2008 Annual Report

Pallid Sturgeon Population Assessment and Associated Fish Community Monitoring for the Missouri River: Segment 2

Prepared for the U.S. Army Corps of Engineers – Missouri River Recovery Program
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EXECUTIVE SUMMARY

A total of 16 pallid sturgeon *Scaphirhynchus albus* were sampled in segment 2 during 2008, all of which were of hatchery origin. Standard gears collected half of the specimens, including five in otter trawls and three in trammel nets. Trotlines, a wild gear sampled the remaining eight pallid sturgeon. No pallid sturgeon were captured in duplicate non-random subsamples. Pallid sturgeon averaged 307.6 mm in length and 88.9 g in weight. Four distinct year classes were sampled, seven from the 2006 year class, five from 2005, two from 2007 and one from 2001. The stocking location was known for 13 pallid sturgeon and was as follows; eight from Wolf Point, four near the mouth of the Milk River and one from Culbertson. All the pallid sturgeon recaptured from the Milk River stocking location had net downstream movements averaging 27.4 river miles. All four Wolf Point stocked pallid sturgeon had upstream net movements that averaged 11.2 river miles, while the one Culbertson stocked fish had a net movement of 109 river miles upstream. The pallid sturgeon catch was distributed throughout the bends sampled in segment 2 with little pattern.

The CPUE estimates of trammel nets and otter trawls by season have not followed each other through the past three years of sampling. For both seasons combined, trammel net CPUE for was the same in 2008 (CPUE = 0.009 fish/ 100m) as 2007 (CPUE = 0.09 fish/ 100m), but both years were higher than 2006 (CPUE = 0.002 fish/ 100m). Otter trawl CPUE was at a three year low in 2008 (CPUE = 0.011 fish/ 100m) compared to 2007 (CPUE = 0.022 fish/ 100m) and 2006 (CPUE = 0.19 fish/ 100m). It is hard to make comparisons based on these relatively low CPUE estimates since just a handful of captures can make sizeable increases in the estimate. However, we should see an overall trend of increasing CPUE with both gears over a longer time period as more pallid sturgeon are rearing in the Missouri River downstream of Fort Peck Dam.

No shovelnose sturgeon *Scaphirhynchus platorynchus* x pallid sturgeon hybrid were sampled in segment 2 during 2008. In all, 759 shovelnose sturgeon were sampled for a pallid sturgeon to shovelnose sturgeon ratio of 0.0237:1. Shovelnose sturgeon were sampled throughout the length of segment 2 with no particular pattern in their distribution. Standard gears sampled 513 shovelnose sturgeon, while trotlines sampled 246. Shovelnose sturgeon

averaged 560 mm FL with a range of 316 mm to 857 mm. We haven't collected any YOY shovelnose sturgeon in segment 2 during the past three years of sampling. Overall trammel net CPUE for shovelnose sturgeon was at a high of 0.92 fish/ 100m during 2008 compared to 0.57 and 0.65 fish/ 100 m in 2007 and 2006, respectively. Overall otter trawl CPUE of shovelnose sturgeon remained similar at 0.25 fish/100 m in 2008 to 0.26 fish/100 m in 2007, while both estimates were higher than the 2006 estimate of 0.20 fish/ 100m.

The large majority (96%) of all sturgeon chubs *Macrhybopsis gelida* sampled in segment 2 occurred from river mile 1735 downstream, which was a similar pattern in their distribution that we've seen over the past three years of sampling. Sturgeon chub abundance gets higher the further as you go downstream from Fort Peck Dam. A total of 71 were sampled in 2008, which equated to an overall otter trawl CPUE of 0.14 fish/ 100 m, which was down from 0.22 fish/ 100 m in 2007 0.16. Although the presence and abundance of sturgeon chubs is limited in segment 2, sicklefin chubs *Macrhybopsis meeki* are even more so. Only one sicklefin chub was collected in both 2008 and 2006, while only two samples were collected in 2007. All four of these samples were collected in the very downstream end of segment 2. Although 59 blue suckers *Cycleptus elongates* have been collected from 2006 through 2008, all were large adults, possibly indicating little or no recruitment is occurring, which is similar to all segments of the Missouri River between Fort Peck Dam and Lake Sakakawea. Adult sauger *Sander Canadensis* are common in segment 2, but limited YOY rearing takes place in this segment. Overall trammel net CPUE was at 0.12 fish/ 100m in 2008, down from 0.21 in 2007, but both years were higher than the low of 0.17 fish/100m in 2006. Sand shiners *Notropis stramineus* are quite abundant with 1,948 sampled in the three years collectively. Sand shiner relative abundance has been steady in over the past two years with 8.2 fish/ net night during 2008 and 8.5 fish/net in 2007, both higher than 4.5 fish/net in 2006. The abundance of western silvery minnows *Hybognathus argyritis* was lower in 2008 (0.35 fish/net night) than in both 2007 (0.64 fish/net night) and 2006 (0.63 fish/net night).

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Introduction

The U.S. Fish and Wildlife Service (USFWS) listed pallid sturgeon *Scaphirhynchus albus* as endangered in 1990. In response to listing, the USFWS issued a Biological Opinion to the U.S. Army Corps of Engineers (COE), the primary water management entity responsible for the Missouri River mainstem from Fort Peck Dam and Reservoir to its confluence with the Mississippi River. Additionally, an amendment to the 2000 Biological Opinion was issued in 2003. The Amendment listed several Reasonable and Prudent Alternatives (RPA) to address the inability of pallid sturgeon to naturally reproduce and the need to be able to detect changes in their populations and ecosystem trends.

The Pallid Sturgeon Population Assessment Program (program) is guided by the RPA's in the 2003 Amendment to the 2000 Biological Opinion. The program is a comprehensive monitoring plan designed to assess survival, movement, distribution, habitat use, and physical characteristics of these habitats used by wild and hatchery reared juvenile pallid sturgeon (Drobish 2008). The 2000 Biological Opinion divides the program area into river and reservoir segments and assigns high, moderate, or low priority management action to these segments for pallid sturgeon (Drobish 2008). The focus of the program is on the high priority management action segments. The Missouri River from Fort Peck Dam downstream to the headwaters of Lake Sakakawea, ND is listed as a high priority action segment.

The program has stratified the Missouri River from Fort Peck Dam to the headwaters of Lake Sakakawea into four study segments based on biological, hydrological and fluvial geomorphological characteristics. The COE contracted Montana Fish, Wildlife & Parks (FWP) to conduct program sampling from Fort Peck Dam downstream to the North Dakota border, which consists of study segments 1 through 3.

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.

Sampling Season and Species

This program has two discrete seasons (sturgeon and fish community), which are primarily segregated by water temperatures. However, the sturgeon season is designed to sample sturgeon with gears that are temperature dependent, such as gill nets. Due to the nature of the majority of habitats in segment 1 through 3, gill nets are not an efficient gear for collecting pallid sturgeon due to debris flows and swift current and therefore they are not used in any segment situated in Montana. Trammel nets and otter trawl are standard gears used in segments 1-4 during sturgeon season, and appear to be an effective method to sample pallid sturgeon.

The fish community season extends from the beginning of July till the end of October and is designed not only to monitor sturgeon, but also monitor other native Missouri River fish populations. Both trammel nets and otter trawls are used during the fish community season, however mini fyke nets are added as a standard gear to more effectively sample shallow water habitats < 1.2 m in depth.

In addition to pallid sturgeon, the program is designed to monitor nine other native Missouri River species labeled “target” species. These include, shovelnose sturgeon *Scaphirhynchus platorynchus*, blue sucker *Cycleptus elongatus*, sauger *Sander canadense*, sturgeon chub *Macrhybopsis gelida*, sicklefin chub *M. meeki*, speckled chub *M. aestivalis*, plains minnow *Hybognathus placitus*, western silvery minnow *H. argyritis*, and sand shiner *Notropis stramineus*. This suite of species was selected for various reasons. First, some species may have similar habitat requirements as pallid sturgeon and therefore by monitoring their populations we may gain further insight into pallid sturgeon habitat and how anthropomorphic and natural changes to the Missouri River affect native fish assemblages. Secondly, it is hypothesized that various chub species and other native fishes are an important component of pallid sturgeon diet,

and thereby monitoring pallid sturgeon prey will allow us to better describe their habitat. Thirdly, we wouldn't expect to see an immediate response in a long-lived species like pallid sturgeon would be difficult to measure when environmental conditions change from either favorable or detrimental conditions. Thus, by monitoring short-lived native fishes we may be able to correlate environmental conditions to changes in fish populations on a much shorter time interval and make inferences on how pallid sturgeon populations may be affected.

Study Area

Study Segment 2 of the Missouri River Pallid Sturgeon Population Assessment Program begins at the confluence of the Missouri and Milk Rivers and runs downriver 59 river miles to Wolf Point, Montana (Drobish, 2008). This reach of the Missouri River is impacted by the presence and operations of Fort Peck Dam. Fort Peck Dam inhibits the natural spring pulses and distributes that water more evenly throughout the remainder of the year. Fort Peck Dam draws its water for power production from the hypolimnetic regions of Fort Peck reservoir, which are significantly colder during the summer months and warmer during the winter months, when compared to the Missouri River above the reservoir.

Fort Peck Reservoir traps the sediment loads of the Missouri River and therefore releases sediment free clear water to the Missouri River. This sediment free high-energy water scours the river of fine sediments and has reduced the amount of sand bars within the river.

Segment 2 is a transitional segment, which exhibits both characteristics of the hypolimnetic water releases from Fort Peck Dam and of the warmer sediment packed waters of the Milk and Redwater Rivers. The water transitions through segment 2 from, very cold clear waters in the upper most reaches to warmer more turbid waters in the downstream reaches near Wolf Point, MT.

The Milk River is the largest tributary in this segment and its flows can influence water temperature and discharge of the Missouri River (Kapuscinski, 2002). Throughout the spring, the Milk River forms a plume of warm turbid water that mixes with the cold clear waters of the Missouri. When the Milk River is flowing, it results in a warm turbid river on the north side of the channel and a cold clear river on the south side (Gardner and Stewart, 1987). The warm and cold waters do not generally mix until after moving 15 river miles downstream near Frazer Rapids, where the water remains relatively cold and clear (Kapuscinski, 2002). Water withdrawals for irrigation have reduced the Milk Rivers influence on the Missouri River during low water years.

Geologically, the entire segment is surrounded by the Bearpaw Shale formation, where upstream reaches are comprised of gravelly areas, which transition into sandbar habitats farther

downstream near Wolf Point (NRIS, 2007). Fish distribution changes throughout the segment in accordance with turbidity, temperature, and substrate.

Methods

Sampling methods for the Pallid Sturgeon Population Assessment Program were conducted in accordance with the Standard Operating Procedures (Drobish 2008), which was established by representatives from State and Federal agencies involved with pallid sturgeon recovery on the Missouri River. For a detailed description of methodologies please see Drobish (2008). A general description of those guidelines follows.

Sampling Site Selection and Description

Montana Fish Wildlife & Parks (FWP) was contracted to sample Segment 1 from Fort Peck Dam (RM 1771.5) to the mouth of the Milk River (RM 1761), Segment 2 from the mouth of the Milk River (RM 1761) to Wolf Point (RM 1701.5) and Segment 3 from Wolf Point (RM 1701.5) to the Montana/North Dakota border (RM 1586.5). Segment 2 consisted of twelve randomly selected bends. All 12 bends were sampled during both the sturgeon season (March 26 through June 5) and the Fish Community Season (August 7 through October 29) during 2008.

Two gears, trammel net and otter trawl were considered standard gears for both the sturgeon and fish community seasons. Both trammel nets and the otter trawl were used in all 12 randomly selected bends during both seasons. Additionally, mini fyke nets were also considered a standard gear for the fish community season and all 12 randomly selected bends were sampled with mini fyke nets.

Trotlines were used in segment 2 during 2008 as a wild gear with the intent to begin evaluating its use as a pallid sturgeon gear. Six randomly chosen river bends were sampled with trotlines during the sturgeon season and seven during the fish community season. Random river bends for trotlines were chosen by moving one river bend upstream from the 12 randomly chosen river bends for standard gears. This was done to minimize the influence of trotlines on our standard gears and make logistics easier. Since trotlines are a gear that requires attending a river bend on two consecutive days, it is logistically better to be able to set trotlines on the same day as otter trawling or drifting trammel nets occurs. We also wanted to make sure that one gear wasn't influencing the catch of other gears and by sampling the next river bend upstream we

believe we achieved this. No marked pallid sturgeon captured in standard gears or trotlines were subsequently captured in different gear at an adjacent bend within the same sampling period in 2008.

The Population Assessment Team developed a standard set of habitat classifications for the Missouri River (Appendix B) which consists of three distinct macrohabitats found in every bend, a main channel crossover (CHXO), main channel outside bend (OSB), and main channel inside bend (ISB). Each sampling bend was comprised of these three main macrohabitats. Nine additional macrohabitats were identified that may or may not be present in every bend: large tributary mouths (TRML), small tributary mouths (TRMS), confluence areas (CONF), large and small secondary connected channels (SCCL& SCCS), deranged channels (DRNG), braided channels (BRAD), dendritic channels (DEND) and non-connected secondary channel (SCN).

Mesohabitats were established to further define macrohabitats. Mesohabitats include bars (BARS), pools (POOL), channel border (CHNB), thalweg (TLWG) and island tip (ITIP). Channel borders are situated in areas between the deepest portions of the river up to a depth of 1.2 m. Bars are considered shallow areas (< 1.2 m) where terrestrial and aquatic habitats merge. The thalweg is the deepest portion of the river between the two channel borders where the majority of the flow is directed. Pools are directly downstream of any feature that creates scour, thus creating a habitat of deep (> 1.2 m) slower moving water. Island tips are just downstream of bars or islands where two channels meet where the water is > 1.2 m in depth.

For all analysis, the sampling unit was the river bend, where every river bend has a channel crossover, inside and outside bend. The downstream border of a river bend is the beginning of the next downstream bend's channel crossover.

Sampling Gear

For specific information pertaining to the specific habitats gears are utilized in and physical measurements taken in accordance with sampling the various gears described below, please see Drobish (2008).

Trammel Net

The standard trammel net has a length of 38.1 m, an inner mesh wall 2.4 m and two outer mesh walls 1.8 m deep. The inner mesh is made of #139 multifilament twine with a bar mesh size of 25.4 mm. The outer walls are constructed of #9 multifilament twine with a bar mesh size of 203.2 mm. The float line is a 12.7 mm diameter foam core with a lead line of 22.7 kg. Trammel nets were drifted from the bow of the boat and orientated perpendicular to the river flow for a minimum of 75 m and a maximum drift distance of 300 m.

Otter Trawl

The standard otter trawl has a length of 7.6 m, a width of 4.9 m and height of 0.9 m. The otter trawl has an inner mesh (6.35mm bar, #18 polyethylene twine) and outer mesh (38mmbar, #9 polyethylene twine) and a cod end opening of 406.4 mm. The trawl doors were made from 19.1 mm marine plywood and measured 762 mm x 381 mm. The trawl doors are used to keep the mouth of the trawl open while deployed on the riverbed. The trawl also has a 7.9 m long tickler chain attached to the bottom of the mouth of the trawl, which aids in keeping it orientated on the riverbed and protecting the mouth when snags are encountered. The otter trawl was deployed from the bow of the boat parallel to the current with two 30.5 m ropes and towed downstream slightly faster than current speed for a minimum of 75 m and a maximum distance of 300 m.

Mini Fyke Nets

The standard mini-fyke net consists of two rectangular frames 1.2 m wide and 0.6 m high and two 0.6 m tempered steel hoops. A 4.5 m long and 0.6 m high lead is connected to the first frame. The fyke net was made of 3 mm “ace” style mesh. The lead has small floats attached to the top and lead weights on the bottom. Mini-fyke nets are set with a “T” stake on shore and extend into river as perpendicular to the shoreline as possible or angled slightly downstream where higher velocities existed. Mini-fyke nets were set overnight and checked the following morning.

Trotlines

Trotlines consisted of 32 m nylon rope attached to both upstream and downstream anchors. Octopus style circle hooks were attached to the ropes using 136 kg monofilament line

and commercial fishing clips. Twenty 45.7 cm leaders were used on each trotline. Two hook sizes were used, size 2/0 and 2 circle hooks, Each trotline used one hook size and each hook size was used at least once in each macrohabitat sampled. Trotlines were set overnight and checked the next morning.

Data Collection and Analysis

A minimum of eight random subsamples were taken in macrohabitats present at each randomly selected river bend. At least two subsamples (when possible) were taken using each gear in each macro habitat within a bend. More than two subsamples were taken in a macrohabitat for a gear when the number of discrete macrohabitats was less than four or less than four could be effectively sampled. When a pallid sturgeon was captured, we duplicated the sample in a non-random manner. No more than eight duplicates were taken and we would stop taking duplicates whenever two contiguous duplicate subsamples contain no pallid sturgeon. Although this non-random sampling, it gives us a better understanding of relative abundance and identifies habitats that pallid sturgeon may congregate in.

