



The Pallid Sturgeon

Scientific Investigations Aid the Recovery of Endangered Fish

Fourteen years ago, the pallid sturgeon was declared endangered in the Missouri River and resource managers initiated recovery plans. Today, though some recovery efforts are underway, difficult management decisions remain about how to increase the pallid sturgeon population while maintaining the multiple human uses of the river.

It is a scientific challenge to provide the information needed to aid in making such complex resource-management decisions, especially on a large, highly managed river system. Scientists at the USGS Columbia Environmental Research Center conduct investigations to provide the research methods and baseline information that policymakers need to evaluate recovery options.

River scientists have identified critical questions related to the pallid sturgeon's reproduction and survival, the habitats it selects, and the availability of those habitats. USGS biologists and hydrologists address these questions through interdisciplinary research projects. Research results provide information that Missouri River stakeholders can use to design cost-effective recovery projects that have the highest probability of success.

REPRODUCTION AND SURVIVAL

Are pallid sturgeon spawning successfully or do environmental factors, such as the river's flow and temperature, limit successful reproduction?

Although habitat loss has been considered the greatest contributor to pallid sturgeon decline, it is possible that other environmental conditions may prevent the fish from reproducing or surviving to adulthood. USGS biologists conduct basic research on the pallid sturgeon life cycle to improve fundamental understanding and to evaluate potential barriers to recovery.

Because pallid sturgeon do not spawn every year like other fishes, it is important to be able to identify which individuals are ready to spawn. USGS biologists have developed new methods to identify gender, age, and reproductive status of the fish using minimally-invasive ultrasound and endoscope imaging devices. These tools, combined with blood tests, aid in assessing egg stage, gonad size and female fertility in sturgeon.



The reproductive assessment methods are applied in the field with pallid and shovelnose sturgeon to monitor reproductive status and maturation of fish implanted with telemetry devices. The genetically similar shovelnose sturgeon is also used for research purposes because the pallid sturgeon is extremely rare. As with all USGS methods development, these state-of-the-art techniques are made available to other public and private researchers.

In reproductive studies, USGS biologists use ultrasound imagery to study the reproductive cycle of the pallid sturgeon.

HABITAT USE

What types of habitats do the fish use for their different life stages?

Habitat-use studies focus on the timing of pallid sturgeon movements in relation to reproductive status, environmental conditions, and habitat availability in the river.

Biologists track the fish using two types of implanted telemetry devices. One provides the location of the fish (river map, right) and the second records the temperature and depths of the habitats used by the fish. By comparing temperature records from the fish with records from different river and tributary locations, researchers can discern the environmental cues that determine where and when the fish may spawn, search for food, and over-winter.

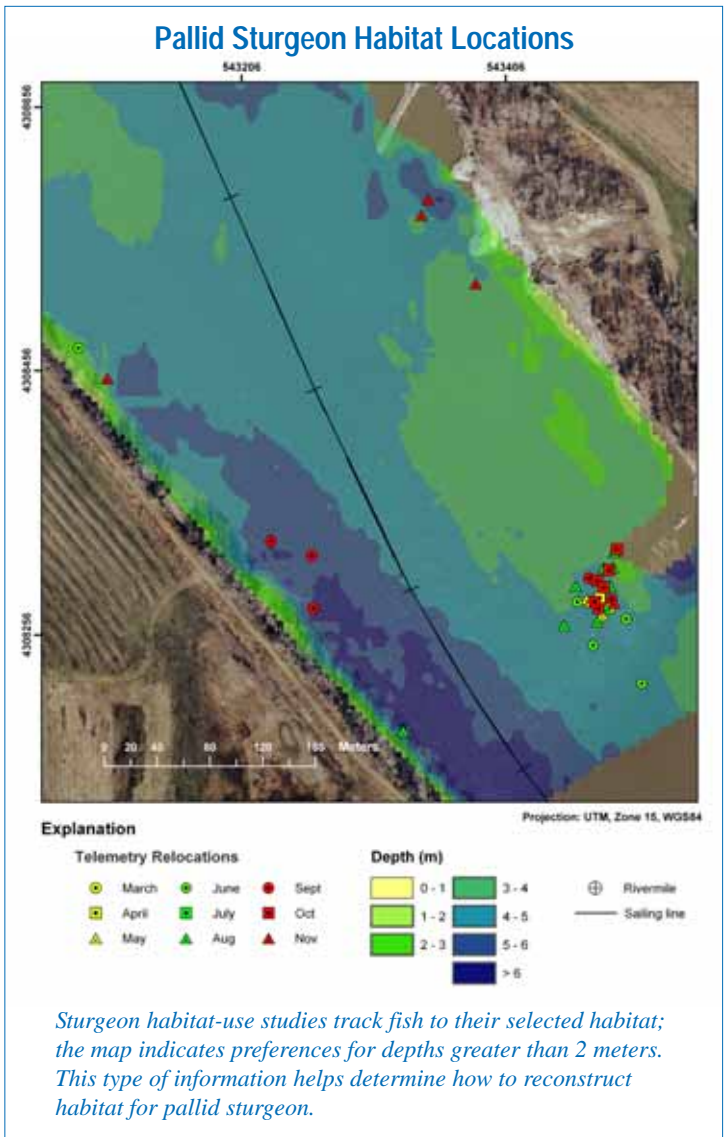
Hydrologists use hydroacoustic mapping to assess the habitat areas where sturgeon are found. The depth, velocity, and substrate are mapped and stored in a comprehensive database of habitat-use organized by river location, season, and life stage of sturgeon.

HABITAT AVAILABILITY

How much habitat is available and how does the interaction between water and land create habitat?

Hydrologists assess habitat availability using hydroacoustic mapping and hydraulic modeling. The mapping documents the river's depth, velocity and substrate, the basic components used to evaluate habitats. The models quantify how flow and channel morphology changes combine to create different habitats. Managers can use this information to evaluate the trade-offs between flow change and channel re-engineering to achieve habitat targets for the pallid sturgeon.

Studies of processes that create and maintain habitat include research on sediment transport, a critical component of aquatic habitat creation, and availability of gravel deposits, which are considered to be important spawning habitats for the sturgeon. Hydrologists have surveyed 221 km (river mile 263-126) for potential spawning habitat. The map of gravel deposits supports reproductive studies and is used to develop a predictive model for where spawning substrates occur.



Sturgeon habitat-use studies track fish to their selected habitat; the map indicates preferences for depths greater than 2 meters. This type of information helps determine how to reconstruct habitat for pallid sturgeon.



Gravel deposit near Miami, Missouri. This type of substrate may be important spawning habitat for pallid sturgeon.

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