

PALLID STURGEON RECOVERY UPDATE

the latest research and management actions for recovery

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Editor: Steve Krentz

Swimming Endurance of Juvenile Pallid Sturgeon

Juvenile pallid sturgeon from Gavins Point National Fish Hatchery in South Dakota, 13 - 20 centimeters fork length, were subjected to swimming stamina tests in a 100 liter Blazka-type swim tunnel at 17 - 20 C. A fixed velocity protocol was applied in which fish swam a predetermined speed and the time recorded. Sturgeon were tested at speeds ranging from 10 - 70 cm s⁻¹ to measure burst, prolonged, and sustained swimming speeds; these are speeds maintained for <30 seconds, 30 s - 200 minutes, and >200 minutes, respectively. Burst swimming speeds are the highest speeds attained by fish and are used in prey capture, predator avoidance, and short-term negotiation of fast currents. In our experiments, sturgeon swam burst speeds of 55 - 70 cm/s; higher speeds may be attainable, but we reached the maximum capacity of the swimming flume. Prolonged swimming speeds of pallid sturgeon ranged from 30 - 50 cm/s and swimming ended in fatigue, representing the depletion of aerobic fuels. Long-term or sustained swimming does not end in fatigue and includes migrating speeds as well as routine activity (foraging and station holding). Pallid sturgeon were able to swim up to 480 minutes at speeds less than 30 cm s⁻¹. Sustained and prolonged speeds of juvenile pallid sturgeon are comparable to speeds reported for similar sized lake sturgeon (*Acipenser fulvescens*); however, pallid sturgeon demonstrated a higher capacity for burst swimming.

Similar work was completed on adult shovelnose sturgeon. Five adult (57 - 69 cm fork length) shovelnose sturgeon, *Scaphirhynchus platyrhynchus*, were studied in a 945 liter swim tunnel at 16 C. Fifteen-minute critical swimming speeds ranged from 65 to 116 cm s⁻¹. Sturgeon swam volitionally at low speeds (5 - 30 cm s⁻¹), but at higher speeds (40 - 120 cm s⁻¹) sturgeon alternated between active swimming and appressing themselves to the bottom of the tunnel. This second behavior is enhanced by sturgeon morphology - streamlined body shape, flat rostrum, and large pectoral fins. It allows shovelnose sturgeon to exploit river bottoms as a refugia from current and maintain position in high velocities.

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Missouri's LTRM Station captures seven pallid sturgeon

During one week in December 1997 and two weeks in February 1998, the LTRM Station at Cape Girardeau, MO captured seven pallid sturgeon in gill nets in the Mississippi River. During the three-week sampling period, an additional 1,549 shovelnose sturgeon and one small lake sturgeon were also captured. Capture gear was 2 inch bar mesh, monofilament gill nets, 150 feet long and 10 feet deep. A total of 63 net days were spent capturing the 1,557 sturgeons. All of the pallid sturgeon were apparently from the 1994 hatchery stocking in the Missouri and Mississippi rivers and were about 15-18 inches in length. One of the sturgeon was tagged with a double T-bar tag and the other 6 had scars on their left pectoral fin indicating that they were once tagged. All of them had coded wire tags under their dorsal scutes. There is increasing evidence that sturgeon can be captured during winter in large rivers from deep scour holes below wing dikes.

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Pallid Sturgeon Spawmed at Natchitoches NFH, Louisiana During 1998

The Louisiana Department of Wildlife and Fisheries working in cooperation with several commercial fishermen collected pallid sturgeon broodstock from the Old River Control Complex (ORCC) in Concordia Parish, LA. The ORCC is home to one of the largest concentrations of pallid sturgeon found in the lower Mississippi River and is designated as priority recovery area number 6 in the Recovery Plan. During three nights of netting in December 1997 a total of 22 pallids were captured and transported to the Natchitoches National Fish Hatchery for propagation purposes during spring 1998. Six of the pallids were gravid (stage 4) females and the remaining 16 were stage 4 males. Two of these fish were later identified as recaptures. Both not only carried PIT tags, but were found to contain sonic transmitters as well. The two fish had been surgically implanted on 2 June 1994 by Glenn Constant (LSU) who was studying pallid movements in the ORCC. Additionally, these two fish represented the first recaptures of pallids in Louisiana since studies were begun in 1991.