All fish were measured to the nearest mm. Fork length (FL) was used for pallid and shovelnose sturgeon, while other species were measured to TL, except for paddlefish *Polyodon spathula*, which were measured from the eye to the fork in the caudal fin. The first 25 fish of each species in each subsample were measured, after 25 they were counted.

Time was recorded at the beginning of each sample with all gears and an end time was always recorded when pulling mini fyke net sets. A global positioning satellite (GPS) position was taken at the beginning and end of all otter and beam trawls and trammel net drifts. One GPS location was taken for mini fyke net samples (middle of the seine). All GPS locations were taken using a Garmin GPS 76 unit with Wide Area Augmentation System (WAAS) capability.

Sample depth was determined at the beginning, middle and end of each trawl and drift using a Lowrance X136 sonar unit. One depth was taken for mini fyke nets at the intersection of the frame and floatline using a wading rod.

Water temperature taken near the surface was recorded at every sample using the Lowrance X136 unit for trawls and trammel net drifts and using a hand held thermometer for mini fyke net and bag seine samples.

Habitat samples were collected randomly for 25% of each mesohabitat within each macrohabitat sampled. Velocities (mps) were taken at three depths in the water column for habitats > 1.2 m in depth (bottom, 0.8 of bottom depth and 0.2 of the bottom depth) using either a Current AA Price Meter and sounding reel or a Marsh-McBirney Flo Mate 2000. Velocities for shallow water habitats (< 1.2 m) were taken at the bottom and 0.6 of the bottom depth using the March-McBirney Flo Mate 2000.

Turbidity was recorded in nephelometeric turbidity units (NTU) using a LaMotte 2020 turbidity meter. Turbidity was taken at the midpoint of all samples, except mini fyke sets, where it was taken at the convergence of the rectangular frame and float line.

In addition to 25% of all mesohabitats, habitat measurements were taken whenever a pallid sturgeon was captured.

Genetic Verification

Genetic verification for pallid sturgeon or potential hybrids followed the methods outlined in Drobish (2008). Two fin pectoral fin clips (~ 2 cm^2) are taken from any pallid sturgeon of unknown origin. Fin samples are then preserved in 95% non-denatured alcohol for genetic analysis. All samples are sent to the U.S. Fish and Wildlife Service's Lamar Laboratory for analysis and archiving.

Relative Condition

Relative condition (Kn) for all sampled pallid sturgeon was calculated using the following formula: Kn = W / W', where W is the fork length of the specimen and W' is the length-specific mean weight predicted by the weight-length relationship equation calculated for that population. Since no weight length-relationship exists for the hatchery reared pallid sturgeon population in segment 2, we used the weight-length relationship [$\log_{10} W = -6.378 + 3.357 \log_{10} L$ ($r^2 = 0.9740$)] derived by Keenlyne and Evanson (1993) for pallid sturgeon throughout their range.

Incremental Stock Density

Incremental stock density (RSD) was used to describe the size structure of pallid and shovelnose sturgeon sampled in segment 2. We used the length categories proposed by Shuman et al. (2006) for pallid sturgeon and Quist et al. (1998) for shovelnose sturgeon. Additionally, we broke up sub-stock sizes for both pallid and shovelnose into two groups to aid in determining recruitment of young-of-the-year (YOY) sturgeon. Fork length categories for both species of sturgeon are given in all figures and tables pertaining to RSD.

Analyses

The fundamental sampling unit for the Population Assessment Program is the river bend. Therefore, sample size was equal to the number of bends sampled. Accordingly, all catch-per-unit-effort (CPUE) estimates for each species by gear were made on a bend level and the mean bend CPUE's were averaged to obtain the segment CPUE. Catch-per-unit-effort was stratified by season, depending on the analysis. In addition, stratification by macro- and mesohabitats was performed for each species. All CPUE estimates were performed by the Missouri Department of Conservation.

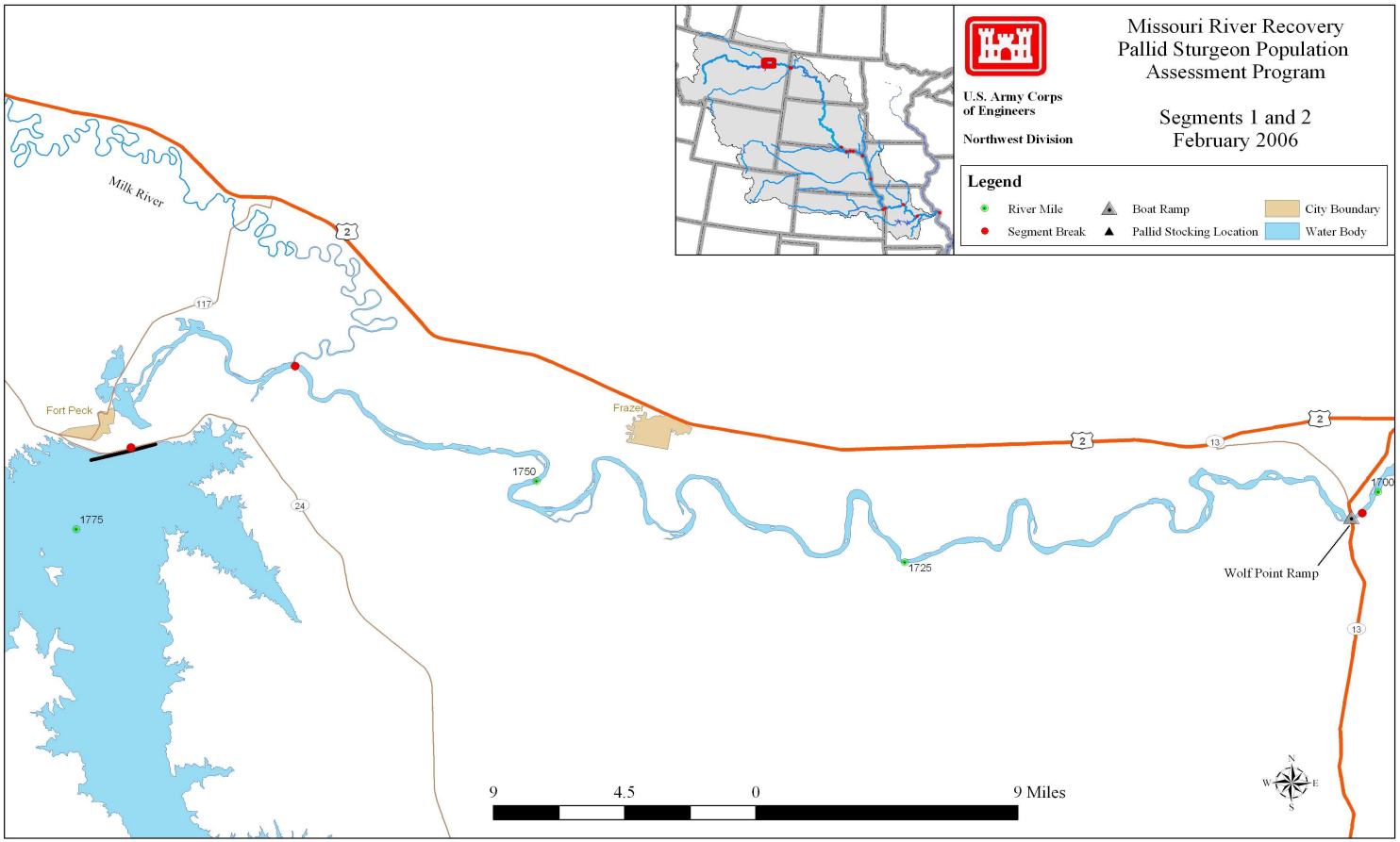

Figure 1a. Map of segment 2 of the Missouri River with major tributaries, common landmarks, and historic stocking locations for pallid sturgeon. Segment 2 encompasses the Missouri River from the mouth of the Milk River (River Mile 1760.0) to Wolf Point, MT (River Mile 1701.0)

Results

Pallid Sturgeon

A total of sixteen pallid sturgeon were sampled in segment 2 during 2008, all of which were of hatchery origin. For the most part pallid sturgeon were sampled throughout the length of segment 2. The total catch of pallid sturgeon was slightly lower in 2008 than that of 2007 when 22 were sampled, but still higher than 2006 when 14 were captured (Figure 9). Of the total 2008 catch, 5 were collected during the sturgeon season and 11 during the fish community season. For standard gears during the sturgeon season, the otter trawl collected three pallid sturgeon and trammel nets zero. During the fish community season the otter trawl collected two and trammel nets three. Trotlines, a wild gear that was used in all bends once over both seasons instead of all bends twice as with the standard gears captured a total of eight pallid sturgeon, two during the fish community season and six during the fish community season.

Otter trawl CPUE for pallid sturgeon during the sturgeon season was slightly lower in 2008 than in 2007, but still higher than that of 2006 (Figure 2). However the variability of catches within each year has led to a high associated error for each estimate, which in turn makes the comparison between years difficult. No pallid sturgeon were sampled using trammel nets during the sturgeon season during 2008. This was a slight decrease from 2007, but again likely not significantly different CPUE than either 2007 or 2006 (Figure 3).

Trammel net CPUE for pallid sturgeon during the fish community season has increased every year from a low of 0.003 fish/100 m during 2006 to a high of 0.017 fish/100 m in 2008 (Figure 5). The opposite pattern was observed in otter trawl CPUE during the fish community season, where CPUE has been decreasing from 2006 to 2008 (Figure 5). No pallid sturgeon have been captured in mini fyke nets over the last three years of sampling (Figure 7).

The specific macro and meso habitats that pallid sturgeon were sampling in by size class and gear can be found in Tables 9 through 16. During 2008, eight pallid sturgeon were sampled in channel crossovers, four in inside bends and four in large secondary connected

side channels. The average depth of all gear deployments capturing pallid sturgeon was 1.6 m, with a minimum of 0.6 and a maximum of 3.2m. On average pallid sturgeon were captured in slightly shallower water using trammel nets (1.2 m) than both otter trawls (1.6 m) and trotlines (1.8 m).

Pallid sturgeon in segment 2 had an average length of 307.6 mm FL with a range of 233 to 422 mm and an average weight of 88.9 g with a range of 35 to 155 g. The average length of 307.6 mm FL was larger than the 2007 average of 287.0 mm, but smaller than the 2006 average of 310.4 mm. On average the otter trawl captured smaller pallid sturgeon (253.4 mm) than trammel nets (309.3 mm) and trotlines (340.9 mm)

Four separate year classes of pallid sturgeon were captured during 2008, seven from 2006, five from 2005, two from 2007, one from 2001 and one of an unknown year class. The largest pallid captured in 2008 was from the 2006-year class, stocked in 2006, while the smallest pallid sturgeon was from an unknown year class. Growth data for pallid sturgeon by year class is shown in Table 6. However, the majority of these fish were batch marked using elastomer tags when stocked and subsequently only average lengths and weights were taken prior to stocking. Therefore, large recapture numbers are need to make inferences on growth due to the inherent variability in the lengths and weights of individual fish at the time of stocking. The relative condition (Kn) for pallid sturgeon in segment 2 decreases as they grow into larger length categories (Table 7), which is similar to the decrease in growth rates as pallid sturgeon age (Table 6).

Thirteen pallid sturgeon sampled in segment 2 during 2008 came from four different known stocking locations, while the stocking site of the remaining three were unknown. Of the pallid sturgeon captured, eight were stocked near Wolf Point, three at the School Trust site, one near the mouth of the Milk River and one near Culbertson, MT. The largest movement documented was the Culbertson stocked pallid sturgeon which moved approximately 109 river miles upstream from the time of stocking to its time of capture. All the school trust and mouth of Milk River stocked fish had downstream movements, which averaged 27.4 river miles, while all the Wolf Point stocked fish moved upstream at an average of 11.2 river miles.

Table 1. Number of bends sampled, mean number of deployments, and total number of deployments by macrohabitat for segment 2 on the Missouri River during sturgeon season and fish community season in 2008. N-E indicates the habitat is non-existent in the segment.

Gear	Number of Bends	Mean deploy-ments	Macrohabitat[a]													
			BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Fall through Spring - Sturgeon Season																
1 Inch Trammel Net	12	8	N-E	33	0	N-E	N-E	30	29	4	0	0	0	0	0	N-E
Gill Net			N-E	0	0	0	0	0	0	0	0	0	0	0	0	N-E
Otter Trawl	12	8	N-E	32	0	N-E	N-E	31	29	4	0	0	0	0	0	N-E
Summer – Fish Community Season																
1 Inch Trammel Net	12	8.00	N-E	31	0	N-E	N-E	30	29	6	0	0	0	0	0	N-E
Mini-Fyke Net	12	7.75	N-E	23	0	N-E	N-E	32	2	11	23	2	0	0	0	N-E
Otter Trawl	12	8.00	N-E	29	0	N-E	N-E	32	29	6	0	0	0	0	0	N-E

[a] Habitat abbreviations and definitions presented in Appendix B.

Table 2. Number of bends sampled, mean number of deployments, and total number of deployments by mesohabitat for segment 2 on the Missouri River during sturgeon season and fish community season in 2007-2008. N-E indicates the habitat is non-existent in the segment.

Gear	Number of bends	Mean deploy-ments	Mesohabitat[a]					
			BARS	CHNB	DTWT	ITIP	POOL	TLWG
Fall through Spring – Sturgeon Season								
1 Inch Trammel Net	12	8	0	95	N-E	1	N-E	0
Gill Net								0
Otter Trawl	12	8	0	96	N-E	0	N-E	0
Summer – Fish Community Season								
1 Inch Trammel Net	12	8.00	0	96	N-E	0	N-E	0
Mini-Fyke Net	12	7.75	93	0	N-E	0	N-E	0
Otter Trawl	12	8.00	0	96	N-E	0	N-E	0

[a] Habitat abbreviations and definitions presented in Appendix B.

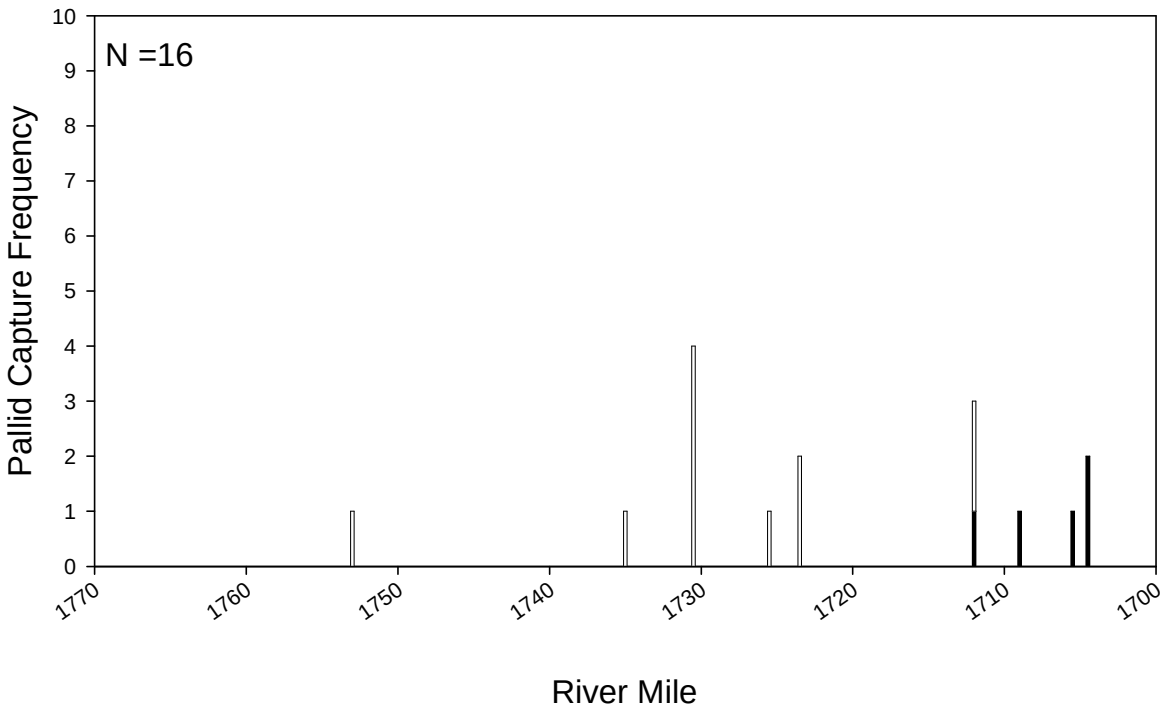

Figure 1b. Distribution of pallid sturgeon captures by river mile for segment 2 of the Missouri River during 2008. Black bars represent pallid captures during sturgeon season and white bars during fish community season. Figure includes all pallid captures including non-random and wild samples.

