgeons are bottom dwelling fish which move within big rivers and into tributaries for spawning. The spawning cycle is believed to be similar to that of other North American sturgeon species, especially the shovelnose, with which it occasionally hybridizes. Pallids spawn over open gravel beds or other hard bottoms at the mouths of large tributaries, in main river channel areas, or along the periphery of the main river channel. Spawning is believed to occur in the spring and early summer (March, April and June) coinciding with high water from plains runoff and mountain snowmelt. No larvae or young-of-the-year pallid sturgeon have been collected in Nebraska to date. Therefore, it appears that some aspect of their reproductive cycle has been adversely affected by human-caused changes in the river. Perhaps it is because the majority of rivers throughout the pallid sturgeon's range have been altered by man-made structures in the last century, and movement to spawning habitats has been impeded.

Male pallid sturgeons probably

reach sexual maturity in seven to nine years and may spawn once every two or three years. Females reach sexual maturity between 15 and 20 years of age, and they may only spawn once every three to 10 years. Like other sturgeons, pallids require swiftly flowing water for laying their highly adhesive eggs. The one-eighth-inch-diameter eggs take five to eight days to hatch, depending on water temperature. Larval pallids are approximately one-quarter inch long when hatched.

Lake sturgeon inhabit both lakes and rivers within their range and move great distances to spawn. Depending on latitude, spawning generally takes place from late April to late June during high water, with water temperatures slowly approaching 53 to 64 degrees F. Lake sturgeons show a preference for swift water two to 15 feet deep, often near rapids or similar habitat. Generally, one or more males mate with each female. The adhesive eggs are scattered to attach to gravel, rocks and snags, rather than being deposited in a nest. A single female may lay anywhere from 50,000 to 700,000 black eggs approximately one-eighth inch in diameter. Fertilized eggs

hatch in five to eight days at temperatures of 60 to 64 degrees F. Upon hatching, larvae are slightly more than one-quarter inch long and tend to seek shelter under gravel or other substrate material.

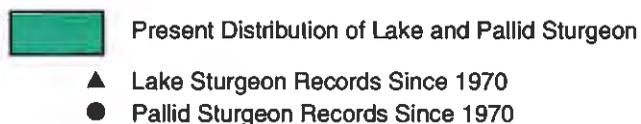
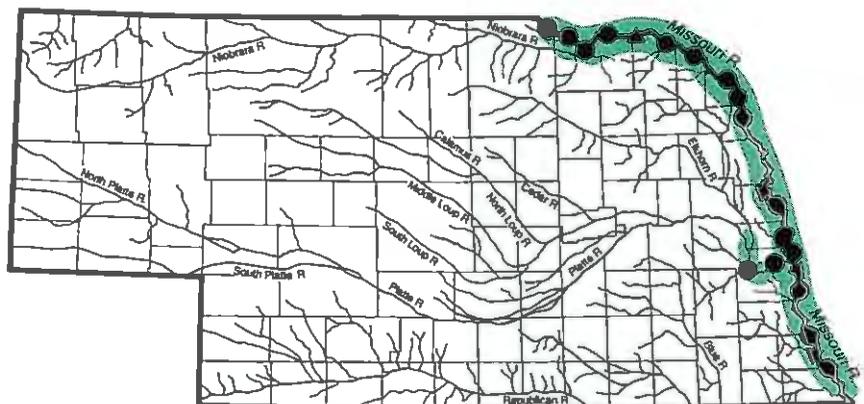
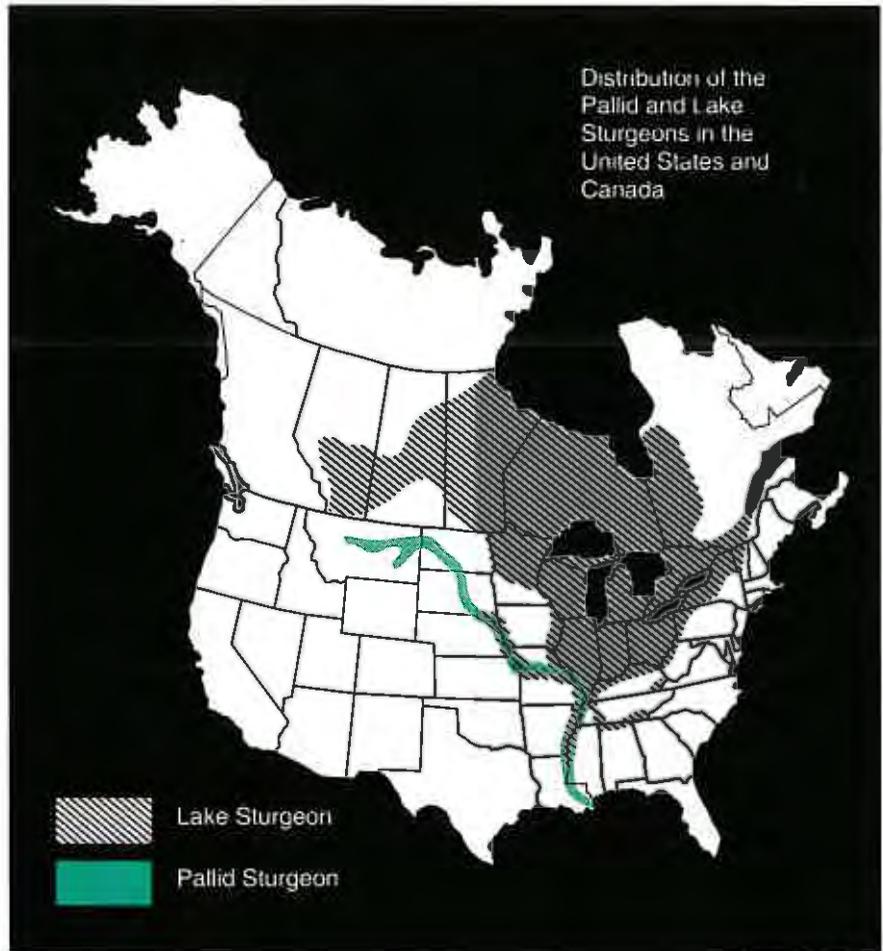
## Food