Interestingly, the two recaptured fish were the first of the brooders found to be reproductively "ready" in March 1998. Personnel at Natchitoches National Fish Hatchery spawned these pallids on March 17 and produced a total of 9,000 fertilized eggs. A very high hatch rate (90%) was observed. Hatchery manager Karen Kilpatrick coordinated with MO hatchery manager Jerry Hamilton and Gavins Point manager Herb Bollig on the rearing of the pallid fingerlings. Attempts to spawn two additional females at NNFH were unsuccessful. A total of 19 brooders were returned to the wild at ORCC during the summer of 1998. Growth rates of fingerlings were rapid and a total of 35 12-14 inch fish were stocked in the fall of 1998. In December of 1998, a total of 25 pallid brooders were collected at ORCC for 1999 spawning efforts. These included 7 females and 18 males. These captures bring the total number of all adult pallids captured at ORCC since 1991 to 150 animals. For additional information contact Hatchery Manager Karen Kilpatrick at (318-352-5324) or Karen_Kilpatrick@mail.fws.gov.

Garrison Dam NFH Update

Garrison Dam NFH continues to play a vital role in the recovery of the pallid sturgeon. The hatchery, located in midcentral North Dakota, is utilized as a spring spawning facility and a holding and recovery site for fall captured sturgeon in North Dakota and Montana prior to transport to Gavins Point. Our first attempts to spawn the pallids occurred in 1997. A single female was induced and we recovered eggs. A power failure occurred the night following spawning and all eggs were lost. This past spring we were successful in spawning and hatching 17,500 larval pallids. The fry were flown to Gavins Point for further rearing.

In both years we have had post spawn mortality with the females. The first year we used the cesarean method for collecting eggs. Ten days post spawn, the female exhibited signs of stress and died. Last year, we avoided any surgery on the fish. She was staged using a catheterization technique and eggs were taken on a dozen occasions using palpation. The end result, the same - 10 days post spawn the fish died. In both instances, the fish appeared fine up until the 9th day. No obvious signs of stress-internal examination didn't reveal any problems. Both fish were obviously older fish, each weighed 66 lbs. The ovaries of both fish contained large amounts of fatty tissue. In both cases, there were a few eggs held up in the ovaries.

This year we plan on spawning pallids again. We are in the process of adding tank space for holding and rearing fry. We have submitted proposals for constructing ponds to hold domestic broodstock as a backup source for the Recovery Priority Management areas 1 & 2.

For further information contact:

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Pallid Sturgeon Habits and Habitat in Louisiana Near Old River Control Complex

Pallid sturgeon were tagged and tracked in and near the outfall channels of the Corps Old River Control Complex (ORCC), Concordia Parish, LA, where Mississippi River water is diverted through several structures and canals and into the headwaters of the Atchafalaya Basin. Glenn Constant (1997) found that pallids did not spend a lot of time moving around the channels and river, but rather stayed somewhat sedentary, lying in troughs between sand waves, and avoiding strong currents. Glenn found that when pallids did move, they sometimes moved considerable distances in a short period of time, and often inhabited deep water (50 -70 feet), and were positioned in troughs in the main channel.

Jan Hoover (1998) conducted swimming performance studies on young pallids at the Corps WES facility in Vicksburg. He found that pallids are actually weak swimmers and tended to avoid high velocity currents whenever possible. Additionally, pallids spend considerably more time "hunkering" to avoid strong currents than do their cousin the shovelnose. Jan's study lends considerable support to Glenn's previous study.

Mike Ewing and Bobby Reed (unpublished data) found pallids inhabiting very deep water (80 -100 feet) below the Low Sill structure of the ORCC. This is in a deep scour hole created by the 1973 flood, which almost consumed the structure. The Corps seldom uses this structure to pass water and current remains slack in the hole throughout most of the year. This channel (including scour hole) is lined by very large boulders and appears to be important winter habitat for pallids. We have been able to capture 25 -30 pallid brooders in this deep water each December (1997-1998) with only a minimum of effort (two or three nets for three nights). We fish 3 1/2, and 4 inch mesh mono gill nets on the bottom of this slack water hole with the assistance of commercial fishermen. Temperatures range from 42 to 50 degrees F. For more information contact Bobby Reed at 318-491-2577.