Table 3. Pallid sturgeon capture summaries for all gears relative to habitat type and environmental variables on the Missouri River during 2007-2008. 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.

Habitat		Depth		Bottom Velocity (m/s)		Temperature		Turbidity (ntu)		
Macro-	Meso-	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	Total pallids caught
CHXO	BARS	0.4 (0.2-0.6)		0.05 (0.00-0.18)		15.5 (9.2-20.4)		14.6 (6.0-39.0)		.
	CHNB	1.7 (0.4-4.5)	1.8 (1.0-3.0)	0.66 (0.26-0.97)	0.59 (0.32-0.79)	11.2 (1.7-22.0)	12.7 (3.3-18.9)	11.1 (2.0-28.0)	14 (8.0-28.0)	8
	DTWT	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	ITIP									
	POOL	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	TLWG	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
ISB	BARS	0.3 (0.2-0.6)		0.08 (0.02-0.18)		16.1 (9.3-19.8)		13.9 (3.0-22.0)		.
	CHNB	1.4 (0.5-3.2)	1.4 (1.1-1.5)	0.6 (0.00-0.82)	0.53 (0.28-0.77)	11.8 (2.5-19.8)	9.8 (8.7-11.4)	11.6 (2.0-30.0)	13 (5.0-24.0)	4
	DTWT	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	ITIP									
	POOL	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	TLWG	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
OSB	BARS	0.6 (0.5-0.6)		0 (0.00-0.00)		16.9 (16.4-17.4)		10 (10.0-10.0)		.
	CHNB	2 (0.6-4.3)		0.72 (0.31-1.39)		11.6 (2.4-19.5)		11.3 (2.0-32.0)		
	DTWT	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	ITIP									

Habitat		Depth		Bottom Velocity (m/s)		Temperature		Turbidity (ntu)		
Macro-	Meso-	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	Total pallids caught
SCCL	POOL	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	TLWG	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	BARS	0.4 (0.2-0.6)		0.08 (0.00-0.22)		14.8 (9.1-19.7)		13.6 (9.0-19.0)		.
	CHNB	1.3 (0.8-2.2)	1.6 (1.1-2.2)	0.7 (0.47-0.84)	0.62 (0.47-0.75)	16.7 (12.1-19.3)	18.6 (18.3-19.1)	13.8 (7.0-27.0)	8.5 (7.0-9.0)	4
	DTWT	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	ITIP	1.5 (1.5-1.5)				12.4 (12.4-12.4)				.
SCCS	POOL	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	TLWG	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	BARS	0.4 (0.2-0.7)		0.05 (0.00-0.16)		17.5 (13.4-23.3)		17.3 (5.0-57.0)		.
	CHNB									
	DTWT	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	ITIP									
	POOL	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E
	TLWG	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E	N-E

Table 6. Mean fork length, weight, relative condition factor (Kn), and absolute growth rates for all hatchery-reared pallid sturgeon captures by year class at the time of stocking and recapture during 2008 from segment 2 of the Missouri River. Relative condition factor was calculated using the equation in Keenlyne and Evanson (1993). Standard error (+/- 2 SE) 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)	K_n	Length (mm)	Weight (g)	K_n	Length (mm/d)	Weight (g/d)
2001	1	250	.	.	332	105	0.862	0.040	.
		.	.	.	.	.	.	.	.
2005	5	290	77.0	1.205	336	114.4	0.902	0.092	0.054
		(31)	.	.	(24)	(22.2)	(0.080)	(0.009)	.
2006	7	262	69.5	1.239	306	84.6	0.979	0.098	0.074
		(38)	(33.0)	(0.005)	(44)	(18.9)	(0.216)	(0.017)	(0.004)
2007	2	247	48.5	1.042	268	55.5	0.894	0.214	0.064
		(34)	(27.0)	(0.113)	(68)	(41.0)	(0.072)	(0.262)	(0.127)

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 2008 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	K_n (+/- 2 SE)
Sturgeon Season			
Sub-stock (0-199 mm)	0	.	0
Sub-stock (200-329 mm)	3	.	1.130 (0.075)
Stock	2	100	0.874 (0.022)
Quality	0	.	0
Preferred	0	.	0
Memorable	0	.	0
Trophy	0	.	0
Overall K_n	.	.	1.028 (0.133)
Fish Community Season			
Sub-stock (0-199 mm)	0	.	0
Sub-stock (200-329 mm)	7	.	1.002 (0.070)
Stock	4	100	0.756 (0.296)
Quality	0	.	0
Preferred	0	.	0
Memorable	0	.	0
Trophy	0	.	0
Overall K_n	.	.	0.912 (0.130)

[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 %).

Segment 2 - Pallid Sturgeon / Sturgeon Season

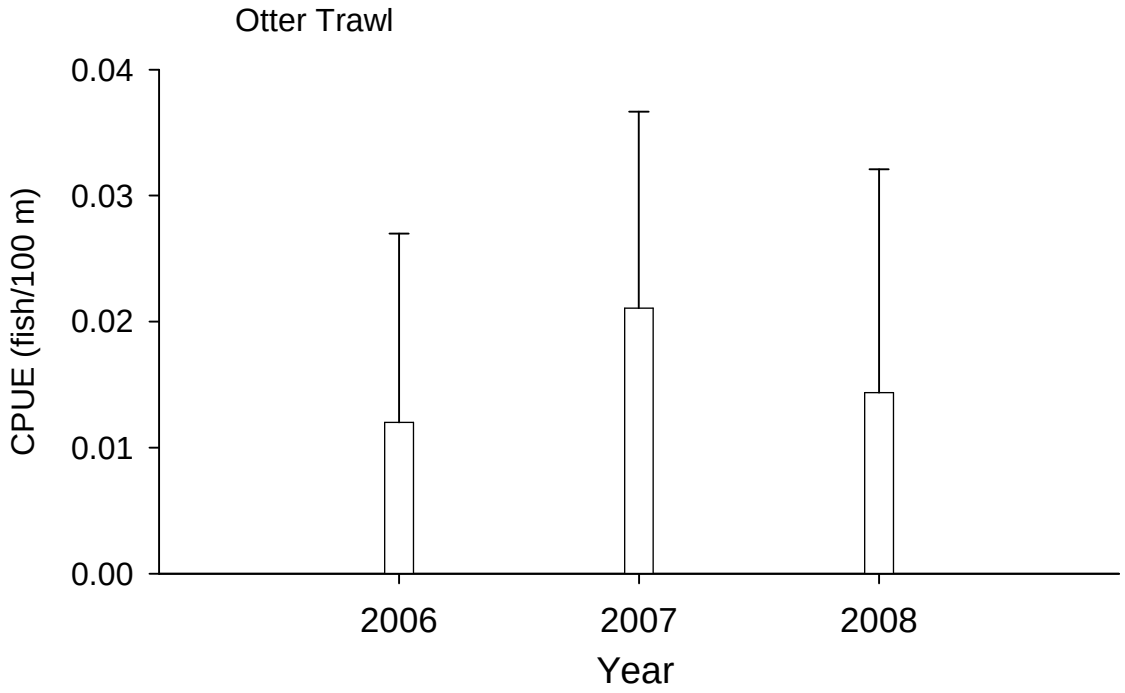

Figure 2. Mean annual catch per unit effort (+/- 2 SE) of wild (black bars), hatchery reared (white bars), and unknown origin (cross-hatched bars) pallid sturgeon using otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

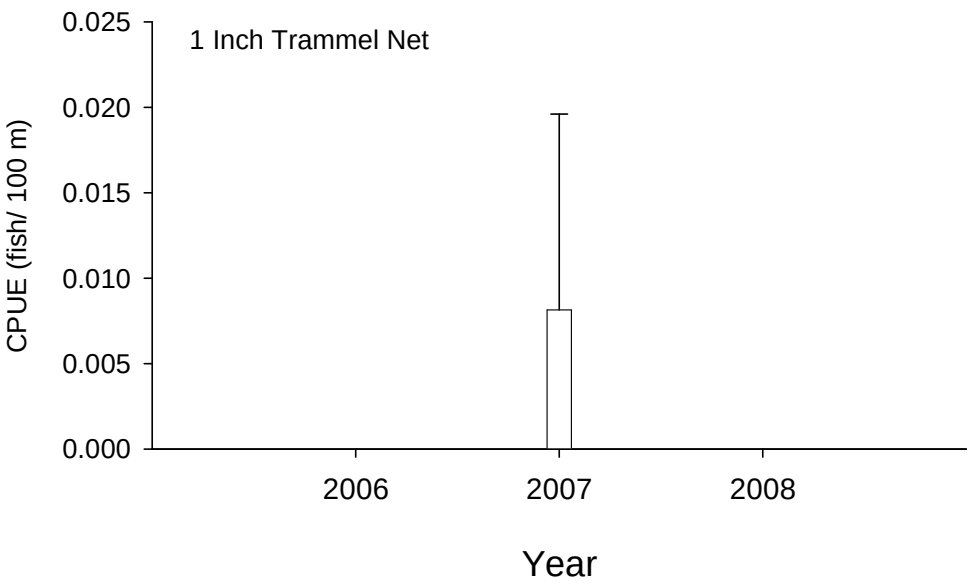

Figure 3. Mean annual catch per unit effort (+/- 2 SE) of wild (black bars), hatchery reared (white bars), and unknown origin (cross-hatched bars) pallid sturgeon using 1 inch trammel nets in segment 2 of the Missouri River during sturgeon season 2006-2008. Pallid sturgeon of unknown origin are awaiting genetic verification.

Segment 2 - Pallid Sturgeon / Fish Community Season

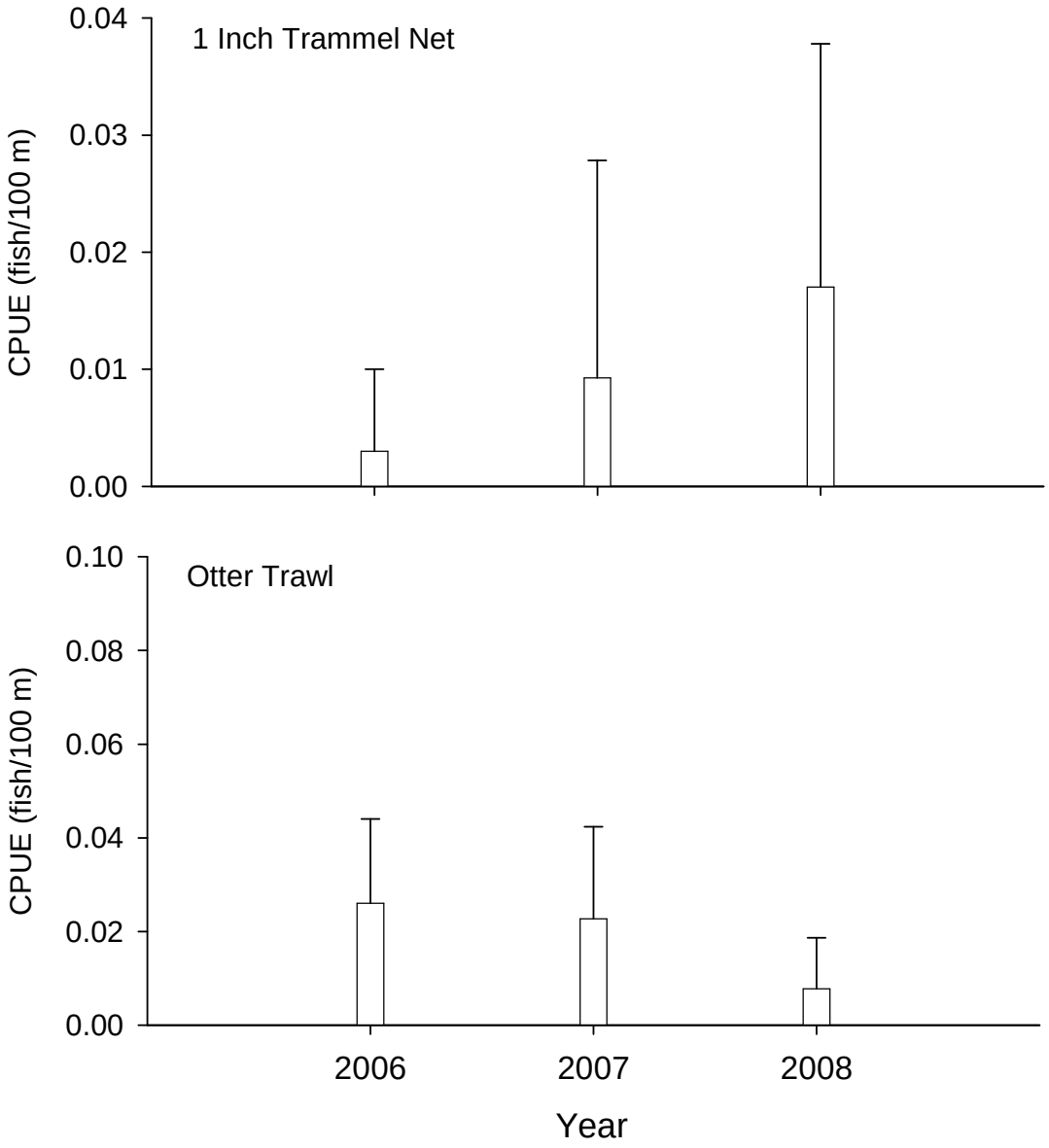

Figure 5. Mean annual catch per unit effort (+/- 2 SE) of wild (black bars), hatchery reared (white bars), and unknown origin (cross-hatched bars) pallid sturgeon using 1 inch trammel nets and otter trawls in segment 2 of the Missouri River during fish community season 2006-2008.

Segment 2 - Pallid Sturgeon / Fish Community Season

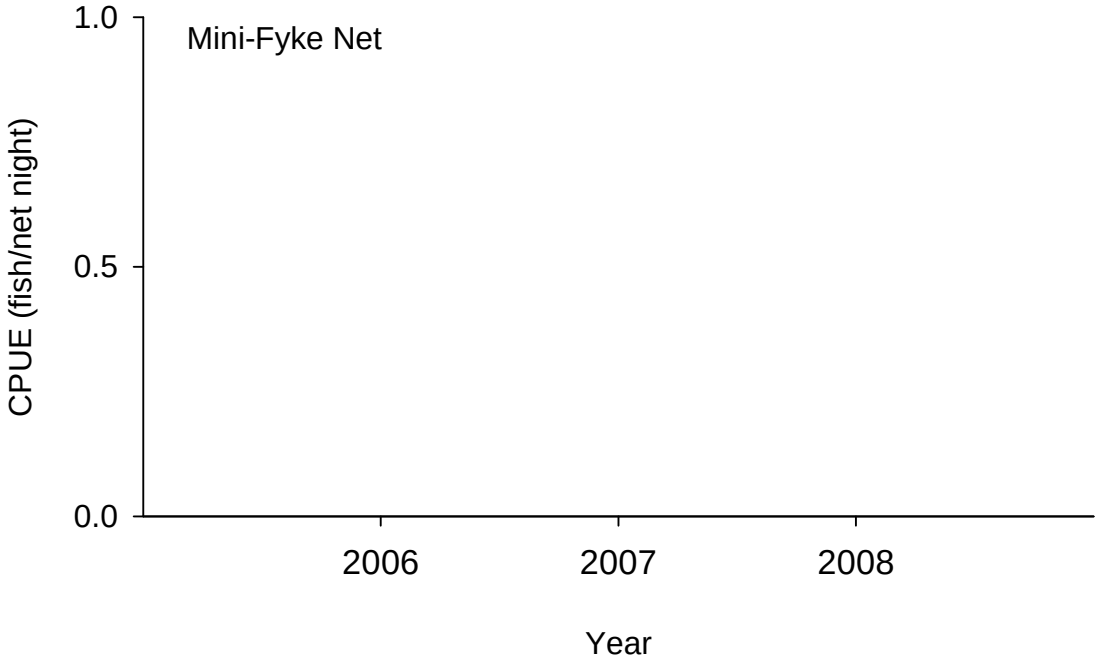

Figure 7. Mean annual catch per unit effort (+/- 2 SE) of wild (black bars), hatchery reared (white bars), and unknown origin (cross-hatched bars) pallid sturgeon using mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0			(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0			(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0			(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0			(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0			(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)		(2)		0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)		0		0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)		0		0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0		0		0
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)		0		0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	3	0	67	0	N-E	N-E	33	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	2	0	50	0	N-E	N-E	0	0	50	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	2	0	50	0	N-E	N-E	50	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	3	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	2	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	2	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	1	0	0	0	N-E	N-E	100	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	1	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	·	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	·	(100)	0	0	0	0	0
Otter Trawl	0	0	0	N-E	0	N-E	0
	·	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

