2006 Annual Report

Pallid Sturgeon Population Assessment Project and Associated Fish Community Monitoring for the Missouri River: Segment 07

Prepared for the U.S. Army Corps of Engineers – Missouri River Recovery Program
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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 pallid sturgeon *Scaphirhynchus albus* and other native fish populations. This reach (Segment 7) of the River was fully sampled for the first time during the 2006 season.

A total of nine pallid sturgeon were captured in Segment 7 during 2006 (5 were of known hatchery origin, and 4 were unmarked). All of the unmarked fish were PIT tagged and tissue samples were taken for genetic analysis. The unmarked fish had lengths of 975, 962,714, and 394 mm. The 5 known hatchery-reared fish originated from 3 year-classes (1999, 2002, and 2004). One of the 2002 fish was originally stocked in RPMA 3 (stocked at Standing Bear in 2003) and had passed through Gavins Point Dam. The remainder were stocked at Sioux City NE, Bellevue NE, and Mulberry Bend NE (2 fish). Three of the pallid sturgeon were captured in standard small-mesh trammel nets, 3 in standard gill nets, 1 in the standard 16' otter trawl, 1 in a standard large-mesh trammel net, and 1 in a green small-mesh trammel net. Pallid sturgeon were captured from 7 different macrohabitats including: outside bends (2), braided (2), inside bends, channel crossovers, dendritic, deranged, and confluence. All but one of the pallid sturgeon (pool) were captured in channel border mesohabitats. Five of the fish were captured in the first 13 miles below Gavins Point Dam and the remaining 4 were captured within 15 miles of Ponca State Park. There is a 30 mile gap of river between these 2 areas. Pallid sturgeon relative condition ranged from 0.71to 0.86. The growth rates of the hatchery fish were 0.29 mm/day (1999 fish), 0.14 mm/day (mean of the three 2002 fish), and 0.54mm/day (2004 fish). A total of 1,143 shovelnose sturgeon *S. platorynchus* were captured during 2006: 604 with trammel nets, 270 with gill nets, 209 with otter trawls, and 60 by hook. No young-of-year sturgeon were captured during 2006 and the ratio of pallid to shovelnose sturgeon was 1:127.

Eight other native species were targeted for assessment as part of this project. A total of 917 blue suckers *Cycleptus elongates* were sampled. Most of them were captured in 2.5" trammel nets (n= 334). Seventeen saugers *Sander canadense* were sampled, mostly with gill nets (n= 10). Otter trawls captured 2 speckled chubs *Macrohybopsis aestivalis* and 6 sicklefin chubs

M. meeki. Sand shiners *Notropis stramineus* were common in mini fyke nets (n=901). Ten Western silvery minnows *Hybognathus argyritis* were captured in 2006 (all but one in otter trawls). No plains minnows *H. placitus* or sturgeon chubs *M. gelida* were sampled.

A total of 52 fish species and one hybrid were caught in segment 7 during 2006. A total of 11,021 individual fish were sampled. Several Asian carp were captured during 2006 including 6 bighead *Hypopthalmichthys nobilis*, 1 silver *Hypopthalmichthys molitrix*, and 7 grass carp *Ctenopharyngodon idella*.

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Introduction

The pallid sturgeon *Scaphirhynchus albus* is a fish dependent on large, turbid river systems. It is a top-level predator considered to be an indicator of the ecological health of such rivers. Manipulations to the Missouri and Mississippi Rivers have negatively affected pallid sturgeon populations. This species now only inhabits a fraction of its historical range. Due to dramatic population declines, the pallid sturgeon was listed as an endangered species in 1990. It is believed that only hatchery-produced fish will be found in the wild beyond 2016 (Pallid Sturgeon Propagation Committee, 2004).

The Pallid Sturgeon Population Assessment Team was assembled to initiate a comprehensive monitoring plan designed to assess survival, movement, distribution, and habitat use, of wild and hatchery reared (stocked) juvenile pallid sturgeon (Drobish 2005a). The Population Assessment Team consists of field crews from several different state and federal agencies. The Missouri River was divided into 14 sampling segments for this project. These segments were designated by commonalities in habitat conditions. Each field crew is responsible for sampling one or two segments of the river using standardized methods. Habitat classification, gear deployment, and reporting are all guided by a set of standard operation procedures produced by the Team (Drobish 2005b).

All fish sampled are measured and recorded. In addition to the pallid sturgeon, more detailed information is collected from a set of 9 native Missouri River fishes (Appendix A). These include: sand shiner *Notropis stramineus*, sicklefin chub *Macrhybopsis meeki*, sauger *Zander canadense*, shovelnose sturgeon *Scaphirhynchus platorynchus*, plains minnow *Hybognathus placitus,* Western silvery minnow *Hybognathus argyritis*, speckled chub

Macrhybopsis aestivalis, sturgeon chub *Macrhybopsis gelid,and* blue sucker *Cycleptus elongatus,*. Information on age, growth, and body condition of these species will be collected to further monitor the fish community of the Missouri River. Some of these species (e.g., chubs) are potential prey for the pallid sturgeon. Others may serve as a surrogate to detect native community responses to environmental changes.

This study utilizes river bends as study units. Each segment of the river is broken into many smaller parts based on river morphology. Each time the main channel crosses from one bank to the other; a new study unit (bend) is designated. A number of these bends (typically 12) are randomly selected to be thoroughly studied within each of the 14 River segments. The available habitats within each of the chosen bends are identified and sampled with appropriate gears as directed by the protocols (Drobish 2005b).

Each sampling year is broken into 2 seasons based on water temperature and sampling focus. These seasons include a Sturgeon Season that focuses on the assessment of sturgeon species, and a Fish Community Season that continues to assess sturgeon but places an additional emphasis on native Missouri River species. The Sturgeon Season encompasses the cool-water season (fall and spring) and the Fish Community season stretches from July 1 to October 31. Gillnets are unique to the Sturgeon season and shallow-water gears (bag seines and mini-fykes) are unique to the Community Season. Trammel nets and otter trawls are deployed in both seasons.

Study Objectives (Drobish 2005a)

In response to the 2000 Missouri River Biological Opinion, the COE is developing monitoring and restoration projects to avoid jeopardizing pallid sturgeon populations. As part of their Implementation Plan, the COE is working with the U. S. Fish and Wildlife

Service (USFWS) and State Resource Agencies to develop and conduct a pallid sturgeon monitoring and assessment program. The objectives of this program are as follows:

1. Document annual results and long-term trends in pallid sturgeon population abundance and geographic distribution throughout the Missouri River System.
2. Document annual results and long-term trends of habitat use of wild pallid sturgeon and hatchery stocked pallid sturgeon by season and life stage.
3. Document population structure and dynamics of pallid sturgeon in the Missouri River System.
4. Evaluate annual results and long-term trends in native target species population abundance and geographic distribution throughout the Missouri River system.
5. Document annual results and long-term trends of habitat usage of the native target species by season and life stage.
6. Document annual results and long-term trends of all non-target species population abundance and geographic distribution throughout the Missouri River system, where sample size is greater than fifty individuals.
7. Document annual results and long-term trends in pallid sturgeon population abundance and geographic distribution throughout the Missouri River System.
8. Document annual results and long-term trends of habitat use of wild pallid sturgeon and hatchery stocked pallid sturgeon by season and life stage.
9. Document population structure and dynamics of pallid sturgeon in the Missouri River System.
10. Evaluate annual results and long-term trends in native target species population abundance and geographic distribution throughout the Missouri River system.
11. Document annual results and long-term trends of habitat usage of the native target species by season and life stage.
12. Document annual results and long-term trends of all non-target species population abundance and geographic distribution throughout the Missouri River system, where sample size is greater than fifty individuals.

Study Area

The South Dakota Game, Fish, and Parks Sturgeon crew monitored segment 7 of 14 on the Missouri River. This segment is located between Gavins Point Dam and Ponca State Park (miles 811 to 752). Segment 7 coincides with the lower (59-mile) reach of Missouri National Recreational River. A multitude of habitats are found here, including sandbars, backwaters, secondary channels, and wooded islands. Bank stabilization is sporadic, allowing some erosion to occur as the channel meanders from bank to bank.

This reach of the River was isolated from upstream reaches when Gavins Point Dam was closed in 1955. Controlled releases from Gavins Point continue to influence the morphology and ecology of segment 7 today. The U.S. Army Corps of Engineers uses the dam to provide stable releases to downstream areas, thus allowing for reliable navigation and water supplies. The dam blocks natural sediment transport causing incision and decreased turbidity. These facts, combined with an altered hydrograph, have created conditions that are quite different from the pre-dam era.

Discharge from Gavins Point Dam typically peaks in late summer at about 30,000 cfs and declines to near 12,000 cfs during the winter (http://www.nwd-mr.usace.army.mil/rcc/reports/pdfs/aopfinal2005.pdf). Diel variations are not as significant as those found upriver (segments 5 and 6). Much of the river in segment 7 is less than 2 m deep, but holes deeper than 15 m exist. River width varies from over 1,400 m to less than 300 m. The James River (mile 798) and Vermillion River (mile 772) are major tributaries contributing to flows in this reach.

Methods

Sampling methods used in segment 7 are consistent with those used by all of the assessment teams. Methodology was developed by the Pallid Sturgeon Population Assessment Team and is detailed in Drobish 2005b.

Sample site selection and description

River bends comprise sampling units in this study. Each bend is further broken down based on a three tiered hierarchical habitat classification system that was inspired by the Benthic Fishes Study (Berry and Young 2001). With this system, analysis is possible at the macro, meso, and microhabitat levels.

The meandering of the main channel defines a river bend. A standard bend consists of a relatively deep and swift outside bend, inside bend (shallower depositional zone), and channel crossover. These three bend components are classified as macrohabitats. Other macrohabitats include: braided channels, dendritic channels, deranged channels, secondary channels (large, small, and non-connected), tributary mouths (large and small), and confluence areas. For further habitat descriptions, reference Drobish 2005b. Macrohabitats are further subdivided into a set of mesohabitats. Channel borders, island tips, pools, and bars comprise the mesohabitats categories. In certain cases, mesohabitats are subdivided even further – into microhabitats. Classification at this level provides great detail about the sampling site. Using a set of 6 microhabitat coded digits, one can record (for example) a particular sandbar's state of submersion, its size, and where the particular sampling gear was deployed. Codes and definitions for all levels of habitat classification can be found in Appendix B.

Given the dynamic nature of the river in segment 7, habitat is in a constant state of flux. Entire river bends may change from one sampling season to the next. Habitat conditions were recorded as they appeared on the day of sampling.

Sampling gear

Twelve of 33 bends in segment 7 were randomly selected for standardized sampling (Table 1). These bends were sampled with a package of gears (described below). Additional non-random bends were sampled with partial gear sets at the crew leader's discretion. Non-random sampling was done as time allowed. Sampling was based upon habitat. Each macro/meso habitat combination had sampling requirements. Each gear had to be deployed twice for each macro/meso combination in a given bend. Basic habitat data (turbidity, velocity, and substrate) was also typically recorded once per macro/meso combination. These measurements were also taken any time a pallid sturgeon was captured. Temperature and

depth were measured at every gear deployment site. For more information on habitat analysis see Drobish (2005b).

A sampling year was broken into a warm and a cool-water season. Capturing pallid sturgeon and other large fishes was the primary objective of the cool-water season (Sturgeon Season). Gillnets and 1" trammel nets were used during the Sturgeon season. During the warmer months (Fish Community Season), effort was focused on catching young/smaller fishes in shallow water. Mini-fyke nets, 1" trammel nets, and otter trawls were used during the Fish Community Season. The Sturgeon Season ran from November 1 to June 30, and the Fish Community season spanned from July 1 October 31.

Six standardized gears were deployed at each randomly selected bend: stationary gillnets, small and large-mesh drifted trammel nets, 2 otter trawls, and mini-fyke nets. For detailed information about each gear, see Drobish (2005b). This package of gears allowed for the sampling of a variety of depths, and targeting various species.

Four-panel (3.81cm, 5.08 cm, 7.62 cm, and 10.16 cm) experimental gillnets were deployed during the sturgeon season. These 1.8 m deep by 30 m long, multifilament nets were set in a variety of habitats > 1.2 m deep. These nets have been standard since the population assessment started in 2003. A total of 230 net/nights of effort (standard white nets) were expended in Segment 7 during 2006.

Small-mesh trammel nets (1.8 m deep X 38 m wide with a 6" outer mesh and 1" inner mesh) were used during both the Sturgeon and Fish Community season. These nets were drifted in habitats >1.2 m deep. Trammel net drifts ranged from 75 m to 300 m, depending on prevalence of snags. Very few drifts exceeded 200 m, before ending in a snag. A total of 293 small-mesh drifts were completed in 2006, resulting in over 24,000 m of drift sampling. A total of 185 large-mesh trammel drifts were also completed. Small-mesh trammel nets have been a standard gear since 2003 and large-mesh nets were added as a new standard gear in 2005.

Two different otter trawls (both 4.8 m wide X 0.91 m deep) were used to sample for all sizes of fish in deeper water (> 1.2 m). The large-mesh trawl was 7.6 m long with 38 mm chafing mesh and size 110 mesh around the cod end. The small-mesh trawl was 7.6 m long with 36 mm chafing mesh and 4mm mesh in the body and codend. The small-mesh trawl was tried on a trial basis in 2006 and is considered a "wild" gear. A flat bottom boat was

used to pull the trawls (bow trawling) downstream. Trawling runs ranged in length from 75 m to 300 m. The large-mesh trawl was used during both sampling seasons and the small-mesh trawl was only used during the fish community season. The large-mesh otter trawl has been utilized since project inception in 2003 and the small-mesh trawl was new in 2006. A total of 201 large-mesh and 100 small-mesh otter trawl samples were collected in 2006, resulting in over 52,000 m of sampling.

Mini-fyke nets were also used in shallow water. The 4.5 m long x 0.6 m high lead was staked to the bankline. The rest of the net consisted of 2 1.2 m wide x 0.6 m high steel frames (cab) and two 0.6 m diameter hoops with 3 mm "ACE" type mesh. Mini-fykes were only used during the Fish Community Season. Mini-Fykes were set for a total of 107 net/nights. Mini-fykes have been standard gears since 2003.

A 9.1 m bag seine had been previously used as part of this project. The Pallid Sturgeon Population Assessment Team made a decision to eliminate bag seines as a standard gear for 2006 because of redundancy with mini fyke net catches.

Passive gears (mini-fykes and gillnets) were set for a maximum of 24 hours and catch-per-unit-effort (CPUE) was calculated as the number of fish per net night. CPUE was calculated as number of fish per 100 m deployed for trammel nets and the otter trawl. Distances were measured using a Garmin GPS unit.

Calculations

Relative abundance was assessed using CPUE. This was done at several levels. An overall segment 7 CPUE was calculated for each species (by gear). This was derived by figuring the CPUE for all sub-samples within the 12 random bends. That provided a mean CPUE for each of the bends. These "bend means" were then averaged to calculate the overall segment 7 CPUE. Catches within each habitat type were also analyzed to calculate a CPUE (for each gear). To assess CPUE variability, we calculated standard errors (SE). Two SE approximate a 95% confidence interval around the mean.

Fish condition was assessed for shovelnose sturgeon. The relative weight (Wr) index was the metric used for condition assessment. The equation for calculating Wr is found in

Anderson and Newman (1996). Condition was not calculated for pallid sturgeon because of low sample size.

Population size structure for shovelnose sturgeon and sauger is described using incremental relative stock density (RSD). This method (proposed by Gabelhouse 1984), allows us to express whether the population consists of mostly large fish, small fish, or something in between. Because of the low sample size (n=1), RSD was not calculated for pallid sturgeon. Length categories have been proposed for pallid sturgeon (Shuman 2006), shovelnose sturgeon (Quist et al. 1998), and sauger (Gabelhouse 1984). For these species we calculated the percent of fish that were < stock length, stock length, and > stock length. RSD equations can be found in Anderson and Newman (1996).

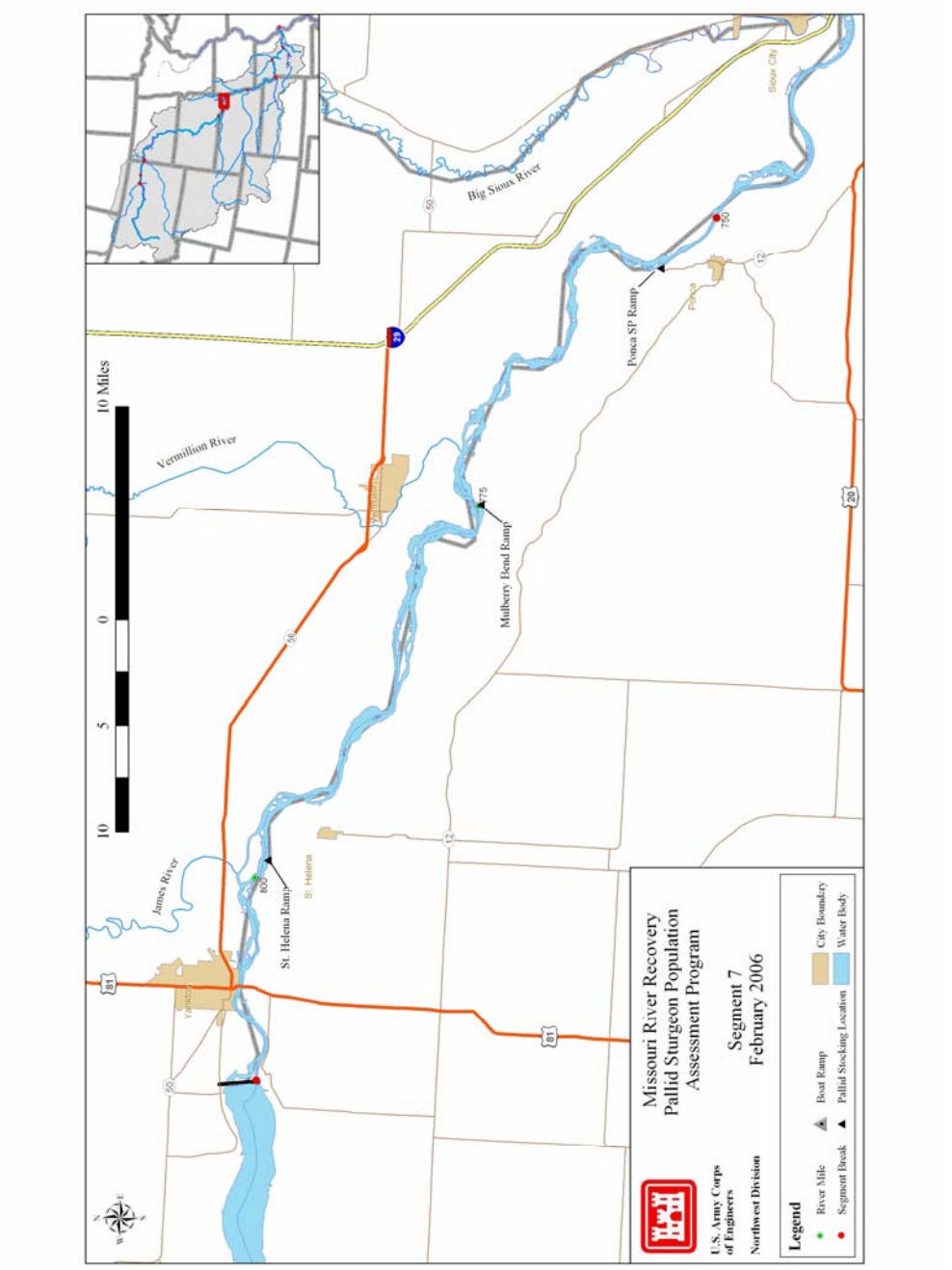

Figure 1a. Map of segment 7 of the Missouri River with major tributaries, common landmarks, and historic stocking locations for pallid sturgeon. Segment 7 encompasses the Missouri River from Gavins Point Dam (River Mile 811) to Ponca NE (River Mile 753)

Results

Pallid Sturgeon

A total of nine pallid sturgeon were captured in Segment 7 during 2006. That is a substantial increase from the single fish captured during the abbreviated 2005 season. Five of the 2006 pallid sturgeon were of known hatchery origin. Lengths of the known hatchery fish ranged from 309-670 mm. The remaining 4 fish were unmarked and had lengths of 975, 962,714, and 394 mm. Genetic samples were taken from the unmarked fish. No results were available at the time of this writing.

The 5 known hatchery fish were from the 1999, 2002 (n=3), and 2004 year classes. They had been stocked at Bellevue NE, Sioux City IA, Mulberry Bend NE, and Standing Bear Bridge NE (above Gavins Point Dam). The pallid sturgeon that had been stocked at Bellevue (11/01/02) had moved 201 miles up river to its capture point (03/20/06). The fish stocked at Standing Bear Bridge moved 34 miles downstream through Lewis and Clark Lake, passed through Gavins Point Dam, and then proceeded another 52 miles downstream to its capture point. It was captured 86 miles from its stocking site. The other 3 fish were captured 69, 16, and 7 miles from their stocking sites.

Pallid sturgeon were captured in 7 different macro habitats. Only outside bends and braded macro habitats produced more than a single capture (n=2). Channel crossovers, inside bends, dendritic, confluence, and deranged habitat all produced a single pallid sturgeon catch. One of the sturgeon was caught in a pool meso habitat, and the rest in a channel border. Depths of gear deployment associated with captures ranged from 1.2 to 4.8m. Associated bottom velocities ranged from 0.26 to 0.70 mps. Turbidity at the capture points ranged from 7 to 30.

Five pallid sturgeon were caught in drifted trammel nets during 2006; 3 in standard small-mesh nets, 1 in a green-dyed small-mesh net, and 1 in a large-mesh net. Gill nets captured three pallid sturgeon, and the large-mesh otter trawl captured one. Gill net CPUE was 0.01 fish per net night and standard small-mesh trammel net CPUE was 0.01 fish /100m.

Eight of the 9 fish were captured during the sturgeon season, with 6 of those 8 coming during the spring period. The lone fish community season capture occurred on 9/5/2006 during an otter trawl tow.

No shovelnose sturgeon/pallid sturgeon hybrids were captured during 2006. The ratio of pallid sturgeon to shovelnose sturgeon was 1:127. Unless the genetic results indicate that the unmarked 394 mm fish is of wild origin, there was no evidence of natural recruitment found in 2006.

Table 1. Number of bends sampled, mean effort per bend (mean number of deployments), and total effort by macrohabitat (total number of deployments) for segment 7 on the Missouri River during fall through spring (sturgeon season) and summer (fish community season) in 2005 – 2006. N-E indicates the habitat is non-existent in the segment.

Gear	Number of Bends	Mean Effort	Macrohabitat													
			BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Fall through Spring - Sturgeon Season																
1 Inch Trammel Net	19	9.5	29	31	8	13	14	35	31	8	4	0	0	0	0	8
2.5 Inch Trammel Net	21	8.8	22	33	9	8	8	47	48	8	2	0	0	0	0	0
Gill Net	13	17.7	48	45	4	10	8	58	43	6	4	0	0	4	0	0
Otter Trawl	12	8.3	19	16	2	10	6	18	18	6	4	0	0	0	0	0
Summer – Fish Community Season																
1 Inch Trammel Net	13	8.6	17	7	8	8	22	23	8	2	0	0	0	0	0	0
Mini-Fyke Net	12	8.8	0	0	2	1	27	12	7	35	2	2	0	0	0	0
Otter Trawl	12	8.5	16	2	7	10	19	17	6	4	0	0	0	0	0	0

Table 2. Number of bends sampled, mean effort per bend (mean number of deployments), and total effort by mesohabitat (total number of deployments) for segment 7 on the Missouri River during fall through spring (sturgeon season) and summer (fish community season) in 2005 – 2006. N-E indicates the habitat is non-existent in the segment.

Gear	Number of bends	Mean Effort	**Mesohabitat**				
			BAR	POOL	CHNB	TLWG	ITIP
Fall through Spring – Sturgeon Season							
1 Inch Trammel Net	19	9.5	0	0	165	0	8
2.5 Inch Trammel Net	21	8.8	0	2	177	0	6
Gill Net	13	17.7	0	20	204	0	6
Otter Trawl	12	8.3	0	0	93	0	6
Summer – Fish Community Season							
1 Inch Trammel Net	13	8.6	0	0	106	0	6
Mini-Fyke Net	12	8.8	104	0	1	0	0
Otter Trawl	12	8.5	0	0	96	0	6

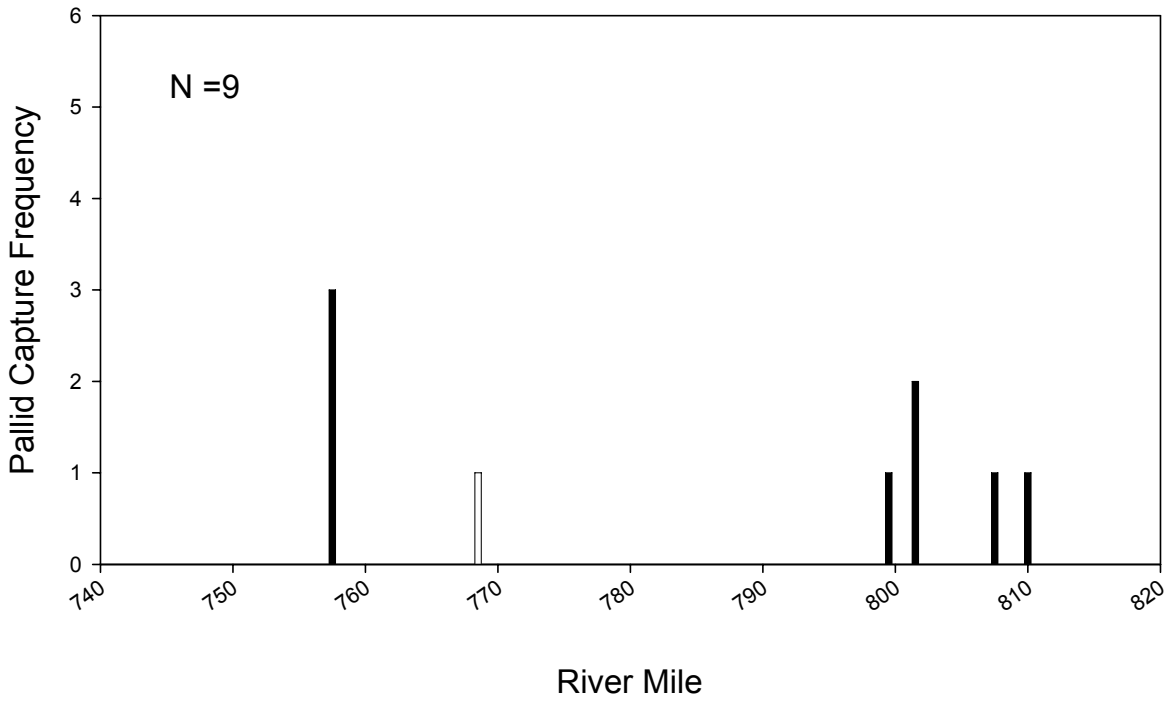

Figure 1b. Distribution of pallid sturgeon captures by river mile for segment 7 of the Missouri River during 2005-2006. Black bars represent pallid captures during Sturgeon Season and white bars during Fish Community Season. Figure includeds all pallid captures including non-random and wild samples.

