

**EXECUTIVE SUMMARIES FOR THE PALLID  
STURGEON POPULATION ASSESSMENT PROGRAM BY  
SEGMENT FOR SAMPLING OCCURRING FROM  
NOVEMBER 1, 2004 THROUGH OCTOBER 30, 2005.**

**SEGMENT 1: FORT PECK DAM TO THE MILK  
RIVER/MISSOURI RIVER CONFLUENCE**

-THE PROGRAM WAS NOT IMPLEMENTED IN SEGMENT 1 IN 2005

**SEGMENT 2: MILK RIVER/MISSOURI RIVER  
CONFLUENCE TO WOLF POINT, MONTANA**

-THE PROGRAM WAS NOT IMPLEMENTED IN SEGMENT 2 IN 2005

**SEGMENT 3: WOLF POINT, MONTANA TO THE  
YELLOWSTONE RIVER/MISSOURI RIVER  
CONFLUENCE**

-THE PROGRAM WAS NOT IMPLEMENTED IN SEGMENT 3 IN 2005

# **SEGMENT 4: YELLOWSTONE/MISSOURI RIVER CONFLUENCE TO THE HEADWATERS OF LAKE SAKAKAWEA**

## **EXECUTIVE SUMMARY**

The Missouri River below the confluence of the Yellowstone River is a highly dynamic system and features a diverse assemblage of habitats that typify the historic conditions of the river. The influence of the Yellowstone River and the seasonal fluctuations in the hydrograph, including the immense sediment load, greatly influence the fish community, including the pallid sturgeon (*Scaphrynchus albus*).

This was the first year of sampling under the standardized sampling regime devised for the Missouri River. Sampling for segment 4 started well into the sturgeon season which ended at the end of June. Although sampling was initiated in May and the trawl gear had not been acquired, a full complement of standard trammel nets were deployed. Sampling continued through the entire fish community season with a full complement of standard gears.

Pallid sturgeon is the primary target of this sampling effort. Although the population within this segment of the Missouri River is typified by older individuals with very little indication of wild fish recruitment, the stocking efforts have provided an opportunity to gain further insight into this earlier life stage.

Of the total of 31 pallids that were captured in segment 4 with combined efforts, 28 pallid sturgeon were captured using standard protocols and gears, while three were captured with nonrandom sampling. Due to the limited effort during the sturgeon season, only two were captured during this time period. The remaining 29 pallids were captured during the fish community season. The percentage of pallids originating from previous stocking events was about 81% (N = 25), while 19% were likely wild origin. One fish classified

as wild may actually be a stocked fish that shed its passive integrated transponder (PIT) tag.

Of the six pallids that were considered wild, three had been captured in previous efforts and three were untagged. Tag retention rates are still uncertain; however, from the 2005 data for segment 4, ten of the twelve (83%) juvenile pallids that were stocked with PIT tags still retained their tags. This included two fish from the earliest stockings conducted for this reach. Six of the eight year classes that have been stocked were sampled during 2005. The only year classes of stocked pallid sturgeon that were not sampled were the 1999 and 2005 year classes. The standard trammel net accounted for 77% (N=24) of the pallid captures while the otter trawl caught 23% (N=7). Although age data is not available, young of the year and one year old sturgeon were sampled, however, a majority of these were identified as shovelnose sturgeon. Relative condition factors for all pallid sturgeon captured during this effort ranged from 0.622 to 1.797. Growth rates for recaptured juvenile sturgeon ranged from 0.048 to 0.161 mm/day. Pallids are widely distributed throughout this segment as pallids were sampled in ten of the twelve bends. Outside bend macrohabitats produced pallid sturgeon in almost half of the captures with channel crossovers and inside bends producing most of the remaining captures. Channel border and island tip mesohabitats produced most of the pallid sturgeon captures.

Shovelnose sturgeon (*S. platyrhynchus*) captures totaled 275 samples in trammel nets and otter trawls combined. The otter trawl captured the smaller size classes more effectively than the trammel nets, however, the trammel nets appeared to sample the larger size classes more effectively. The ratio of pallid to shovelnose sturgeon was one pallid for every 8.9 shovelnose sturgeon.