Little is known about the diet of wild lake sturgeon, but they are opportunistic feeders. In hatcheries, yolk-sac absorption in lake sturgeon takes place between eight and 10 days, at which time they move toward light and swim actively searching for food. They eat brine shrimp larvae and water fleas until 50 days of age. Yearling lake sturgeons prefer a diet of live food.

Small pallid sturgeons feed primarily on caddis flies and small fish, according to one study. Other food includes mayflies, dragonflies, midges and flies, other invertebrates and plant material. The majority of insects consumed are immature forms known as macroinvertebrates, which spend part of their life cycle in the water. When searching for food, sturgeons swim with their sensitive barbels lightly dragging the bottom. They suck food into their extendable, tube-like mouths and drop inedible items or pass them out under their gill covers.

## Habitat

The pallid sturgeon evolved to live near the bottom of large, turbid rivers and associated habitats. Because many observations in Nebraska occur near the mouths of large Missouri River tributaries, important aspects of their life cycle needs are likely being met there. These waters carry relatively large amounts of silt, organic matter and drifting aquatic insects, and water temperatures are similar to conditions before the dams and reservoirs were built. Pallid sturgeons can also be found in deep holes below sandbars in unchannelized reaches



of the Missouri River and near shore areas between wing-dikes on the channelized Missouri River. Although specific requirements are unknown, high quality habitat surely includes areas with a variety of depths, water velocities and bottom structures. Lake sturgeons inhabit large rivers as well as lakes and reservoirs over their range. The shape of the head, the flattened body, tactile barbels and tough skin allow both species to thrive in swift, turbid waters.

## Limiting Factors

During the late 1800s and early 1900s, the eggs of large lake and pallid sturgeon were commercially valued as caviar, and the populations were over-exploited because there were no harvest restrictions. Because they are protected as endangered and threatened species, no legal commercial market exists today.

From 1937 to 1955, six mainstem dams were built on the Missouri River, and the reservoirs inundated more than 1.2 million acres of natural channel chutes, backwaters, oxbow lakes, sandbars and island shorelines. About 900 miles of river channel were converted to reservoirs in the upper Missouri basin, and channelization shortened by 127 miles the original 859-mile reach between Sioux City, Iowa, and St. Louis, Missouri. Channel loss, altered water temperature and flow patterns, removal of tree snags and drift piles, and reduction in nutrient-rich plant matter reaching the river are major factors which affect the health of the Missouri River ecosystem and the future well-being of the pallid and lake sturgeons.