Table 3. Pallid sturgeon (PDSG) capture summaries for all gears relative to habitat type and environmental variables on the Missouri River during 2005-2006. Means (minimum and maximum) are presented. Habitat definitions and codes presented in Appendix B. N-E indicates the habitat is non-existent in the segment.

Macro-	Meso-	Depth (m) (Effort)	Depth (m) (Catch)	Bottom Velocity (m/s) (Effort)	Bottom Velocity (m/s) (Catch)	Temp. °C (Effort)	Temp. °C (Catch)	Turbidity (ntu) (Effort)	Turbidity (ntu) (Catch)	Total Pallids caught
BRAD	BAR	0.5 (0.3-0.7)				17.4 (14.6-26.5)		24 (19-30)		
	POOL	2.8 (1.3-5)	2.1	0.58 (0.26-0.75)	0.26	2.3 (0-3.9)	2.9	11 (7-17)	7	1
	CHNB	2.1 (1-6.9)	1.2	0.59 (0.06-1)	0.47	14.7 (0-30)	24.2	22 (6-128)	30	1
	ITIP	1.5 (1.2-1.8)				20.6 (20.5-20.6)				
CHXO	POOL	1.6 (1.3-2.1)				9.8 (9.8-9.9)		11		
	CHNB	2.1 (1.2-9.5)	2.2	0.59 (0.18-0.96)	0.59	15 (0-26.7)	10.7	17 (4-64)	8	1
CONF	CHNB	2.6 (1.3-4.1)	1.8	0.73 (0.37-1.25)	0.61	17.9 (2.8-27)	21.8	21 (11-39)	23	1
DEND	BAR	0.4 (0.4-0.5)				25.6 (25.5-25.6)		18		
	CHNB	2.1 (0.9-4.3)	1.2	0.67 (0.38-1.16)	0.49	13.5 (0.1-25.9)	18.7	27 (4-131)	27	1
DRNG	BAR	0.3 (0.3-0.3)				26				
	CHNB	2.7 (1.2-5.9)	2.8	0.56 (0.09-0.89)	0.13	14.8 (0-26.1)	21	22 (6-66)	20	1
ISB	BAR	0.5 (0.3-0.6)				21.4 (15.7-26.3)		26 (20-34)		
	POOL	2.2 (1.5-4)		0.18 (0.01-0.53)		7.1 (1.1-13.6)		15 (5-49)		
	CHNB	2 (1-5.3)	1.4	0.56 (0.08-0.96)	0.62	15.3 (0-27.9)	13.7	16 (6-63)	13	1
OSB	BAR	0.5 (0.4-0.6)				22.7 (16-26.6)		18 (12-27)		
	CHNB	3.1 (1.2-6.6)	4.5 (4.2-4.8)	0.64 (0.14-1.02)	0.6 (0.5-0.7)	15.1 (0-26.7)	6.4 (2-10.7)	16 (5-63)	8	2
SCCL	BAR	0.5 (0.3-0.5)				21.5 (14.4-26.4)		22 (16-27)		
	CHNB	2.1 (1.2-4.2)		0.61 (0.31-0.92)		18.6 (0.9-27.9)		21 (9-41)		
	ITIP	2.1 (1.1-2.9)		0.65 (0.56-0.75)		18.4 (1.8-27.2)		18 (12-29)		
SCCS	BAR	0.4 (0.2-0.7)				19.6 (13.7-26.9)		22 (12-29)		
	CHNB	0.3 (0.3-0.3)				26.1		27		

Table 3 (continued).

Macro-	Meso-	Depth (m) (Effort)	Depth (m) (Catch)	Bottom Velocity (m/s) (Effort)	Bottom Velocity (m/s) (Catch)	Temp. °C (Effort)	Temp. °C (Catch)	Turbidity (ntu) (Effort)	Turbidity (ntu) (Catch)	Total Pallids caught
	ITIP	2.5 (1.4-4)		0.66 (0.15-1)		16.6 (4.9-25.9)		22 (7-39)		
SCCN	BAR	0.4 (0.4-0.4)				27.6 (27.1-28.1)		22		
TRIB	BAR	0.6 (0.6-0.6)				19.2 (19.2-19.3)		19		
TRML	CHNB	2.3 (1.5-3.2)		0.02 (0-0.03)		6.2 (3-8.5)		18 (17-19)		
WILD	DTWT	3.6 (2.2-4.8)		0.34 (0.04-0.65)		21.3 (21.1-21.7)		14 (13-14)		

Table 6. Mean fork length, weight, relative condition factor (Kn), growth rates, and water temperature for hatchery-reared pallid sturgeon captures by year class at the time of stocking and recapture during 2006 from segment 7 of the Missouri River. Relative condition factor was calculated using the equation in Keenlyne and Evanson (1993). Standard error (+/- 2SE) was calculated where N>1 and is represented on second line of each year.

Year class	N	Stock Data			Recapture Data			Growth Data	
		Length (mm)	Weight (g)	Kn	Length (mm)	Weight (g)	Kn	Length (mm/d)	Weight (g/d)
1999	1	312	249	2.52	670	1100	0.86	0.29	0.6
2002	3	286	NA		433	213.3	0.71	0.136	NA
		10				84.5	0.23	0.021	
2004	1	209	NA		309	77	0.81	0.538	NA

Table 7. Incremental relative stock density (RSD)[a] and relative condition factor (Kn) for all pallid sturgeon captured with all gear by a length category during 2005-2006 in the Missouri River. Length categories[b] determined using the methods proposed by Shuman et al. (2006). Relative condition factor was calculated using the equation in Keenlyne and Evanson (1993).

Length Category	N	RSD	Kn (+/- 2SE)
	Sturgeon Season		
Sub-stock (0-199)	0		
Sub-stock (200-329)	1		
Stock	3	43	0.8 (0.5)
Quality	2	29	0.8 (0.1)
Preferred	2	29	0.8 (0.1)
Memorable	0		
Trophy	0		
Overall Kn			0.8
	Fish Community Season		
Sub-stock (0-199)			
Sub-stock (200-329)			
Stock	1		0.88
Quality			
Preferred			
Memorable			
Trophy			
Overall Kn			

[a] RSD = (# of fish of a specified length class / # of fish ≥ minimum stock length fish) * 100.
[b] Length categories based on the percentage of the largest known pallid sturgeon: Sub-stock FL < 330 mm (20 %), Stock FL =330 - 629 mm (20 – 36 %), Quality FL = 630 – 839 mm (36 – 45 %), Preferred FL = 840 – 1039 mm (45 – 59 %), Memorable FL = 1040 – 1269 mm (59 – 74 %), Trophy FL > 1270 mm (>74 %).

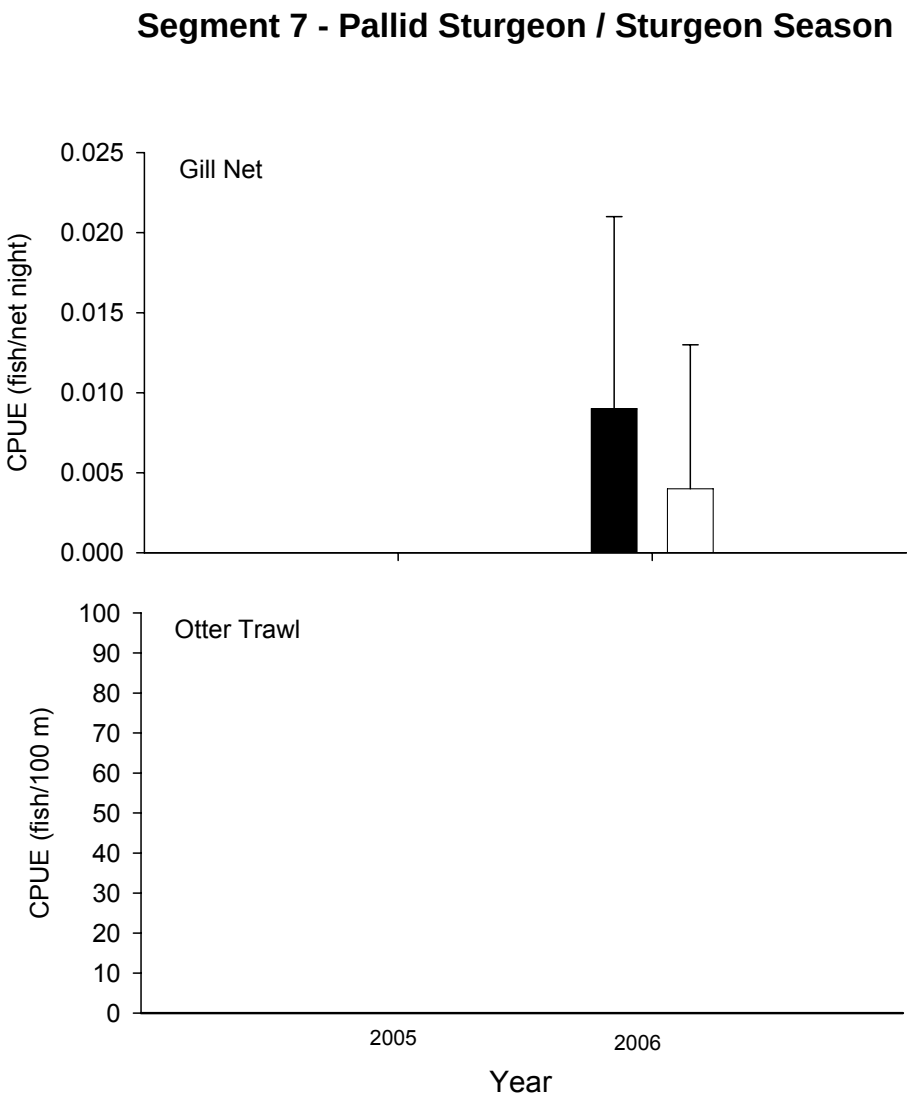

Figure 2. Mean annual catch-per-unit-effort (+/- 2 SE) of wild (black bars) and hatchery reared (white bars) pallid sturgeon using gill nets and otter trawls in segment 7 of the Missouri River during sturgeon season 2005-2006. All pallid sturgeon that were captured with no evidence of previously being tagged were deemed wild pending genetic verification.

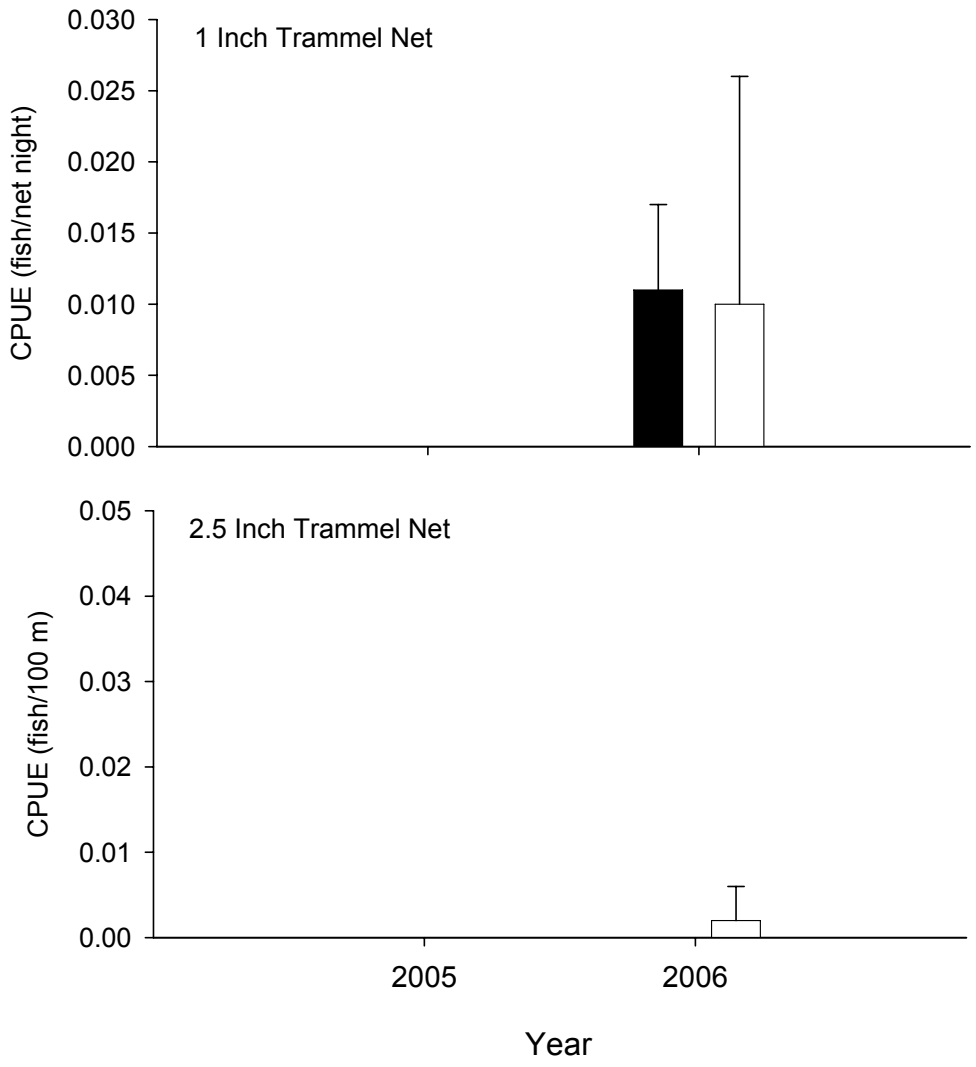

Figure 3. Mean annual catch-per-unit-effort (+/- 2 SE) of wild (black bars) and hatchery reared (white bars) pallid sturgeon using 1 and 2.5 inch trammel nets in segment 7 of the Missouri River during sturgeon season 2005-2006. All pallid sturgeon that were captured with no evidence of previously being tagged were deemed wild pending genetic verification.

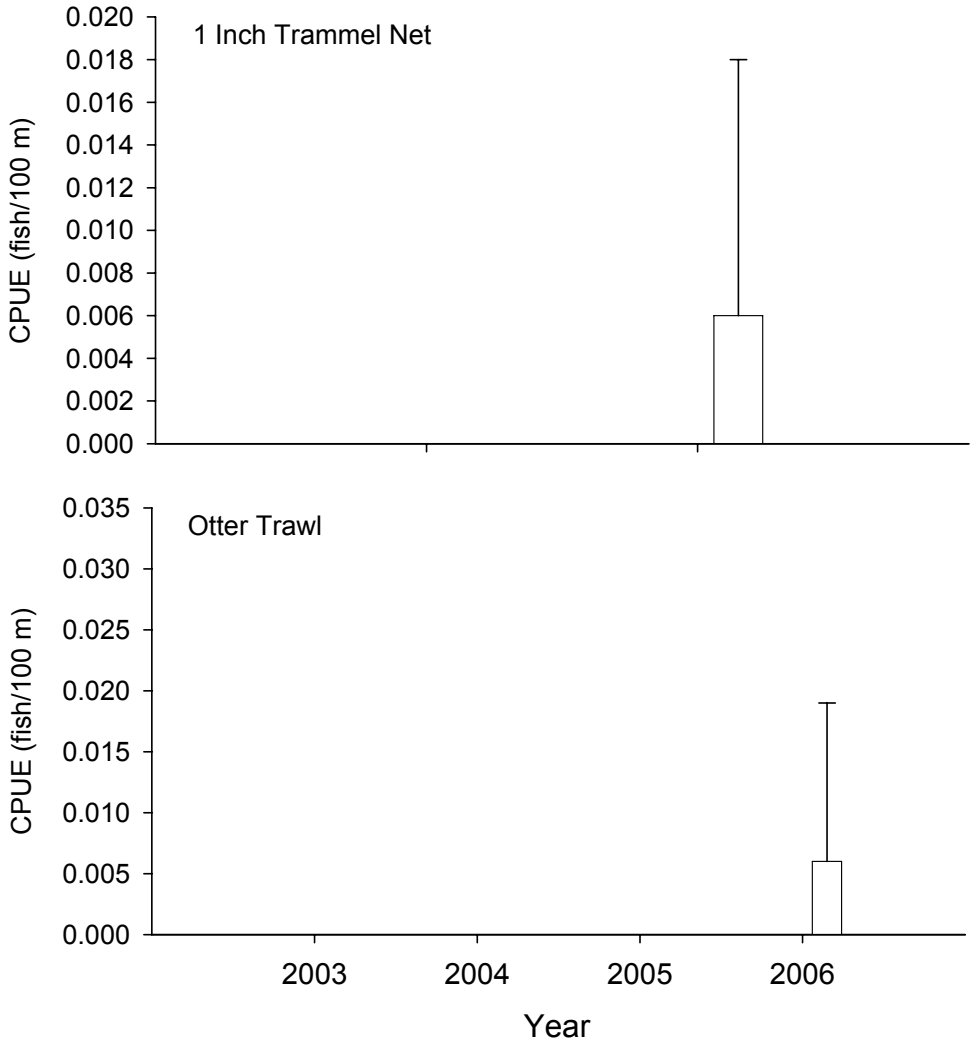

Figure 5. Mean annual catch-per-unit-effort (+/- 2 SE) of wild (black bars) and hatchery reared (white bars) pallid sturgeon using 1 inch trammel nets and otter trawls in segment 7 of the Missouri River during fish community season 2005-2006. All pallid sturgeon that were captured with no evidence of previously being tagged were deemed wild pending genetic verification.

Table 9. Total number of sub-stock size (0-199 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 10. Total number of sub-stock size (0-199 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	DTWT
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

Table 11. Total number of sub-stock size (200-329 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	**1**	0 21	0 20	0 2	0 4	0 3	0 25	**100** 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 12. Total number of sub-stock size (200-329 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	1	0 0	100 89	0 3	0 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

Table 13. Total number of stock size (330-629 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	3	33 16	0 16	33 4	33 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	1	10 22	10 16	5 2	5 7	100 9	10 18	50 17	0 6	N-E 4	0 0	0 0	0 0	10 0	10 0

Table 14. Total number of stock size (330-629 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	1	0 0	100 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	1	0 0	100 94	0 6	0 0	0 0

Table 15. Total number of quality size and greater (≥630 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	1	0 11	0 16	0 5	0 4	0 4	0 27	100 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	2	50 21	50 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 16. Total number of quality size and greater (≥630 mm) pallid sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 7. N-E indicates the habitat is non-existent in the segment.

Gear	N	Mesohabitat				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	1	0 0	100 97	0 2	0 1	0 0
Gill Net	2	0 0	50 89	0 3	50 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

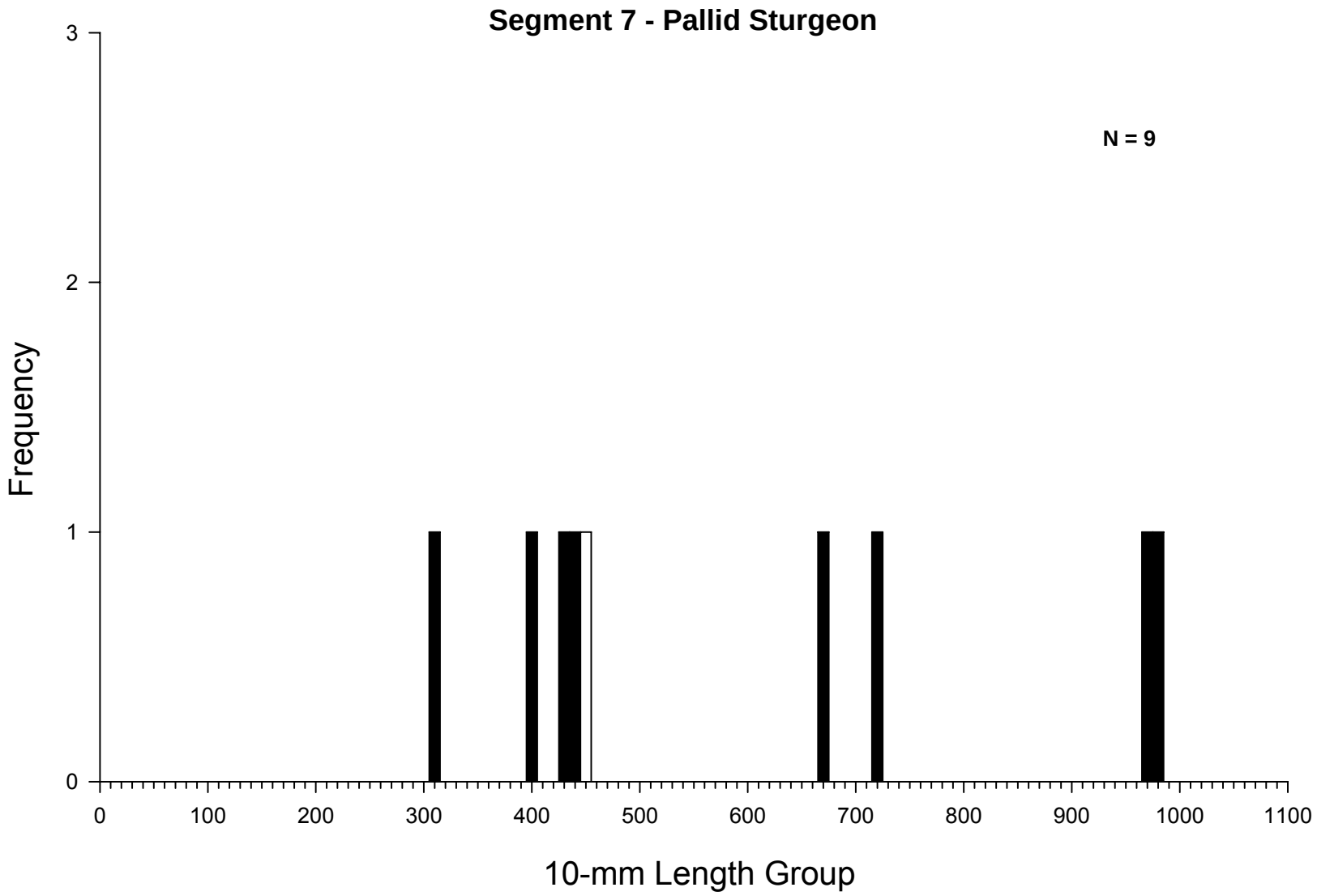

Figure 8. Length frequency of pallid sturgeon captured during fall through spring (sturgeon season, black bars) and summer (fish community season, white bars) in segment 7 of the Missouri River during 2005 - 2006 including non-random and wild samples.

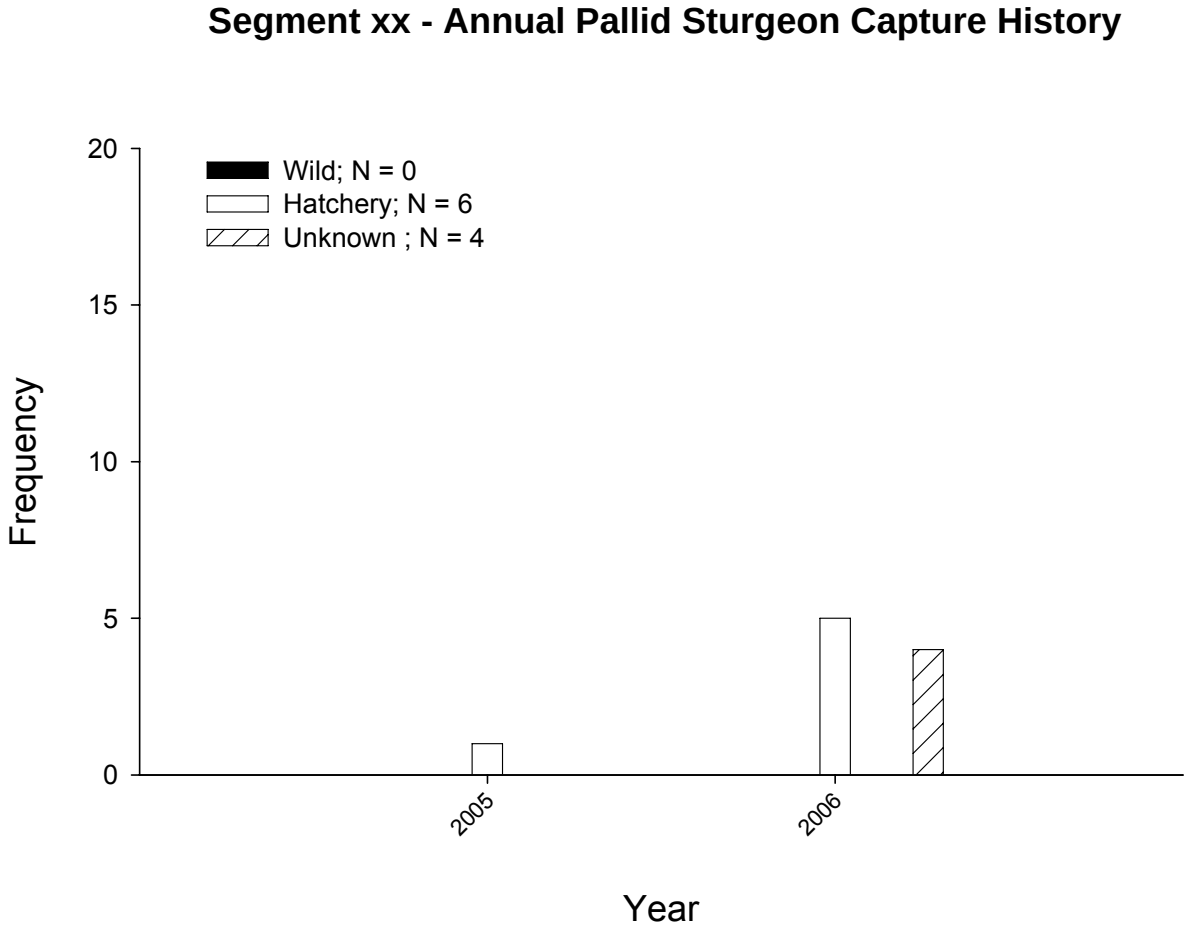

Figure 9. Annual capture history of wild (black bars) and hatchery reared (white bars) pallid sturgeon collected in segment 7 of the Missouri River from 2005 to 2006. Figure is designed to compare overall pallid sturgeon captures from year to year and may be biased by variable effort between years.