In 2005, seven of the eight native Missouri River species that were targeted for assessment were sampled. Sturgeon chub (*Macrohybopsis gelida*) were only sampled during the fish community season. The majority of sturgeon chub were sampled in otter trawls (N = 176) with mini-fyke nets (N = 8) and bag seines (N = 3) capturing the remaining specimens. A total of 331 sicklefin chubs (*M. meeki*) were collected in segment 4. Most sicklefin chubs were captured in the otter trawl (N = 329). Speckled chubs (*M. aestivalis*) were the only targeted native species not captured in any gear. Only one sand shiner (*Notropis stramineus*) was sampled in 2005 and it was captured in

a mini-fyke net. *Hybognathus spp.* were the most abundant targeted native river species sampled. Most *Hybognathus spp.* were captured during the fish community season in mini-fyke nets (N = 5,587) and bag seines (N = 230). A total of nine *Hybognathus spp.* were captured in the otter trawl. A total of four blue suckers (*Cycleptus elongates*) were collected in trammel nets (N = 3) and otter trawls (N = 1). Sauger (*Sander canadense*) were captured in all gears during both seasons. Mini-fyke nets (N = 104) captured the most sauger, followed by trammel nets (N = 60), bag seine (N = 11), and otter trawl (N = 9). A total of 25,143 fish representing 32 species were sampled in segment 4 of the Missouri River during 2005.

# **SEGMENTS 5 AND 6: FORT RANDALL DAM TO THE NIOBRARA/MISSOURI RIVER CONFLUENCE AND THE NIOBRARA/MISSOURI RIVER CONFLUENCE TO THE HEADWATERS OF LEWIS AND CLARK LAKE**

## **EXECUTIVE SUMMARY**

Pallid sturgeon *Scaphirhynchus albus* and the associated fish community were randomly sampled in the unchannalized Missouri River below Fort Randall Dam to the headwaters of Lewis and Clark Lake (Recovery Priority Management Area #3; [RPMA]) with standardized gear and protocols from fall of 2004 to fall of 2005 (i.e., 2005 season). Ten randomly selected bends were sampled with a minimum of 8 gear deployments expended in each bend. The confluence of a major tributary, the Niobrara River, delineates segment 5 (upstream of the confluence) from segment 6 (the confluence to the headwaters of Lewis and Clark Lake); however, both segments were pooled for analysis. In 2005, all recaptured pallid sturgeons (n = 44) were of hatchery origin and readable passive integrated transponder (PIT) tags were found in 84% of the fish. Recaptured pallid sturgeon represented all year classes that have been stocked (1997 - 1999 and 2001 - 2004) into RPMA #3 as part of population supplementation efforts. For standardized gears, 7 pallid sturgeon were captured with gillnets, 26 with trammel nets and 11 with the otter trawl. In 2005, the relative abundance of pallid sturgeon captured in gillnets was 32% lower compared to the overall running average (2003-2004). For drifted trammel nets in 2005, relative abundance increased 9% during fall through spring (i.e. the sturgeon season) and increased 79% during summer (i.e. fish community season) when compared to the overall running averages (2003-2004). Forty-five percent of pallid sturgeon were caught in the same location where a gear initially captured a pallid

sturgeon (i.e. duplicate samples). Relative condition of recaptured pallid sturgeons ranged from 0.7 to 1.0. The mean growth of age-6 and older fish was < 0.06 mm/d whereas the mean growth for ages 2-4 was 0.238 mm/d and the youngest year class (2004) grew 1.249 mm/d. Spatially, pallid sturgeons were captured throughout most of the length of segments 5 and 6 (river mile 869 to 832) with most fish captured in the channel border mesohabitat of inside bends (23%), outside bends (16%), channel crossovers (20%) and braided channels (36%). One pallid sturgeon was captured in the channel border mesohabitat of a large secondary connected channel and at the Niobrara River confluence. A total of 236 shovelnose sturgeons *S. platyrhynchus* were captured in 2005: 99 with gillnets, 93 with trammel nets, 31 with otter trawls, and 13 with set lines. No young-of-year *Scaphirhynchus* spp. were captured and the ratio of pallid to shovelnose sturgeons was 1:5.1.

In addition to sturgeon, eight native Missouri River species were targeted for assessment: speckled chub *Macrhybopsis aestivalis*, sturgeon chub *M. gelida*, sicklefin chub *M. meeki*, Western silvery minnow *Hybognathus argyritis*, plains minnow *H. placitus*, sand shiner *Notropis stramineus*, blue sucker *Cycleptus elongates*, and sauger *Sander canadense*. One *Hybognathus* spp. was captured in a mini-fyke net during summer which is the first occurrence in segments 5 and 6 since monitoring began in 2003. No sturgeon chubs, sicklefin chubs, or speckled chubs were captured in 2005. Sand shiners were only captured with mini-fyke nets (n = 25) during summer and otter trawls (n = 1) during the spring. A total of 34 blue suckers were captured: four in gillnets, three in otter trawls, and 27 in hoopnets (a nonstandard gear) during spring. During 2005 a total of 114 saugers were caught: 46 in trammel nets, 40 in otter trawls, 24 in gillnets, two in mini-fyke nets, and one in bag seines and hoopnets (a wild gear). Saugers were captured with gillnets (n = 46) primarily during April to June. A total of 45 fish species and one hybrid were caught in segments 5 and 6 of the Missouri River during 2005. None of the four exotic Asian carps, bighead carp *Hypophthalmichthys noblis*, silver carp *H. molitrix*, grass carp *Ctenopharyngodon idella*, and black carp *Mylopharyngodon piceus*, were captured.