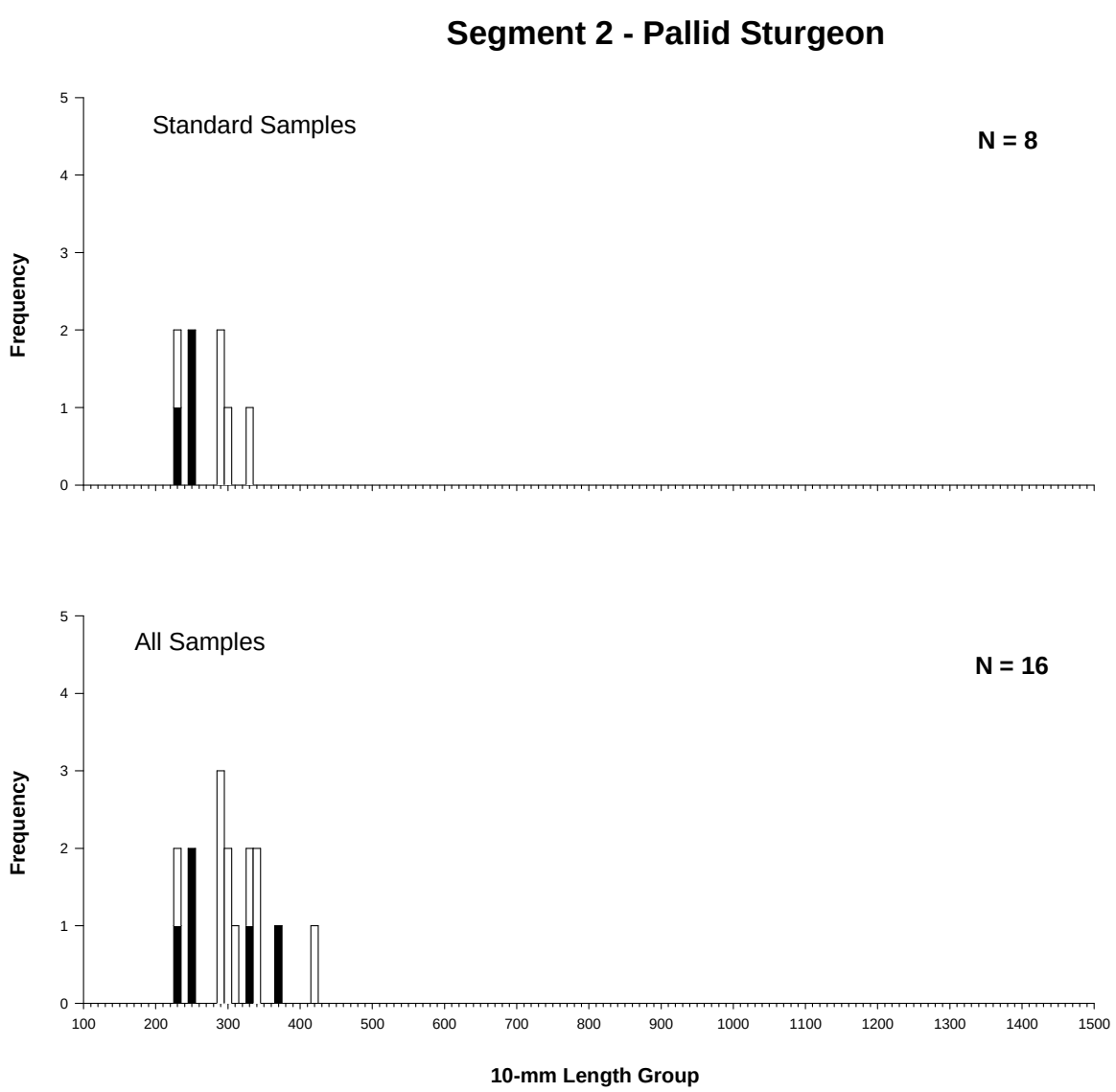

Figure 8. Length frequency of pallid sturgeon captured during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2008.

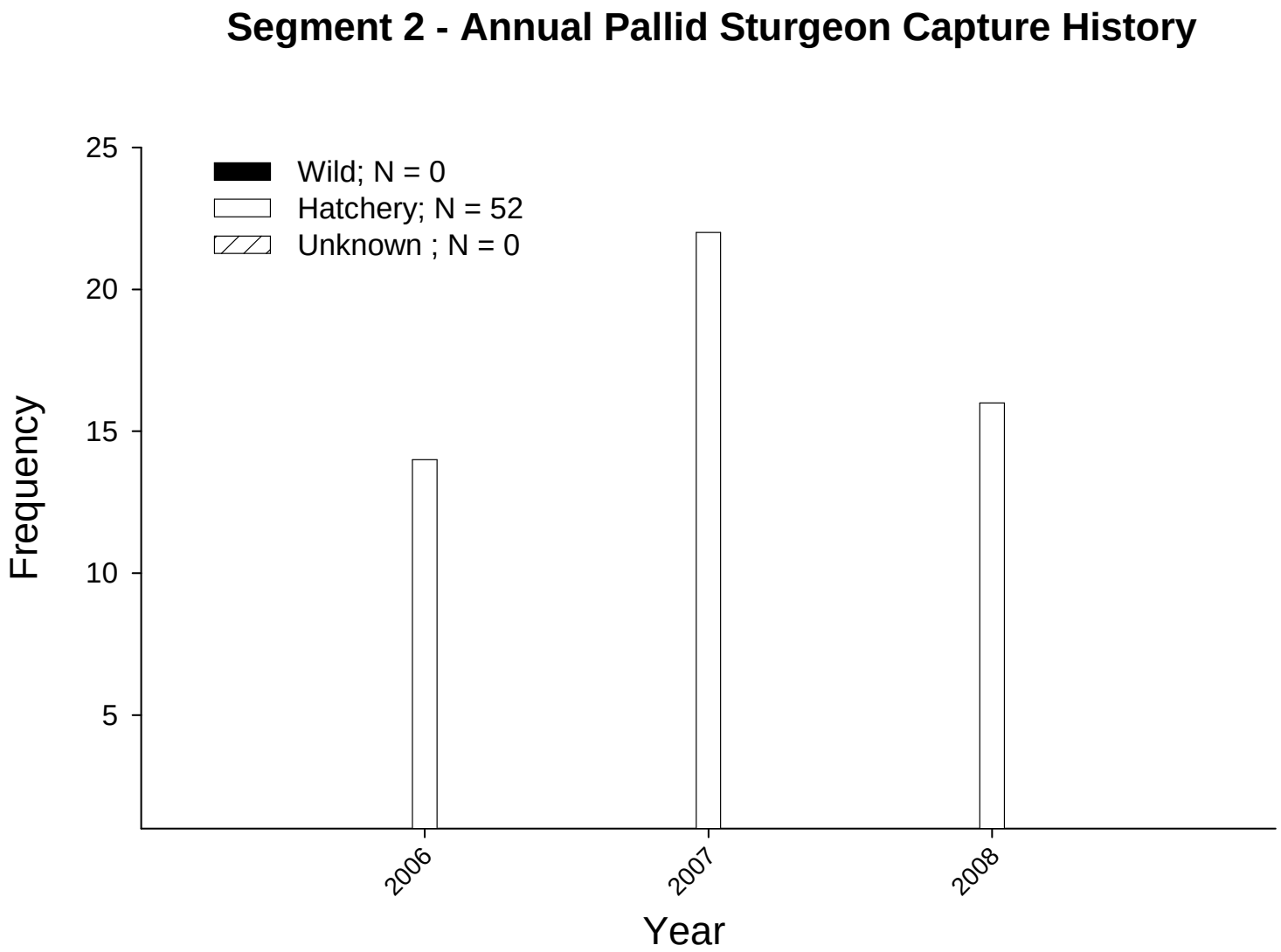

Figure 9. Annual capture history of wild (black bars), hatchery reared (white bars), and unknown origin (cross-hatched bars) pallid sturgeon collected in segment 2 of the Missouri River from 2006 to 2008. Figure is designed to compare overall pallid sturgeon captures from year to year and is biased by variable effort among years. Figure includes all pallid captures including non-random and wild samples.

Shovelnose X Pallid Sturgeon Hybrids

No shovelnose X pallid sturgeon hybrids have been captured in segment 2 of the Missouri River from 2006 through 2008.

Targeted Native River Species

Shovelnose Sturgeon

A total of 759 shovelnose sturgeon were sampled in segment 2 during 2008, 412 during the sturgeon season and 347 during the fish community season. Trammel nets captured 382 shovelnose sturgeon, trotlines 246 and the otter trawl 131.

During the sturgeon season, the long-term average otter trawl CPUE of shovelnose sturgeon larger than 380 mm FL has remained relatively constant over the past three years, even though it was slightly lower in 2008 than 2007 (Figure 11). CPUE was estimated at 0.29 fish/100 m in 2008, 0.33 in 2007 and 0.24 in 2006 (Figure 11). For smaller shovelnose (<380 mm FL), a slight increase in CPUE was observed in 2008 when compared to 2007 and 2006. Fourteen-shovelnose sturgeon smaller than 380 mm FL were captured in 2008 compared to one during 2007 and three in 2006. Sturgeon season trammel net CPUE was higher in 2008 for larger (> 380 mm) shovelnose sturgeon than that of 2007 or 2006 (Figure 12). The CPUE of smaller (< 380 mm) shovelnose sturgeon was not appreciably different, although nine were sampled in 2008 compared to two in both 2007 and 2006.

Shovelnose sturgeon CPUE for trammel nets and otter trawls during the fish community season has remained relatively constant of the past three years (Figure 14). The highest CPUE for shovelnose sturgeon over the past three years of sampling have consistently occurred using trammel nets during the fish community season (Figures 11-14). For 2008, trammel nets captured shovelnose sturgeon > 380 mm at a rate of 0.93 fish/100 m, which is higher than trammel nets during the sturgeon season (0.83 fish/ 100 m) and the otter trawl during both the sturgeon (0.29 fish/ 100 m) and fish community (0.15 fish/ 100 m) seasons. A total of 43 shovelnose sturgeon < 380 mm have been collected in the past three years, with the majority (n = 31) occurring in 2008, while only 5 and 7 were collected in 2007 and 2006, respectively.

Shovelnose sturgeon averaged 559.7 mm FL with a range of 316.0 to 857.0 mm and weighed an average of 658.9 g. The majority of shovelnose sturgeon captured in segment 2 were

between the 510-639 mm length group, which corresponds to age-6 and older (Steffensen and Hamel 2008) (Table 25). We have found no evidence of YOY shovelnose sturgeon rearing in segment 2 during the past three years of sampling. However, stock sized fish (< 379 mm) were sampled in both seasons, suggesting age-1 and age-2 fish are moving into segment 2, most likely from areas downstream in segment 3 and 4. This is also supported by the length frequency histogram in Figure 17, which displays a population that is skewed to older fish. However, if no recruitment was occurring into this population we would expect to see the left side of this histogram fade over time with all fish being larger, something that we do not see. Instead, the length frequency histograms for segment 2 look very similar for all three years sampled, again suggesting that segment 2 is not a YOY rearing area and that fish tend to move into the area around age-1 and older.

Specific data on the habitats that shovelnose sturgeon were captured by gear and size can be found in Tables 17-24.

Segment 2 - Shovelnose Sturgeon / Sturgeon Season

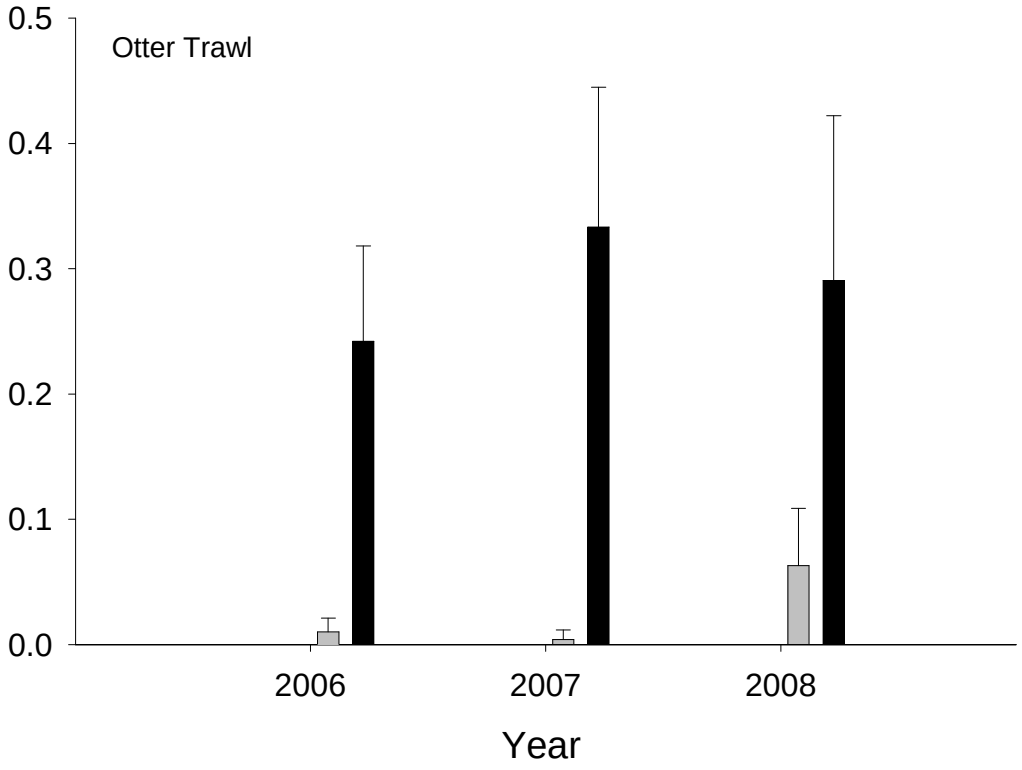

Figure 11. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; white bars), sub-stock size (150-249 mm; cross-hatched), stock size (250-379 mm; gray bars), and quality and above size (> 380 mm; black bars) shovelnose sturgeon using otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

Segment 2 - Shovelnose Sturgeon / Sturgeon Season

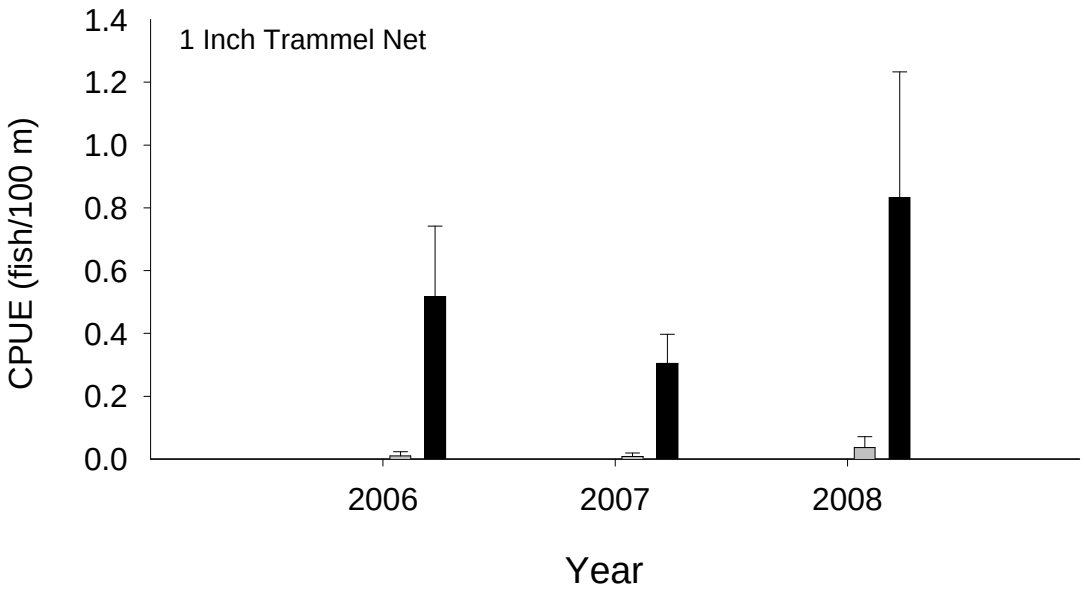

Figure 12. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; white bars), sub-stock size (150-249 mm; cross-hatched), stock size (250-379 mm; gray bars), and quality and above size (> 380 mm; black bars) shovelnose sturgeon using 1 inch trammel nets in segment 2 of the Missouri River during sturgeon season 2006-2008.