Shovelnose X Pallid Sturgeon Hybrids

No shovelnose X pallid sturgeon hybrids were captured during 2006.

Targeted Native River Species

Shovelnose Sturgeon

Shovelnose sturgeon

A total of 1,143 shovelnose sturgeon were captured in 2006. Active gears caught 813 fish and passive gears 330 fish. The majority of the sturgeon were captured in small-mesh (1" inner panel) trammel nets (n= 452). Most of those (N=337) were sampled during the sturgeon season (CPUE = 1.5 fish/100m) and 115 were captured during the fish community season (CPUE = 0.9 fish/100m). Detailed catch-per-unit-effort data can be found in Figures 12 and 14. Gillnets captured 262 fish resulting in a CPUE of 1.14 fish/ net night. Large-mesh otter trawls captured 196 fish resulting in a CPUE of 0.542 fish/100m. No shovelnose sturgeon were caught in the mini-fyke nets.

Gears were set in a total 11 macrohabitats, and shovelnose sturgeon were captured in 10 of them. Dam tailwater (DTWT) was the only habitat that did not produce a shovelnose sturgeon. During the sturgeon season, shovelnose sturgeon were most frequently found in inside bend (22%) and outside bend (21%) macrohabitats. Similarly, during the fish community season, catches were highest in outside bends (20%) and inside bends (16%). Island tips associated with large secondary channels yielded the highest catch rates for 1" trammel (2.7 fish/100m) over the entire year (both seasons combined). Channel borders were the most productive mesohabitat, producing 86% of the shovelnose sturgeon catch.

Shovelnose sturgeon fork lengths ranged from 370 to 754 mm (figure 17). Most of the fish (92%) were over 500 mm in length. Incremental RSD analysis yielded RSD-P values of 85.2 and 80.6 for the sturgeon and fish community season, respectively. The mean relative weight for shovelnose sturgeon was 80.8 with a range of 51 to 113.

Segment 7 - Shovelnose Sturgeon / Sturgeon Season

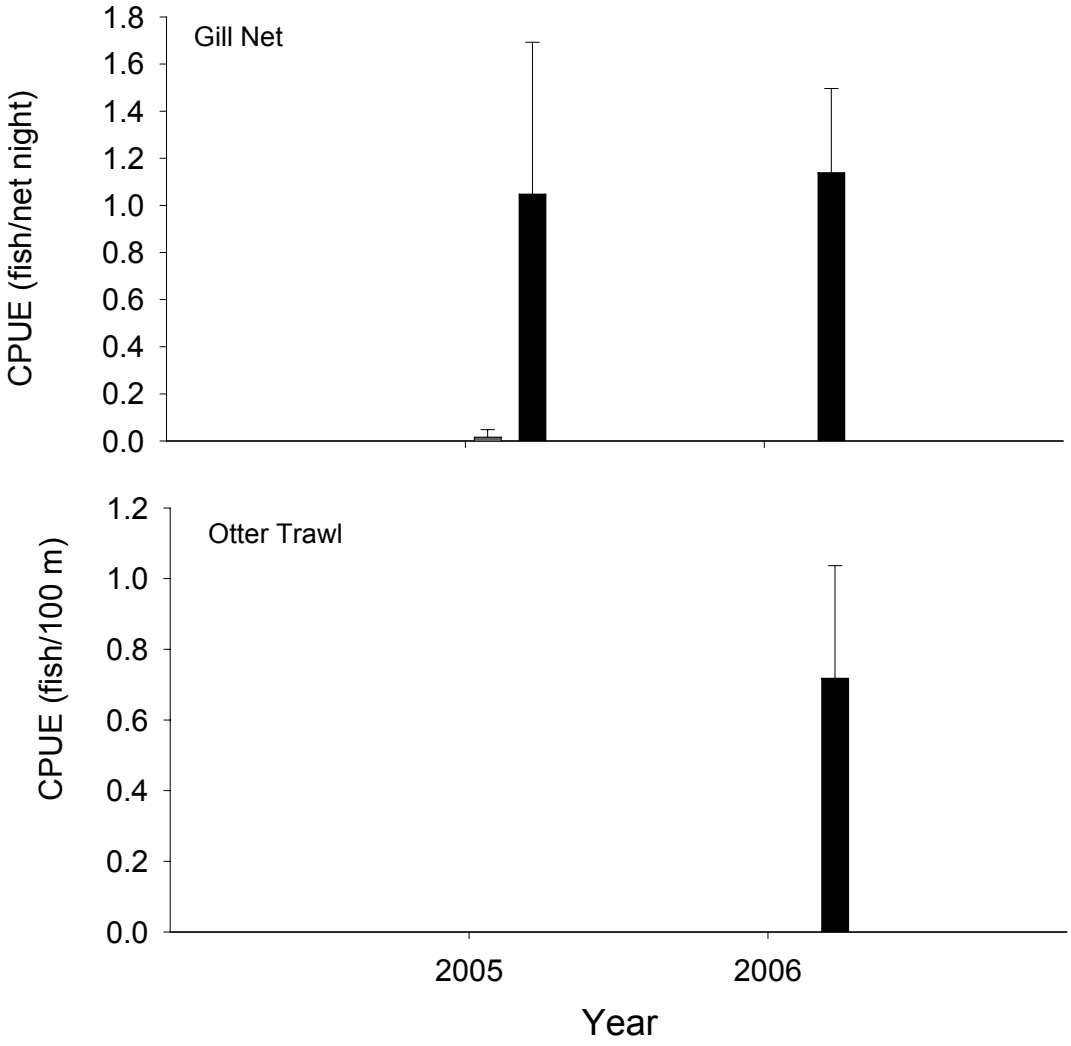

Figure 11. Mean annual catch-per-unit-effort (+/- 2SE) of sub-stock size (0-149 mm; white bars), sub-stock size (150-249; cross-hatched), stock size (250-379 mm; gray bars), and quality and above size (> 380 mm; black bars) shovelnose sturgeon using gill nets and otter trawls in segment 7 of the Missouri River during sturgeon season 2005 - 2006.

Segment 7 - Shovelnose Sturgeon / Sturgeon Season

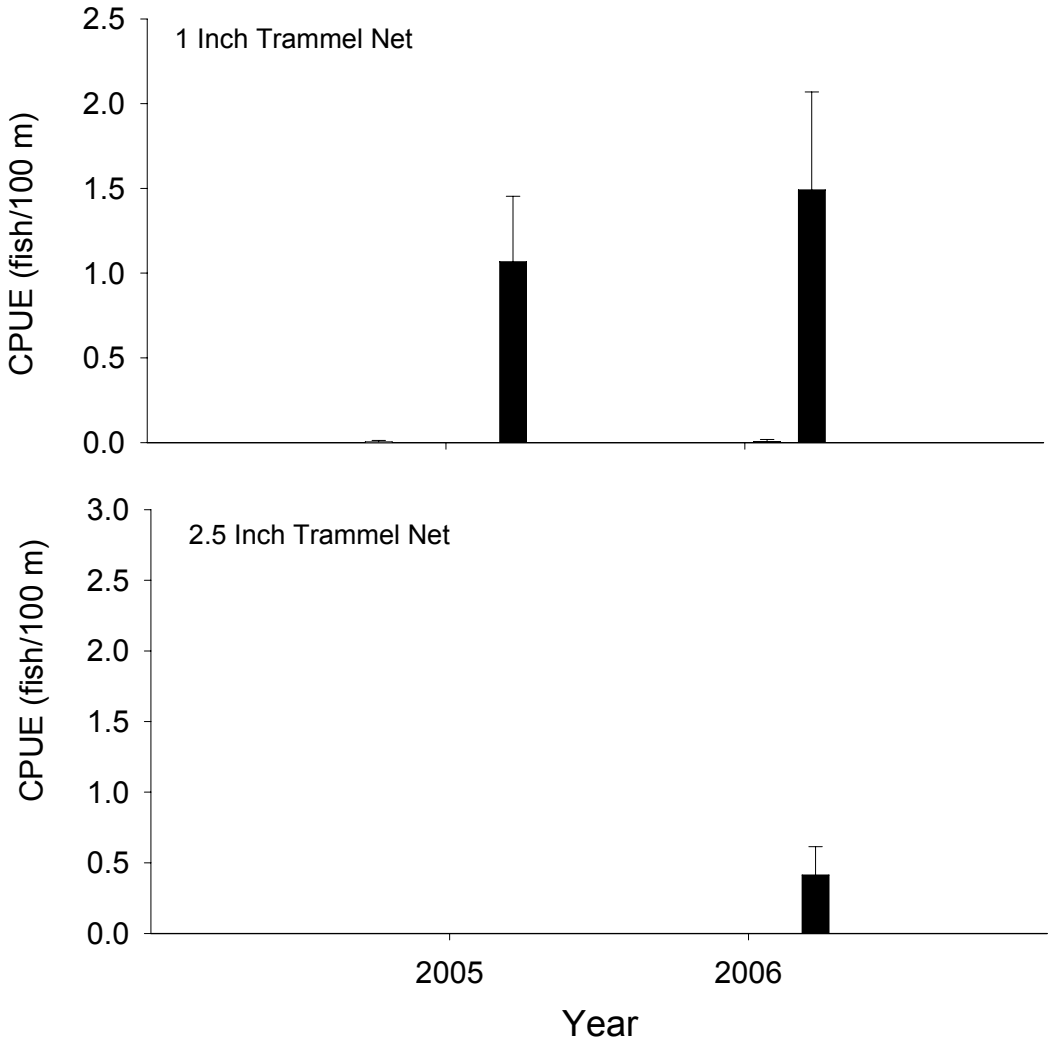

Figure 12. Mean annual catch-per-unit-effort (+/- 2SE) of sub-stock size (0-149 mm; white bars), sub-stock size (150-249; cross-hatched), stock size (250-379 mm; gray bars), and quality and above size (> 380 mm; black bars) shovelnose sturgeon using 1 and 2.5 inch trammel nets in segment 7 of the Missouri River during sturgeon season 2005 - 2006.

Segment 7 - Shovelnose Sturgeon / Fish Community Season

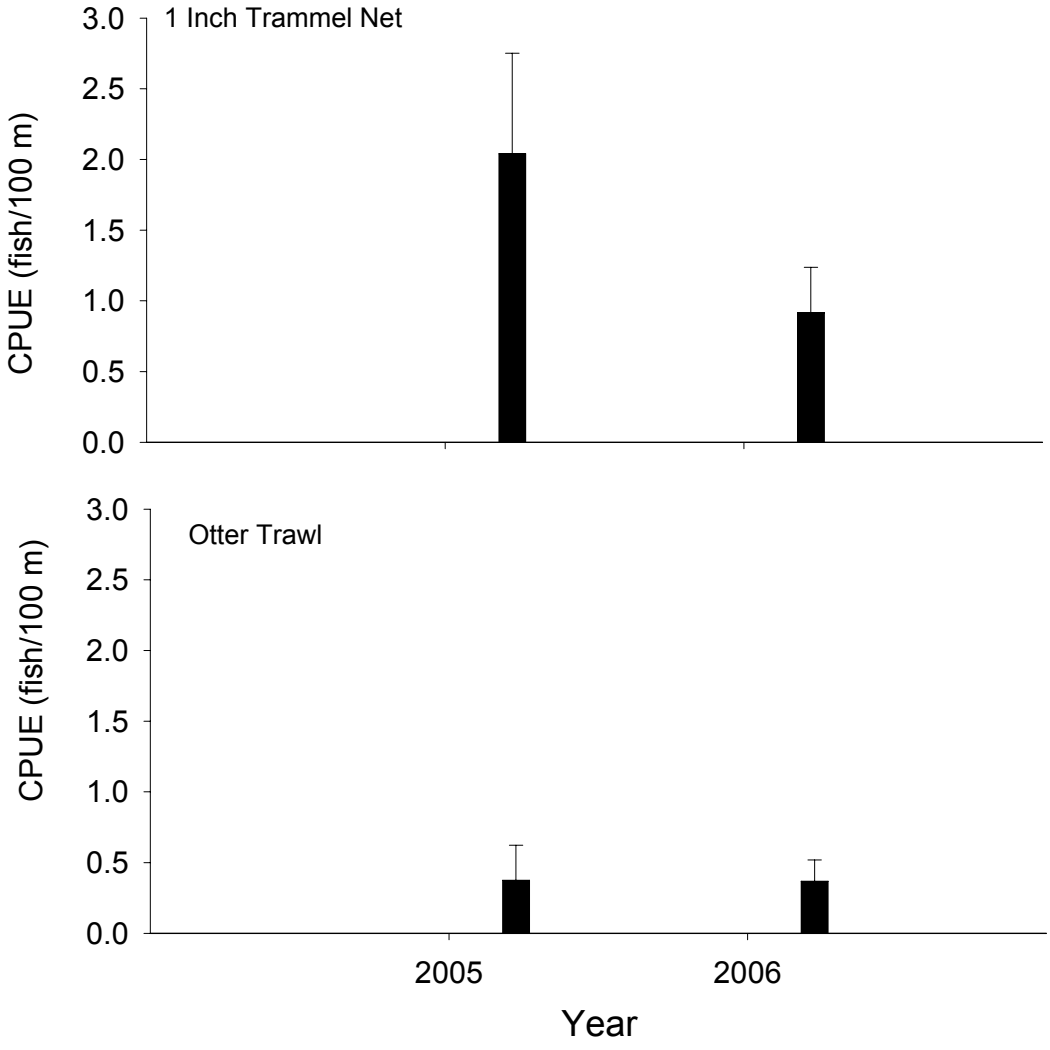

Figure 14. Mean annual catch-per-unit-effort (+/- 2SE) of sub-stock size (0-149 mm; white bars), sub-stock size (150-249; cross-hatched), stock size (250-379 mm; gray bars), and quality and above size (> 380 mm; black bars) shovelnose sturgeon using 1 inch trammel nets and otter trawls in segment 7 of the Missouri River during fish community season 2005 - 2006.

Table 17. Total number of sub-stock size (0-149 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 18. Total number of sub-stock size (0-149 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

Table 19. Total number of sub-stock size (150-249 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 20. Total number of sub-stock size (150-249 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	Mesohabitat				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

Table 21. Total number of stock size (250-379 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	1	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 22. Total number of stock size (250-379 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	1	0	100	0	0	0
		0	92	5	0	4
2.5 Inch Trammel Net	0	0	0	0	0	0
		0	97	2	1	0
Gill Net	0	0	0	0	0	0
		0	89	3	9	0
Otter Trawl	0	0	0	0	0	0
		0	94	6	0	0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0	0	0	0	0
		0	96	4	0	0
Mini-Fyke Net	0	0	0	0	0	0
		99	1	0	0	0
Otter Trawl	0	0	0	0	0	0
		0	94	6	0	0

Table 23. Total number of quality size and greater (≥380 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	336	23 16	13 16	3 4	2 6	5 8	24 19	21 19	9 5	1 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	86	5 11	15 16	7 5	0 4	8 4	22 27	33 29	10 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	262	23 21	8 20	2 2	1 4	3 3	31 25	11 19	7 3	8 2	0 0	0 0	5 2	0 0	0 0
Otter Trawl	131	36 18	18 17	2 2	5 12	5 7	14 17	8 19	8 5	5 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	115	10 18	11 13	3 4	3 8	8 8	17 20	27 22	21 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	65	25 22	18 16	 2	8 7	12 9	9 18	9 17	0 6	8 4	0 0	0 0	0 0	0 0	0 0

Table 24. Total number of quality size and greater (≥380 mm) shovelnose sturgeon captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. Size categories described in Table 25. N-E indicates the habitat is non-existent in the segment.

Gear	N	Mesohabitat				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	336	0	95	5	0	0
		0	92	5	0	4
2.5 Inch Trammel Net	86	0	88	12	0	0
		0	97	2	1	0
Gill Net	262	0	68	15	18	0
		0	89	3	9	0
Otter Trawl	131	0	94	6	0	0
		0	94	6	0	0
Fish Community Season (Summer)						
1 Inch Trammel Net	115	0	91	9	0	0
		0	96	4	0	0
Mini-Fyke Net	0	0	0	0	0	0
		99	1	0	0	0
Otter Trawl	65	0	89	11	0	0
		0	94	6	0	0

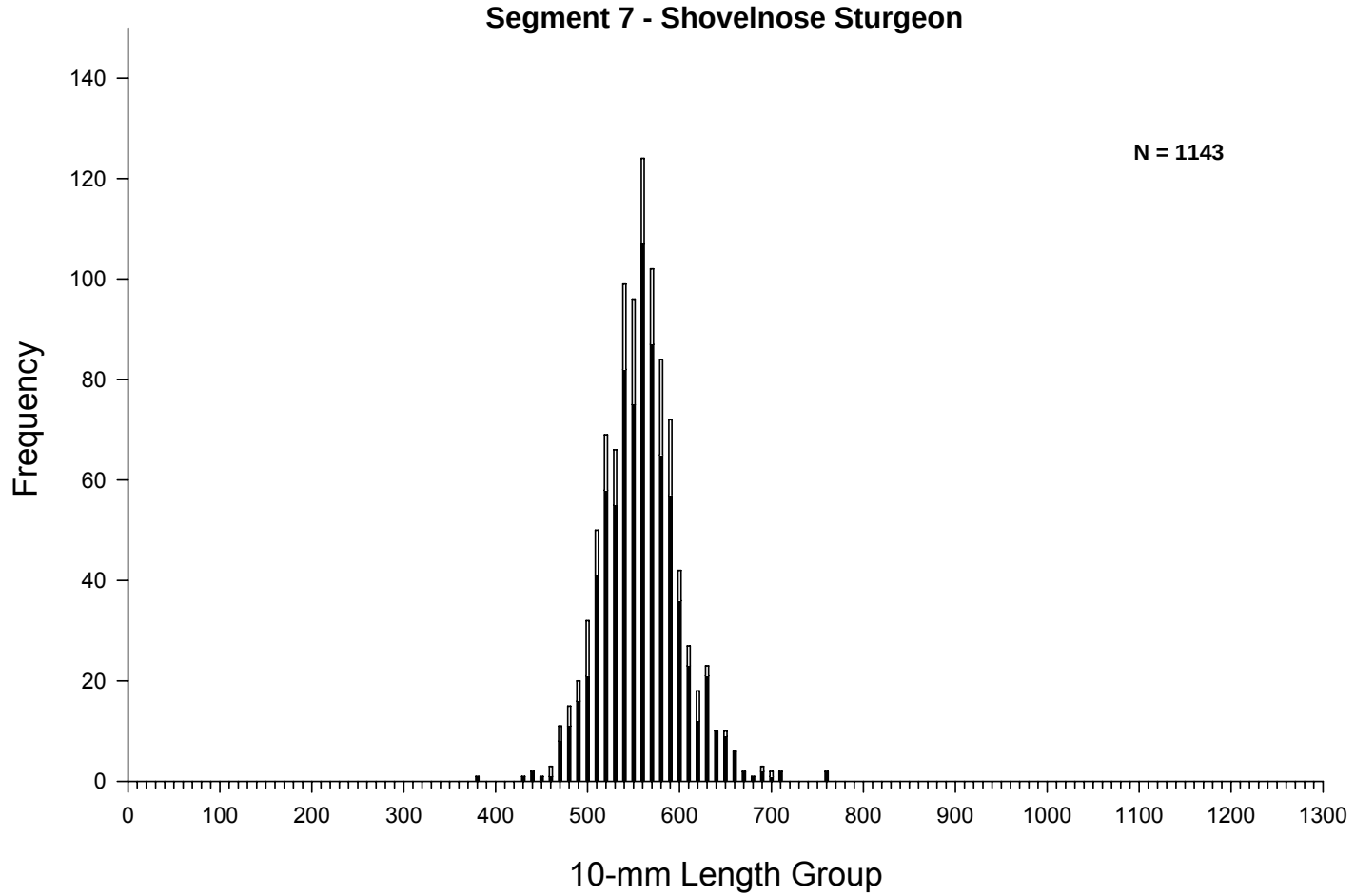

Figure 17. Length frequency of shovelnose sturgeon from fall through spring (sturgeon season, black bars) and summer (fish community season, white bars) in segment 7 of the Missouri River during 2005 - 2006.

Table 25. Incremental relative stock density (RSD)[a] and mean relative weight (Wr) by a length category for shovelnose sturgeon in segment 7 of the Missouri River captured during 2005 – 2006. Length categories[b] determined using methods proposed by Quist (1998).

Length category	N	RSD	Wr (+/- 2SE)
Sturgeon Season			
Sub-stock (0-149 mm)	0		
Sub-stock (150-249 mm)	0		
Stock	1		86.1
Quality	95	11.6	86.5 (3.0)
Preferred	695	85.2	79.8 (0.9)
Memorable	25	3.1	86.4 (4.9)
Trophy	0		
Overall Wr			81.2 (0.92)
Fish Community Season			
Sub-stock (0-149 mm)	0		
Sub-stock (150-249 mm)	0		
Stock	0		
Quality	32	17.8	81.4 (3.4)
Preferred	145	80.6	79.5 (1.8)
Memorable	3	1.7	69.4 (16.6)
Trophy	0		
Overall Wr			79.7 (1.6)

[a] RSD = (# of fish of a specified length class / # of fish ≥ minimum stock length fish) * 100.

[b] Length categories based on the percentage of the largest known shovelnose sturgeon: Sub-stock FL < 250 mm (20 %), Stock FL =250-379 mm (20 – 36 %), Quality FL = 380 – 509 mm (36 – 45 %), Preferred FL = 510 - 639 mm (45 – 59 %), Memorable FL = 640 – 809 mm (59 – 74 %), Trophy FL > 810 mm (>74 %).

Sturgeon Chub

No sturgeon chubs were captured during the 2006 season. A single specimen was captured during 2005 (Fish Community Season).

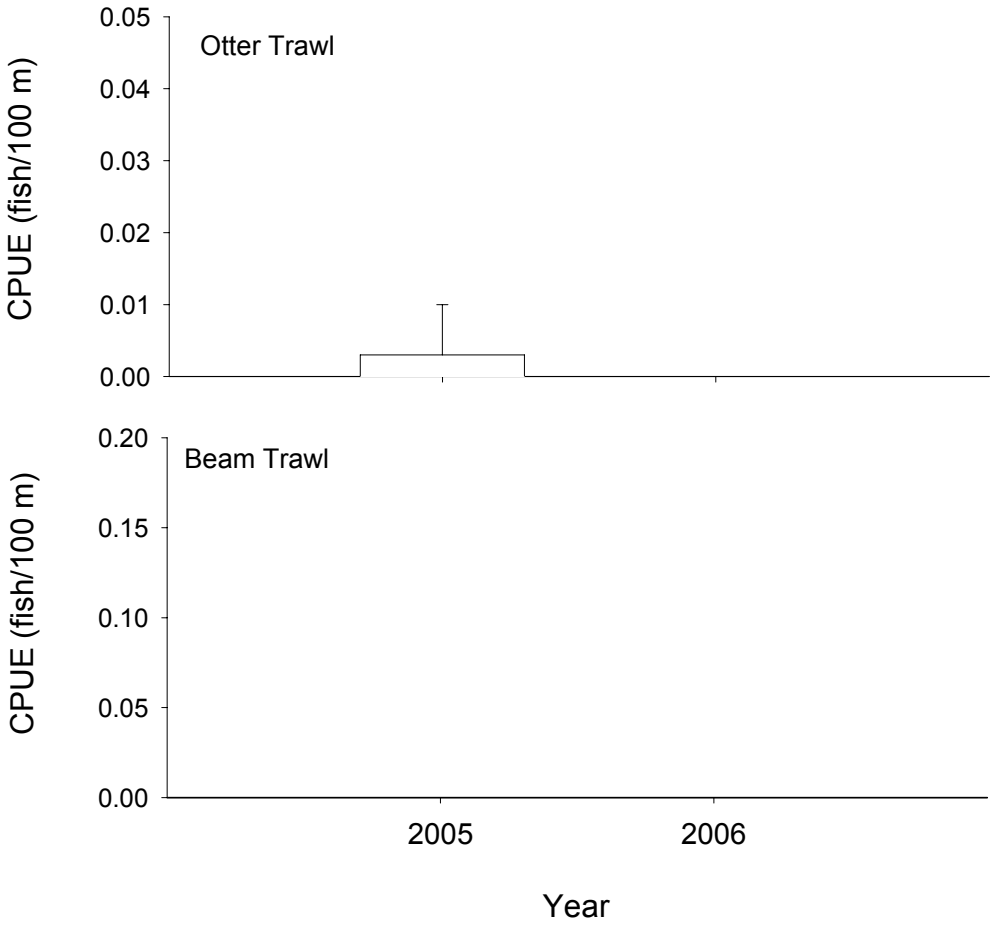

Figure 19. Mean annual catch-per-unit-effort (+/- 2SE) of sturgeon chub using otter trawls and beam trawls in segment 7 of the Missouri River during fish community season 2005-2006.

Table 26. Total number of sturgeon chubs captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 27. Total number of sturgeon chubs captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

Sicklefin Chub

Six sicklefin chubs were captured in 2006, all of them in otter trawls. Three of the chubs were caught on a single day (5/16/06) in large-mesh trawls near river mile 767. Two of the others were caught on 8/7/06 in consecutive large-mesh trawls near mile 756. The last chub was caught in a small-mesh trawl on 9/25/2006 near mile 768. Macro habitats associated with these captures included braided (3), inside bend (2), and deranged. Three of the chubs were caught during the sturgeon season and three during the fish community season. The 2005 fish community season produced one sicklefin chub.