## **SEGMENT 7: GAVINS POINT DAM TO PONCA, NEBRASKA**

### **EXECUTIVE SUMMARY**

South Dakota Game, Fish, and Parks biologists sampled the 59-mile stretch of unchannelized Missouri River between Gavin's Point Dam and Ponca, Nebraska (Recovery Priority Management Area number 4 [RPMA]) to assess native fish populations. Pallid sturgeon *Scaphirhynchus albus* were the primary target of sampling efforts, however there was also a focus on other native species. Sampling began in the fall of 2004 and concluded in the fall of 2005. However, a full complement of gears was not available until July. Efforts led to the capture of 1 hatchery-reared pallid sturgeon. The fish was captured in a drifted trammel net at river mile 761. It was caught in a pool located immediately downstream from an island engineered to provide habitat for threatened and endangered species. The fish had a readable passive integrated transponder (PIT) tag that revealed its origin to be Garrison Dam National Fish Hatchery (spawn date: June 6/02). It was stocked at Mulberry Bend (9 miles upriver from the capture site) in July of 2003. The fish grew from 296 mm to 421 mm during the 25 months it had been in the river. No young-of-year sturgeon were sampled during 2005.

Nine other native fish species were targeted as part of this study. A total of 511 shovelnose sturgeon *S. platyrhynchus* were captured in 2005: 372 with 1" trammel nets, 68 with otter trawls, 67 with gillnets and 4 with bag seines. 192 blue suckers *Cycleptus elongates* were sampled. Most of them were captured in 1" trammel nets (n= 113). A total of 44 saugers were sampled, mostly with bag seines (n= 18). Otter trawls captured 1 speckled chub *Macrohybopsis aestivalis*, 1 sturgeon chub *M. gelida*, and 1 sicklefin chub *M. meeki*. Sand shiners *Notropis stramineus* were common in our shallow water gears (n=1251). Mini-fyke nets produced the most (n= 979) and bag seines captured 271. Three Western silvery minnow *Hybognathus argyritis* were captured in a bag seine. No plains minnows *H. placitus* were sampled.

A total of 53 fish species and one hybrid were caught in segment 7 during 2005. A total of 13,823 individual fish were sampled. Several Asian carp were captured during 2005 including 2 bighead *Hypophthalmichthys nobilis*, 1 silver *Hypophthalmichthys molitrix*, and 1 grass carp *Ctenopharyngodon idella*.

## **SEGMENT 8: PONCA, NEBRASKA TO THE PLATTE RIVER/MISSOURI RIVER CONFLUENCE**

### **EXECUTIVE SUMMARY**

The Nebraska Game and Parks Commission (NGPC) is participating with the U.S. Army Corps of Engineers in the Pallid Sturgeon Population Assessment Project. During 2005 NGPC started sampling segment 8, the reach from Lower Ponca Bend (R.M. 753.0), where river channelization begins, downstream to the mouth of the Platte River (R.M. 595.0)

The sturgeon season started during mid-October and continued until late November, when ice flows started. Sampling then resumed in early March, after ice flows had subsided, and continued until 30 June. During the sturgeon season, a total of five hundred and sixty-seven samples were completed using gill nets, otter trawls, 1.0" and 2.5" trammel nets. The fish community season started 1 July and continued until mid-October when water temperature fell below 12.7°C. During the fish community season, a total of six hundred and seven samples were completed using otter trawls, 1.0" trammel nets, bag seines, and mini-fyke nets.