Platte River Pallid Sturgeon Workshop Held

In July of 1997, the states of Nebraska, Colorado, Wyoming, and the Department of the Interior signed a three-year Cooperative Agreement to develop and implement a "recovery implementation program" to improve and conserve habitat for four endangered species that use the Platte River in Nebraska including the pallid sturgeon. One of the goals of the program includes testing the assumption that it is possible to improve habitat for the pallid in the Lower Platte River by managing flows in the Central Platte River. Under the proposed Program, participants will need to assess if activities to enhance flow conditions in the Big Bend reach of the central Platte River will increase the likelihood for recovery of the pallid sturgeon in lower reaches of the Platte River.

To start work on this daunting task, a workshop, hosted by U.S. Fish and Wildlife Service, Nebraska Game and Parks Commission, and University of Nebraska at Lincoln, was held on January 20-21, 1999, in Lincoln, Nebraska. Workshop participants shared information on the current status of the pallid sturgeon throughout its range and in the Platte River. The group also discussed and

identified: what problems/issues currently face the pallid sturgeon in the Platte River, the importance of the Platte River to the pallid's overall recovery, what the needs of the pallid sturgeon in the Lower Platte are to meet recovery goals, and what information/data gaps would be most beneficial to know first. Information and ideas obtained from the workshop will be used to guide research and focus agency resources toward meeting the goals of the Platte River Endangered Species Recovery Program. Workshop notes can be obtained from Sharon Whitmore at the U.S. Fish and Wildlife Service office in Grand Island, NE, 308-382-6468x18, or Gene Zuerlein at the NE Game and Parks Office in Lincoln, NE, 402-471-5555.

Young-of-the-year pallid sturgeon collect in the Mississippi River

On 24 July 1998, the LTRM Station at Cape Girardeau, MO, captured a Y-O-Y pallid sturgeon from the Mississippi River approximately 2.5 miles south of Cape Girardeau. This is the first reported capture of a Y-O-Y pallid ever captured. This small sturgeon was 79 mm fork length and was captured in an experimental bottom trawl. The trawl is a modification of the standard LTRM slingshot balloon trawl. The fish was captured over a primarily sand substrate, although there was some gravel present. Bottom dunes to 31 cm high were recorded at the sample site. Water averaged 2.7 m in depth and bottom water velocities averaged 0.55 m/s, and surface water velocity averaged 1.07 m/s. Water temperature was 29.6C.

The collection site is classified as main channel border-unstructured strata (no revetment or wing dams) and was located on an inside bend. Typically, inside bends in the Mississippi River near Cape Girardeau have large sand flats with a point bar at the downstream end. Sand dunes occurring in these areas range from 15cm to 1.2m high. We determined substrate types by dragging a metal pole on the bottom. Substrate firmness could be estimated as the pole ascended and descended a dune. In general, substrate was soft to firm sand when ascending a dune and firm sand or cobble/gravel in the trough below the dune. We do not know if the pallid sturgeon was captured on or below a dune or in some interstitial space between dunes.

The Y-O-Y pallid sturgeon, which was killed in the trawl, was preserved and is in ichthyological collections at the University of Alabama. Bobby Reed (LA Dept. of Wildlife and Fisheries), and an active member of the Pallid Sturgeon Recovery Team, made the initial verification of the vouchered specimen. The sturgeon was also verified by Dr. Richard Mayden at the University of Alabama.