Segment 7 - Sicklefin Chub / Sturgeon Season

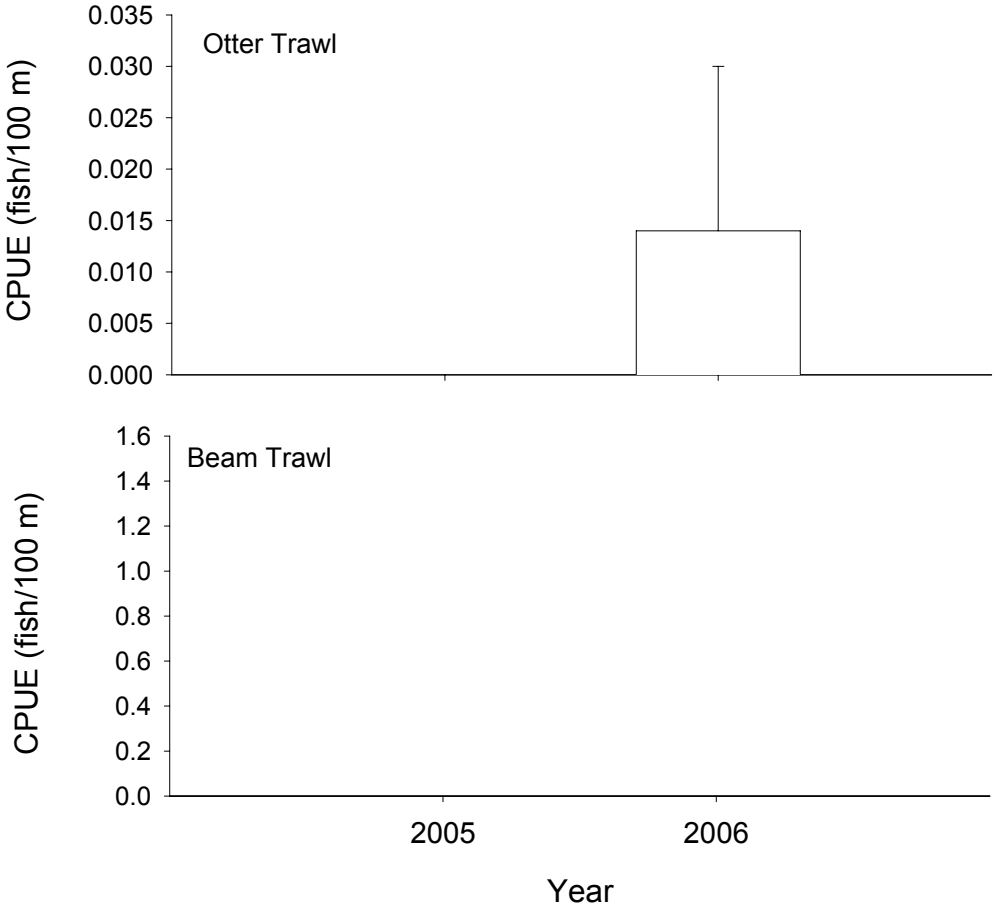

Figure 22. Mean annual catch-per-unit-effort (+/- 2SE) of sicklefin chub using otter trawls and beam trawls in segment 7 of the Missouri River during sturgeon season 2005-2006.

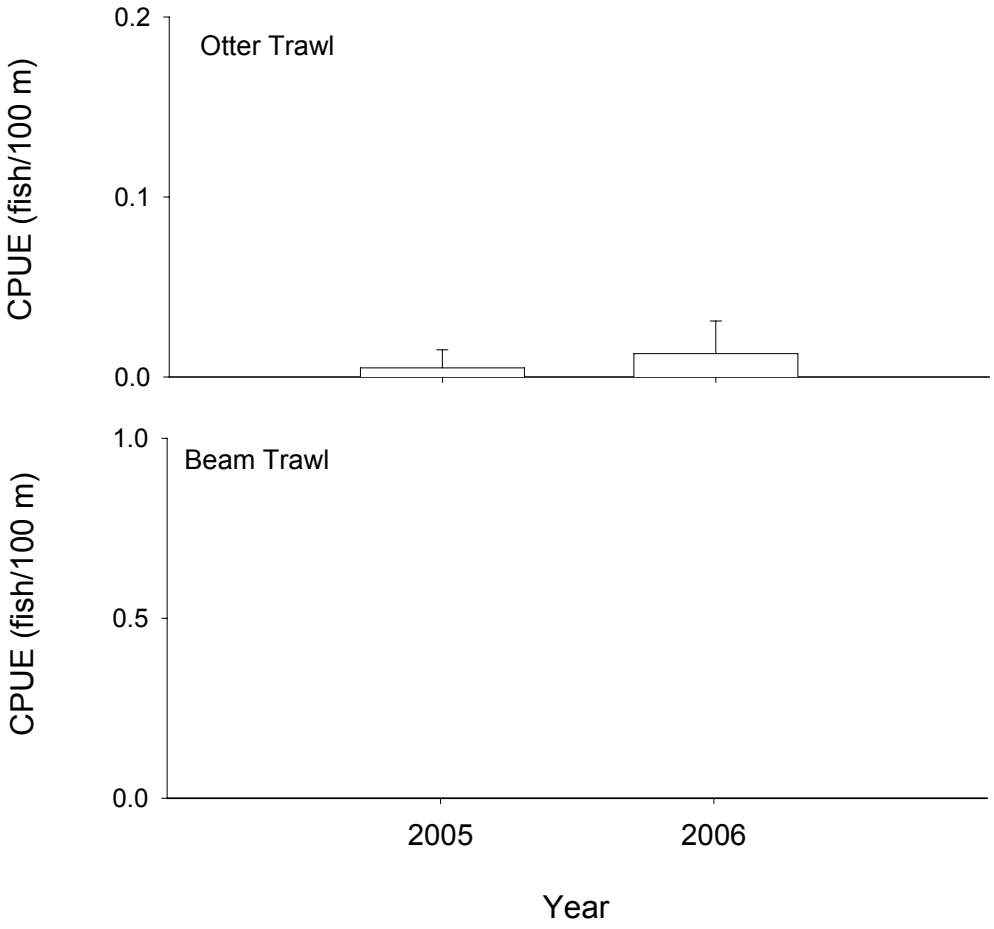

Figure 23. Mean annual catch-per-unit-effort (+/- 2SE) of sicklefin chub using otter trawls and beam trawls in segment 7 of the Missouri River during fish community season 2005-2006.

Table 28. Total number of sicklefin chubs captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	3	67 18	0 17	0 2	0 12	33 7	0 17	0 19	0 5	N-E 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	2	0 22	0 16	0 2	0 7	0 9	100 18	0 17	0 6	N-E 4	0 0	0 0	0 0	0 0	0 0

Table 29. Total number of sicklefin chubs captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	3	0 0	100 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	2	0 0	100 94	0 6	0 0	0 0

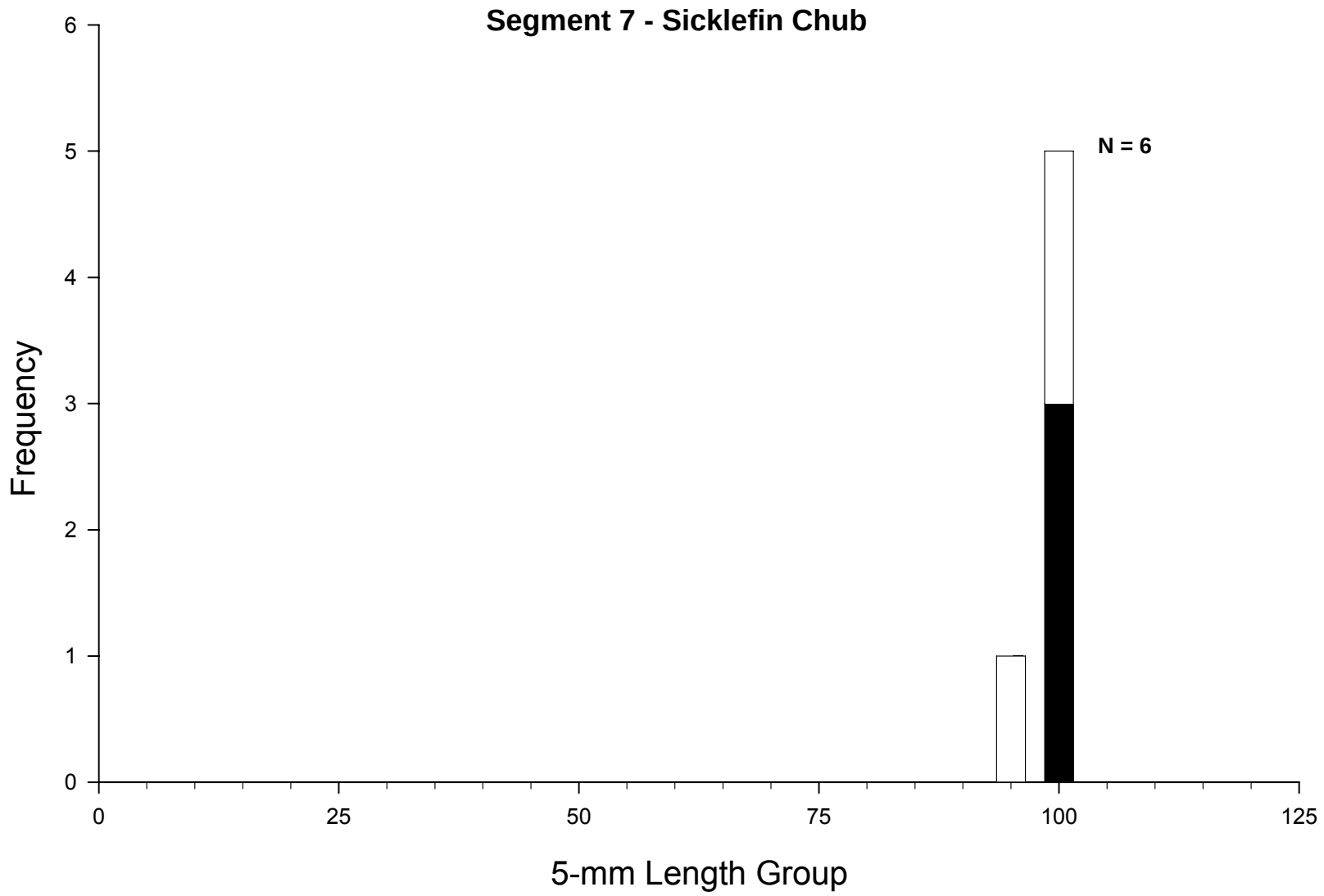

Figure 25. Length frequency of sicklefin chubs during fall through spring (sturgeon season, black bars) and summer (fish community season, white bars) in segment 7 of the Missouri River during 2005 - 2006.

Speckled Chub

Two speckled chubs were captured in 2006, both of them in the fish community season. The fish were caught in consecutive small-mesh otter trawl tows (wild gear) near river mile 801 on 9/06/06. Both of them were captured in inside bend macro habitats and channel border mesohabitats. The 2005 fish community season produced one speckled chub.

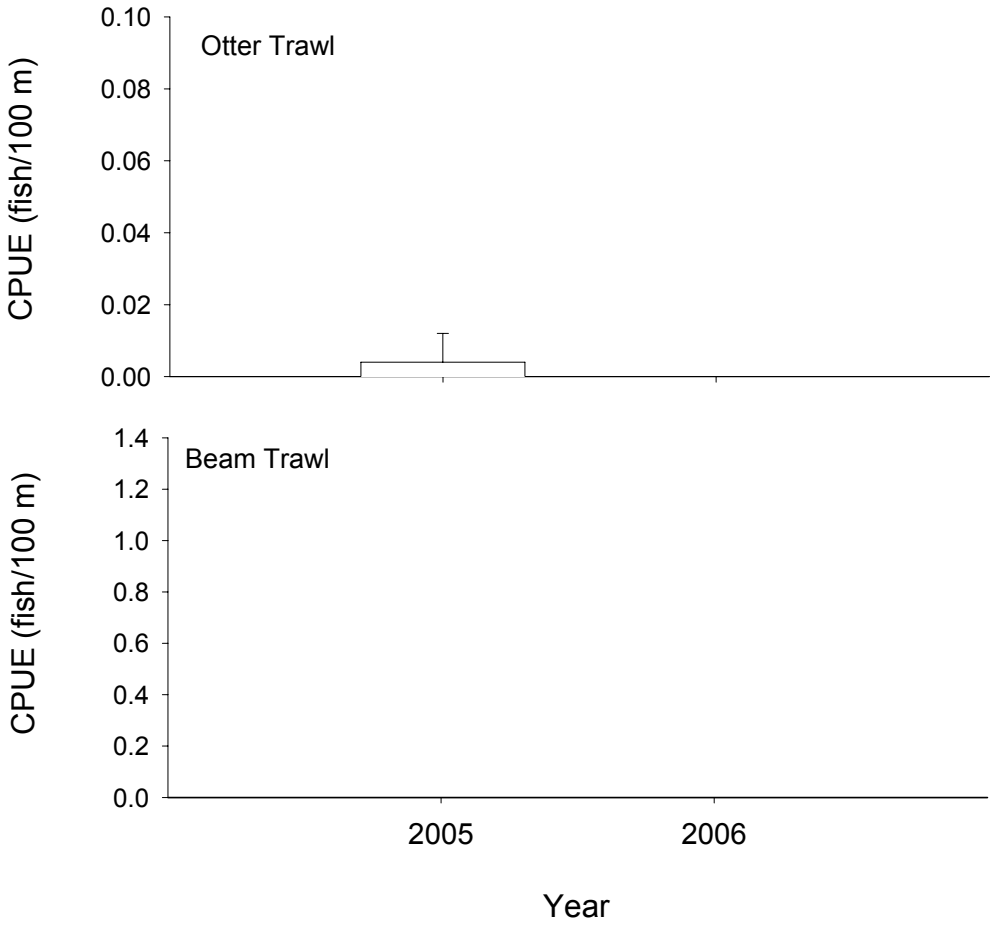

Figure 27. Mean annual catch-per-unit-effort (+/- 2SE) of speckled chub in segment 7 of the Missouri River during fish community season 2005 -2006.

Table 30. Total number of speckled chubs captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	0	0 18	0 17	0 2	0 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 31. Total number of speckled chubs captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

Sand Shiner

Sand shiners were common in Segment 7 in 2006. A total of 894 were sampled during the fish community season. Mini fyke nets produced 890 (8.5 fish/net night). Large-mesh otter trawls produced 3 sand shiners, and small-mesh trawls produced 1 sand shiner. Most of the fish were caught in dendritic habitat (50%), but all but 3 of those were captured in one particular net set. Braided macro habitats (15%) and outside bends (13%) produced the second and third most sand shiners. Habitat-based CPUE data can be found in Table 32. Sand shiners ranged in length from 30 mm to 63 mm (Figure 33). All but 3 were captured during the fish community season. The 2005 fish community season produced 1,251 sand shiners. However, 271 of those fish were captured in seine hauls. Mini fyke nets captured 979 sand shiners (9.6 fish/net night) in 2005, which slightly higher than the 2006 catch.

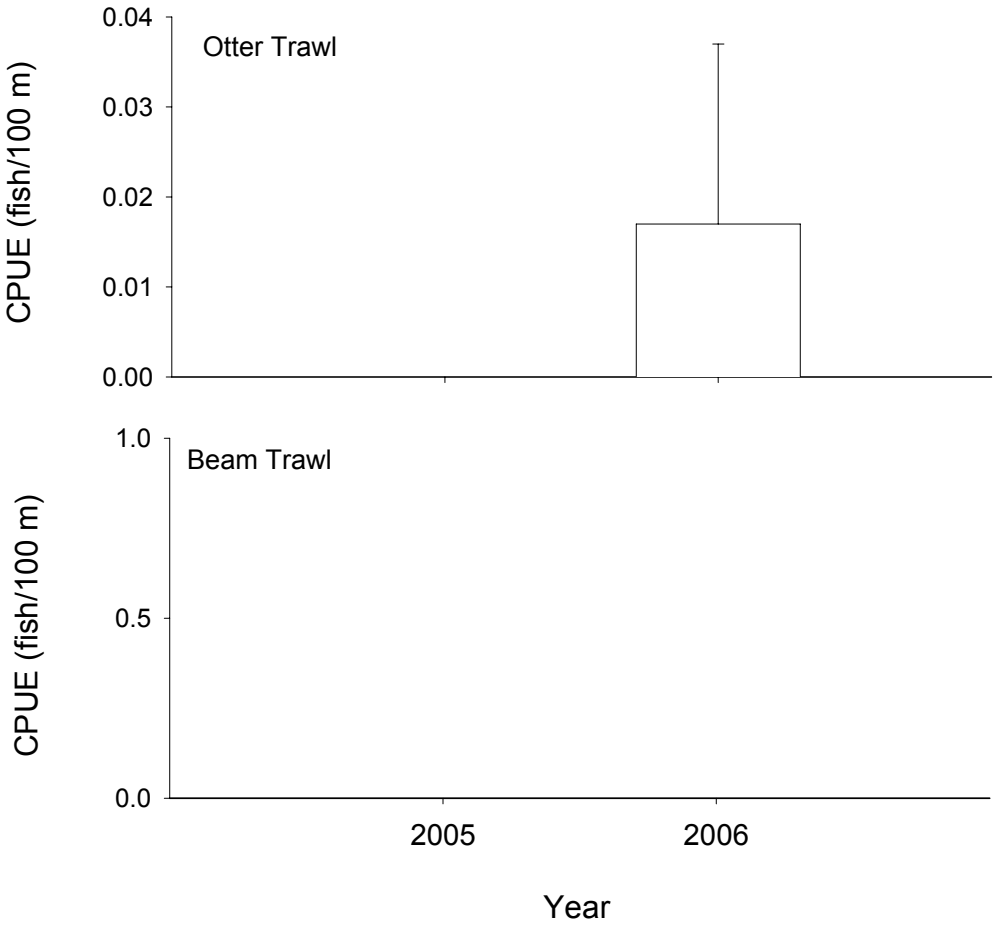

Figure 30. Mean annual catch-per-unit-effort (+/- 2SE) of sand shiner with otter trawls and beam trawls in segment 7 of the Missouri River during sturgeon season 2005 -2006.

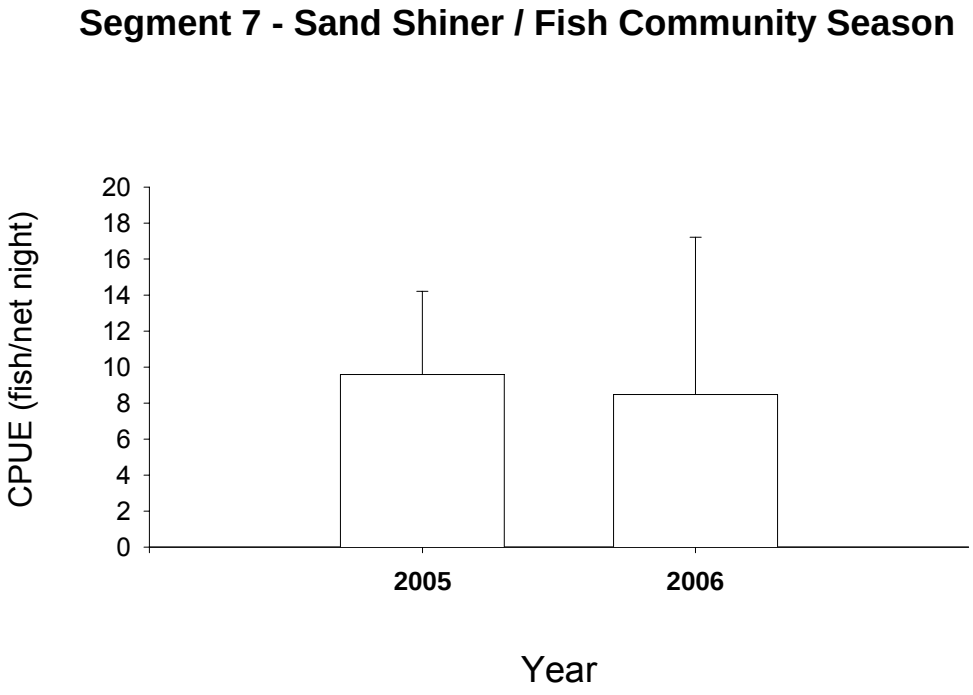

Figure 32. Mean annual catch-per-unit-effort (+/- 2SE) of sand shiner with mini-fyke nets in segment 7 of the Missouri River during fish community season 2005 - 2006.

Table 32. Total number of sand shiners captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	3	0 18	33 17	33 2	33 12	0 7	0 17	0 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	890	15 16	0 0	0 0	50 2	0 1	8 26	13 11	2 7	12 33	1 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 33. Total number of sand shiners captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	3	0 0	100 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	890	100 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

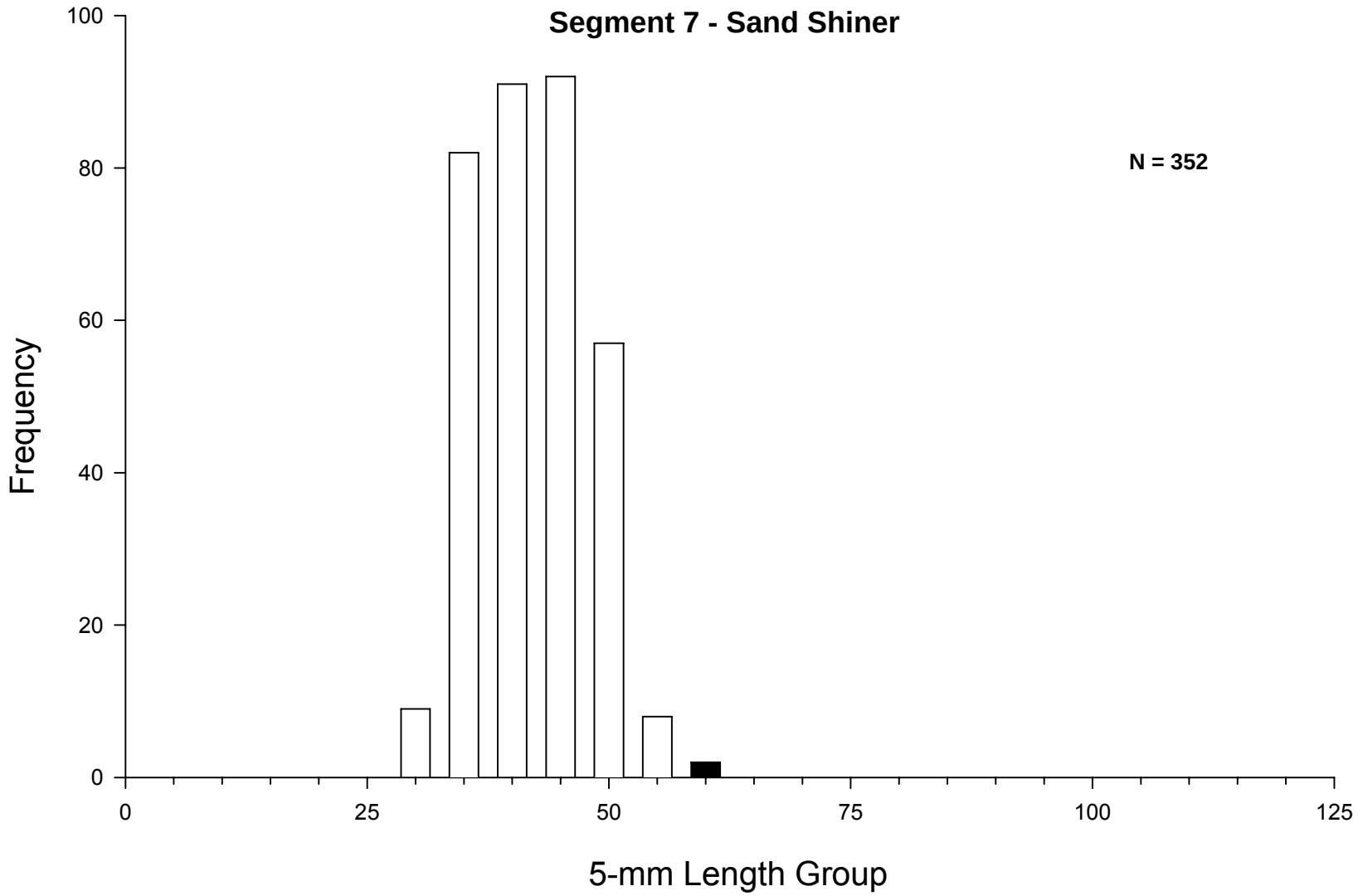

Figure 33. Length frequency of sand shiners during fall through spring (sturgeon season, black bars) and summer (fish community season, white bars) in segment 7 of the Missouri River during 2005- 2006.

***Hybognathus* spp**.

Ten Western silvery were captured in 2006, all of them during the sturgeon season. Large-mesh otter trawls accounted for 9 of the fish. Five of those were captured in a single tow near mile 755 on 4/5/06 (macro habitat: large secondary channel). The tenth fish was captured during hook and line (angling) sampling in a scour hole located behind a Meridian Bridge (mile 806) pillar. These fish ranged in length from 96 to 146 mm. No hybognathus spp. were captured during the fish community season. The 2005 fish community season produced 3 hybognathus spp., all of which were captured in seine hauls.