A total of 15 pallid sturgeon were captured during the 2005 sampling season. Hatchery reared pallid sturgeon recaptures accounted for nine fish while the remaining six are presumed to be of wild origin. Two of eight hatchery reared pallid sturgeon were thought to have shed their original PIT tags with one pallid not having a PIT tag at time of stocking. This results in a 75% pit tag retention in segment 8. Recaptured hatchery reared pallid sturgeon represented three year classes (2001, 2002 and 2004) that have been stocked into RPMA #4. Year classes that have been stocked but are missing from our samples include 1997, 1999, 2003, and 2005. Standardized gears collected all pallid sturgeon during 2005. Otter trawls captured six fish, gill nets and 1.0" trammel nets captured four fish each, and 2.5" trammel nets captured one. Bag seines and mini-fyke nets were the only standard gears that did not collect any pallid sturgeon. No young-of-the-year pallid sturgeon were collected with any gear during 2005.

Relative condition of recaptured hatchery reared pallid sturgeon could not be calculated at time of stocking because of lack of weight data but Kn averaged 1.09 and

ranged from 0.80 to 1.52 at time of recapture. Mean growth per day was calculated for fish with sufficient data and was 0.12 mm/day. Pallid sturgeon were caught throughout segment 8 with 4 pallids being sampled from Omadi bend (RM 722.0). No other single bend produced more than two pallids. Most pallid sturgeon (n = 11) were captured on the inside bend channel borders. A total of 1,201 shovelnose sturgeon were captured in 2005: 582 with gill nets, 428 with 1.0" trammel nets, 181 with otter trawls, and 10 with 2.5" trammel nets. The ratio of pallid sturgeon to shovelnose sturgeon was 1:80.1.

The Pallid Sturgeon Assessment Team identified eight target species to serve as surrogate species to detect changes to the overall fish community. These target species include: shovelnose sturgeons, sturgeon chubs, sicklefin chubs, speckled chubs, sand shiners, *Hybognathus* species, blue suckers and sauger. A total of 1,201 shovelnose sturgeon were capture in 2005. Gill nets were the most effective gear for collecting shovelnose (48%), followed by 1.0" trammel nets (36%). Otter trawls were most effective in collecting *Macrhybopsis* spp. All sturgeon chubs (n = 13) and sicklefin chubs (n = 33) and 57 of 59 speckled chubs were collected by otter trawls throughout both seasons. Seining and mini-fyke nets were the most effective method to sample sand shiners collecting 98 % of the 252 individuals. A total of 19 *Hybognathus* species were captured in 2005. Only bag seines and mini-fyke nets captured *Hybognathus* species. 675 blue suckers were captured in 2005 with gill nets comprising 50% of the catch. Gill nets were also most effective in catching sauger. A total of 43 sauger were captured in 2005, 20 of them were sampled with gill nets. Overall, a total of 11,404 fish representing 50 species were captured during 2005 in segment 8.

Barada, A.J. and K.D. Steffensen. 2006. 2005 Annual Report, Pallid Sturgeon Population Assessment Project and Associated Fish Community Monitoring for the Missouri River: Segment 8. Nebraska Game and Parks Commission, Lincoln, Nebraska

# **SEGMENT 9: PLATTE RIVER/MISSOURI RIVER CONFLUENCE TO THE KANSAS RIVER/MISSOURI RIVER CONFLUENCE**

## **EXECUTIVE SUMMARY**

The Nebraska Game and Parks Commission (NGPC) is participating with the U.S. Army Corps of Engineers in the Pallid Sturgeon Population Assessment Project. NGPC and the Missouri Department of Conservation (MDC) sampled segment 9, the reach from the Platte River (River Mile (RM) 595.0) to the Kansas River (RM 367.5).

The sturgeon season started during mid-October when water temperatures fell below 12.7°C and continued until late November, when ice flows started. Sampling then resumed in early March, when ice flows subsided, and continued until 30 June. During the sturgeon season, a total of six hundred and fifty-three samples were completed using gill nets, otter trawls, 1.0" trammel nets and 2.5" trammel nets. The fish community season started 1 July and continued until mid-October when water temperature fell below 12.7°C. During the fish community season, a total of six hundred and fifty samples were completed using otter trawls, 1.0" trammel nets, bag seines and mini-fyke nets.

A total of 15 pallid sturgeon were captured during the 2005 sampling season. Hatchery reared pallid sturgeon recaptures accounted for nine collections while the remaining six were presumed to be wild origin. Hatchery reared pallid sturgeon appeared to retain their PIT tags, while pallid sturgeon assumed to be of wild origin showed no evidence of tagging scars. Therefore, we assume that PIT tag loss from those year classes sampled was minimal. Recaptured hatchery reared pallid sturgeon represented five year classes (1997, 1999, 2001, 2002 and 2003) that have been stocked into RPMA #4. The only year classes stocked but not sampled were 2004 and 2005. Standardized gears collected all of the pallid sturgeon during 2005. Gill nets captured eight fish, 1.0" trammel nets captured five and otter trawls captured two. Bag seines, mini-fyke nets and 2.5" trammel nets did not collect any pallid sturgeon. No young-of-the-year pallid sturgeon were collected with any gear during 2005.