The high spring and early summer river flows that naturally occurred during spawning periods are gone, replaced by water releases from dams operating for power generation and navigation flows. Power peaking discharges from dams can cause daily water level fluctuations that reduce sturgeon



Populations of lake sturgeon (top) and the much lighter colored pallid sturgeon, both residents of Nebraska's large rivers, have greatly declined in this century.

reproductive success by leaving eggs and larvae high-and-dry. Macro-invertebrates, an important food source, can also be harmed.

The loss of high spring flows has accelerated conversion of barren sandbar habitat in unchannelized sections to permanently vegetated islands. The channelized and regulated Missouri is cutting its bed ever deeper, causing important chutes, marshes, wetlands and old oxbow lakes to lose their hydraulic connection to the river and dry up.

Fish bypass facilities were not initially constructed at any of the mainstem dams. Consequently, upstream and downstream movement of pallid and lake sturgeon for spawning has been interrupted.

Water released from the depths of mainstem reservoirs is much colder than normal river water. Thus, temperatures as much as 40 degrees colder can affect aquatic insect life cycles and change the timing of sturgeon spawning, which have evolved together under natural seasonal temperatures and river flows.

Thousands of tree snags and tree drift piles that provided instream habitat for aquatic insects and fish were removed. As snags decayed slowly, they supplied the river

ecosystem with a continual source of organic nutrients.

There is a breakdown in the food chain. Before dams and dikes, seasonal high flows replenished the system by capturing leaves, grass and other plant material from the low-lying floodplain. Today, plant material recharge has been reduced, and what nutrients exist are now trapped in the reservoirs. This short-circuits the food chain by reducing the transfer of carbon (energy) stored in plant materials to important food organisms such as aquatic insects and, eventually, fish.

## Management and Outlook

Demand for jobs following World War II, development of electricity distribution systems in rural areas, flood control and navigation were society's main concerns when changes to the Missouri River ecosystem were made. Effects on flora and fauna were poorly understood. Since the 1950s, knowledge of fishery resource management has increased dramatically along with our understanding of riverine ecosystems.

Because pallid and lake sturgeons

are so long-lived, having produced only 20 generations since North America was colonized, it has been difficult to study their population dynamics and life histories. Management must concentrate on habitat and the recovery of lost river functions. Seasonal high discharge, floodplain connection to the active river channel, availability of tree snags, and sediment and plant matter transport within the ecosystem must be restored.

To improve Missouri River habitat for pallid sturgeon and lake sturgeon, five steps are essential:

1. Recover some resemblance of natural pre-development high-water flows and their timing.
2. Manage unchanneled reaches of the Missouri River to maintain

existing habitat diversity.

3. Connect severed chutes, back-water areas, side channels and wetlands to the channelized river.
4. Construct fish bypasses on mainstem dams to allow effective passage for spawning.
5. Facilitate energy flow between food chain levels in order to increase the amount of macroinvertebrates available as food for pallid and lake sturgeon as well as the rest of the fish community.

These goals are achievable. It is essential to protect instream flows in the mainstem Missouri and its major tributaries, particularly the lower reaches and mouths where sturgeon concentrate.

To enhance the vitality of the Missouri River ecosystem in the long

term will take focus, persistence, knowledge, cooperative effort from responsible resource agencies, communication with Congressional representatives as well as assistance from a number of federal organizations capable of contributing to this important cause. For example, the goal of the U.S. Fish and Wildlife Service Pallid Sturgeon Recovery Plan is to restore populations to a level at which they will be self-sustaining and no longer need the protection of the Endangered Species Act.

As a society that has received much from its spectacular natural resources, we must answer the larger question of whether we are now willing to give something back to this important river, the Missouri.

### Suggested Reading

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- Scott, W.B. and E.J. Crossman. 1973. *Freshwater Fishes of Canada*. Fisheries Research Board of Canada Bulletin 184. 966 pp.
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Note: New data on the occurrence and distribution of these species are being collected constantly, and some of the information in this publication may be outdated. It should be used for a general understanding of the status of these species in Nebraska and not as the sole source of locational information for any report, project, regional/local planning or environmental impact assessment. For current information on these or other threatened and endangered species, or for additional copies of this publication, contact the Wildlife Division, Nebraska Game and Parks Commission, P.O. Box 30370, Lincoln, NE 68503.



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