Segment 2 - Shovelnose Sturgeon / Fish Community Season

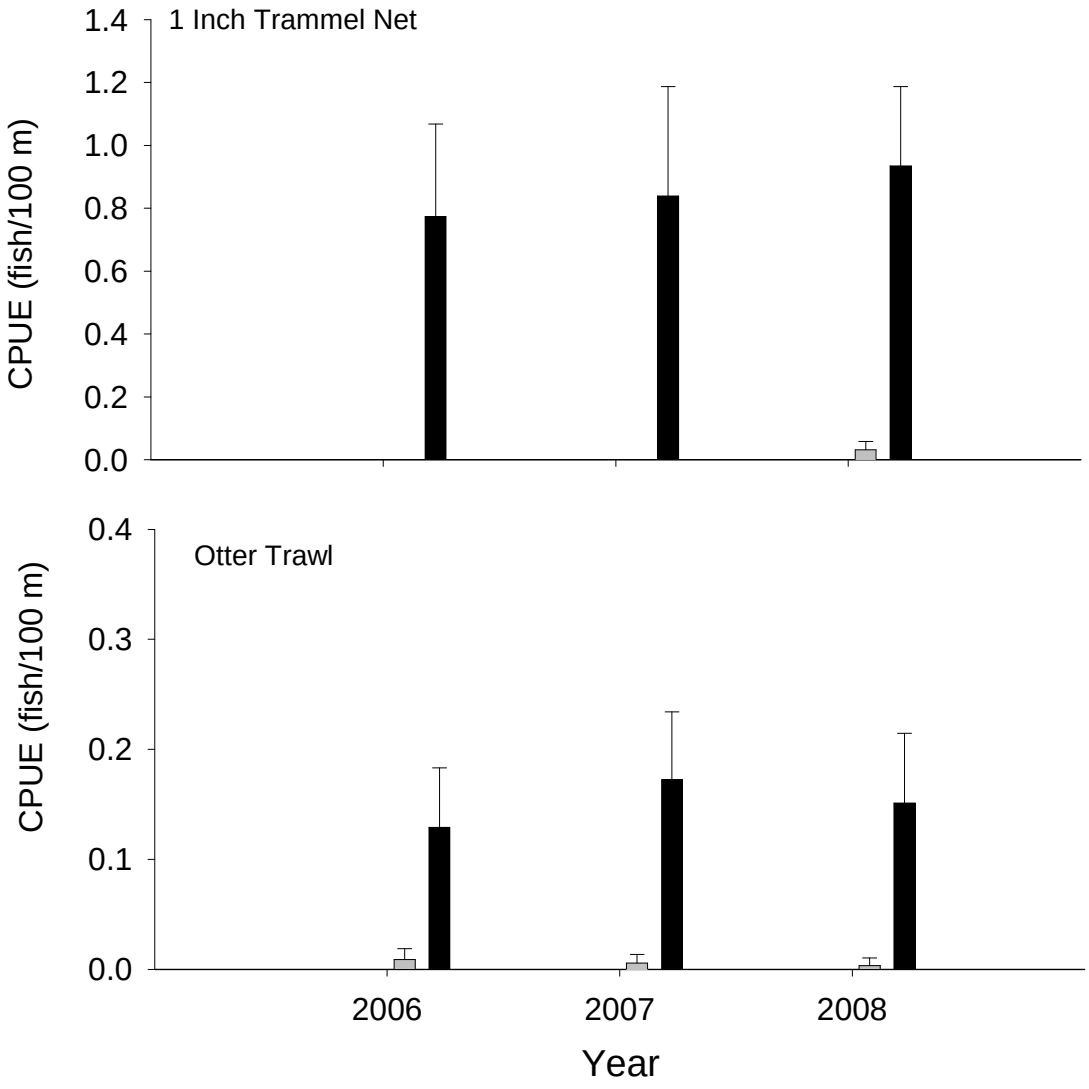

Figure 14. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; white bars), sub-stock size (150-249 mm; cross-hatched), stock size (250-379 mm; gray bars), and quality and above size (> 380 mm; black bars) shovelnose sturgeon using 1 inch trammel nets and otter trawls in segment 2 of the Missouri River during fish community season 2006-2008.

Segment 2 - Shovelnose Sturgeon / Fish Community Season

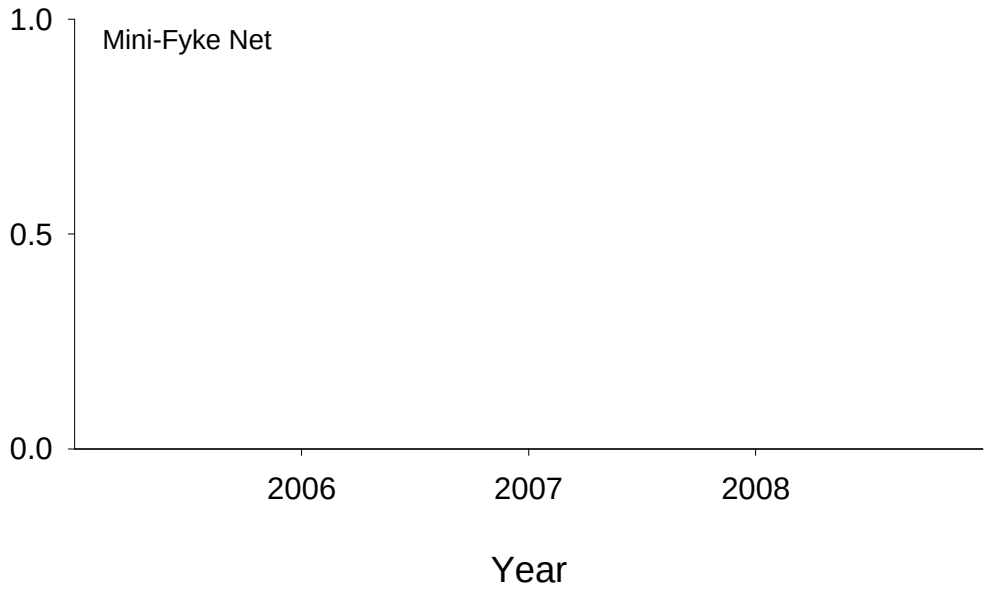

Figure 15. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; white bars), sub-stock size (150-249 mm; cross-hatched), stock size (250-379 mm; gray bars), and quality and above size (> 380 mm; black bars) shovelnose sturgeon using mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	9	0	11	0	N-E	N-E	44	22	22	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	14	0	29	0	N-E	N-E	7	57	7	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	8	0	50	0	N-E	N-E	38	0	13	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	1	0	0	0	N-E	N-E	100	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	9	0	100	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	14	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	8	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	1	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	171	0	43	0	N-E	N-E	19	37	1	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	68	0	57	0	N-E	N-E	6	35	1	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	191	0	45	0	N-E	N-E	21	32	2	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	42	0	50	0	N-E	N-E	19	26	5	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

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 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	171	0	99	N-E	1	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	68	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	191	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	42	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

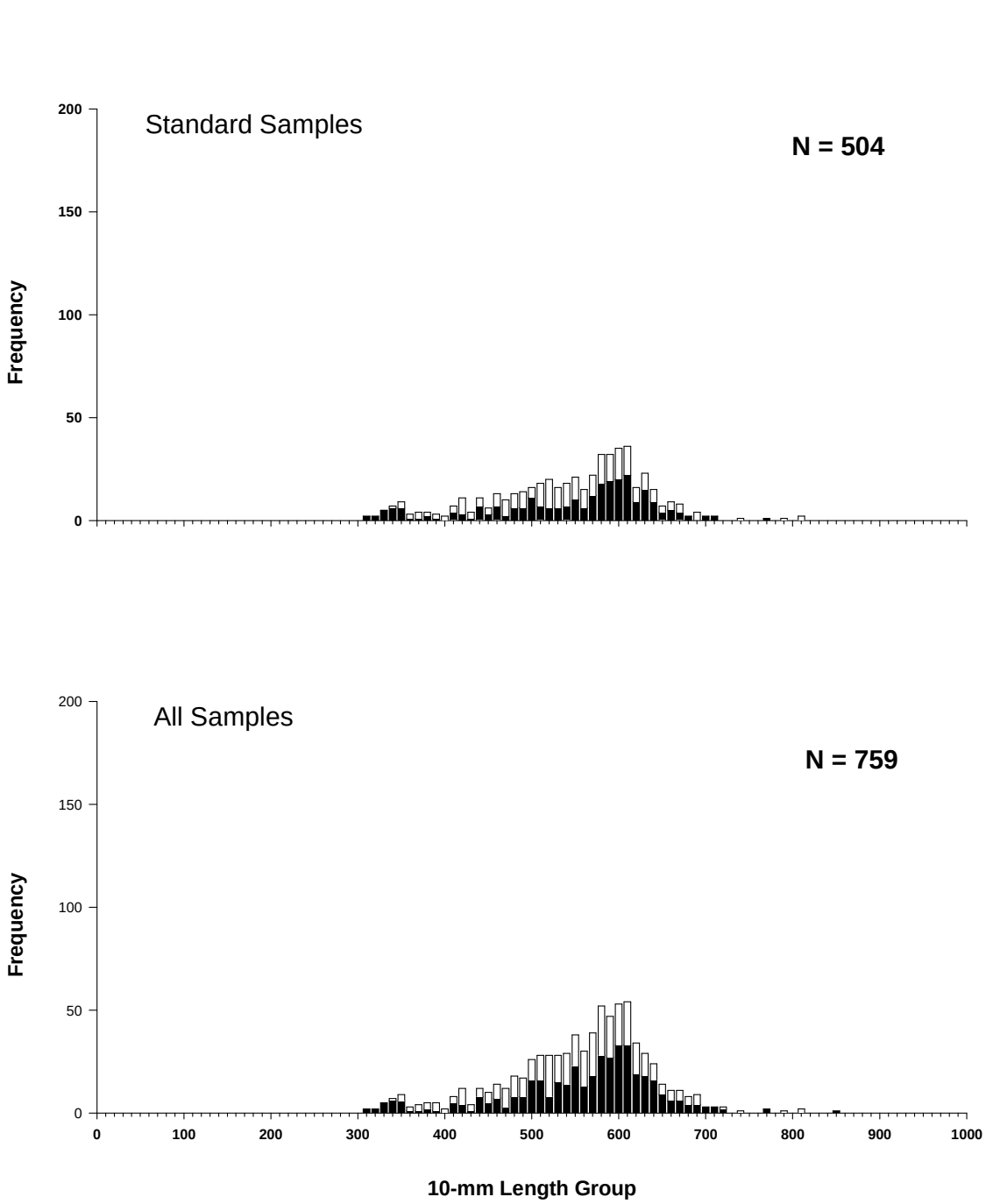

Figure 17. Length frequency of shovelnose sturgeon during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2007-2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2008.

Table 25. Incremental relative stock density (RSD)[a] and mean relative weight (Wr) by a length category for shovelnose sturgeon in segment 2 of the Missouri River captured during 2007-2008. Length categories[b] determined using methods proposed by Quist (1998).

Length category	N	RSD	Wr (+/- 2 SE)
Sturgeon Season			
Sub-stock (0-149 mm)	0	.	0
Sub-stock (150-249 mm)	0	.	0
Stock	23	9	95.07 (10.09)
Quality	53	20	90.89 (5.941)
Preferred	157	60	82.60 (1.116)
Memorable	29	11	76.66 (3.305)
Trophy	0	.	0
Overall Wr	.	.	84.71 (1.779)
Fish Community Season			
Sub-stock (0-149 mm)	0	.	0
Sub-stock (150-249 mm)	0	.	0
Stock	9	4	92.75 (3.020)
Quality	61	25	86.88 (2.203)
Preferred	147	61	86.87 (2.636)
Memorable	23	10	85.67 (7.199)
Trophy	2	1	87.39 (37.06)
Overall Wr	.	.	86.98 (1.842)

[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

A total of 71 sturgeon chubs were sampled in segment 2 during 2008, 51 during the sturgeon season and 20 during the fish community season. This was a decrease in the total catch from 2007 and 2006 when 150 and 113 were sampled, respectively. However, all sturgeon chubs were sampled via the otter trawl in 2008, while in 2007 the push trawl accounted for 9 of the specimens and beam trawl captured 24 and bag seine 2 during 2006. Even so, when just the otter trawl catch is compared 2008 had a lower total catch when compared to the previous two sampling years.

The CPUE for sturgeon chub in the otter trawl was estimated at 0.20 fish/ 100 m, which was down from 0.38 and 0.23 fish/ 100 m in 2007 and 2006, respectively (Figure 18). For the three sampling years the CPUE has been substantially higher during the sturgeon season than during the fish community season. The 2008 fish community season CPUE of sturgeon chubs was actually higher at 0.07 fish/ 100 m than in 2007 (0.05 fish/ 100 m) or 2006 (0.09 fish/ 100 m) (Figure 19).

Overall sturgeon chubs averaged 72.5 mm TL during 2008. They were slightly larger during the sturgeon season (mean TL = 73.5 mm) when compared to the fish community season (mean TL = 69.9 mm). This is most likely due to the addition of YOY sturgeon chubs in the trawls during the early and late fall months of sampling. The size structure of sampled sturgeon chubs is given in Figure 21. Although very few YOY sturgeon chubs are being captured, this is likely due to the otter trawl selecting slightly larger sturgeon chubs. These data suggest that the majority of the segment 2 sturgeon chub catch is composed of age-2 fish (Herman et al. 2008

In addition to the higher relative abundance of sturgeon chubs in segment 2 during the sturgeon season when compared to the fish community season, sturgeon chubs have also shown a patter of utilizing areas further upstream in the Missouri River during this time period. In all years sampled sturgeon chubs are either found higher in the River or their densities further up in the River are higher during the spring season than during the summer and fall months. This could be due to the slightly increased turbidities of the Missouri River during the spring months when the Milk River and other smaller tributaries are adding suspended sediment to the Missouri River increasing its overall turbidity. By summer and late into the fall segment 2 is back to being almost void of suspended sediment and turbidities are very low.

Additionally, sturgeon chubs spawn in the spring and may be making migrations upriver during this time period. As of yet, we do not know that specific river bends where sturgeon chubs are spawning within segment 2.

For the specific habitats that sturgeon chubs were sampled in within segment 2 see Tables 26 and 27.

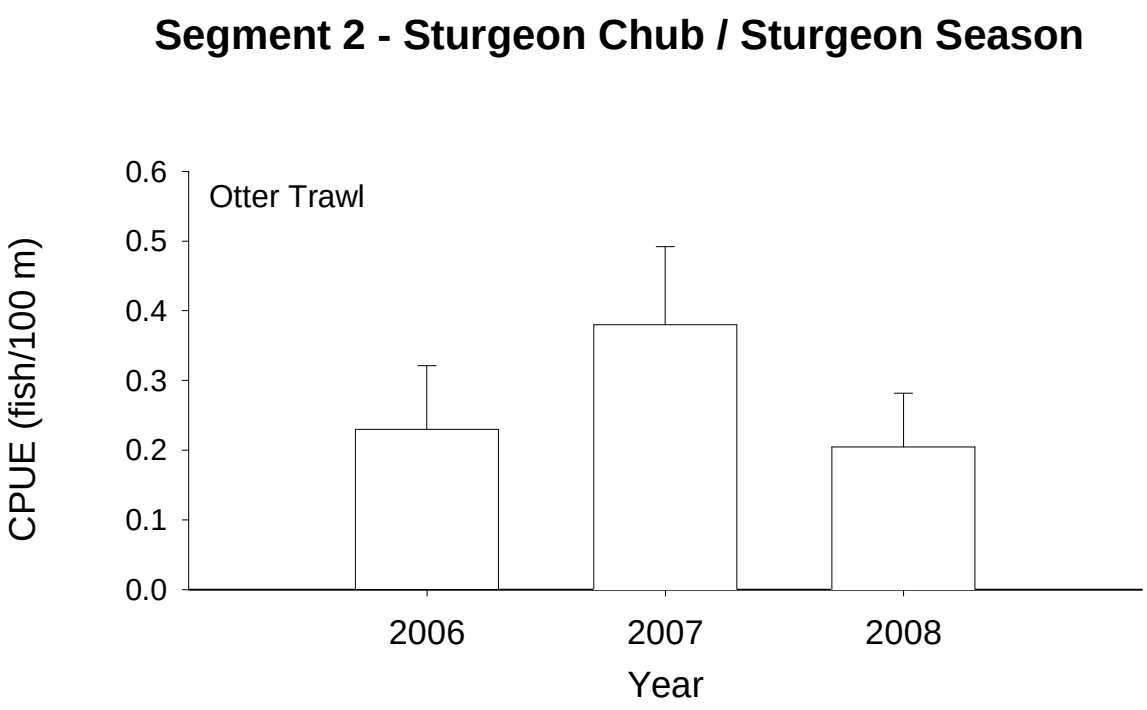

Figure 18. Mean annual catch per unit effort (+/- 2 SE) of sturgeon chub using otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

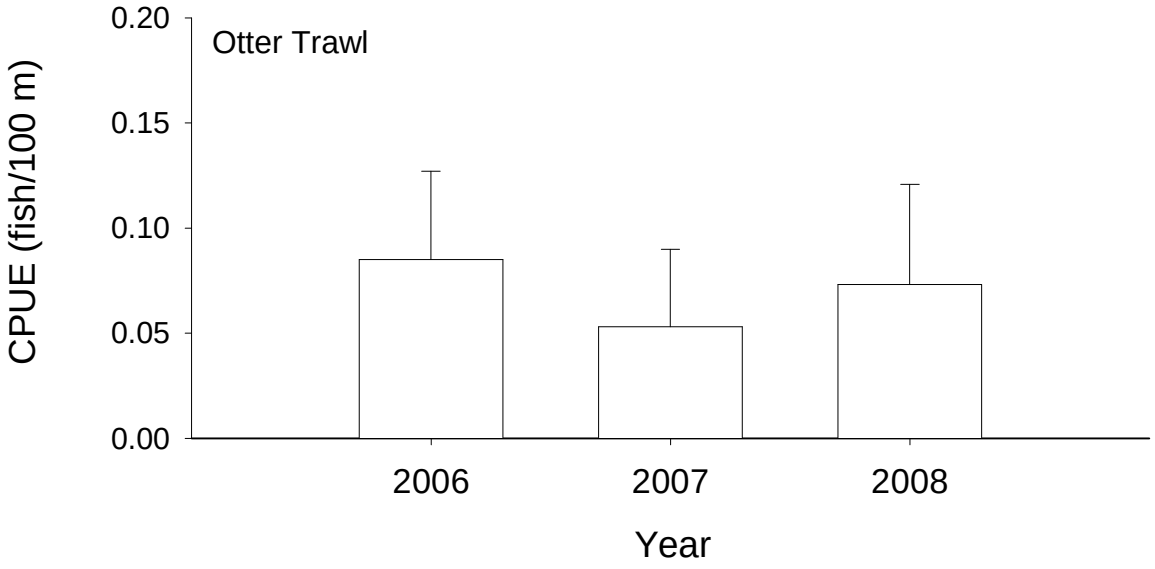

Figure 19. Mean annual catch per unit effort (+/- 2 SE) of sturgeon chub using otter trawls in segment 2 of the Missouri River during fish community season 2006-2008.