Segment 7 - *Hybognathus* spp. / Sturgeon Season

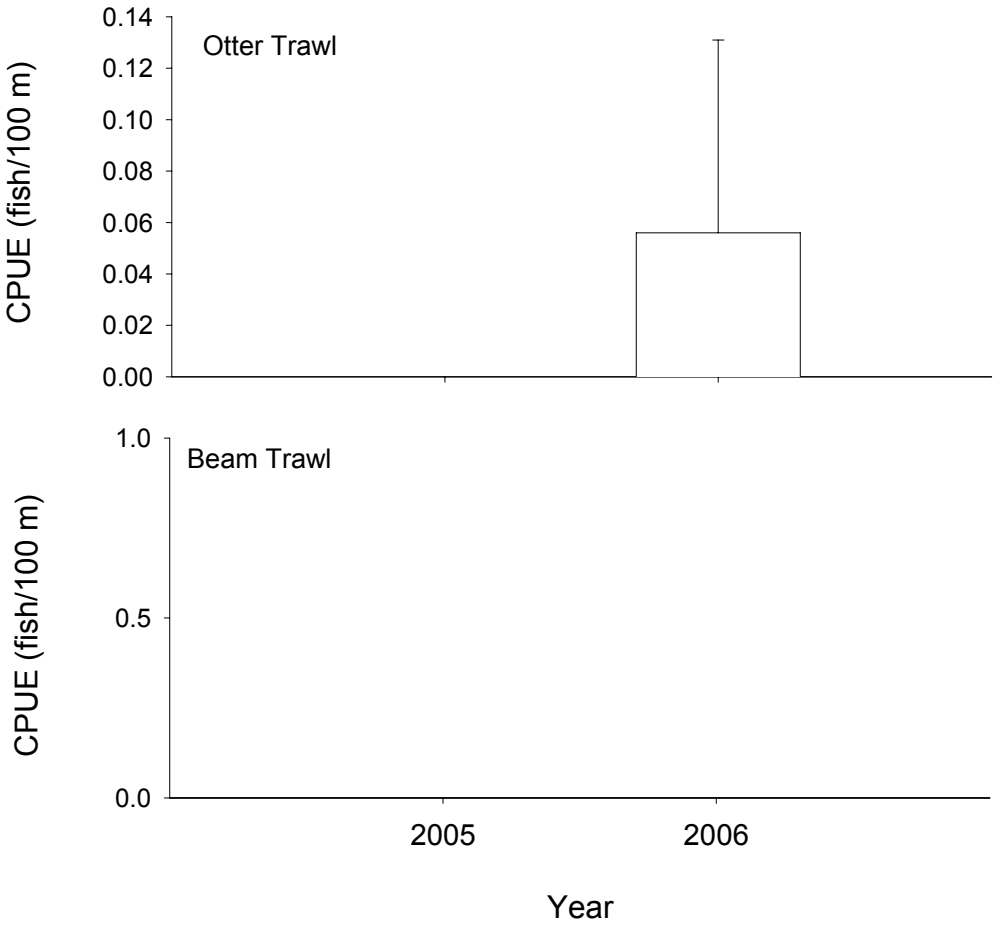

Figure 34. Mean annual catch-per-unit-effort (+/- 2SE) of *Hybognathus* spp. with otter trawls and beam trawls in segment 7 of the Missouri River during sturgeon season 2005 - 2006.

Table 34. Total number of *Hybognathus* spp. captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0 16	0 16	0 4	0 6	0 8	0 19	0 19	0 5	0 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	0	0 21	0 20	0 2	0 4	0 3	0 25	0 19	0 3	0 2	0 0	0 0	0 2	0 0	0 0
Otter Trawl	9	11 18	0 17	11 2	0 12	11 7	11 17	0 19	56 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	0	0 22	0 16	0 2	0 7	0 9	0 18	0 17	0 6	0 4	0 0	0 0	0 0	0 0	0 0

Table 35. Total number of *Hybognathus* spp. captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	0	0 0	0 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	0	0 0	0 89	0 3	0 9	0 0
Otter Trawl	9	0 0	100 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	0	0 0	0 94	0 6	0 0	0 0

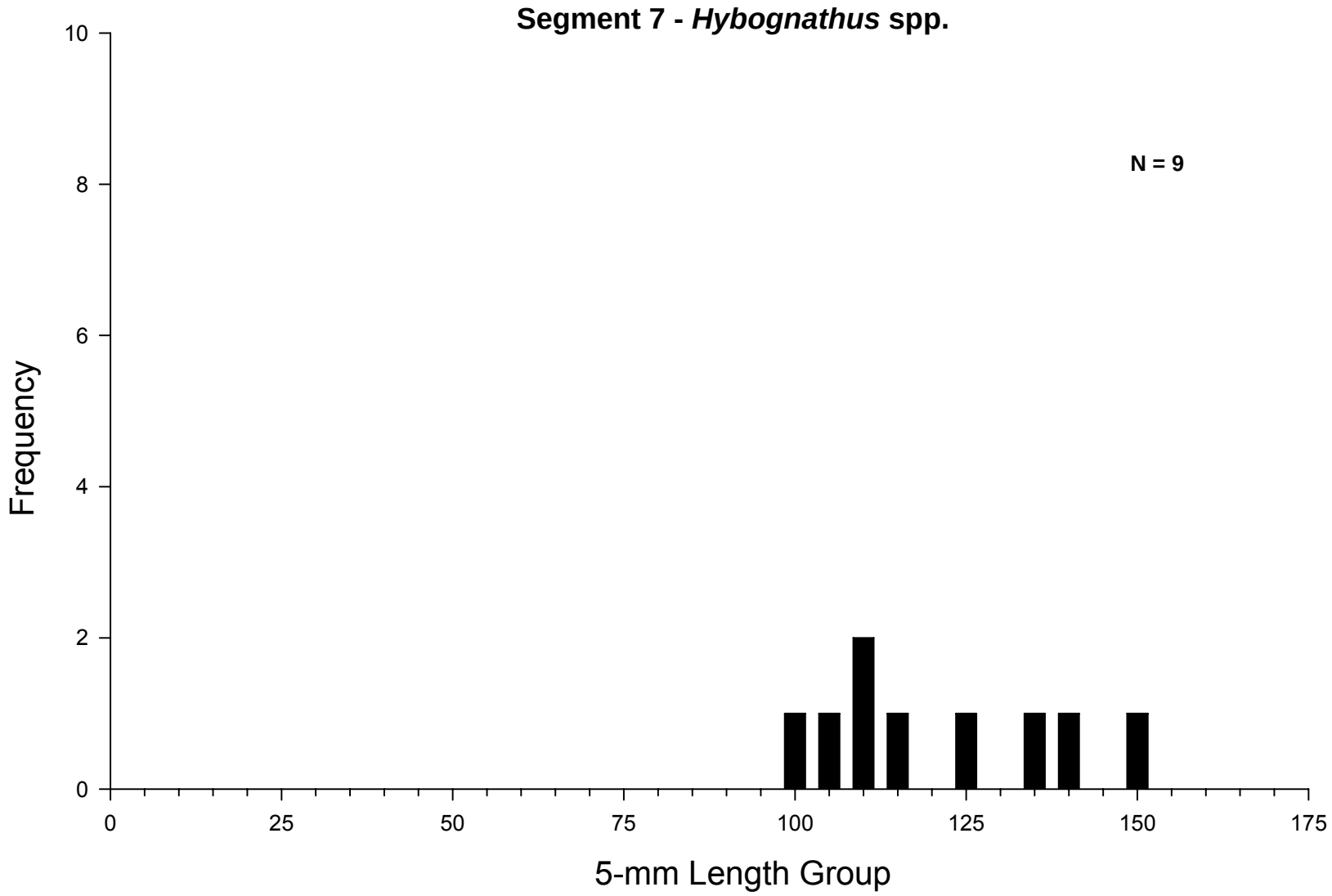

Figure 37. Length frequency of *Hybognathus* spp. caught during fall through spring (sturgeon season, black bars) and summer (fish community season, white bars) in segment 7 of the Missouri River during 2005 - 2006.

Blue Sucker

A total of 917 blue suckers were captured in 2006. That is a substantial increase over the number caught in 2005 (n=192). The vast majority (n=782) of these fish were caught during the sturgeon season, and 88% of those were captured between late February and late June. This period was not sampled during 2005. Active gears caught 596 fish and passive gears 321 fish in 2006. The majority of blue suckers were captured in large-mesh (2.5" inner panel) trammel nets (n= 334). Detailed catch per unit effort data can be found in Appendix H and tables 36 and 37. Gillnets captured 321 fish resulting in a CPUE of 1.4 fish per / night. That nearly doubles the 2005 catch rate (0.78 fish / net night). Large-mesh otter trawls captured 59 fish resulting in a CPUE of 0.5 fish / 100m. Small-mesh otter trawls captured only 4 blue suckers. No blue suckers were caught in mini-fyke nets.

Gears were set in a total of 11 macrohabitats. Blue suckers were captured in all of them. Blue suckers were most common in inside bend macro habitats during both the sturgeon and fish community seasons (Table 36). Most blue suckers were captured in channel border mesohabitats, producing 85% of our blue sucker catch. Catch rates for 1" trammel nets were the highest in confluence macrohabitats (0.8 fish / 100m).

Blue sucker lengths ranged from 190 to 819 mm (figure 44). Most of the fish (85%) were over 550 mm in length. This population is dominated by large fish. A 190 mm fish (determined to be age zero by scale and ray analysis) was captured in an otter trawl on 9/05/06 near river mile 767. This was the lone young-of-year blue sucker sampled in 2006. The fish was captured in a braided (macro habitat) channel border (meso habitat). Depths during the drift varied from 1.2 to 1.5 m. A single YOY blue sucker was also captured in 2005. This fish was also captured in a BRAD/CHNB habitat near river mile 767.

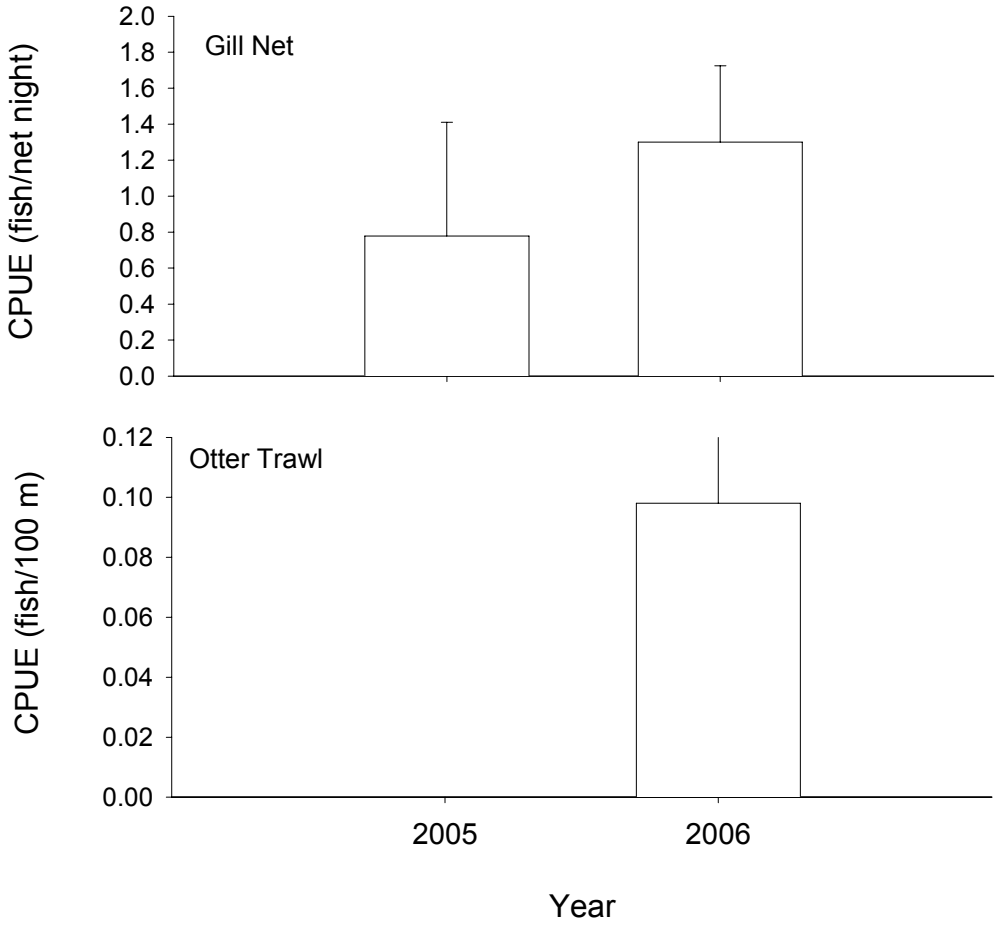

Figure 38. Mean annual catch-per-unit-effort (+/- 2SE) of blue sucker with gill nets and otter trawls in segment 7 of the Missouri River during sturgeon season 2005 - 2006.

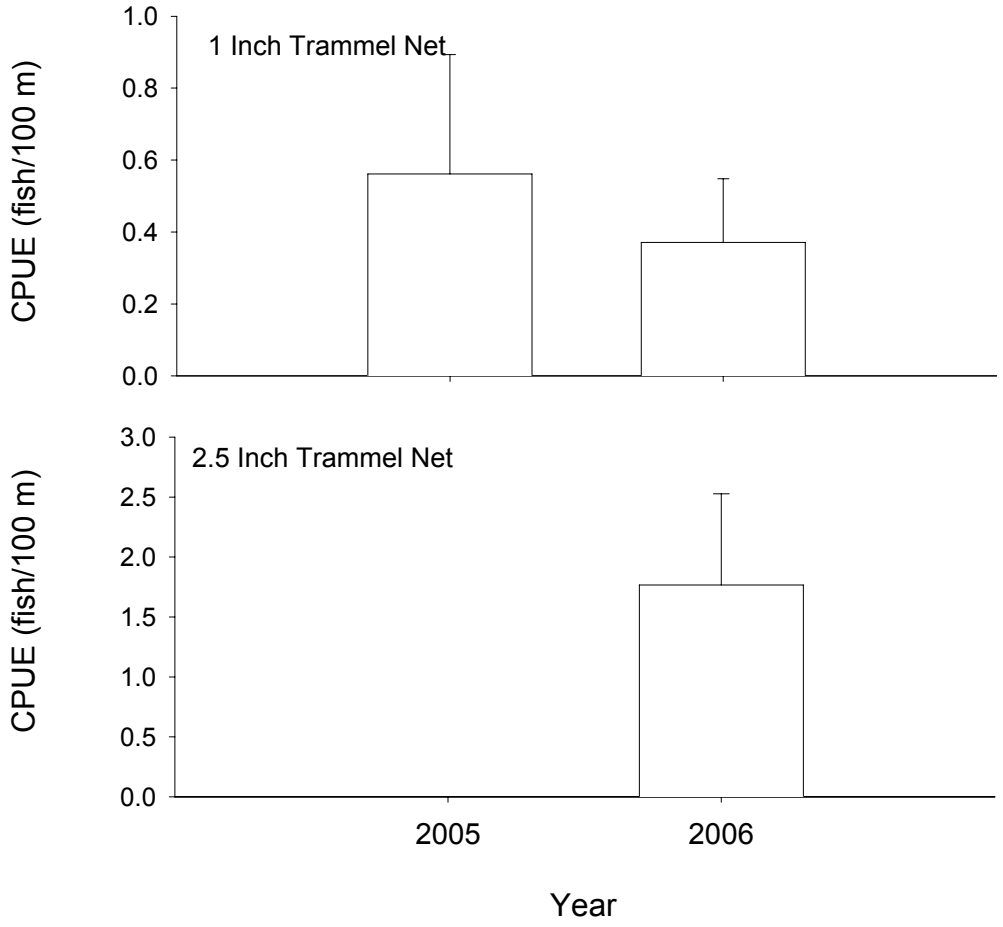

Figure 39. Mean annual catch-per-unit-effort (+/- 2SE) of blue sucker with 1 and 2.5 inch trammel nets in segment 7 of the Missouri River during sturgeon season 2005 - 2006.

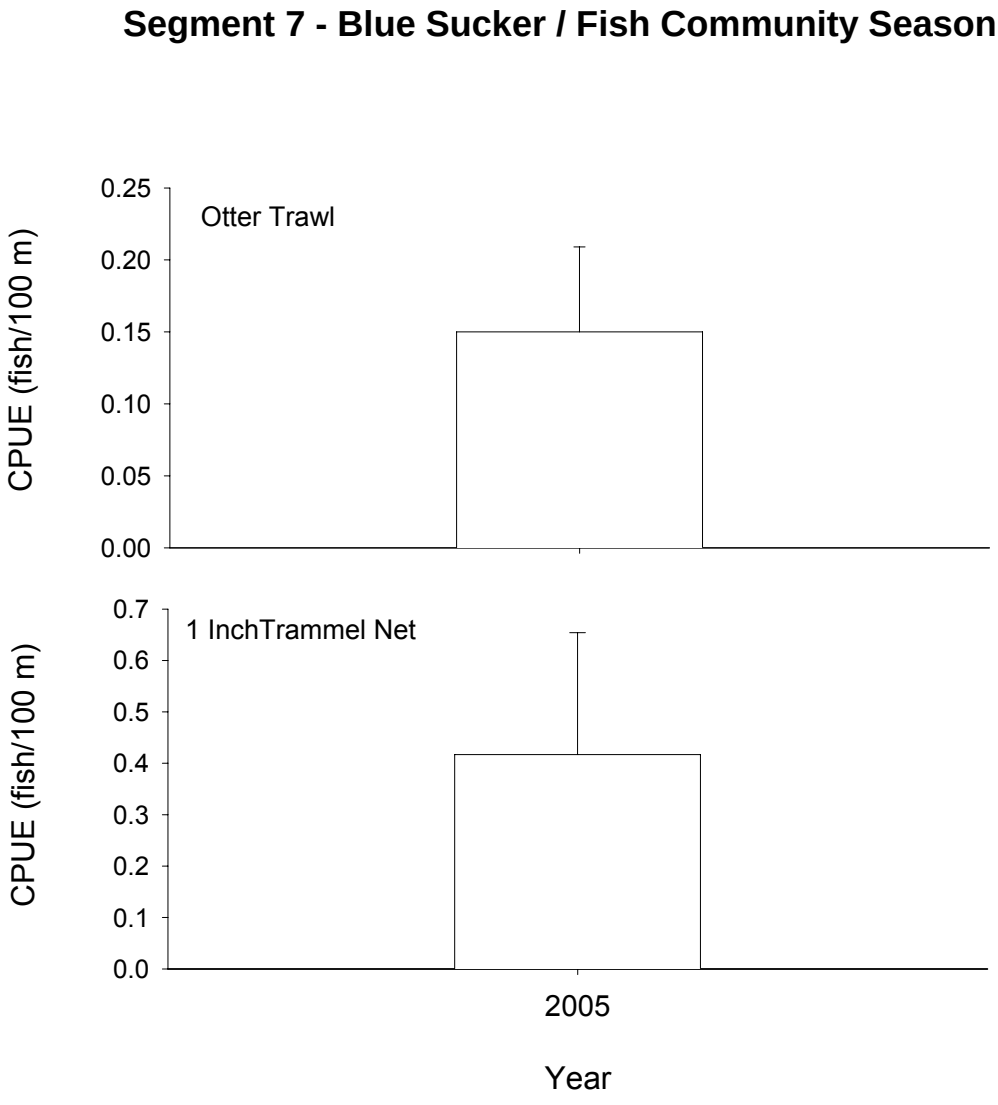

Figure 41. Mean annual catch-per-unit-effort (+/- 2SE) of blue sucker using otter trawls and 1 inch trammel nets in segment xx of the Missouri River during fish community season 2005 - 2006.

Table 36. Total number of blue suckers captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	85	4 16	18 16	11 4	4 6	12 8	24 19	6 19	4 5	N-E 2	0 0	0 0	0 0	0 0	20 4
2.5 Inch Trammel Net	334	16 11	10 16	2 5	2 4	10 4	42 27	11 29	4 3	2 1	0 0	0 0	0 0	10 0	10 0
Gill Net	299	20 21	9 20	6 2	0 4	1 3	24 25	15 19	0 3	9 2	0 0	0 0	11 2	0 0	0 0
Otter Trawl	22	5 18	27 17	0 2	0 12	5 7	45 17	18 19	0 5	N-E 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	66	2 18	18 13	3 4	2 8	2 8	44 20	30 22	0 6	N-E 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	37	5 22	38 16	0 2	0 7	0 9	24 18	30 17	0 6	N-E 4	0 0	0 0	0 0	0 0	0 0

Table 37. Total number of blue suckers captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	85	0	79	1	0	0
		0	92	5	0	4
2.5 Inch Trammel Net	334	0	93	4	2	0
		0	97	2	1	0
Gill Net	299	0	73	13	14	0
		0	89	3	9	0
Otter Trawl	22	0	100	0	0	0
		0	94	6	0	0
Fish Community Season (Summer)						
1 Inch Trammel Net	66	0	100	0	0	0
		0	96	4	0	0
Mini-Fyke Net	0	0	0	0	0	0
		99	1	0	0	0
Otter Trawl	37	0	97	3	0	0
		0	94	6	0	0

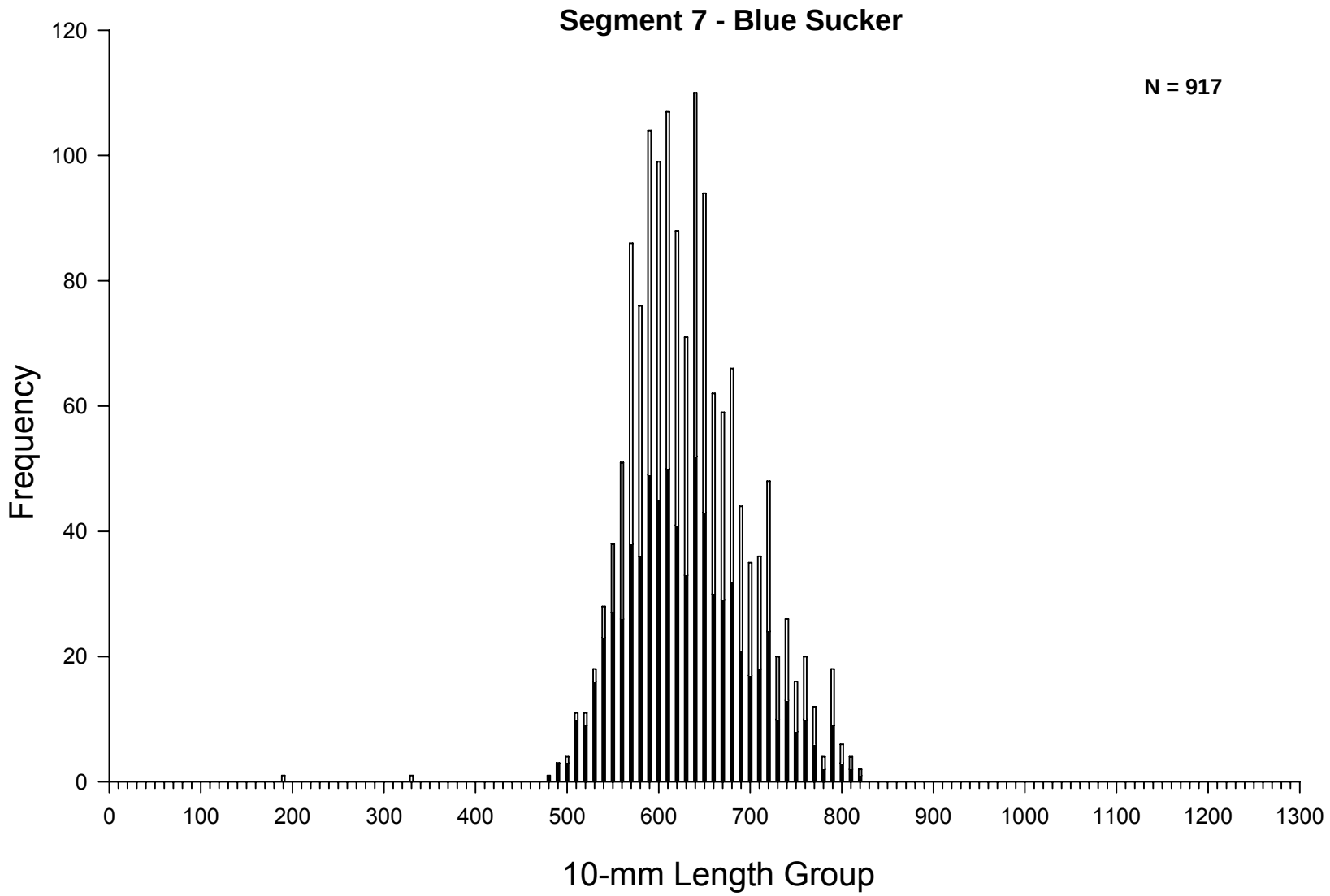

Figure 44. Length frequency of blue suckers during fall through spring (sturgeon season, black bars) and summer (fish community season, white bars) in segment 7 of the Missouri River during 2005 - 2006.

Sauger

A total of 17 saugers were captured in 2006. The majority (n=14) of these were captured during the sturgeon season. Gill nets were the most effective gear (n=10). The saugers ranged in length from 365-495 mm. Given the extensive hybridization and back-crossing among walleye *Sander vitreum*, sauger, and hybrids (saugeye) in this area, we could not confidently differentiate among young-of-year specimens. A total of 78 fish were classified as saugeye in 2006.