Mean relative condition of recaptured hatchery reared pallid sturgeon was 1.30 at time of stocking but had declined to 0.73 when recaptured. Mean growth per day was

0.272 mm. Pallid sturgeon captures were evenly distributed amongst segment 9 bends, except for the confluence of the Platte and Missouri Rivers where three pallid sturgeon were collected. Most pallid sturgeon ( $n = 9$ ) were captured on the inside bend channel borders. A total of 3,915 shovelnose sturgeon were captured in 2005: 2,695 with gill nets, 752 with 1.0" trammel nets, 411 with otter trawls and 56 with 2.5" trammel nets. The ratio of pallid sturgeon to shovelnose sturgeon was 1:261 compared to 1:279 in 2004 and 1:1,076 in 2003.

The Pallid Sturgeon Assessment Team identified eight native species to serve as target species to determine changes in the overall fish community. These target species include: shovelnose sturgeon, sturgeon chubs, sickfin chubs, speckled chubs, sand shiners, *Hybognathus* species, blue suckers and sauger. A total of 3,915 shovelnose sturgeon were captured in 2005. Gill nets collected 68%, followed by 1.0" trammel nets (19%). Otter trawling collected 99 of 100 sturgeon chubs, 206 of 210 sicklefin chubs and 256 of 291 speckled chubs throughout both seasons. Seining and mini-fyke nets continue to be the most effective method to collect sand shiners. Mini-fyke nets ( $n = 89$ ) and seines ( $n = 70$ ) collected 96% of all sand shiners. A total of 388 *Hybognathus* species were captured in 2005, seining and mini-fyke nets were the only method that collected *Hybognathus* species. Gill nets sampled almost 50% of all blue suckers during 2005. Only 52 sauger were captured in 2005, most while winter gill netting. A total of 20,179 fish representing 75 species were captured during 2005 in segment 9.

Steffensen, K.D. and A.J. Barada. 2006. 2005 Annual Report, Pallid Sturgeon Population Assessment Project and Associated Fish Community Monitoring for the Missouri River: Segment 9. Nebraska Game and Parks Commission, Lincoln, Nebraska

# **SEGMENT 10: KANSAS RIVER/MISSOURI RIVER CONFLUENCE TO THE GRAND RIVER/MISSOURI RIVER CONFLUENCE**

## **EXECUTIVE SUMMARY**

The Missouri Department of Conservation began sampling within the Pallid Sturgeon Population Assessment Program in segment 10 midway through the 2005 sampling season. No sampling was conducted during the sturgeon sampling season, but sampling in all required bends (N = 12) was successfully completed during the 2005 fish community season. A total of four pallid sturgeon (1 wild and 3 hatchery-stocked; fork length = 252 to 611 mm) was captured in segment 10 during the 2005 fish community season. Two individuals were captured in standard 1-inch trammel nets (mean CPUE = 0.013 fish/100m) and two were caught in standard otter trawls (mean CPUE = 0.007 fish/100 m). Three pallid sturgeon (2 hatchery-stocked, 1 wild) were captured in the five river bends sampled between RM 335 and 363. Seven river bends were sampled between RM 257 and 310 in which only one (hatchery-stocked) pallid sturgeon was captured. Recaptured hatchery-stocked fish represented the 2002, 2003, and 2004 year class (N = 1 for each year class) and all fish examined retained their PIT tags (PIT tag retention = 100%). Condition ( $K_n$ ) values of hatchery-stocked pallid sturgeon ranged from 0.769 to 1.036 and were inversely related to time-at-large. Mean growth rates for the 2002 and 2004 year class individuals were (0.201 and 0.678 mm/d, respectively; both, N = 1). All pallid sturgeon were captured in channel border, open water areas in association with wing dikes (one in channel crossover and three in the inside bend macrohabitats). Two of the four pallid sturgeon were caught in habitats associated with bank-notched wing dikes. A total of 637 shovelnose sturgeon (fork length = 21 to 762 mm) was captured with 1-inch trammel nets (N = 375) and otter trawls (N = 262) of which approximately 3% were age-0 fish. Most shovelnose sturgeon were captured within the channel border and were associated with open water areas below wing dikes. Two pallid sturgeon X shovelnose sturgeon hybrids were captured with character index values from (-0.0992 to 0.014). The

ratio of wild pallid sturgeon to hatchery-stocked fish was 1:3 and the ratio of all pallid sturgeon to shovelnose sturgeon was 1:160.