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Pallid Sturgeon Reintroduction in Missouri

Approximately 7,000 pallid sturgeon fingerlings, reared at Blind Pony Hatchery in 1992 and stocked into the Missouri and Mississippi rivers in 1994, are apparently thriving and beginning to make their presence known. An additional 3,000 pallid sturgeon were reared at Blind Pony Hatchery and stocked into the same rivers in 1997, but are still too small to be captured with any regularity. Also, during 1997, 300 pallid sturgeon fingerlings were stocked into the Platte River in Nebraska near the confluence with the Missouri River. All sturgeons were tagged with coded wire under the second or third dorsal scute and with numbered, double T-bar tags in the left pectoral fin. There is evidence that many of the sturgeons stocked in 1994 are losing T-bar tags because several have been reported without T-bar tags but with scars in the pectoral tissue indicating tags were once there. Most of these fish have coded wire under their dorsal scutes indicating external tag life may be only about 5-6 years.

All pallid sturgeon stocked as 2-year-old fingerlings in 1994 were about 11-12 inches long. Reports from biologists and commercial fishermen capturing these fish indicate they are in extremely good shape and average about 15-20 inches in length. Since stocking in fall 1994, 86 tagged pallid sturgeon and 13 with only scars, but coded wire, have been reported. Eight individual fish have been captured twice. Most of the tagged pallid sturgeons are being reported in the Mississippi River below St. Louis. This is to be expected because most of the fish were stocked in that portion of the river and most of the active commercial sturgeon fishermen fish the Mississippi River. Fourteen pallids stocked in the Missouri River were reported captured in the Mississippi River below St. Louis, and only nine pallids stocked in the Missouri River were captured there. There are fewer commercial fishermen on the Missouri River and reports are expected to be fewer in number. Most of the tagged fish reported are with 100 miles of their release site (movement is generally downstream), although a couple individuals have moved nearly 300 miles.

Because the 3,300 pallid sturgeon tagged and stocked in the Missouri and Mississippi rivers in 1997 are considerably smaller (about 11-12 inches total length), only five have been reported captured. This is not surprising because most of the earlier stockings were not captured in great numbers until they reached about 15 inches in length. Apparently, smaller pallid sturgeon do not move great distances and are less susceptible to pole and line and other capture gears. None of the 300 pallids stocked in Nebraska in 1997 have been reported captured.

Apparently, survival of tagged and stocked pallid sturgeon in Missouri has been excellent. Although it is apparent that external tags are being lost, and fewer will be reported by commercial fishermen, we expect their home range to expand because of their larger size, permitting them to better swim in strong currents.

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PALLID STURGEON STUDIES ABOVE FORT PECK RESERVOIR

1996-98

Pallid sturgeon work has been confined to evaluating the recovery phase in this section of the Missouri River. I am doing this by sampling for 3-year-old and older pallid sturgeon using

standardized sampling techniques in a 16-mile core area. Two of these surveys have been completed, the first in the fall 1996 when we captured 3 pallids in 50 net drifts and another in 1997 when we only captured one pallid in 50 net drifts. This information should provide a baseline for comparing the abundance index for years before pallids were stocked vs. the post-stocking years. The program calls for conducting the fall surveys on a biannual basis beginning 1999. The 1998 released yearling pallids should be of a nettable size for the first time during the 2001 survey, a considerable period of time before a stocking evaluation can be made.

On August, 1998, 745 hatchery-reared yearling pallid sturgeon were released at 3 sites in this 150-mile Missouri River reach. It was decided to release some of the pallids as far upriver as the habitat allowed so that a portion would take up residence at upriver sites and, perhaps later on, spawn at the upriver sites. This in turn would give the resulting post-hatch larvae more time to develop while drifting the extra distance between here and upper Fort Peck Reservoir; consequently they may be able to stop in the river before reaching the reservoir. A radio telemetry study was conducted in order to get a more immediate evaluation of the yearling pallids released in the study area. Small (2½ gm.), time-programmed radio transmitters were surgically implanted in 45 yearling pallids and were monitored for about 3 months. I was interested in getting information on initial survival, effects on release location, habitat use and movement patterns. Initial survival (for the 2-3 months monitored) of the radioed pallids was 100%; we did not notice any dead or odd behaving fish. The radioed fish released at the upper site moved downstream the greatest distance, averaging 10.8 miles downstream (min/max = 0/81.4 mi) compared to 3.0 miles downstream (min/max= 0/26.9) for the mid-river release site and 0.7 miles downstream (0/10.5 mi) for the lower river site. Gradient may be a factor here since it is the steepest at the upriver site. The habitat conditions that most of the radioed yearling pallids were found in were midpool and tailpool areas with moderate depths of 6.5 ft, slower than average current velocities (2.5 fps) and areas with a sandy substrate.