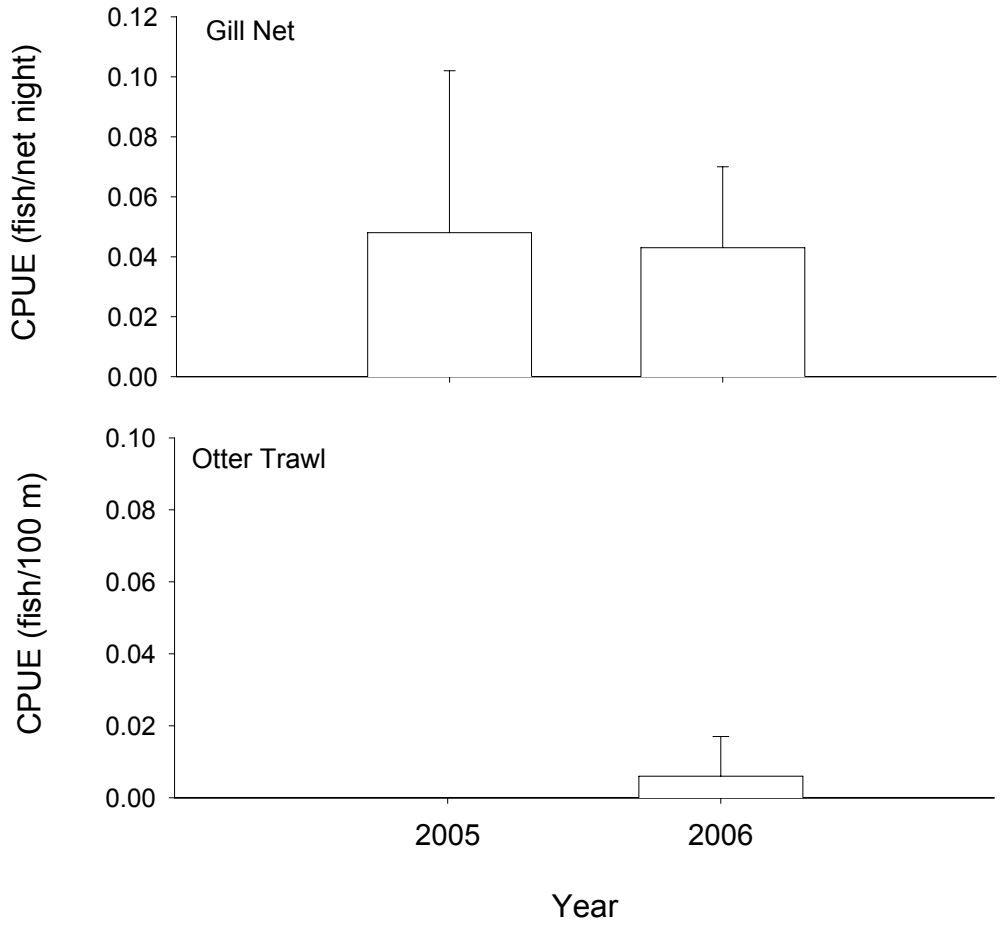

Figure 45. Mean annual catch-per-unit-effort (+/- 2SE) of sauger using gill nets and otter trawls in segment 7 of the Missouri River during sturgeon season 2005 - 2006.

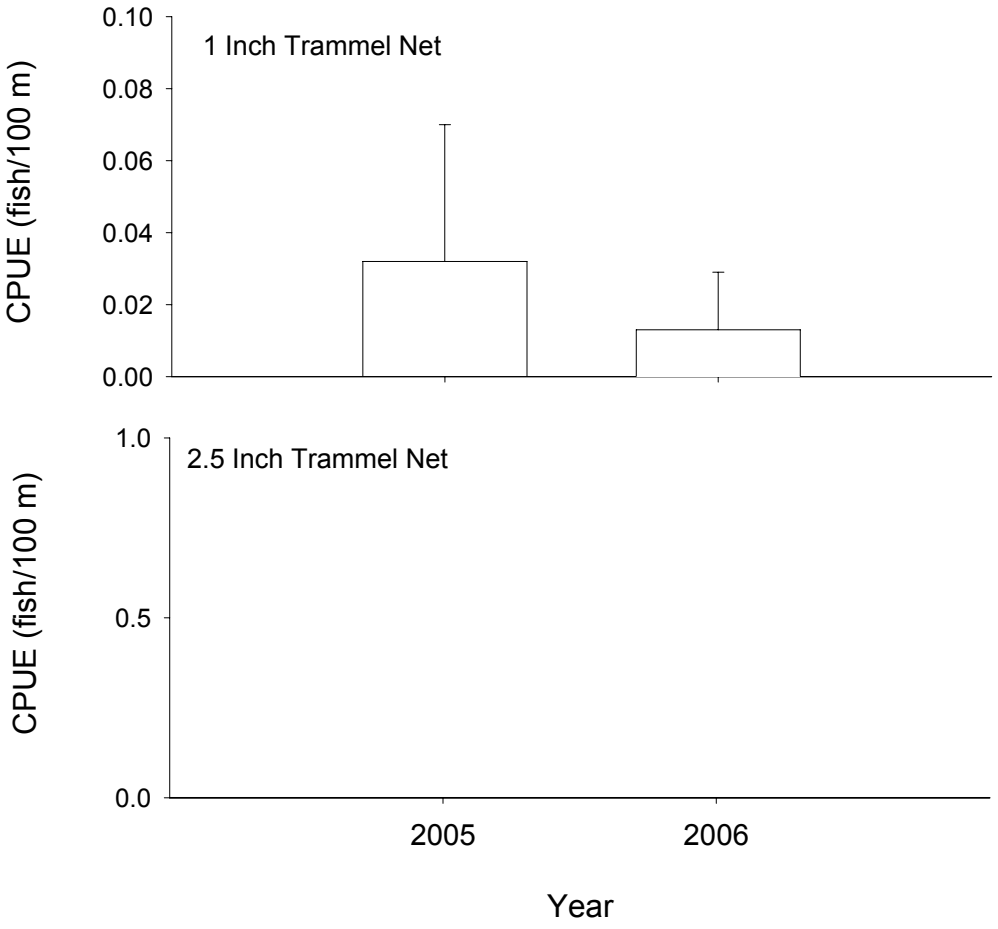

Figure 46. Mean annual catch-per-unit-effort (+/- 2SE) of sauger using 1 and 2.5 inch trammel nets in segment 7 of the Missouri River during sturgeon season 2005 - 2006.

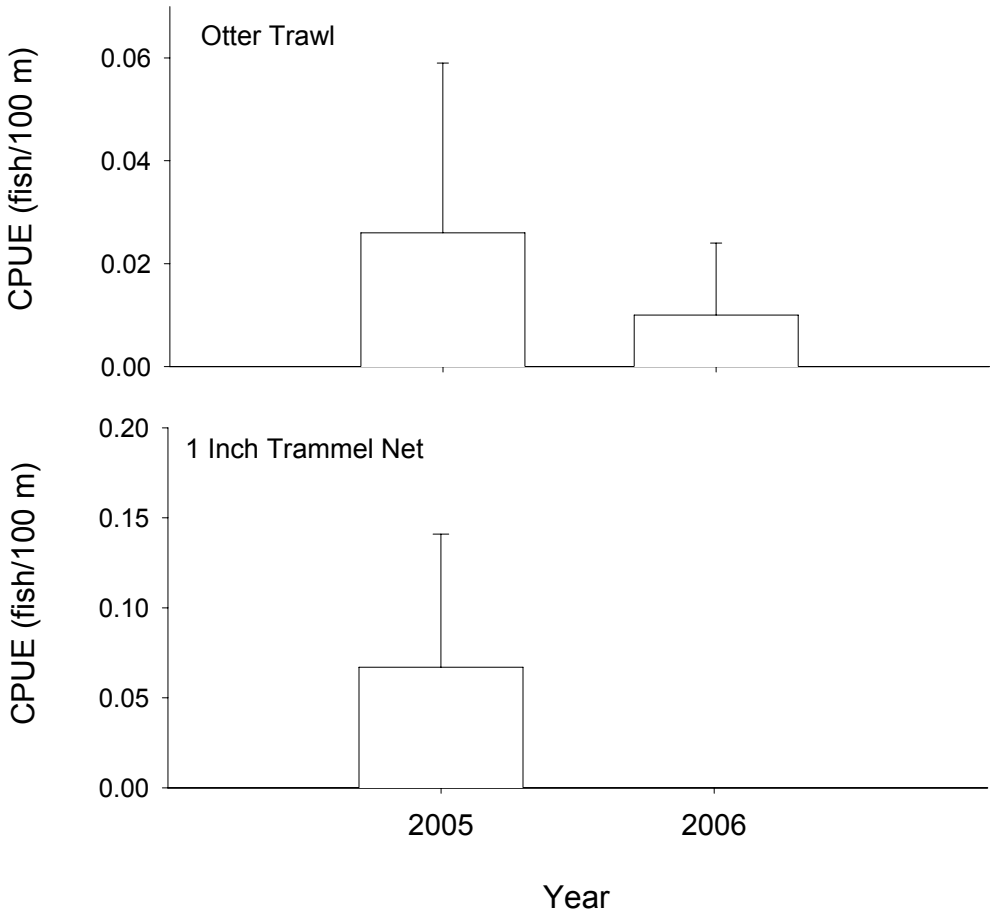

Figure 48. Mean annual catch-per-unit-effort (+/- 2SE) of sauger using otter trawls and 1 inch trammel nets in segment 7 of the Missouri River during fish community season 2005 - 2006.

Table 38. Total number of saugers captured for each gear during each season and the proportion caught within each macrohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	Macrohabitat													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	3	0 16	33 16	0 4	0 6	0 8	33 19	33 19	0 5	N-E 2	0 0	0 0	0 0	0 0	0 4
2.5 Inch Trammel Net	0	0 11	0 16	0 5	0 4	0 4	0 27	0 29	0 3	0 1	0 0	0 0	0 0	0 0	0 0
Gill Net	10	0 21	30 20	0 2	0 4	0 3	30 25	20 19	0 3	N-E 2	0 0	0 0	20 2	0 0	0 0
Otter Trawl	1	0 18	0 17	0 2	0 12	0 7	0 17	100 19	0 5	0 4	0 0	0 0	0 0	0 0	0 0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0 18	0 13	0 4	0 8	0 8	0 20	0 22	0 6	0 2	0 0	0 0	0 0	0 0	0 0
Mini-Fyke Net	0	0 16	0 0	0 0	0 2	0 1	0 26	0 11	0 7	0 33	0 2	0 2	0 0	0 0	0 0
Otter Trawl	2	0 22	50 16	0 2	0 7	0 9	50 18	0 17	0 6	N-E 4	0 0	0 0	0 0	0 0	0 0

Table 39. Total number of saugers captured for each gear during each season and the proportion caught within each mesohabitat type in segment 7 of the Missouri River during 2005 – 2006. The percent of total effort for each gear in each habitat is presented on the second line of each gear type. N-E indicates the habitat is non-existent in the segment.

Gear	N	**Mesohabitat**				
		BARS	CHNB	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)						
1 Inch Trammel Net	3	0 0	100 92	0 5	0 0	0 4
2.5 Inch Trammel Net	0	0 0	0 97	0 2	0 1	0 0
Gill Net	10	90 0	0 89	0 3	10 9	0 0
Otter Trawl	1	0 0	100 94	0 6	0 0	0 0
Fish Community Season (Summer)						
1 Inch Trammel Net	0	0 0	0 96	0 4	0 0	0 0
Mini-Fyke Net	0	0 99	0 1	0 0	0 0	0 0
Otter Trawl	2	0 0	100 94	0 6	0 0	0 0

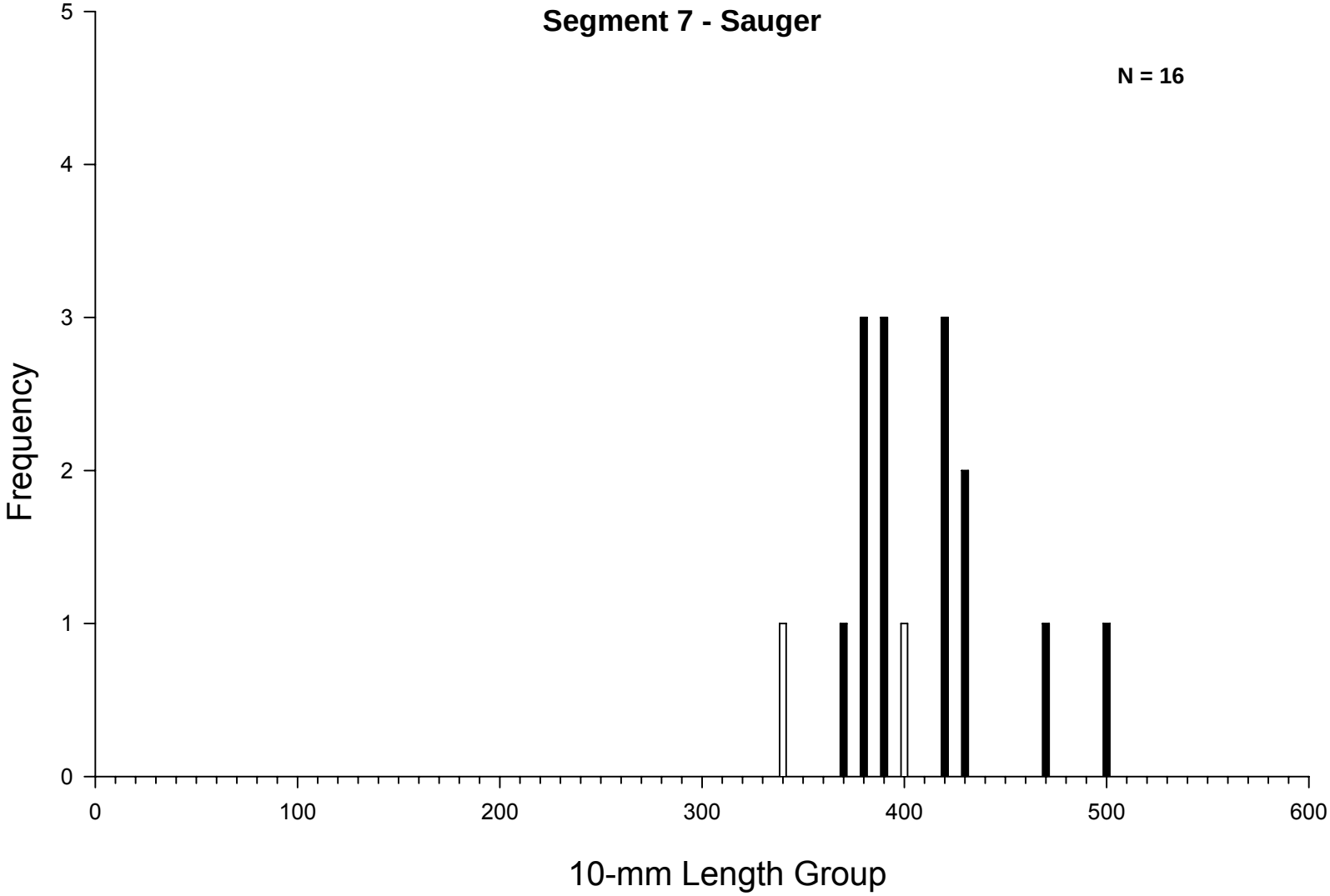

Figure 51. Length frequency of sauger during fall through spring (sturgeon season, black bars) and summer (fish community season, white bars) in segment 7 of the Missouri River during 2005 - 2006.

Missouri River Fish Community

A total of 52 species and 1 hybrid were captured in Segment 7 during the 2006 sampling season. This includes 11,021 individual fish. The most diversity (45 different species) was seen during the fish community season. The sturgeon season yielded 37 different species. The most common fish sampled during the fish community season were red shiners *Cyprinella lutrensis* (n=2,323), emerald shiners *Notropis atherinoides* (N= 1,490), and spotfin shiners *Cyprinella spiloptera* (n= 935). Nearly all of these were sampled in shallow water with mini-fyke nets. Shovelnose sturgeon (N=934), blue suckers (n=782), and goldeye *Hiodon alosoides* (n= 378) were the most common species during the sturgeon season.

All 6 of the gears used during 2006 caught native target species. Large-mesh otter trawls captured 7 of the 10 target fishes with the exception of sturgeon chubs, speckled chubs, and plains minnows. Mini-Fyke nets had the most diverse overall catch (33 species) and large-mesh trammel nets the least (16 species). Small mesh trammel nets caught 22 species (including 4 target fishes). Shovelnose sturgeon were the most common (number) fish captured in 1" trammel nets during both the sturgeon season (CPUE = 1.49 fish / 100m) and the fish community season (CPUE = 0.92 fish / 100m).

Saugeye were the most common percid sampled throughout 2006 (n=78). Walleye *Sander vitreum* catches totaled 57 fish. A total of 17 sauger were sampled. It is very likely that there are multiple generations of back-crossing, making it challenging to differentiate between saugers and saugeye.

Several exotic carp were sampled in 2006. We captured 1 silver carp, 6 bighead carp, 7 grass carp, and 14 common carp. Young-of-year common carp catches were down substantially from 2005. Only 4 age-zero common carp were caught in 2006 (compared to 132 in 2005). Silver carp were frequently observed jumping near the mouths of the James and Vermillion Rivers during the summer and early fall. Both bighead and silver carp seem very adept at avoiding our current gears. Bighead carp are often spotted in the tailrace area below Gavins Point Dam. Additionally, they are commonly taken by bow fishermen throughout Segment 7. No zebra mussels or Asian clams were observed in Segment 7 during 2006.

Through the end of the 2006 season we had the following turtle catches: 48 false map *Graptemys psudogeographica* , 14 smooth softshell *Apalone mutica*, and 1 painted turtle *Chrysemys picta bellii*. Mini-fyke nets accounted for all of the false map catches. Smooth

softshells were captured in the large-mesh trawl (n=7), mini-fyke nets (n=5), and small-mesh trammel nets (n=2). No spiny softshell turtles *Apalone spinifera* were captured.

Discussion

Based on 2006 results, no discernable habitat affinities for pallid sturgeon stood out. That is not surprising, given such a small sample size (n=9). Pallid sturgeon were captured in 7 of 13 different macro habitats sampled. Only outside bends and braided macro habitats produced more than a single capture (n=2). Channel crossovers, inside bends, dendritic, confluence, and deranged habitat all produced a single pallid sturgeon catch. Physical habitat data associated with the 9 captures was not very revealing either. Turbidity ranged from 7-30 ntu (mean = 17). Bottom velocity ranged from 0.13-0.7 mps (mean = 0.49). Capture depths ranged from 1.2 – 4.8m (mean =2.4). Based on this small number of catches, it would be difficult to predict pallid sturgeon locations in Segment 7.

Spatially, pallid catches show preliminary evidence of unequal distribution in Segment 7. After 1.75 sampling years, no pallid sturgeon have been captured between river miles 796 and 763 (roughly between the James and Vermillion River mouths). That 33-mile stretch of river represents 56% of Segment 7. Random sample site selection has resulted in reasonable sampling in the zone. Six bends were sampled within this stretch in 2005 and 5 bends in 2006. Due to low overall pallid sturgeon catches (n = 10 in 1.75 sampling years), more data is needed before drawing any conclusions. Shovelnose sturgeon catches could possibly be interpreted to show decreased catch rates in the same area as well. During 2006 only 32% of the shovelnose sturgeon catch came from the area in question (again, this area represents 56% of Segment 7). More data is needed before further speculation is warranted. Six bends will be sampled in this area during 2007.

Shovelnose sturgeon were captured in 10 different habitats during 2006. Small-mesh trammel net catch rates showed them to be most abundant in large secondary channel/island tip macro/meso habitats (CPUE = 2.73 fish/100m). Large secondary channel/channel border (2.67 fish/100m) and braided/channel border (1.27 fish/100m) produced the next highest catches. All of these habitats are found in reaches with complex channel systems and high heterogeneity.

Catch rates in 2006 show seasonal variation in shovelnose sturgeon abundance. In particular, there appears to be a pulse of fish in the area during the early spring period. Small-mesh trammel nets produced a catch rate of 4 shovelnose sturgeon per 100m in April (nearly 4 times higher than any other month). This catch rate quickly dropped off in May (1.59 fish/100m) and stayed near that level throughout the summer. Other researchers working in the same area noted similar trends in catches (Steve LaBay and Darin Simpkins, personal communication).

Shovelnose sturgeon catches indicated a lack of immature fish in Segment 7. Only 91 of 1,143 (8%) fish were less than 500 mm in length (Figure 17). That is consistent with the percentage of fish < 500mm in 2005 (9%). This could be the result of a general lack of reproduction/recruitment in Segment 7. It just as likely could indicate that larval sturgeon produced in this area drift downstream into the lower reaches of the river (Kynard et al. 2002). A third explanation is that current gears do not adequately sample young sturgeon. However, downstream crews have had success using these same gears (Doyle et al. 2005, NGPC 2004). Many gravid-looking sturgeon (robust and dark-colored midsection) were observed between March and July, indicating that spawning was possible. The effects of Gavins Point dam has led to a profusion of glacially-derived hard substrate (cobble and boulders) in the upper 10 miles of Segement 7 (USACE 1996). This type of habitat is a potential spawning site for sturgeon (Keenlyne 1989). Altered hydrographs, thermal regimes, and lack of sediment due to the effects of Gavins Point Dam could be affecting sturgeon spawning behavior in Segment 7 (Dryer and Sandvol 1993).

Blue sucker length data shows similarities to shovelnose sturgeon. Mature fish dominated the 2006 catch (Figure 44). Only 22 of 917 (%2) fish were less than 500 mm in length. That is a decrease in the percentage of the same size class from the 2005 season (5%). Relatively high catches of juvenile blue sucker were recorded in Segment 8 during 2006 (Kirk Stephensen, Nebraska Game and Parks Commission. Personal Communication). This indicates that current gears are effective at sampling this age class. Still, little is known about the early-life stages of this fish in the Missouri River.

Very few chubs were sampled in Segment 7 during 2007. Silver chubs were the most common (n=42). We also captured only 2 speckled and 6 sicklefin chubs. All of the chubs (excluding one silver) were sampled in the otter trawl. The low catch numbers may be partially attributable to the difficulty associated with trawling in such a challenging environment. Sand waves, cobble, and constant woody snags may decrease trawl efficiency. It is also possible that the effects of Gavins Point Dam have reduced chub numbers. Reduced turbidity may make these fish more vulnerable to sight-feeding predators (Everett 1999). Hydrograph or thermal modification could have also altered habitat and food availability (Hesse 1994). The same could be said for the *Hybognathus* spp. Only ten individuals were captured in 2006 (9 in otter trawls and one via hook and line).

Acknowledgments

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APPENDICES

Appendix A. Phylogenetic list of Missouri River fishes with corresponding letter codes used in the long-term pallid sturgeon and associated fish community sampling program. The phylogeny follows that used by the American Fisheries Society, Common and Scientific Names of Fishes from the United States and Canada, 5th edition. Asterisks and bold type denote targeted native Missouri River species.

Scientific name	Common name	Letter Code
	CLASS CEPHALASPIDOMORPHI-LAMPREYS	
	ORDER PETROMYZONTIFORMES	
	Petromyzontidae – lampreys	
Ichthyomyzon castaneus	Chestnut lamprey	CNLP
Ichthyomyzon fossor	Northern brook lamprey	NBLP
Ichthyomyzon unicuspis	Silver lamprey	SVLP
Ichthyomyzon gagei	Southern brook lamprey	SBLR
Petromyzontidae	Unidentified lamprey	ULY
Petromyzontidae larvae	Unidentified larval lamprey	LVLP
	CLASS OSTEICHTHYES – BONY FISHES	
	ORDER ACIPENSERIFORMES	
	Ascipenseridae – sturgeons	
Acipenser fulvescens	Lake sturgeon	LKSG
Scaphirhynchus spp.	Unidentified Scaphirhynchus	USG
Scaphirhynchus albus	**Pallid sturgeon**	**PDSG***
Scaphirhynchus platorynchus	**Shovelnose sturgeon**	**SNSG***
S. albus X S. platorynchus	Pallid-shovelnose hybrid	SNPD
	Polyodontidae – paddlefishes	
Polyodon spathula	Paddlefish	PDFH
	ORDER LEPISOSTEIFORMES	
	Lepisosteidae – gars	
Lepisosteus oculatus	Spotted gar	STGR
Lepisosteus osseus	Longnose gar	LNGR
Lepisosteus platostomus	Shortnose gar	SNGR
	ORDER AMMIFORMES	
	Amiidae – bowfins	
Amia calva	Bowfin	BWFN
	ORDER OSTEOGLOSSIFORMES	
	Hiodontidae – mooneyes	
Hiodon alosoides	Goldeye	GDEY
Hiodon tergisus	Mooneye	MNEY
	ORDER ANGUILLIFORMES	
	Anguillidae – freshwater eels	
Anguilla rostrata	American eel	AMEL

Appendix A. (continued).

Scientific name	Common name	Lettter Code
	ORDER CLUPEIFORMES	
	Clupeidae – herrings	
Alosa alabame	Alabama shad	ALSD
Alosa chrysochloris	Skipjack herring	SJHR
Alosa pseudoharengus	Alewife	ALWF
Dorosoma cepedianum	Gizzard shad	GZSD
Dorosoma petenense	Threadfin shad	TFSD
D. cepedianum X D. petenense	Gizzard-threadfin shad hybrid	GSTS
	ORDER CYPRINIFORMES	
	Cyprinidae – carps and minnows	
Campostoma anomalum	Central stoneroller	CLSR
Campostoma oligolepis	Largescale stoneroller	LSSR
Carassius auratus	Goldfish	GDFH
Carassus auratus X Cyprinius carpio	Goldfish-Common carp hybrid	GFCC
Couesius plumbens	Lake chub	LKCB
Ctenopharyngodon idella	Grass carp	GSCP
Cyprinella lutrensis	Red shiner	RDSN
Cyprinella spiloptera	Spotfin shiner	SFSN
Cyprinus carpio	Common carp	CARP
Erimystax x-punctatus	Gravel chub	GVCB
Hybognathus argyritis	**Western slivery minnow**	**WSMN***
Hybognathus hankinsoni	Brassy minnow	BSMN
Hybognathus nuchalis	Mississippi silvery minnow	SVMW
Hybognathus placitus	**Plains minnow**	**PNMW***
Hybognathus spp.	Unidentified Hybognathus	**HBNS***
Hypophthalmichthys molitrix	Silver carp	SVCP
Hypophthalmichthys nobilis	Bighead carp	BHCP
Luxilus chrysocephalus	Striped shiner	SPSN
Luxilus cornutus	Common shiner	CMSN
Luxilus zonatus	Bleeding shiner	BDSN
Lythrurus unbratilis	Western redfin shiner	WRFS
Macrhybopsis aestivalis	**Speckled chub**	**SKCB***
Macrhybopsis gelida	**Sturgeon chub**	**SGCB***
Macrhybopsis meeki	**Sicklefin chub**	**SFCB***
Macrhybopsis storeriana	Silver chub	SVCB
M. aestivalis X M. gelida	Speckled-Sturgeon chub hybrid	SPST
M. gelida X M. meeki	Sturgeon-Sicklefin chub hybrid	SCSC
Macrhybopsis spp.	Unidentified chub	UHY
Margariscus margarita	Pearl dace	PLDC
Mylocheilus caurinus	Peamouth	PEMT
Nocomis biguttatus	Hornyhead chub	HHCB
Notemigonus crysoleucas	Golden shiner	GDSN
Notropis atherinoides	Emerald shiner	ERSN
Notropis blennius	River shiner	RVSN
Notropis boops	Bigeye shiner	BESN
Notropis buchanani	Ghost shiner	GTSN
Notropis dorsalis	Bigmouth shiner	BMSN
Notropis greenei	Wedgespot shiner	WSSN

Appendix A. (continued).