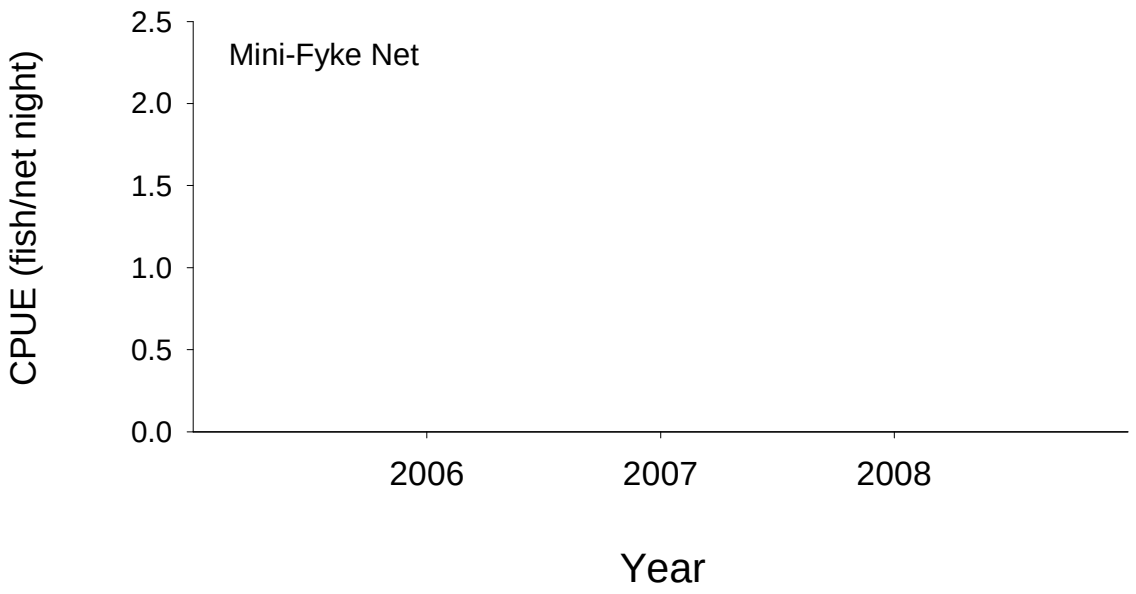

Figure 20. Mean annual catch per unit effort (+/- 2 SE) of sturgeon chub using mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

Table 26. Total number of sturgeon chubs captured for each gear during each season and the proportion caught within each macrohabitat type in segment 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	51	0	27	0	N-E	N-E	24	45	4	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	18	0	17	0	N-E	N-E	39	39	6	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Table 27. Total number of sturgeon chubs captured for each gear during each season and the proportion caught within each mesohabitat type in segment 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	51	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	18	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

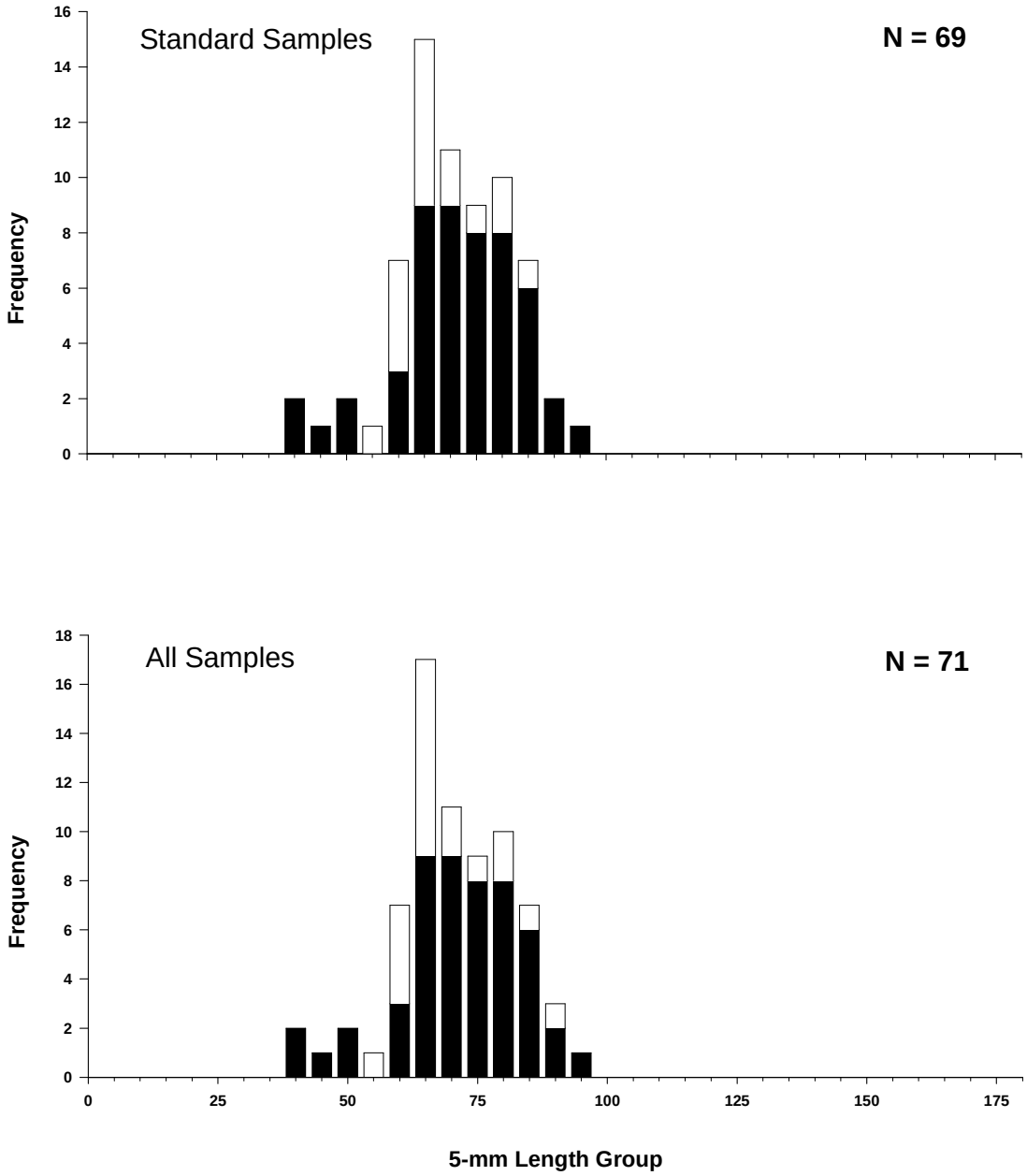

Figure 21. Length frequency of sturgeon chub during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2008.

Sicklefin Chub

Only one sicklefin chub was collected in segment 2 during 2008. This fish was captured in the otter trawl during the sturgeon season at river mile 1704.5. This is located at the very downstream end of segment 2 approximately 2.5 river miles upstream of the upstream end of segment 3. This fish was sampled in a non-random subsample and therefore is not incorporated into the long-term CPUE data. This is not dissimilar to 2007 and 2006 when only two and one sicklefin chubs were sampled, respectively. Sicklefin chubs are more common in the segment 3 and more particularly in the downstream most portions of segment 3 where water temperatures and turbidities are much more normalized than that of the highly altered segment 2.

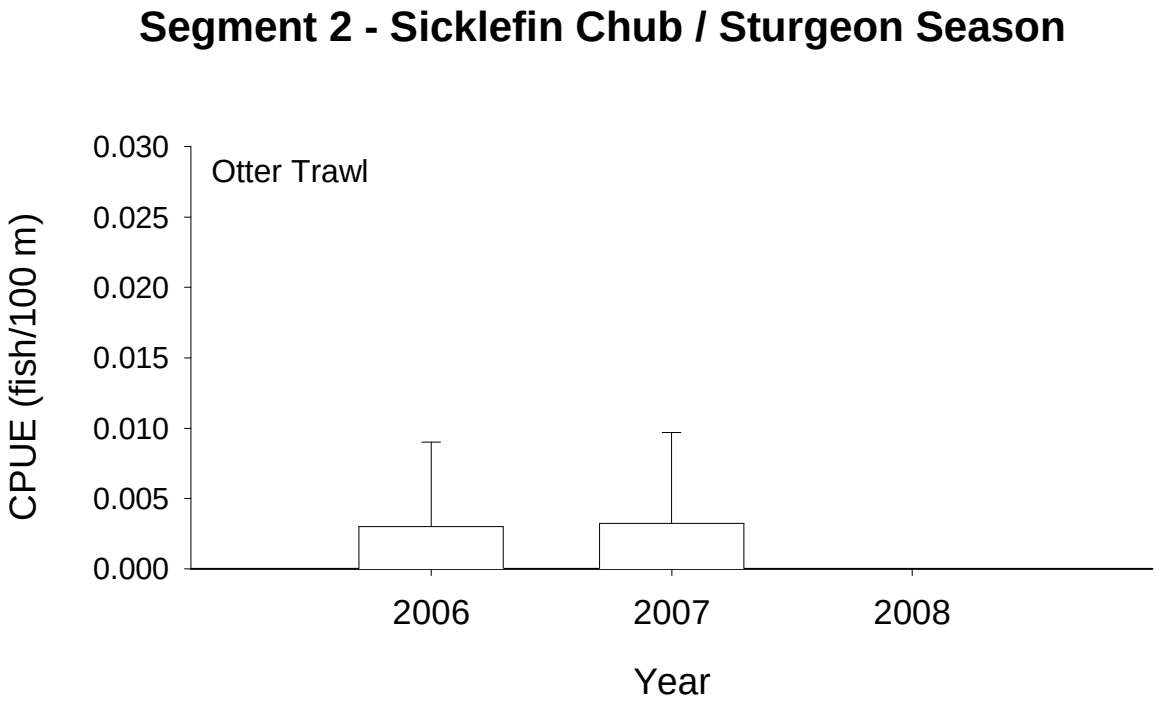

Figure 22. Mean annual catch per unit effort (+/- 2 SE) of sicklefin chub using otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

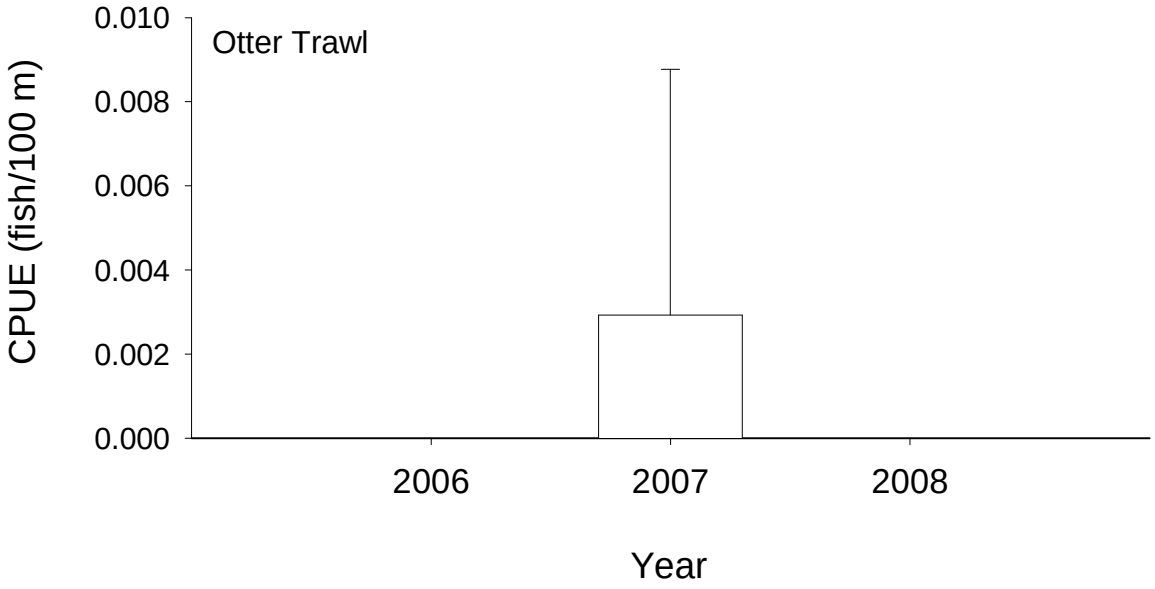

Figure 23. Mean annual catch per unit effort (+/- 2 SE) of sicklefin chub using otter trawls in segment 2 of the Missouri River during fish community season 2006-2008.