Attempts were made to capture the radioed pallids using 1 inch trammel nets and ¾ inch gill nets but were unsuccessful. However, using a 6 ft benthic trawl 3 of the stocked pallids (without radios) were captured in 50 hauls. Two of the captured yearlings were ones released at the site 2 months earlier and the other was from the release at the upper site, 140 miles upriver.

Plans for 1999 pallid work include:

- 1) Stock 300-500 hatchery-reared pallids in the Upper Missouri reach; both yearlings and 2-year-olds will be released and performance comparisons between both groups will be studied.
- 2) Radio tag 30 yearling and 20 2-yr-old pallids for survival and habitat evaluations. The 1998 upper release site will be moved downstream 20 miles to a flatter gradient site where it is anticipated that pallids will be more inclined to reside at.
- 3) Capture 2-5 adult pallids and transport to Gavins Point NFH where they will be spawned and resulting progeny used for future reintroductions.

For additional information, contact: Bill Gardner.

Nebraska Game and Parks Activities

On October 15, 1997 four hundred and twelve 10 inch pallid sturgeon were stocked in the lower Platte River near Highway 50. These fish came from the Missouri Department of Conservation Blind Pony Hatchery and were tagged with micro-tags as well as yellow two-inch long external tags with the MDC address on them. A March 1998 Nebraskaland article explained the rationale for this first ever augmentation in the lower Platte River.

On April 16, 1998 eighty-four 6 year old pallid sturgeon raised at the Gavins Point National Fish Hatchery were stocked in the lower Platte River about seven miles upstream of the confluence of the Elkhorn River mouth. The actual site was the Cottonwood camping site at the Nebraska Game and Parks Commission's Two Rivers State Recreational Area. In addition to the color hatchery marks, all pallid sturgeon were micro-tagged and PIT tagged. Ten of the pallid sturgeon were fitted with internal radio transmitters and five of the ten were also fitted with sonic tags in case they migrated downstream to the deeper Missouri River. Dr. Ed Peters (UNL) has a graduate student by the name of Vaughn Snook monitoring their movements, including water depth, velocity, temperature, etc. This valuable information was presented at a Pallid Sturgeon Workshop held at the University of Nebraska in Lincoln on January 20-21, 1999.

Efforts during 1998 to keep/put more water in the middle and lower Platte River got a boost when the Nebraska Game and Parks Commission obtained instream flows for fishery resources (a community of species, but no data was available on the pallid sturgeon at that time) and when a Cooperative Agreement (CA) was signed by the governors of Colorado, Wyoming, Nebraska, and Interior Secretary Babbitt in 1997. Under this agreement, the pallid sturgeon life cycle requirements must be considered in the lower Platte River.

Two historical documentations of pallid sturgeon in the unchannelized Missouri Rive between Ft. Randall Dam and the upper end of Lewis and Clark Lake were discovered recently. The first is a pallid sturgeon about 2½ feet long, captured in July 1964 at the mouth of the Niobrara River. It was caught by NGPC employee Marv Miller and a slide documents its identification. A second pallid was 40 pounds and caught on a set line by a Niobrara angler fishing for catfish. He took a photo and released the fish on April 11, 1994.

For more info, contact: Gene Zurlein, Nebraska Game and Parks Commission. 402-471-5555 or at zurlein@ngpc.state.ne.us

Gavins Point NFH Update

Gavins Point NFH has been an extremely busy facility the past couple of years. Herb Bollig and the staff at the hatchery have done an exceptional job of promoting pallid sturgeon recovery through research and propagation. Research of the sturgeon species conducted with the assistance of the hatchery include endocrine analysis, physiological responses to stress, sperm preservation, species identification from morphology of sperm cell, hormone physiology.

In addition to this work, the hatchery staff have been able to successfully propagate the pallid sturgeon in both 1997 and 1998. As a result of this work, several hundred pallid sturgeon have been raised and shipped by this facility to stocking sites in Montana, North Dakota, and Nebraska.