Scientific name	Common name	Letter Code
	Cyprinidae – carps and minnows	
Notropis heterolepsis	Blacknose shiner	BNSN
Notropis hudsonius	Spottail shiner	STSN
Notropis nubilus	Ozark minnow	OZMW
Notropis rubellus	Rosyface shiner	RYSN
Notropis shumardi	Silverband shiner	SBSN
Notropis stilbius	Silverstripe shiner	SSPS
Notropis stramineus	**Sand shiner**	**SNSN***
Notropis topeka	Topeka shiner	TPSN
Notropis volucellus	Mimic shiner	MMSN
Notropis wickliffi	Channel shiner	CNSN
Notropis spp.	Unidentified shiner	UNO
Opsopoeodus emiliae	Pugnose minnow	PNMW
Phenacobius mirabilis	Suckermouth minnow	SMMW
Phoxinus eos	Northern redbelly dace	NRBD
Phoxinus erythrogaster	Southern redbelly dace	SRBD
Phoxinus neogaeus	Finescale dace	FSDC
Pimephales notatus	Bluntnose minnow	BNMW
Pimephales promelas	Fathead minnow	FHMW
Pimephales vigilas	Bullhead minnow	BHMW
Platygobio gracilis	Flathead chub	FHCB
P. gracilis X M. meeki	Flathead-sicklefin chub hybrid	FCSC
Rhinichthys atratulus	Blacknose dace	BNDC
Rhinichthys cataractae	Longnose dace	LNDC
Richardsonius balteatus	Redside shiner	RDSS
Scardinius erythrophtalmus	Rudd	RUDD
Semotilus atromaculatus	Creek chub	CKCB
	Unidentified Cyprinidae	UCY
	Unidentified Asian Carp	UAC
	Catostomidae - suckers	
Carpiodes carpio	River carpsucker	RVCS
Carpiodes cyprinus	Quillback	QLBK
Carpiodes velifer	Highfin carpsucker	HFCS
Carpiodes spp.	Unidentified Carpiodes	UCS
Catostomus catostomus	Longnose sucker	LNSK
Catostomus commersoni	White sucker	WTSK
Catostomus platyrhynchus	Mountain sucker	MTSK
Catastomus spp.	Unidentified *Catastomus* spp.	UCA
Cycleptus elongatus	**Blue sucker**	**BUSK***
Hypentelium nigricans	Northern hog sucker	NHSK
Ictiobus bubalus	Smallmouth buffalo	SMBF
Ictiobus cyprinellus	Bigmouth buffalo	BMBF
Ictiobus niger	Black buffalo	BKBF
Ictiobus spp.	Unidentified buffalo	UBF
Minytrema melanops	Spotted sucker	SPSK
Moxostoma anisurum	Silver redhorse	SVRH
Moxostoma carinatum	River redhorse	RVRH
Moxostoma duquesnei	Black redhorse	BKRH
Moxostoma erythrurum	Golden redhorse	GDRH
Moxostoma macrolepidotum	Shorthead redhorse	SHRH
Moxostoma spp.	Unidentified redhorse	URH

Appendix A. (continued).

Scientific name	Common name	Letter Code
Catostomidae - suckers	Unidentified Catostomidae	UCT
	ORDER SILURIFORMES	
	Ictaluridae – bullhead catfishes	
Ameiurus melas	Black bullhead	BKBH
Ameiurus natalis	Yellow bullhead	YLBH
Ameiurus nebulosus	Brown bullhead	BRBH
Ameiurus spp.	Unidentified bullhead	UBH
Ictalurus furcatus	Blue catfish	BLCF
Ictalurus punctatus	Channel catfish	CNCF
I. furcatus X I. punctatus	Blue-channel catfish hybrid	BCCC
Ictalurus spp.	Unidentified *Ictalurus* spp.	UCF
Noturus exilis	Slender madtom	SDMT
Noturus flavus	Stonecat	STCT
Noturus gyrinus	Tadpole madtom	TPMT
Noturus nocturnus	Freckled madtom	FKMT
Pylodictis olivaris	Flathead catfish	FHCF
	ORDER SALMONIFORMES	
	Esocidae - pikes	
Esox americanus vermiculatus	Grass pickerel	GSPK
Esox lucius	Northern pike	NTPK
Esox masquinongy	Muskellunge	MSKG
E. lucius X E. masquinongy	Tiger Muskellunge	TGMG
	Umbridae - mudminnows	
Umbra limi	Central mudminnow	MDMN
	Osmeridae - smelts	
Osmerus mordax	Rainbow smelt	RBST
	Salmonidae - trouts	
Coregonus artedi	Lake herring or cisco	CSCO
Coregonus clupeaformis	Lake whitefish	LKWF
Oncorhynchus aguabonita	Golden trout	GDTT
Oncorhynchus clarki	Cutthroat trout	CTTT
Oncorhynchus kisutch	Coho salmon	CHSM
Oncorhynchus mykiss	Rainbow trout	RBTT
Oncorhynchus nerka	Sockeye salmon	SESM
Oncorhynchus tshawytscha	Chinook salmon	CNSM
Prosopium cylindraceum	Bonneville cisco	BVSC
Prosopium williamsoni	Mountain whitefish	MTWF
Salmo trutta	Brown trout	BNTT
Salvelinus fontinalis	Brook trout	BKTT
Salvelinus namaycush	Lake trout	LKTT
Thymallus arcticus	Arctic grayling	AMGL

Appendix A. (continued).

Scientific name	Common name	Letter Code
	ORDER PERCOPSIFORMES	
	Percopsidae – trout-perches	
Percopsis omiscomaycus	Trout-perch	TTPH
	ORDER GADIFORMES	
	Gadidae - cods	
Lota lota	Burbot	BRBT
	ORDER ATHERINIFORMES	
	Cyprinodontidae - killifishes	
Fundulus catenatus	Northern studfish	NTSF
Fundulus diaphanus	Banded killifish	BDKF
Fundulus notatus	Blackstripe topminnow	BSTM
Fundulus olivaceus	Blackspotted topminnow	BPTM
Fundulus sciadicus	Plains topminnow	PTMW
Fundulus zebrinus	Plains killifish	PKLF
	Poeciliidae - livebearers	
Gambusia affinis	Western mosquitofish	MQTF
	Atherinidae - silversides	
Labidesthes sicculus	Brook silverside	BKSS
	ORDER GASTEROSTEIFORMES	
	Gasterosteidae - sticklebacks	
Culeaea inconstans	Brook stickleback	BKSB
	ORDER SCORPAENIFORMES	
	Cottidae - sculpins	
Cottus bairdi	Mottled sculpin	MDSP
Cottus carolinae	Banded sculpin	BDSP
	ORDER PERCIFORMES	
	Percichthyidae – temperate basses	
Morone Americana	White perch	WTPH
Morone chrysops	White bass	WTBS
Morone mississippiensis	Yellow bass	YWBS
Morone saxatilis	Striped bass	SDBS
M. saxatilis X M. chrysops	Striped-white bass hybrid	SBWB
	Centrarchidae - sunfishes	
Ambloplites rupestris	Rock bass	RKBS
Archoplites interruptus	Sacremento perch	SOPH
Lepomis cyanellus	Green sunfish	GNSF
Lepomis gibbosus	Pumpkinseed	PNSD
Lepomis gulosus	Warmouth	WRMH
Lepomis humilis	Orangespotted sunfish	OSSF
Lepomis macrochirus	Bluegill	BLGL
Lepomis magalotis	Longear sunfish	LESF
Lepomis microlophus	Redear sunfish	RESF
L. cyanellus X L. macrochirus	Green sunfish-bluegill hybrid	GSBG

Appendix A. (continued).

Scientific name	Common name	Letter Code
	Centrarchidae - sunfishes	
L. cyanellus X L. humilis	Green-orangespotted sunfish hybrid	GSOS
L. macrochirus X L. microlophus	Bluegill-redear sunfish hybrid	BGRE
Lepomis spp.	Unidentified *Lepomis*	ULP
Micropterus dolomieu	Smallmouth bass	SMBS
Micropterus puntulatus	Spotted sunfish	STBS
Micropterus salmoides	Largemouth bass	LMBS
Micropterus spp.	Unidentified *Micropterus* spp.	UMC
Pomoxis annularis	White crappie	WTCP
Pomoxis nigromaculatus	Black crappie	BKCP
Pomoxis spp.	Unidentified crappie	UCP
P. annularis X P. nigromaculatus	White-black crappie hybrid	WCBC
Centrarchidae	Unidentified centrarchid	UCN
	Percidae - perches	
Ammocrypta asprella	Crystal darter	CLDR
Etheostoma blennioides	Greenside darter	GSDR
Etheostoma caeruleum	Rainbow darter	RBDR
Etheostoma exile	Iowa darter	IODR
Etheostoma flabellare	Fantail darter	FTDR
Etheostoma gracile	Slough darter	SLDR
Etheostoma microperca	Least darter	LTDR
Etheostoma nigrum	Johnny darter	JYDR
Etheostoma punctulatum	Stippled darter	STPD
Etheostoma spectabile	Orangethroated darter	OTDR
Etheostoma tetrazonum	Missouri saddled darter	MSDR
Etheostoma zonale	Banded darter	BDDR
Etheostoma spp.	Unidentified Etheostoma spp.	UET
Perca flavescens	Yellow perch	YWPH
Percina caprodes	Logperch	LGPH
Percina cymatotaenia	Bluestripe darter	BTDR
Percina evides	Gilt darter	GLDR
Percina maculata	Blackside darter	BSDR
Percina phoxocephala	Slenderhead darter	SHDR
Percina shumardi	River darter	RRDR
Percina spp.	Unidentified Percina spp.	UPN
	Unidentified darter	UDR
Sander canadense	**Sauger**	**SGER***
Sander vitreus	Walleye	WLEY
S. canadense X S. vitreus	Sauger-walley hybrid/Saugeye	SGWE
Sander spp.	Unidentified *Sander* (formerly *Stizostedion*) spp.	UST
	Unidentified Percidae	UPC
	Sciaenidae - drums	
Aplodinotus grunniens	Freshwater drum	FWDM
	NON-TAXONOMIC CATEGORIES	
	Age-0/Young-of-year fish	YOYF
	Lab fish for identification	LAB
	No fish caught	NFSH
	Unidentified larval fish	LVFS
	Unidentified	UNID
	Net Malfunction (Did Not Fish)	NDNF

Appendix B. Definitions and codes used to classify standard Missouri River habitats in the long-term pallid sturgeon and associated fish community sampling program. Three habitat scales were used in the hierarchical habitat classification system: Macrohabitats, Mesohabitats, and Microhabitats.

Habitat	Scale	Definition	Code
Braided channel	Macro	An area of the river that contains multiple smaller channels and is lacking a readily identifiable main channel (typically associated with unchannelized sections)	BRAD
Main channel cross over	Macro	The inflection point of the thalweg where the thalweg crosses from one concave side of the river to the other concave side of the river, (i.e., transition zone from one-bend to the next bend). The upstream CHXO for a respective bend is the one sampled.	CHXO
Tributary confluence	Macro	Area immediately downstream, extending up to one bend in length, from a junction of a large tributary and the main river where this tributary has influence on the physical features of the main river	CONF
Dendritic	Macro	An area of the river where the river transitions from meandering or braided channel to more of a treelike pattern with multiple channels (typically associated with unchannelized sections)	DEND
Deranged	Macro	An area of the river where the river transitions from a series of multiple channels into a meandering or braided channel (typically associated with unchannelized sections)	DRNG
Main channel inside bend	Macro	The convex side of a river bend	ISB
Main channel outside bend	Macro	The concave side of a river bend	OSB
Secondary channel-connected large	Macro	A side channel, open on upstream and downstream ends, with less flow than the main channel, large indicates this habitat can be sampled with trammel nets and trawls based on width and/or depths > 1.2 m	SCCL
Secondary channel-connected small	Macro	A side channel, open on upstream and downstream ends, with less flow than the main channel, small indicates this habitat cannot be sampled with trammel nets and trawls based on width and/or on depths < 1.2 m	SCCS
Secondary channel-non-connected	Macro	A side channel that is blocked at one end	SCCN
Tributary	Macro	Any river or stream flowing in the Missouri River	TRIB
Tributary large mouth	Macro	Mouth of entering tributary whose mean annual discharge is > 20 m^3/s, and the sample area extends 300 m into the tributary	TRML
Tributary small mouth	Macro	Mouth of entering tributary whose mean annual discharge is < 20 m^3/s, mouth width is > 6 m wide and the sample area extends 300 m into the tributary	TRMS
Wild	Macro	All habitats not covered in the previous habitat descriptions	WILD
Bars	Meso	Sandbar or shallow bank-line areas with depth < 1.2 m	BARS
Pools	Meso	Areas immediately downstream from sandbars, dikes, snags, or other obstructions with a formed scour hole > 1.2 m	POOL
Channel border	Meso	Area in the channelized river between the toe and the thalweg, area in the unchannelized river between the toe and the maximum depth	CHNB
Thalweg	Meso	Main channel between the channel borders conveying the majority of the flow	TLWG
Island tip	Meso	Area immediately downstream of a bar or island where two channels converge with water depths > 1.2 m	ITIP

Appendix C. List of standard and wild gears (type), their corresponding codes in the database, seasons deployed (Fall-Spring, Summer, or all), years used, and catch-per-unit-effort units for collection of Missouri River fishes in segment 7 for the long-term pallid sturgeon and associated fish community sampling program. Long-term monitoring began in 2005 for segment 06.

Gear	Code	Type	Season	Years	CPUE units
Trammel net – 1 inch inner mesh	TN	Standard	All	2005 - Present	fish/100 m drift
Trammel net – 2.5 inch inner mesh	TN25	Standard	Sturgeon	2006	fish/100 m drift
Gillnet – 4 meshes, small mesh set upstream	GN14	Standard	Sturgeon	2005 - Present	fish/net night
Gillnet – 4 meshes, large mesh set upstream	GN41	Standard	Sturgeon	2005 - Present	fish/net night
Gillnet – 8 meshes, small mesh set upstream	GN18	Standard	Sturgeon	2005 - Present	fish/net night
Gillnet – 8 meshes, large mesh set upstream	GN81	Standard	Sturgeon	2005 - Present	fish/net night
Otter trawl – 16 ft head rope	OT16	Standard	All	2005 - Present	fish/100 m trawled
Otter trawl – 16 ft SKT 4mm x 4mm HB2 MOR	OT01	Wild	Fish Comm.	2006	fish/100 m trawled
Bag Seine – quarter arc method pulled upstream	BSQU	Wild	Fish Comm.	2005	fish/100 m^2
Bag Seine – quarter arc method pulled downstream	BSQD	Wild	Fish Comm.	2005	fish/100 m^2
Bag Seine – half arc method pulled upstream	BSHU	Wild	Fish Comm.	2005	fish/100 m^2
Bag Seine – half arc method pulled downstream	BSHD	Wild	Fish Comm.	2005	fish/100 m^2
Bag seine – rectangular method pulled upstream	BSRU	Wild	Fish Comm.	2005	fish/100 m^2
Bag seine – rectangular method pulled upstream	BSRD	Wild	Fish Comm.	2005	fish/100 m^2
Mini-fyke net	MF	Standard	Fish Comm.	2005 - Present	fish/net night

* Standard only in upper Missouri River segments

Appendix D. Stocking locations and codes for pallid sturgeon by Recovery Priority Management Area (RPMA) in the Missouri River Basin.

State(s)	RPMA	Site Name	Code	River	RM
MT	2	Above Intake	AIN	Yellowstone	70 +
MT	2	Intake	INT	Yellowstone	70.0
MT	2	Sidney	SID	Yellowstone	31.0
MT	2	Big Sky Bend	BSB	Yellowstone	17.0
ND	2	Fairview	FRV	Yellowstone	9.0
MT	2	Milk River	MLK	Milk	11.5
MT	2	Mouth of Milk	MOM	Missouri	1761.5
MT	2	Wolf Point	WFP	Missouri	1701.5
MT	2	Poplar	POP	Missouri	1649.5
MT	2	Brockton	BRK	Missouri	1678.0
MT	2	Culbertson	CBS	Missouri	1621.0
MT	2	Nohly Bridge	NOB	Missouri	1590.0
ND	2	Confluence	CON	Missouri	1581.5
SD/NE	3	Sunshine Bottom	SUN	Missouri	866.2
SD/NE	3	Verdel Boat Ramp	VER	Missouri	855.0
SD/NE	3	Standing Bear Bridge	STB	Missouri	845.0
SD/NE	3	Running Water	RNW	Missouri	840.1
SD/NE	4	St. Helena	STH	Missouri	799.0
SD/NE	4	Mullberry Bend	MUL	Missouri	775.0
NE/IA	4	Ponca State Park	PSP	Missouri	753.0
NE/IA	4	Sioux City	SIO	Missouri	732.6
NE/IA	4	Decatur	DCT	Missouri	691.0
NE/IA	4	Boyer Chute	BYC	Missouri	637.4
NE/IA	4	Bellevue	BEL	Missouri	601.4
NE/IA	4	Rulo	RLO	Missouri	497.9
NE/MO/KS	4	Kansas River	KSR	Missouri	367.5
NE	4	Platte River	PLR	Platte	5.0
KA/MO	4	Leavenworth	LVW	Missouri	397.0
MO	4	Parkville	PKV	Missouri	377.5
MO	4	Kansas City	KAC	Missouri	342.0
MO	4	Miami	MIA	Missouri	262.8
MO	4	Grand River	GDR	Missouri	250.0
MO	4	Boonville	BOO	Missouri	195.1
MO	4	Overton	OVT	Missouri	185.1
MO	4	Hartsburg	HAR	Missouri	160.0
MO	4	Jefferson City	JEF	Missouri	143.9
MO	4	Mokane	MOK	Missouri	124.7
MO	4	Hermann	HER	Missouri	97.6
MO	4	Washington	WAS	Missouri	68.5
MO	4	St. Charles	STC	Missouri	28.5

Appendix E. Juvenile and adult pallid sturgeon stocking summary for segment 7 of the Missouri River (RPMA 4)

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
2002	St. Helena	280	2001	4/3/02	Yearling	PIT Tag	
2002	Mulberry Bend	321	2001	4/3/02	Yearling	PIT Tag	
2002	Mulberry Bend	1855	2001	6/26/01	Yearling	PIT Tag	
2002	Ponca St Pk	28	1997	4/23/02	5	PIT Tag	Elastomere
2002	Ponca St Pk	28	2001	6/26/01	Yearling	PIT Tag	
2002	Ponca St Pk	180	1999	4/23/02	3	PIT Tag	
2003	Mulberry Bend	3235	2002	6/22/02	Yearling	PIT Tag	Elastomere
2003	Mulberry Bend	1763	2003	6/25/03	Fingerling	Coded Wire Tag	Elastomere
2003	Ponca St Pk	7	1997	4/23/03	5	PIT Tag	Elastomere
2006	Ponca St Pk	15	2004	5/9/06	2	PIT Tag	
2006	St. Helena	610	2005	9/1/2006	Yearling	PIT Tag	Elastomere

[a]Age of fish when stocked: Fry, Fingerling, Yearling, 1yo, 2yo, 3yo, etc…

Appendix F

Total catch, overall mean catch per unit effort [± 2 SE], and mean CPUE (fish/100 m) by Mesohabitat within a Macrohabitat for all species caught with each gear type during sturgeon season and fish community season for segment 7 of the Missouri River during 2005-2006. Species captured are listed alphabetically and their codes are presented in Appendix A. Asterisks with bold type indicate targeted native Missouri River species and habitat abbreviations are presented in Appendix B. Standard Error was not calculated when $N < 2$.

Appendix F1. Gill Net: overall season and segment summary. Lists CPUE (fish/net night) and 2 standard errors in brackets.

Species	Total Catch	Overall CPUE	BRAD		CHXO		CONF	DEND	DRNG	ISB		OSB	SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	CHNB	CHNB	CHNB	POOL	CHNB	CHNB	ITIP	ITIP	CHNB
BMBF	2	0.01	0	0	0	0	0	0	0	0	0.11	0	0	0	0	0.25
		[0.01]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.22]	[0]	[0]	[0]	[0]	[0.5]
BUSK*	299	1.3	1.1	2	0.61	0.5	4.25	0.1	0.38	1.02	2.44	1.07	0	6	7	8
		[0.43]	[0.96]	[2.06]	[0.33]	[1]	[6.5]	[0.2]	[0.53]	[0.62]	[3.32]	[0.63]	[0]	[6]	[13.34]	[8.08]
CARP	6	0.03	0	0	0	0	0	0	0.13	0	0.33	0	0	0	0	0.5
		[0.03]	[0]	[0]	[0]	[0]	[0]	[0]	[0.25]	[0]	[0.47]	[0]	[0]	[0]	[0]	[1]
CNCF	70	0.3	0.1	0.22	0.09	0	0.25	0	0	0.1	0.22	0.09	0	0	0	12
		[0.24]	[0.1]	[0.44]	[0.15]	[0]	[0.5]	[0]	[0]	[0.09]	[0.44]	[0.11]	[0]	[0]	[0]	[7.35]
FWDM	6	0.03	0	0	0	0	0	0	0	0	0.33	0	0	0	0	0.75
		[0.02]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.47]	[0]	[0]	[0]	[0]	[0.5]
GDEY	210	0.91	0.18	0.11	0.21	0	0	0	0	0.22	4.11	0.88	0	0	0.25	26.5
		[0.54]	[0.27]	[0.22]	[0.27]	[0]	[0]	[0]	[0]	[0.2]	[3.58]	[0.97]	[0]	[0]	[0.5]	[9.47]
GSCP	4	0.02	0	0	0	0	0	0	0	0	0.33	0	0	0	0	0.25
		[0.02]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.47]	[0]	[0]	[0]	[0]	[0.5]
GZSD	1	0.01	0	0	0	0	0	0	0	0	0.11	0	0	0	0	0
		[0.01]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.22]	[0]	[0]	[0]	[0]	[0]
HFCS	22	0.1	0	0	0	0	0	0	0	0.02	2	0.07	0	0	0	0
		[0.1]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.04]	[2.08]	[0.1]	[0]	[0]	[0]	[0]
LNGR	3	0.13	0	0	0	0	0	0	0	0	0.22	0	0	0	0	0.25
		[0.11]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.29]	[0]	[0]	[0]	[0]	[0.5]
NTPK	2	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
		[0.01]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.58]
PDFH	10	0.04	0.03	0	0.02	0	0	0	0	0	0.22	0.12	0	0	0	0.25
		[0.05]	[0.05]	[0]	[0.05]	[0]	[0]	[0]	[0]	[0]	[0.29]	[0.23]	[0]	[0]	[0]	[0.5]
PDSG*	3	0.01	0	0.11	0.02	0	0	0	0	0	0	0.02	0	0	0	0
		[0.02]	[0]	[0.22]	[0.05]	[0]	[0]	[0]	[0]	[0]	[0]	[0.05]	[0]	[0]	[0]	[0]
QLBK	12	0.052	0.05	0	0.02	0	0	0	0	0	0.89	0	0	0	0	0.25
		[0.73]	[0.1]	[0]	[0.05]	[0]	[0]	[0]	[0]	[0]	[1.78]	[0]	[0]	[0]	[0]	[0.5]
RVCS	37	0.16	0.05	0	0	0	0	0	0	0.02	2.78	0.09	0	0	0	1.25
		[0.14]	[0.1]	[0]	[0]	[0]	[0]	[0]	[0]	[0.04]	[2.98]	[0.19]	[0]	[0]	[0]	[1.26]
SGER	10	0.04	0	0	0.07	0	0	0	0	0.04	0.11	0.05	0	0	0	0.5
		[0.03]	[0]	[0]	[0.08]	[0]	[0]	[0]	[0]	[0.06]	[0.22]	[0.07]	[0]	[0]	[0]	[0.58]
SGWE	20	0.09	0.05	0.22	0.07	0	0	0	0	0	0.33	0.05	0.25	0	0	1.75
		[0.05]	[0.07]	[0.44]	[0.1]	[0]	[0]	[0]	[0]	[0]	[0.47]	[0.07]	[0.5]	[0]	[0]	[0.96]
SHRH	60	0.26	0.03	0	0.09	0	0	0	0.13	0.2	3.22	0.09	0	0	0	2.75
		[0.2]	[0.05]	[0]	[0.09]	[0]	[0]	[0]	[0.25]	[0.15]	[4.58]	[0.09]	[0]	[0]	[0]	[2.22]

Appendix F1 (continued).

Species	Total Catch	Overall CPUE	BRAD		CHXO		CONF	DEND	DRNG	ISB		OSB	SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	CHNB	CHNB	CHNB	POOL	CHNB	CHNB	ITIP	ITIP	CHNB
SJHR	8	0.035 [0.037]	0 [0]	0 [0]	0.05 [0.09]	0 [0]	0 [0]	0 [0]	0 [0]	0.1 [0.15]	0 [0]	0.02 [0.05]	0 [0]	0 [0]	0 [0]	0 [0]
SMBF	22	0.096 [0.103]	0.03 [0.05]	0.11 [0.22]	0.02 [0.05]	0 [0]	0 [0]	0 [0]	0 [0]	0.02 [0.04]	1.89 [2.41]	0.02 [0.05]	0 [0]	0 [0]	0 [0]	0 [0]
SMBS	7	0.03 [0.038]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.02 [0.04]	0.44 [0.89]	0.02 [0.05]	0 [0]	0 [0]	0 [0]	0.25 [0.5]
SNGR	8	0.035 [0.051]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	1.18 [0.71]	0.89 [1.22]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
SNSG	262	1.139 [0.357]	1 [0.73]	2.44 [2.63]	0.49 [0.32]	0 [0]	1.0 [1.16]	0.3 [0.31]	1 [1.73]	0 [0]	2.67 [2.03]	0.67 [0.36]	0.25 [0.5]	8.5 [017]	5.5 [10.34]	3.5 [5.2]
WLYE	15	0.065 [0.041]	0 [0]	0 [0]	0.05 [0.07]	0 [0]	0 [0]	0 [0]	0 [0]	0.08 [0.08]	0.33 [0.33]	0 [0]	0 [0]	0 [0]	0 [0]	1.5 [1.29]
WTBS	2	0.009 [0.012]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.02 [0.04]	0.11 [0.22]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]

Appendix F2. 1 Inch Trammel Net: overall season and segment summary. Lists CPUE (fish/100 m) and 2 standard errors in brackets.