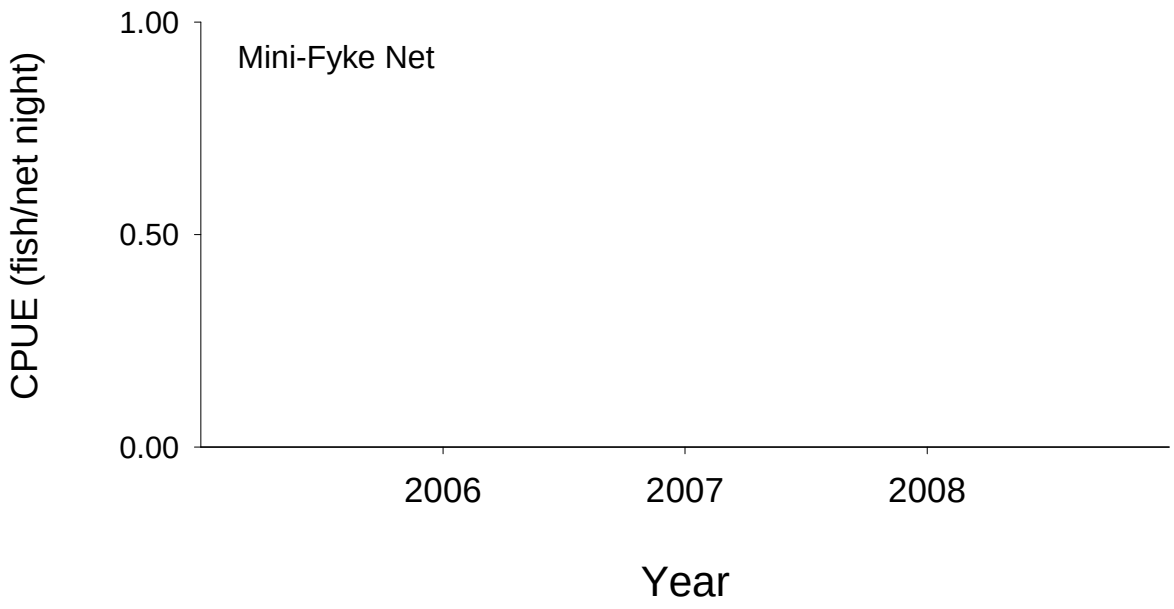

Figure 24. Mean annual catch per unit effort (+/- 2 SE) of sicklefin chub using mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

Table 28. Total number of sicklefin chubs captured for each gear during each season and the proportion caught within each macrohabitat type in segment 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Table 29. Total number of sicklefin chubs captured for each gear during each season and the proportion caught within each mesohabitat type in segment 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Segment 2 - Sicklefin Chub

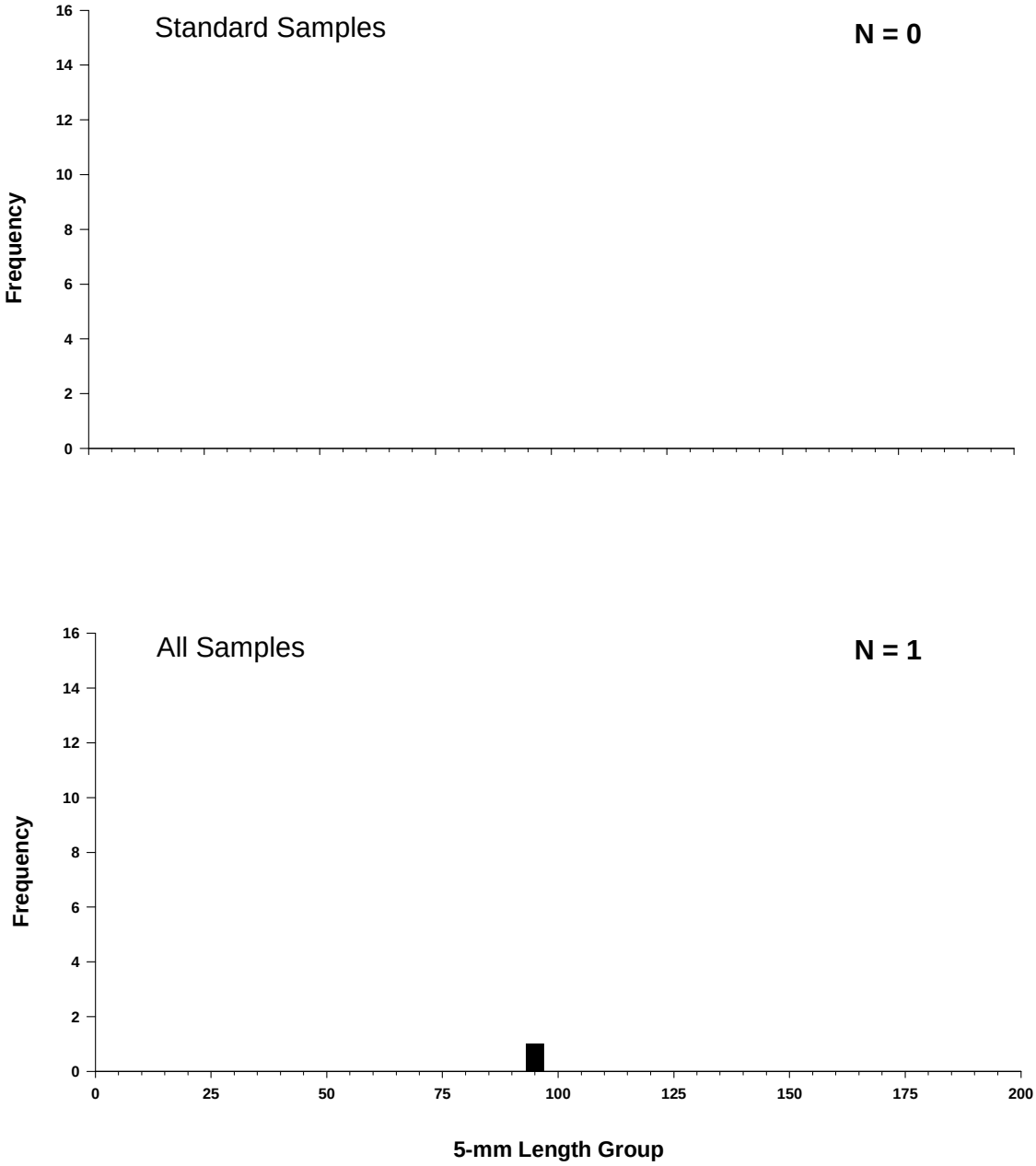

Figure 25. Length frequency of sicklefin chub during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2007-2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2008.

Sand Shiner

A total of 763 sand shiners were collected in segment 2 during 2008, all of which were captured in the fish community season in mini fyke nets. Sand shiner CPUE was estimated at 8.2 fish/ net night during 2008, which was similar to 2007 (8.5 fish/net), but higher than the low of 4.5 fish/net in 2006 (Figure 32). No pattern was seen in the spatial distribution of sand shiners throughout segment 2, although the magnitude of their abundance was patchy. In other words, we collected sand shiners throughout the segment and some river bends had extremely higher catches than others, although there was no spatial pattern to the high abundance river bends.

Sand shiners averaged 46.7 mm TL in segment 2 during 2008. The length frequency histogram in Figure 33 indicates a population composed mainly of YOY and age-1 fishes, with a few fish possibly being age-2 (Datillo et al. 2008a).

For the detailed macro and meso habitats that sand shiners were collected in see Tables 32 and 33.

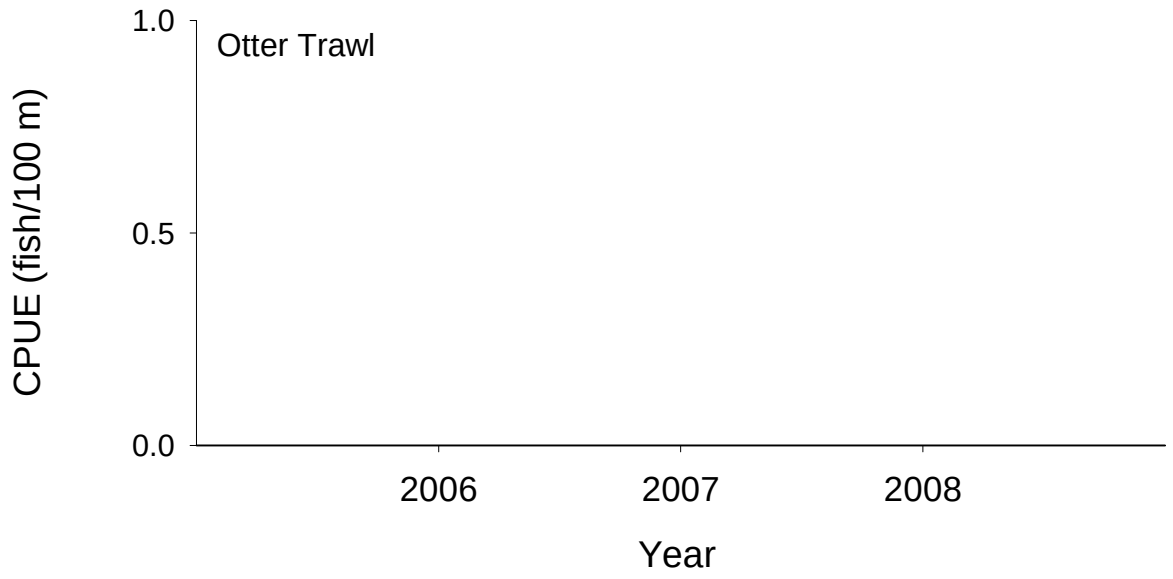

Figure 30. Mean annual catch per unit effort (+/- 2 SE) of sand shiner with otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

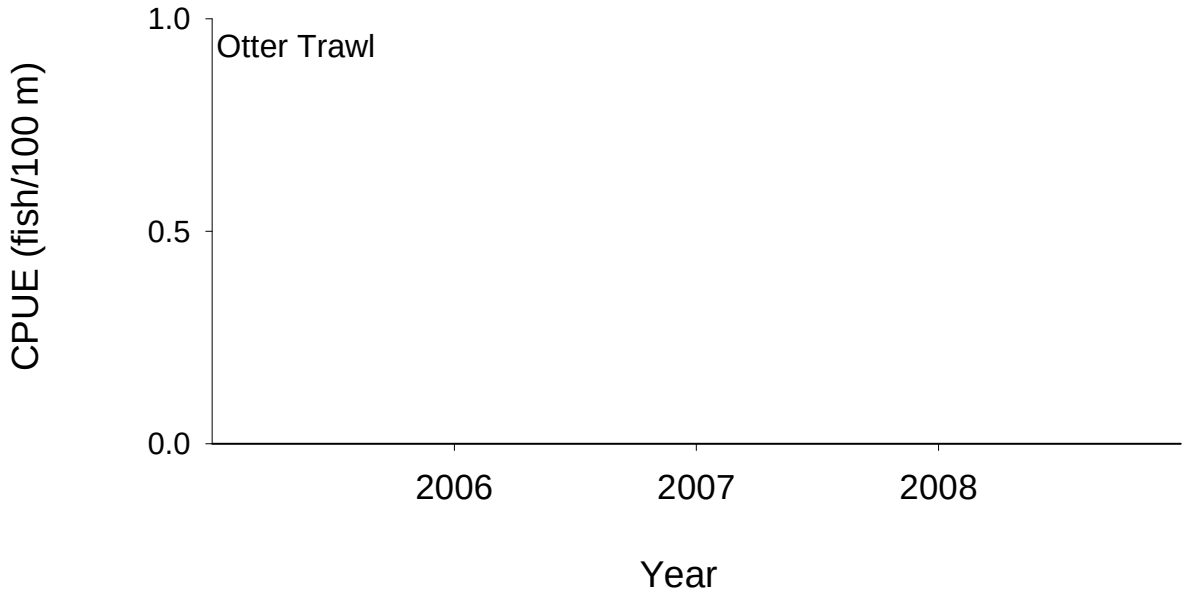

Figure 31. Mean annual catch per unit effort (+/- 2 SE) of sand shiner with otter trawls in segment 2 of the Missouri River during fish community season 2006-2008.

Segment 2 - Sand Shiner / Fish Community Season

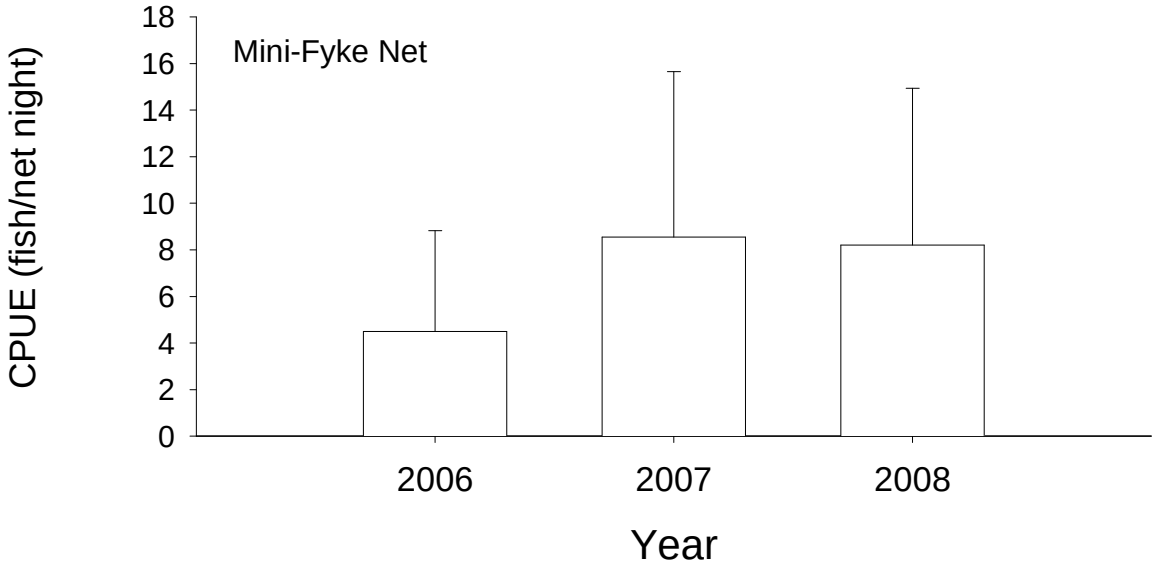

Figure 32. Mean annual catch per unit effort (+/- 2 SE) of sand shiner with mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

Table 32. Total number of sand shiners captured for each gear during each season and the proportion caught within each macrohabitat type in segment 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net															
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	763	0	28	0	N-E	N-E	5	37	3	27	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Table 33. Total number of sand shiners captured for each gear during each season and the proportion caught within each mesohabitat type in segment 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	763	94	6	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Segment 2 - Sand Shiner

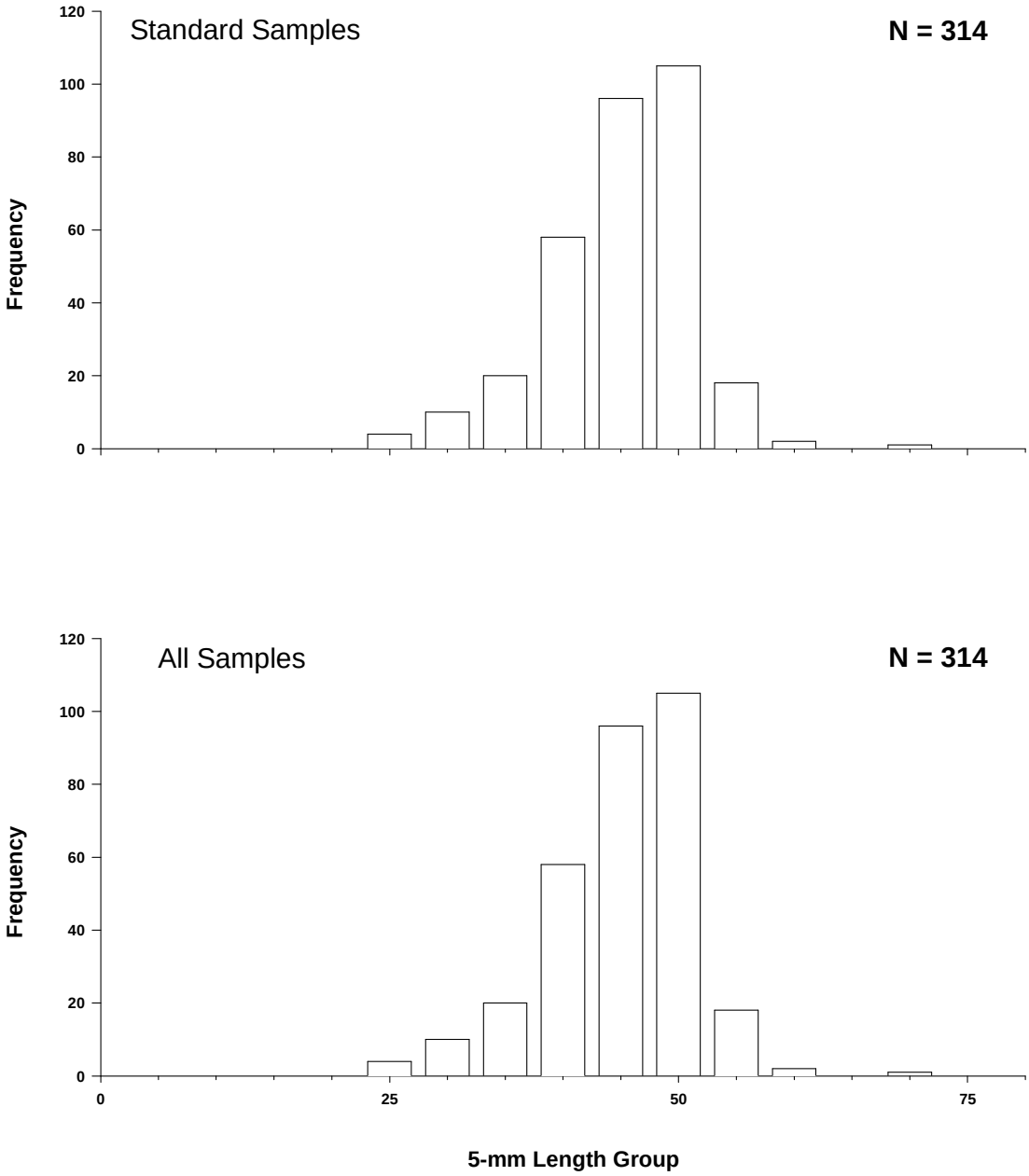

Figure 33. Length frequency of sand shiner during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2008.

***Hybognathus* spp**.

A total of 43 western silvery minnows were sampled in segment 2 during 2008. Thirty-three were sampled in mini fyke nets while one was sampled in the otter trawl, all within the fish community season. Western silvery minnow CPUE in mini fyke nets was down in 2008 compared to the previous two years of sampling (Figure 36). During 2008 CPUE was estimated at 0.35 fish/net night compared to 0.64 and 0.63 fish/net night during 2007 and 2006, respectively. Very few western silvery minnows are captured in the otter trawl and therefore comparisons between years are not meaningful. No plains or brassy minnows were sampled in segment 2 during 2008.