An annual report of the work being conducted by Gavins Point NFH is available by contacting Herb Bollig at 605-665-3352 or at [R6FFA_GAV@mail.fws.gov].

Missouri River Fish & Wildlife Assistance Office Update.

We had a very busy 1998 with the pallid sturgeon stocking in August, assisting Montana Fish, Wildlife and Parks with the juvenile telemetry work and broodstock collection for Gavins Point NFH in September. On top of this, Mark Dryer, former Project Leader and Sturgeon Recovery Leader, accepted another job closer to his family and hometown in Wisconsin. It was too good to pass up and so we wish him all the best and thank him for his devotion to the pallid sturgeon and other native fish of the Missouri River.

Anyway, onward we go. Since this update is meant to disseminate information on the progress of pallid sturgeon research and recovery, we are looking at different options to get the information out to the researchers in a more timely manner and more efficiently. One suggestion is to locate a bulletin board on the internet that would allow researchers to find out what is going on throughout the range. We are currently reviewing this option and finding the best way of accomplishing this. Whatever we come up with, this update will be sent out annually and will serve to summarize what sturgeon activities were accomplished and what research is currently going on. We will try to publish the next issue in January, so I'll need contributing articles by December 1, in order to incorporate them. With the variations in wordprocessors, please send the articles in windows text format.

Last year resulted in the first ever augmentation of the pallid sturgeon populations in the upper basin. We were able to utilize the progeny from the 1997 spawn to stock in seven locations in the upper basin; three above Fort Peck reservoir and four sites on the lower Yellowstone River and the Missouri River between Lake Sakakawea and Fort Peck Dam. A total of 1514 one-year old pallid sturgeon were stocked in the upper basin in 1998. These progeny were the result of spawning two females and three males at Gavins Point NFH in 1997. Ninety four of the fish were equipped with 400 hour radio transmitters and were monitored by Montana Fish, Wildlife and Parks and Fish and Wildlife Service crews.

One of the stocking sites was located at the Fort Buford Historical Site where a dedication was held for the stocking. Dignitaries from North Dakota and Montana were on hand to commemorate the event and lend a hand in returning the adults broodstock and progeny to the river. The event provided an excellent opportunity to highlight the successes in the recovery of the pallid sturgeon and bring the program onto the national scene. As a result of the event, Mike Olson, USFWS-Ecological Services, and Steve Krentz, USFWS-Fisheries, were given the opportunity to brief Jamie Clark, Director of the U.S. Fish & Wildlife Service, Washington D.C. on the pallid sturgeon recovery program.

Approximately 1100 one and two year old pallid sturgeon from the 1998 spawn will be ready to stock into the upper basin in August 1999. Based on results of the telemetry work in 1998, two sites have been selected on the Yellowstone and Missouri Rivers below Ft. Peck Dam and three sites above Ft. Peck Reservoir. In addition, due to the low survival in the hatchery of the 1998 progeny and the uncertainty of the survival in the wild of the stocked fish, the Upper Basin Pallid Sturgeon Workgroup will be incorporating the use of two year old fish into the stocking.

During early April, 1999; crews from Montana Fish, Wildlife and Parks and Fish and Wildlife Service were at the Yellowstone River Confluence and captured 13 pallid sturgeon. Eight of the fish were delivered to Garrison Dam NFH for spawning this spring. At this time, we have two confirmed females with mature eggs and one suspected female and five suspected males. The strategy is to spawn at both places in the hopes that at least one facility is successful.

During this capturing of the broodstock for 1999, several smaller pallid sturgeon in the thirty pound range were observed with larger food items in their stomachs. Although they could not be identified, the last fish of the week gave us a clue to the identity. During data collection, it was observed that a fish tail was still present in the mouth cavity of a 50 pound fish. We were easily able to physically remove the fish and identify it as a goldeye, *Hiodon alosoides*, of approximately 11 inches long.

An annual report of the work being conducted by the Missouri River FWMAO is available by contacting Steve Krentz at 701-250-4419 or at Steven_Krentz@fws.gov.