Species	Total Catch	Overall CPUE	BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCS	SCCL		WILD
			CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	ITIP	CHNB	ITIP	DTWT
BHCP	3	0.01 [0.012]	0.026 [0.052]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.13 [0.26]	0 [0]	0 [0]	0.096 [0.19]
BMBF	3	0.007 [0.009]	0.018 [0.036]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.16 [0.20]	0 [0]	0 [0]
BUSK*	151	0.428 [0.175]	0.07 [0.07]	0.46 [0.27]	0.64 [0.47]	0.27 [0.39]	0.26 [0.37]	0.83 [0.77]	0.33 [0.22]	0 [0]	0.12 [0.24]	0.08 [0.17]	1.91 [1.30]
CARP	1	0.002 [0.003]	0.01 [0.02]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
CNCF	189	0.49 [0121]	0.54 [0.26]	0.54 [0.34]	0.96 [0.82]	0.14 [0.16]	0.31 [0.29]	0.58 [0.31]	0.56 [0.34]	0.10 [0.20]	0.35 [0.45]	0.15 [0.20]	0.29 [0.41]
FHCF	1	0.001 [0002]	0.001 [0.01]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
GDEY	164	0.447 [0.146]	0.48 [0.28]	0.36 [0.29]	0.25 [0.23]	0.37 [0.33]	0.46 [0.06]	0.59 [0.33]	0.27 [0.24]	0.83 [0.98]	0.16 [0.20]	1.9 [3.4]	0.08 [0.17]
GSCP	2	0.004 [0.007]	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
HFCS	12	0.03 [0.023]	0 [0]	0.01 [0.02]	0.06 [0.11]	0.22 [0.27]	0 [0]	0.04 [0.05]	0.01 [0.02]	0 [0]	0 [0]	0 [0]	0 [0]
PDFH	1	0.003 [0.006]	0 [0]	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
PDSG*	3	0.01 [0.012]	0.01 [0.02]	0 [0]	0.08 [0.17]	0.07 [0.13]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
QLBK	18	0.048 [0.024]	0.06 [0.06]	0.02 [0.04]	0.06 [0.11]	0.14 [0.16]	0.05 [0.06]	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
RVCS	36	0.09 [0.035]	0.13 [0.12]	0.06 [0.06]	0.22 [0.24]	0.08 [0.11]	0 [0]	0.13 [0.10]	0.08 [0.07]	0 [0]	0 [0]	0 [0]	0 [0]
SGER	3	0.008 [0.01]	0 [0]	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0.01 [0.02]	0.02 [0.03]	0 [0]	0 [0]	0 [0]	0 [0]
SGWE	5	0.013 [0.013]	0.01 [0.03]	0.02 [0.05]	0.11 [0.22]	0 [0]	0 [0]	0 [0]	0.01 [0.03]	0 [0]	0 [0]	0 [0]	0 [0]
SHRH	60	0.195 [0.102]	0.03 [0.05]	0.19 [0..19]	0.09 [0.20]	0 [0]	0.07 [0.11]	0.52 [0.46]	0.07 [0.07]	0 [0]	0 [0]	0.80 [1.05]	0.48 [0.38
SJHR	1	0.004 [0.008]	0 [0]	0 [0]	0 [0]	0 [0]	0.05 [0.10]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
SMBF	5	0.015 [0.013]	0 [0]	0 [0]	0 [0]	0.03 [0.06]	0.06 [0.11]	0.01 [0.03]	0 [0]	0 [0]	0 [0]	0.09 [0.18]	0 [0]

Appendix F2 (continued).

Species	Total Catch	Overall CPUE	BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCS	SCCL		WILD
			CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	ITIP	CHNB	ITIP	DTWT
SMBS	3	0.006	0	0	0	0	0	0	0.02	0	0	0.07	0
		[0.007]	[0]	[0]	[0]	[0]	[0]	[0]	[0.03]	[0]	[0]	[0.14]	[0]
SMST	1	0.004	0	0	0	0	0	0.02	0	0	0	0	0
		[0.008]	[0]	[0]	[0]	[0]	[0]	[0.04]	[0]	[0]	[0]	[0]	[0]
SNGR	1	0.004	0	0	0	0	0	0	0	0	0	0	0
		[0.008]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]
SNSG	452	1.274	1.54	1.02	0.95	0.37	1.22	0.02	1.52	0.25	2.67	2.73	0
		[0.378]	[1.46]	[0.47]	[0.61]	[0.29]	[1.05]	[0.04]	[1.22]	[0.31]	[2.43]	[1.43]	[0]
WLYE	4	0.008	0.03	0.02	0	0	0	0	0	0	0	0	0
		[0.01]	[0.04]	[0.04]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]

Appendix F3. 2.5 Inch Trammel Net: overall season and segment summary. Lists CPUE (fish/100 m) and 2 standard errors in brackets.

Species	Total Catch	Overall CPUE	BRAD		CHXO	CONF	DEND	DRNG	ISB		SCCL		OSB	SCCS
			CHNB	ITIP	CHNB	CHNB	CHNB	CHNB	CHNB	POOL	CHNB	ITIP	CHNB	ITIP
BHCP	3	0.014 [0.017]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.08 [0.16]	0.03 [0.06]	0 [0]	0 [0]	0 [0]	0.01 [0.03]	0 [0]
BMBF	6	0.021 [0.023]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.02 [0.03]	0 [0]	0 [0]	0 [0]	0.06 [0.08]	0 [0]
BUSK*	334	1.766 [0.76]	2.06 [1.43]	0 [0]	1.03 [1.14]	0.7 [0.85]	1.07 [1.29]	5.05 [8.86]	2.91 [2.35]	5.24 [7.98]	0.93 [0.97]	5.63 [11.25]	0.65 [0.32]	3.61 [4.55]
CNCF	10	0.04 [0.027]	0.06 [0.09]	0 [0]	0 [0]	0 [0]	0 [0]	0.27 [0.28]	0 [0]	0 [0]	0 [0]	0 [0]	0.05 [0.06]	0.67 [1.33]
GDEY	1	0.003 [0.005]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.01 [0.02]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
GSCP	1	0.003 [0.005]	0 [0]	0 [0]	0.02 [0.03]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
GZSD	1	0.017 [0.02]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.02 [0.04]	0 [0]
HFCS	3	0.017 [0.02]	0 [0]	0 [0]	0 [0]	0 [0]	0.11 [0.22]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.05 [0.07]	0 [0]
PDFH	2	0.01 [0.014]	0 [0]	0 [0]	0.06 [0.08]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
PDSG	1	0.002 [0.004]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.01 [0.02]	0 [0]
QLBK	2	0.009 [0.015]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.01 [0.02]	0.67 [1.33]
RVCS	8	0.038 [0.033]	0.17 [0.24]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.03 [0.05]	0 [0]	0 [0]	0 [0]	0.05 [0.07]	0 [0]
SGWE	1	0.004 [0.007]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.09 [0.17]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
SMBF	23	0.117 [0.089]	0 [0]	0 [0]	0.12 [0.14]	0 [0]	0 [0]	0.13 [0.26]	0.18 [0.24]	0 [0]	0 [0]	0 [0]	0.18 [0.24]	0 [0]
SNSG	86	0.413 [0.201]	0.1 [0.11]	0.5 [1]	0.26 [0.18]	0.52 [0.84]	0 [0]	0.59 [0.6]	0.37 [0.26]	0 [0]	0 [0]	5.79 [1.58]	0.56 [0.62]	0 [0]
SVCP	1	0.004 [0.008]	0 [0]	0 [0]	0 [0]	0.08 [0.17]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]

Appendix F4. Otter Trawl: overall season and segment summary. Lists CPUE (fish/100 m) and 2 standard errors in brackets.

Species	Total Catch	Overall CPUE	BRAD	CHXO	CONF	DEND	DRNG	ISB	SCCL		OSB	SCCS
			CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	ITIP	CHNB	ITIP
BMBF	1	0.003	0	0	0	0	0	0	0.08	0	0	0
		[0.007]	[0]	[0]	[0]	[0]	[0]	[0]	[0.17]	[0]	[0]	[0]
BSMW	1	0.003	0	0	0	0.03	0	0	0	0	0	0
		[0.005]	[0]	[0]	[0]	[0.06]	[0]	[0]	[0]	[0]	[0]	[0]
BUSK*	59	0.149	0.04	0.29	0	0	0.02	0.27	0	0.14	0.24	0
		[0.063]	[0.05]	[0.19]	[0]	[0]	[0.04]	[0.2]	[0]	[0.29]	[0.22]	[0]
CARP	1	0.002	0	0	0	0	0	0.01	0	0	0	0
		[0.003]	[0]	[0]	[0]	[0]	[0]	[0.02]	[0]	[0]	[0]	[0]
CNCF	64	0.172	0.25	0.14	0.48	0.05	0.24	0.23	0.06	0.14	0.07	0.22
		[0.059]	[0.19]	[0.12]	[0.6]	[0.07]	[0.24]	[0.16]	[0.13]	[0.29]	[0.09]	[0.31]
ERSN	41	0.95	0.06	0	0	0.94	0	0	0	0	0	0.07
		[0.147]	[0.07]	[0]	[0]	[1.7]	[0]	[0]	[0]	[0]	[0]	[0.15]
FHCF	1	0.003	0	0	0	0	0	0	0	0	0.02	0
		[0.005]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.03]	[0]
FWDM	8	0.024	0	0.02	0	0	0	0	0	0	0.02	0.43
		[0.024]	[0]	[0.04]	[0]	[0]	[0]	[0]	[0]	[0]	[0.04]	[0.51]
GDEY	4	0.01	0	0	0	0.02	0.02	0.02	0.06	0	0	0
		[0.011]	[0]	[0]	[0]	[0.05]	[0.04]	[0.04]	[0.13]	[0]	[0]	[0]
GZSD	1	0.002	0	0	0	0	0.02	0	0	0	0	0
		[0.004]	[0]	[0]	[0]	[0]	[0.05]	[0]	[0]	[0]	[0]	[0]
HBNS	9	0.028	0.01	0	0.16	0	0.03	0.01	0.45	0	0	0
		[0.037]	[0.03]	[0]	[0.31]	[0]	[0.06]	[0.02]	[0.89]	[0]	[0]	[0]
HFCS	3	0.007	0.03	0	0	0	0	0	0	0	0	0.05
		[0.011]	[0.05]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0]	[0.11]
PDFH	1	0.003	0	0	0	0	0	0.02	0	0	0	0
		[0.006]	[0]	[0]	[0]	[0]	[0]	[0.04]	[0]	[0]	[0]	[0]
PDSG	1	0.003	0	0	0	0	0.04	0	0	0	0	0
		[0.007]	[0]	[0]	[0]	[0]	[0.08]	[0]	[0]	[0]	[0]	[0]
QLBK	3	0.007	0	0	0	0.04	0	0.02	0	0	0	0
		[0.009]	[0]	[0]	[0]	[0.08]	[0]	[0.04]	[0]	[0]	[0]	[0]
RDSN	2	0.007	0	0	0	0	0	0	0.11	0	0	0.05
		[0.01]	[0]	[0]	[0]	[0]	[0]	[0]	[0.23]	[0]	[0]	[0.11]
RVCS	11	0.028	0	0.02	0	0	0	0.08	0.09	0	0.02	0.07
		[0.019]	[0]	[0.03]	[0]	[0]	[0]	[0.08]	[0.18]	[0]	[0.04]	[0.15]
SFCB	5	0.014	0.02	0	0	0	0.03	0.04	0	0	0	0
		[0.012]	[0.03]	[0]	[0]	[0]	[0.06]	[0.05]	[0]	[0]	[0]	[0]

Appendix F4 (continued).

Species	Total Catch	Overall CPUE	BRAD	CHXO	CONF	DEND	DRNG	ISB	SCCL		OSB	SCCS
			CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	CHNB	ITIP	CHNB	ITIP
SFSN	1	0.003 [0.008]	0 [0]	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
SGER	3	0.008 [0.009]	0 [0]	0.02 [0.03]	0 [0]	0 [0]	0 [0]	0.01 [0.03]	0 [0]	0 [0]	0.02 [0.03]	0 [0]
SGWE	13	0.039 [0.028]	0 [0]	0.09 [0.12]	0 [0]	0 [0]	0 [0]	0.09 [0.1]	0 [0]	0 [0]	0 [0]	0.19 [0.25]
SHRH	35	0.085 [0.04]	0.03 [0.04]	0.19 [0.17]	0 [0]	0 [0]	0.04 [0.08]	0.11 [0.09]	0 [0]	0.29 [0.57]	0.09 [0.08]	0.16 [0.33]
SMBF	1	0.003 [0.006]	0 [0]	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
SMST	5	0.013 [0.015]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.04 [0.06]	0 [0]	0 [0]	0.03 [0.07]	0 [0]
SNGR	1	0.003 [0.006]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0 [0]
SNSG	196	0.542 [0.177]	0.8 [0.71]	0.6 [0.42]	0.48 [0.6]	0.38 [0.29]	0.54 [0.36]	0.39 [0.22]	1.08 [0.91]	0.58 [0.47]	0.25 [0.21]	0.75 [0.76]
SNSN	3	0.009 [0.01]	0 [0]	0.02 [0.42]	0.16 [0.31]	0.03 [0.05]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
SVCB	32	0.09 [0.048]	0.16 [0.17]	0.09 [0.12]	0 [0]	0 [0]	0.1 [0.11]	0.07 [0.1]	0.11 [0.23]	0.33 [0.67]	0.07 [0.08]	0 [0]
UCS	4	0.011 [0.011]	0 [0]	0.03 [0.05]	0 [0]	0.02 [0.04]	0 [0]	0 [0]	0.09 [0.18]	0 [0]	0 [0]	0 [0]
WLYE	12	0.032 [0.026]	0.01 [0.03]	0 [0]	0 [0]	0 [0]	0 [0]	0.1 [0.1]	0 [0]	0 [0]	0 [0]	0.28 [0.44]
YWPH	1	0.003 [0.005]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.01 [0.03]	0 [0]

Appendix F6. Mini-fyke Net: overall season and segment summary. Lists CPU E (fish/net night) and 2 standard errors in brackets.

Species	Total Catch	Overall CPUE	BRAD	DEND	DRNG	ISB	OSB	SCCL	SCCS		SCN	TRIB
			BARS	BARS	BARS	BARS	BARS	BARS	BARS	CHNB	BARS	BARS
BKBH	1	0.01 [0.02]	0.06 [0.12]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
BKCP	3	0.03 [0.03]	0 [0]	0 [0]	0 [0]	0 [0]	0.17 [0.23]	0 [0]	0 [0]	0 [0]	0 [0]	0.5 [1.0]
BLGL	174	1.66 [1.24]	0.94 [1.4]	0 [0]	0 [0]	1.67 [1.1]	0.08 [0.17]	0.43 [0.6]	0.71 [0.62]	0 [0]	41.56 [31.0]	1.00 [0]
BMSN	24	0.23 [0.13]	0.35 [0.29]	1.0 [2.0]	0 [0]	0.11 [0.16]	0.08 [0.17]	0.71 [1.43]	0.15 [0.15]	0 [0]	0 [0]	0 [0]
BSMW	1	0.01 [0.02]	0.06 [0.12]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
CARP	5	0.05 [0.04]	0.12 [0.16]	0 [0]	0 [0]	0.04 [0.07]	0 [0]	0 [0]	0.06 [0.08]	0 [0]	0 [0]	0 [0]
CNCF	2	0.02 [0.03]	0 [0]	0 [3.0]	0 [0]	0 [0]	0.08 [0.17]	0 [0]	0.03 [0.06]	0 [0]	0 [0]	0 [0]
ERSN	1437	13.69 [7.04]	5.59 [0.16]	4.0 [0]	0 [0]	10.66 [6.47]	37.25 [37.48]	6.88 [12.08]	15 [15.69]	0 [0]	18.5 [13]	3.0 [6.0]
FHCF	2	0.02 [0.03]	0.06 [0.12]	0 [0]	0 [0]	0 [0]	0.08 [0.17]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
FSMT	48	0.46 [0.26]	0.59 [0.57]	0 [0]	0 [0]	0.44 [0.6]	0.83 [0.64]	0.29 [0.37]	0.27 [0.27]	0 [0]	3.5 [7]	3.5 [5.0]
FWDM	20	0.19 [0.1]	0 [0]	0 [0]	0 [0]	0.26 [0.25]	0.08 [0.17]	0.57 [0.6]	0.15 [0.15]	0 [0]	0 [0]	0.5 [1.0]
GNSF	11	0.1 [0.08]	0 [0]	0 [0]	0 [0]	0 [0]	0.17 [0.23]	0 [0]	0.21 [0.2]	0 [0]	0 [0]	1.0 [2.0]
GZSD	287	2.73 [2.75]	0.12 [0.16]	0 [0]	0 [0]	5.96 [10.12]	6.58 [7.09]	1.43 [1.63]	0.94 [0.92]	0 [0]	0.5 [1.0]	0 [0]
JYDR	5	0.05 [0.05]	0.06 [0.12]	0 [0]	0 [0]	0.15 [0.18]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
LMBS	629	5.99 [6.36]	0 [0]	0 [0]	0 [0]	13.37 [17.68]	21.08 [38.57]	0.14 [0.29]	0.38 [0.47]	0 [0]	0 [0]	0 [0]
LNGR	7	0.07 [0.08]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.43 [0.86]	0 [0]	0 [0]	2.0 [2.0]	0 [0]
OSSF	145	1.38 [2.3]	0.18 [0.26]	0.5 [1.0]	0 [0]	0.04 [0.07]	0 [0]	0 [0]	4.09 [7.069]	0 [0]	0 [0]	0.5 [1.0]
PATT	1	0.01 [0.02]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.5 [1.0]

Appendix F6 (continued).

Species	Total Catch	Overall CPUE	BRAD	DEND	DRNG	ISB	OSB	SCCL	SCCS		SCN	TRIB
			BARS	BARS	BARS	BARS	BARS	BARS	BARS	CHNB	BARS	BARS
RBST	2	0.02 [0.04]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
RDSN	2323	22.12 [0.03]	40 [39.3]	7.5 [15]	0 [0]	15.15 [11.32]	23.5 [34.67]	33.0 [27.50]	13.38 [7.55]	0 [0]	104.0 [156.0]	19.5 [39.0]
RVSN	2	0.02 [0.03]	0.06 [0.12]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.03 [0.06]	0 [0]	0 [0]	0 [0]
SFSN	934	8.9 [5.59]	3.47 [1.9]	5.5 [1.0]	0 [0]	20.41 [20.51]	5.75 [5.01]	11.14 [18.97]	4.12 [2.19]	0 [0]	9.0 [10.0]	0.5 [1.00]
SGWE	52	0.5 [0.88]	0 [0]	0 [0]	0 [0]	1.85 [3.4]	0 [0]	0 [0]	0.06 [0.08]	0 [0]	0 [0]	0 [0]
SHRH	50	0.48 [0.3]	0.35 [0.42]	3.0 [2.0]	0 [0]	0.52 [0.69]	0 [0]	0.43 [0.6]	0.53 [0.66]	0 [0]	0.5 [1.0]	0.5 [1.0]
SMBS	70	0.67 [0.25]	0.06 [0.12]	0.5 [1.0]	0 [0]	0.85 [0.42]	1.67 [0.87]	0.71 [0.72]	0.53 [0.55]	0 [0]	1.0 [0.0]	0 [0]
SMST	5	0.05 [0.04]	0.06 [0.12]	0 [0]	0 [0]	0.04 [0.07]	0.17 [0.23]	0 [0]	0.03 [0.06]	0 [0]	0 [0]	0 [0]
SNGR	21	0.2 [0.12]	0.29 [0.23]	0 [0]	0 [0]	0.11 [0.12]	0 [0]	0.14 [0.29]	0.32 [0.32]	0 [0]	0.5 [1.0]	0 [0]
SNSN	890	8.48 [8.74]	7.71 [5.49]	223 [444]	1.0 [1.0]	2.52 [3.62]	9.5 [15.67]	2.29 [3.92]	3.18 [3.15]	0 [0]	2.5 [1.0]	0.5 [1.0]
STCT	1	0.01 [0.02]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.03 [0.06]	0 [0]	0 [0]	0 [0]
STSN	18	0.17 [0.13]	0 [0]	2.5 [5.0]	0 [0]	0.11 [0.16]	0.33 [0.51]	0 [0]	0.15 [0.19]	0 [0]	0.5 [1.0]	0 [0]
UCS	37	0.35 [0.3]	0.24 [0.27]	2.5 [5.0]	0 [0]	0.56 [1.04]	0 [0]	0 [0]	0.21 [0.19]	0 [0]	2.5 [5.0]	0 [0]
WLYE	5	0.05 [0.04]	0.12 [0.16]	0 [0]	0 [0]	0.07 [0.1]	0 [0]	0 [0]	0.03 [0.06]	0 [0]	0 [0]	0 [0]
WTBS	51	0.49 [0.4]	0 [0]	0 [0]	0 [0]	1.19 [1.42]	0.08 [0.17]	1.43 [1.63]	0.21 [0.26]	0 [0]	0 [0]	0 [0]
WTCP	1	0.01 [0.02]	0 [0]	0 [0]	0 [0]	0.04 [0.07]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]

Appendix G. Hatchery names, locations, and abbreviations.

Hatchery	State	Abbreviation
Blind Pony State Fish Hatchery	MO	BYP
Neosho National Fish Hatchery	MO	NEO
Gavins Point National Fish Hatchery	SD	GAV
Garrison Dam National Fish Hatchery	ND	GAR
Miles City State Fish Hatchery	MT	MCH
Blue Water State Fish Hatchery	MT	BLU
Bozeman Fish Technology Center	MT	BFT
Fort Peck State Fish Hatchery	MT	FPH

Appendix H. Alphabetic list of Missouri River fishes with total catch-per-unit-effort by gear type for sturgeon season (fall through spring) and fish community season (summer) during 2005 – 2006 for segment 7 of the Missouri River. Species codes are located in Appendix A. Asterisks and bold type denote targeted native Missouri River species.

Species Code	Sturgeon Season (Fall through Spring)				Fish Community Season (Summer)		
	1 Inch Trammel Net	2.5 Inch Trammel Net	Gill Net	Otter Trawl	1 Inch Trammel Net	Mini-Fyke Net	Otter Trawl
BHCP	0.016	0.014	0	0	0	0	0
BKBH	0	0	0	0	0	0.01	0
BKCP	0	0	0	0	0	0.029	0
BLGL	0	0	0	0	0	1.657	0
BMBF	0.012	0.021	0.009	0	0	0	0.007
BMSN	0	0	0	0	0	0.229	0
BUSK*	0.371	1.766	1.3	0.098	0.517	0	0.199
CARP	0.003	0	0.026	0.003	0	0.048	0
CNCF	0.69	0.04	0.304	0.251	0.17	0.019	0.094
CNLP	0	0	0	0.025	0	13.686	0.164
CSCO	0.002	0	0	0.005	0	0.019	0
CTTT	0	0	0	0	0	0.229	0
FHCF	0	0	0.026	0.016	0	0.19	0.033
FHMW	0.61	0.003	0.913	0.021	0.188	0	0
GNSF	0	0	0	0	0	0.105	0
GSCP	0.006	0.003	0.017	0	0	0	0
GZSD	0	0.005	0.004	0.004	0	2.733	0
HBNS*	0	0	0	0.056	0	0	0
HFCS	0.041	0.017	0.096	0.014	0.013	0	0
JYDR	0	0	0	0	0	0.048	0
LMBS	0	0	0	0	0	5.99	0
LNGR	0	0	0.013	0	0	0.067	0
NTPK	0	0	0.009	0	0	0	0
OSSF	0	0	0	0	0	1.381	0
PDFH	0.005	0.01	0.043	0.007	0	0	0
PDSG*	0.016	0.002	0.013	0	0	0	0.006
QLBK	0.025	0.009	0.052	0.007	0.086	0	0.006
RBST	0	0	0	0	0	0.019	0
RDSN	0	0	0	0.014	0	22.124	0

Appendix H. (continued).

Species Code	Sturgeon Season (Fall through Spring)				Fish Community Season (Summer)		
	1 Inch Trammel Net	2.5 Inch Trammel Net	Gill Net	Otter Trawl	1 Inch Trammel Net	Mini-Fyke Net	Otter Trawl
RVCS	0.122	0.038	0.161	0.04	0.039	0	0.017
RVSN	0	0	0	0	0	0.019	0
SFCB*	0	0	0	0.014	0	0	0.013
SFSN	0	0	0	0	0	8.895	0.006
SGCB*	0.013	0	0.043	0.006	0	0	0.01
SGER*	0.011	0.004	0.087	0.021	0.016	0.495	0.057
SHDR	0.198	0	0.261	0.098	0.19	0.476	0.073
SHRH	0.006	0	0.035	0	0	0	0
SLDR	0.019	0.117	0.096	0.006	0.007	0	0
SMBS	0.007	0	0.03	0	0.006	0.667	0
SNGR	0	0	0.035	0.007	0.011	0.2	0
SNSG*	1.498	0.413	1.139	0.718	0.916	0	0.368
SNSN*	0	0	0	0.017	0	8.476	0
STCT	0	0	0	0	0	0.01	0
STSN	0	0	0	0	0	0.171	0
SVCB	0	0	0	0.048	0	0	0.131
SVCP	0	0.004	0	0	0	0	0
UCS	0	0	0	0.014	0	0.352	0.007
WLEY	0.013	0	0.065	0.01	0	0.048	0.054
WTBS	0	0	0.009	0	0	0.486	0
WTCP	0	0	0	0	0	0.01	0
YWPH	0	0	0	0.005	0	0	0