Sturgeon and sicklefin chubs were the least (N = 19) and most (N = 130) common *Macrhybopsis* species encountered, respectively, and all were caught in channel border mesohabitats with otter trawls. Speckled chubs (N = 99) were captured with otter trawls, bag seines, and mini-fyke nets in the channel border and on sand bars. All sand shiners (N = 63) were also captured with otter trawls, bag seines, and mini-fyke nets with most fish captured on sand bars using bag seines and mini-fyke nets. Bag seines hauled on sand bars were the most effective gear type for *Hybognathus* spp. (N = 8). One-inch trammel nets and otter trawls captured 13 blue suckers in channel border mesohabitats. Two sauger were captured on sand bars with mini-fyke nets and one individual was captured with a 1-inch trammel net. A total of 10,508 fish representing 55 species was captured in segment 10 during the 2005 fish community season.

**SEGMENT 11: KANSAS RIVER FROM THE JOHNSON  
COUNTY WEIR TO THE KANSAS RIVER/MISSOURI  
RIVER CONFLUENCE**

**No sampling was conducted in segment 11 in 2005.**

## **SEGMENT 13: GRAND RIVER/MISSOURI RIVER CONFLUENCE TO THE OSAGE RIVER/MISSOURI RIVER CONFLUENCE**

### **EXECUTIVE SUMMARY**

The number of pallid sturgeon collected in segment 13 has increased from 20 (4 wild and 16 hatchery) in 2004 to 26 (9 wild and 17 hatchery) in 2005. The difference in numbers of wild fish suggests that there could have been some reproduction in the system, probably between 1997 and 2001. However, the sizes of fish captured are consistent with the size range of stocked pallids recaptured from 1997, 2002 and 2003 when the year classes only had one type of tag. It is not possible to calculate tag loss this year, except to say that one pallid with an elastomer had lost a PIT tag and one fish was observed to have a PIT tag scar. Genetic validation of these presumed wild fish is still needed to confirm their true origin and that information is not available at this time. The number of hatchery fish observed should have increased dramatically in 2005 as 13,650 pallids were released in the segment during 2004, but it only increased by one. In addition, more fish should be recruiting to gillnets as their size increases and this was not the case, in that only two juvenile fish were captured in standard gillnets. Recaptures of hatchery pallids has not yet increased in proportion to the number of fish stocked in the segment.

Sampling gears were used throughout the entire year to sample available habitat types over a range of water temperatures. Stationary set gillnets captured 12 pallids, 6 of which were captured in standard gillnets and 6 in wild gillnets. Wild gillnets were used to increase the effort for the largest and smallest pallids. In active gears, 3 pallids were captured in 2.5 inch trammel nets, 6 in standard trammel nets and 5 in otter-trawls. Of the 26 pallids sampled, only 3 were sampled in POOL habitat and POOL habitat accounted for half of the habitat for which gillnets were used. The absence of pallids in this habitat is significant because in years preceding 2004, only POOL habitat was sampled with this gear. This relative absence may be an anomaly that could be attributed to lower river stages seen in recent years, but at the very least, it suggests that a potential winter habitat was not sampled early on in pallid monitoring efforts (1999-2003). Two

pallids were captured from island tips, which are disproportionately available habitat. Thirteen pallids (54%) occurred within inside-bend Macro habitat, which is the most sampled habitat within all gears. Pallids were also captured on less frequently occurring and potentially more important habitats including; 6 (25%) in channel cross-overs and 6 (25%) in side-channel habitats. Channel crossovers occur at every bend but are sampled less proportionately and side-channels rarely occur. Pallids were found to occur disproportionately in the segment relative to the bends sampled, whereby more pallids were captured between river miles 205-220 than throughout the rest of the segment. This reach of river contains a naturally created side channel separating Lisbon Island (RM 217) and has produced 11 juvenile and no adult pallids. In 2005, this bend area produced 5 juvenile pallids in two days of sampling including one fish sampled twice in the side channel. Areas like Lisbon Island and other “cluster” areas could be targeted with additional efforts in the future to answer questions relative to natural recruitment and hatchery successes.

Since 2002, over 30 pallids have been recaptured at least once in this segment and are potentially at large to be recaptured again. Only one was recaptured in 2005 and it was on the same day in the same habitat by a different crew. A principle of mark recapture theory is that multiple recaptures of the same fish give a more accurate estimate of the population size or at least suggest that the program is beginning to detect a limit of population size. In the case of pallid sturgeon, this has not occurred in this segment. Pallid stockings at the time of sampling included 20,968 fish released in the segment (RM 195), and of the fish recaptured, they represented their stocked year class as follows: 2001 – 0.08%, 2002 – 0.14%, 2003 – 0.17%. The combined total percentage of stocked fish (N=13) versus proximate availability (N= 20,968) was 0.06% recaptured. Preliminary recapture data suggests that stocked fish do not move much in the first two years and then rapidly expand their range. In contrast, adult fish found in segment 14 appear not to have moved far out of their range in over a decade. For the fish origins that could be determined in 2005, only one had originated from outside of Segment 13 and it came from 420 miles upstream.

The relative condition of older pallids seems to be less robust than younger fish. The condition for pallids captured in standard gears was: 0.772 (2001), 0.806 (2002) and 0.902 (2003) where a value of one is considered good. It would appear that fish are slowly declining in condition, but the differences at the time of capture and time of stocking are not significant. At the very least, it can be said that condition is not increasing after release. Annual growth rates were 0.301, 0.211 and 0.241 (mm/day) for 2001-2003 year classes. The ratio of pallid to shovelnose has been used as a gauge of relative abundance. The ratio for 2005 was 1 pallid to 205 shovelnose including hatchery and wild pallids and 1: 457 for wild pallids. This ratio shows the success of the hatchery program but should be interpreted cautiously as shovelnose catch rates are affected by migrations and aggregations as well as commercial harvest.

Community target species are used as a gauge for relative change in the river in absence of pallid information. Young of the year sturgeon (preliminarily identified as shovelnose) were present but not abundant relative to adults (N=126 of 4,113). Sturgeon of larger sizes were the most abundant large fish represented in the sampling effort (N=4,113), which suggests that the appropriate gears are being used to detect pallid sturgeon. The 4,113 shovelnose sturgeon captured, were represented in the gear as follows: 2,745 in gillnets, 683 in standard trammel nets, 160 in 2.5 inch trammel nets, 527 in the 16ft otter trawl, 1 in a bag seine. No shovelnose were captured in mini-fyke nets. Within all gears, 63 species and 2 hybrids were captured throughout the year. Different gears are used to target different fishes in the community and the project is adapting to determine the best methods to ensure efficiency within these gears. Sturgeon chubs, sicklefin chubs and speckled chubs were captured most often with trawls. Sand shiners and *Hybognathus* spp were captured in seines and mini-fyke nets, but not in trawls. Blue suckers were captured in gillnets, trammel nets (of both sizes) as well as trawls, and sauger were most often captured with gillnets. For each of these species, there appears to be particular habitat types for which they occur and a sampling design could be adapted to capture higher numbers of each if it were a priority.

Asian carp were represented in almost all gears including some young of year sizes. Considered as nuisance species, these fish appear to have expanded well throughout segment 13, but few young of year have been observed, suggesting that these fish are likely recruiting in reaches of the Mississippi River and immigrating into the Missouri at later life stages. Sampling gears used by this program are not sufficient to draw inferences about these species except to say they exist and are observed more often through jumping or through other gears like hoop nets and electrofishing used in other related projects.

## **SEGMENT 14: OSAGE RIVER/MISSOURI RIVER CONFLUENCE TO THE MISSISSIPPI RIVER/MISSOURI RIVER CONFLUENCE**

### **EXECUTIVE SUMMARY**

The number of pallid sturgeon collected in segment 14 has increased from 5 in 2004 to 13 in 2005. This increase depicts the contribution of the stocking program and exhibits biologist's improved ability to target these rare fish. Of the 13 pallids collected using standard and wild (non-protocol) efforts, four had no tags and were presumed to be wild while nine had some type of tag from a hatchery stocking. Pit tag retention was 100% as far as could be determined on the stocked fish with double tags, however genetic confirmation is still needed on the wild fish to verify their origin.

Sampling gears were used throughout the entire year to sample available habitat types over a range of temperatures. Stationary set gillnets produced 8 pallids, 5 of which were captured in standard gillnets and 3 in wild gillnets. Wild gillnets were used to increase the effort for the largest and smallest pallids. With active gears, four pallids were captured in 2.5 inch trammel nets and one was captured in a 1 inch trammel net. Of the 13 pallids sampled, only 1 was sampled in POOL habitat and POOL habitat accounted for half of the habitat gillnets were deployed in. The absence of pallids in this habitat is significant because in years preceding 2004, only POOL habitat was sampled with this gear. This relative absence may be an anomaly that could be attributed to lower river stages experienced in recent years, but at the very least, it suggests that this potential winter habitat was not sampled early enough in pallid monitoring efforts. Nine pallids (69%) occurred within inside-bend macrohabitat, which was the most sampled habitat with all gears. Pallids were also captured on less frequently occurring habitats including: 2 in channel crossovers, 1 in a confluence area and 1 in an outside bend. Pallids and other sturgeon have been shown to aggregate, or cluster around particular areas that are being examined through telemetry and targeted sampling. One such area was discovered in the spring of 2005 at bend RM 44 where biologists captured five large pallids (>700mm) within a week's time period around a single sand bar. This sand bar had

produced pallid sturgeon in 2004, but recently in 2006, targeted sampling produced no pallids. Pallids were otherwise captured proportionately to the areas where sampling occurred. Efforts will continue to try and identify unique clustering areas through additional telemetry efforts and targeted sampling.

No wild or hatchery fish were recaptured for a second time despite dozens being potentially “at large” in this reach since 1999. There has been a relatively high rate of occurrence of the 1997 stocked year-class of pallids, which have been found to exhibit a restricted upper home range. Pallid stockings of 2,445 fish in 1994 and 1,200 in 1997 have occurred in this reach of the river. Since that time, all additional stockings have occurred upstream, with the closest being at Boonville (RM 195). At the time of sampling, there were 24,600 fish stocked between Booneville and St. Charles (RM 25) and of the fish recaptured they represented their stocked year class as follows: 1992 – 0.04%, 1997 – 0.42%, 2001 – 0.04%, 2002 – 0.04%, 2003 – 0.03%. The combined total percentage of stocked fish (N = 9) versus proximate availability (N= 24,600) was 0.04%. This relatively low percentage of all fish versus the higher percentage of 1997 fish suggests that stocked fish have not dispersed into the lower segment at a high rate and that older fish have not readily moved out. The fish from 1997 and 1992 were also stocked in the Mississippi River and could have been of Mississippi origin (coded wire tagged), but the vast majority of these year classes have been found within the area they were stocked rather than 100’s of miles upstream. The relative condition of older pallids seems to be less robust than the younger fish. The range of condition for pallids captured in standard gears was: 0.78 (1992) – 1.07 (2003) and fish captured in between these years were represented on a consistent gradient with younger fish having better relative condition. This would suggest that hatchery fish are at least finding an adequate food source for survival. However, the low condition of older fish may be reflective of other factors like a post spawn event, or an inaccurate equation used to describe the growth of these fish. Annual growth rates were 0.15 (mm/day) for 2002 fish and 0.36 for 2003 fish. In the past, the ratio of pallid to shovelnose has been used as a gauge of relative abundance, the ratio for 2005 was 1 pallid to 223 shovelnose including hatchery and wild pallids and 1: 819 for wild pallids only. This ratio indicates the success of the hatchery

program but should be interpreted cautiously as shovelnose catch rates are affected by migrations and aggregations as well as commercial harvest.

Community target species are used as a gauge for relative change in the river in absence of pallid information. Young of the year sturgeon (preliminarily identified as shovelnose) were present but not abundant in 2004 (N=42). Sturgeon of larger sizes were the most abundant large fish represented in the sampling effort (N=2,458) which suggests that the appropriate gears are being used to detect pallid sturgeon. Of the 2,458 sturgeon captured they were represented in the gear as follows: 1,244 in gillnets, 558 in standard trammel nets, 136 in 2.5 inch trammel nets, 519 in the 16ft otter trawl, 1 in a bag seine and 0 in mini-fyke nets. Using all gears, 67 species were captured throughout the year. Different gears are used to target different fishes in the community and the project is adapting to determine the best methods to ensure efficiency within these gears. Sturgeon chubs, sicklefin chubs and speckled chubs were captured most often with otter trawls. Sand shiners and *Hybognathus* spp. were captured in seines and mini-fyke nets, but not in otter trawls. Blue suckers were captured in gillnets, trammel nets (of both sizes) as well as otter trawls, and sauger were most often captured with gillnets. For each of these species there appears to be particular habitat types for which they occur and a sampling design could be adapted to capture higher numbers of each if it were a priority.

Asian carp were represented in almost all gears including some young of year sizes. Considered as nuisance species, these fish appear to have expanded well throughout segment 14, but few young of year have been observed, suggesting that these fish are likely recruiting more in reaches of the Mississippi River and immigrating into the Missouri at later life stages. The gears used by this program are not sufficient to draw inferences about these species except to say they exist and are observed more often through jumping or through other gears like hoop nets and electrofishing used in other related projects.