Western silver minnows averaged 60.7 mm TL in segment 2 during 2008, which was notably smaller than 2007 when they averaged 79.8 mm. The length frequency histogram in Figure 37 shows a population made up of mostly YOY fish with a few age-1 and potentially a couple age-2 fish (Datillo et al. 2008b). The age structure was different in 2008 than it was in 2007 or 2006. During 2006, few YOY few were in the catch with the vast majority of fish being age-1 and age-2 fish. In 2007 good numbers of YOY, age-1 and age-2 fish were present.

Western silver minnow were found in low numbers throughout segment 2, while river mile 1725.5 had by far the highest abundance of any bend sampled. For the specific macro and meso habitats that western silvery minnows were sampled see Tables 34 and 35.

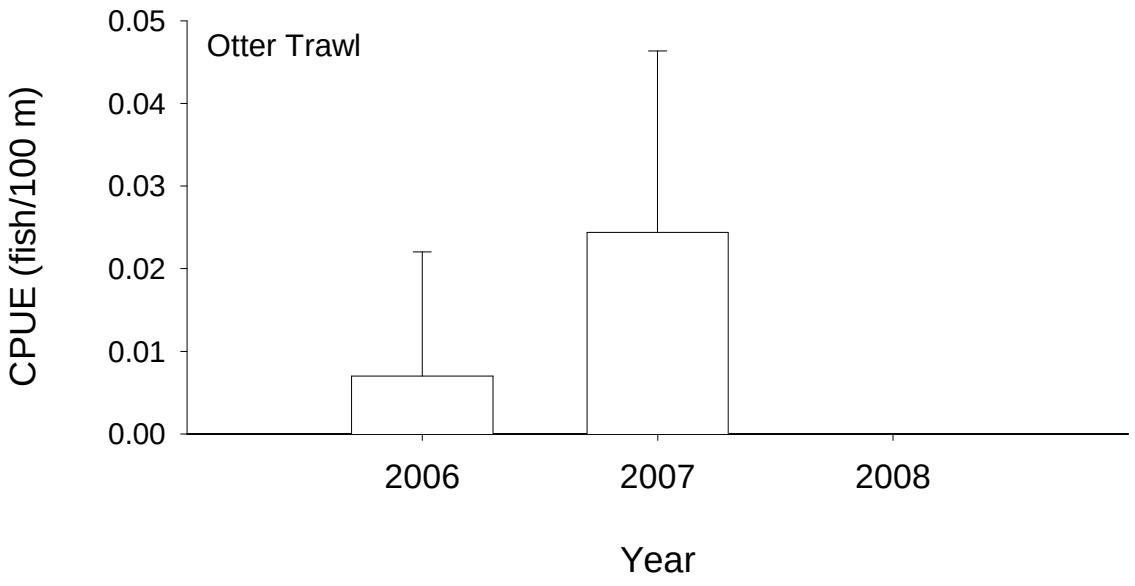

Figure 34. Mean annual catch per unit effort (+/- 2 SE) of *Hybognathus* spp. with otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

Segment 2 - *Hybognathus* spp. / Fish Community Season

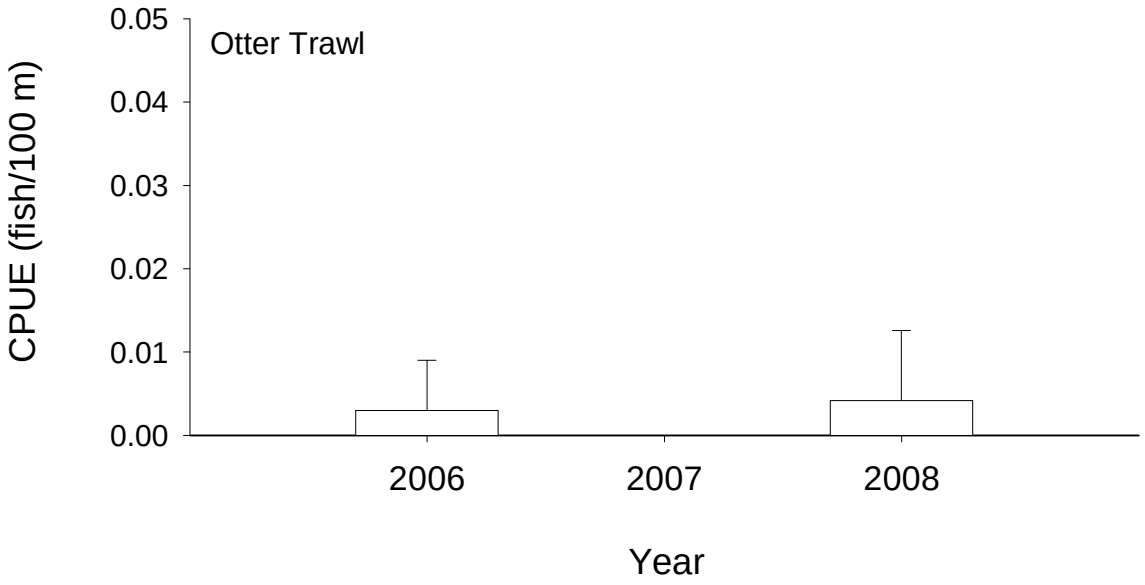

Figure 35. Mean annual catch per unit effort (+/- 2 SE) of *Hybognathus* spp. with otter trawls in segment 2 of the Missouri River during fish community season 2006-2008.

Segment 2 - *Hybognathus* spp. / Fish Community Season

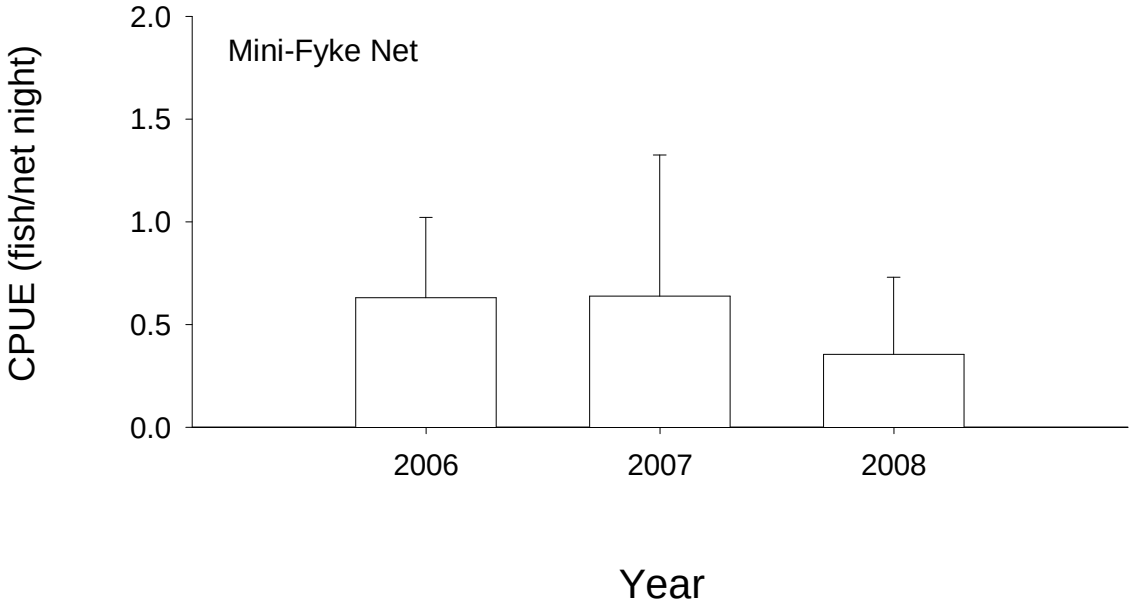

Figure 36. Mean annual catch per unit effort (+/- 2 SE) of *Hybognathus* spp. with mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

Table 34. Total number of *Hybognathus* spp. captured for each gear during each season and the proportion caught within each macrohabitat type in segment 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	33	0	52	0	N-E	N-E	6	0	18	18	6	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	1	0	0	0	N-E	N-E	100	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Table 35. Total number of *Hybognathus* spp. captured for each gear during each season and the proportion caught within each mesohabitat type in segment 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	33	52	48	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	1	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Segment 2 - *Hybognathus* spp.

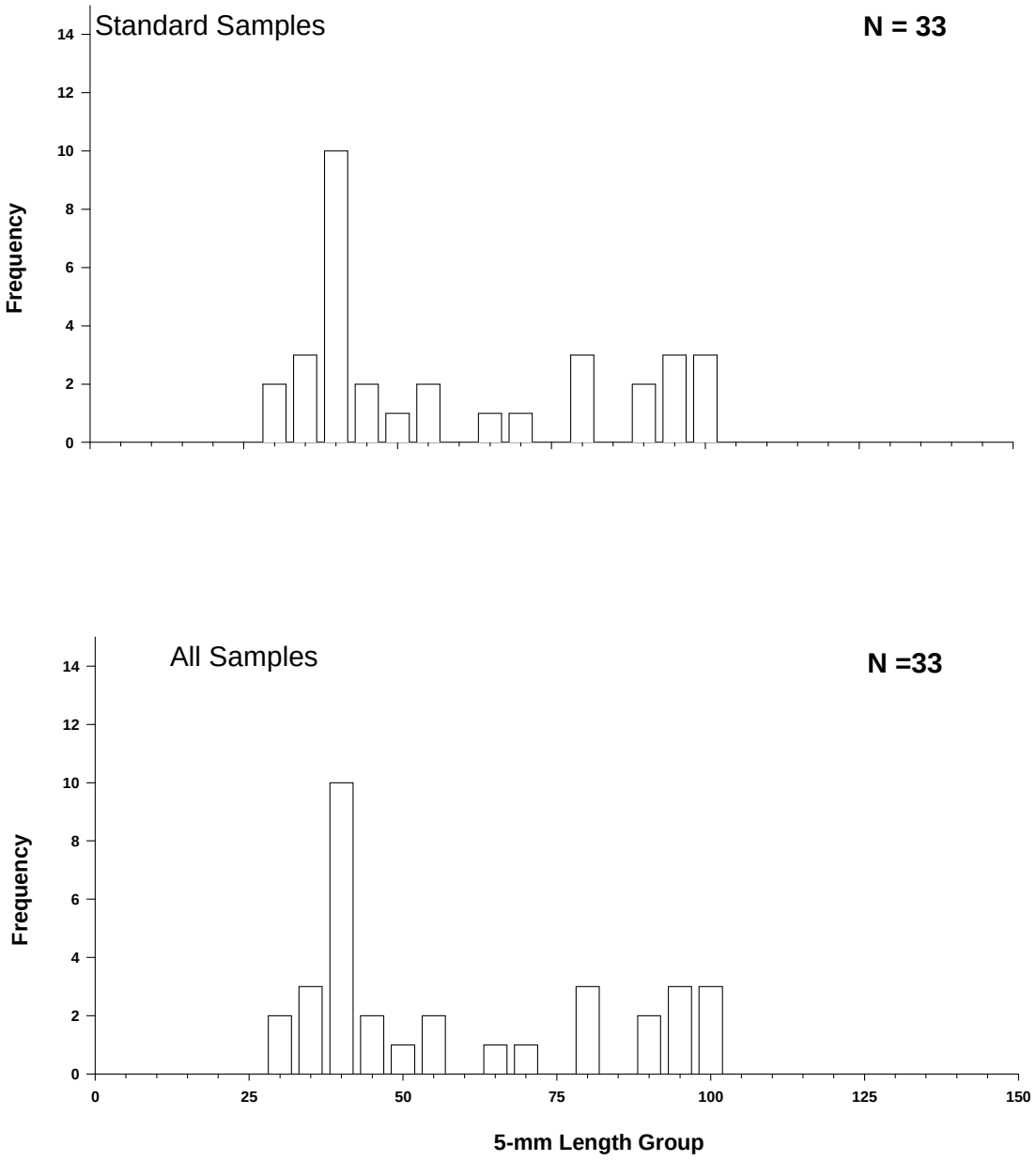

Figure 37. Length frequency of *Hybognathus* spp. caught during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2007-2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2007-2008.

Blue Sucker

A total of 11 blue suckers were sampled in segment 2 during 2008, all using trammel nets. Of the total, 10 were sampled during the sturgeon season and one during the fish community season. This was a decrease from 2007 when 36 total blue suckers were sampled. Trammel net CPUE of blue suckers was 0.06 fish/ 100 m in 2008, a decrease from 0.10 fish/100m in 2007, but still up from 0.03 fish/100 m in 2006 (Figure 39). However, due to the small sample size in all years it is extremely hard to decipher differences in relative abundance between years.

The blue sucker catch was relatively evenly distributed spatially throughout segment 2during 2008. However, all 10 blue suckers captured in the sturgeon season were sampled prior to May 15, even though sampling continued to occur until June 5th. Similarly, in 2007 all blue suckers captured during the sturgeon season were sampled prior to May 25th although sampling continued until June 27th. We've seen a pattern of blue suckers in segment 2 to be more abundant during the early portions of the sturgeon season and then move out of the area and return again during the early to late fall.

During 2008 blue suckers averaged 693 mm TL, which was slightly smaller than 2007 (mean TL = 708 mm) and 2006 (mean TL = 713 mm). The smallest blue sucker captured in each year of sampling has been 583 mm in 2008, 600 mm in 2007 and 635 mm in 2006. Based on aging of blue suckers in lower portions of the Missouri River downstream of Montana (Labay et al. 2008) the blue sucker population is likely composed fish of at least age-5 or older (Figure 44). Recruitment of blue suckers has not been documented in segments 2 or 3 of the Missouri River during the past three years of sampling.

Fort the specific macro and meso habitats where blue suckers were sampled in see Tables 36 and 37.

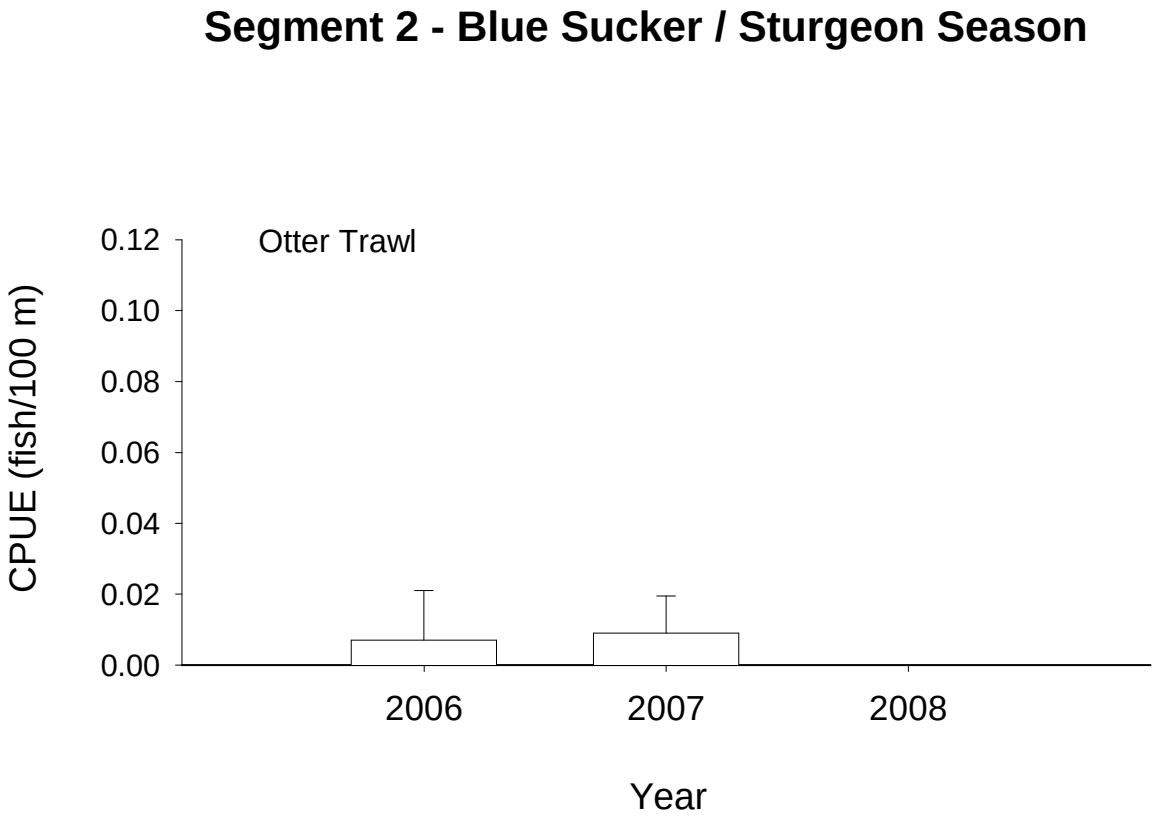

Figure 38. Mean annual catch per unit effort (+/- 2 SE) of blue sucker with gill nets and otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

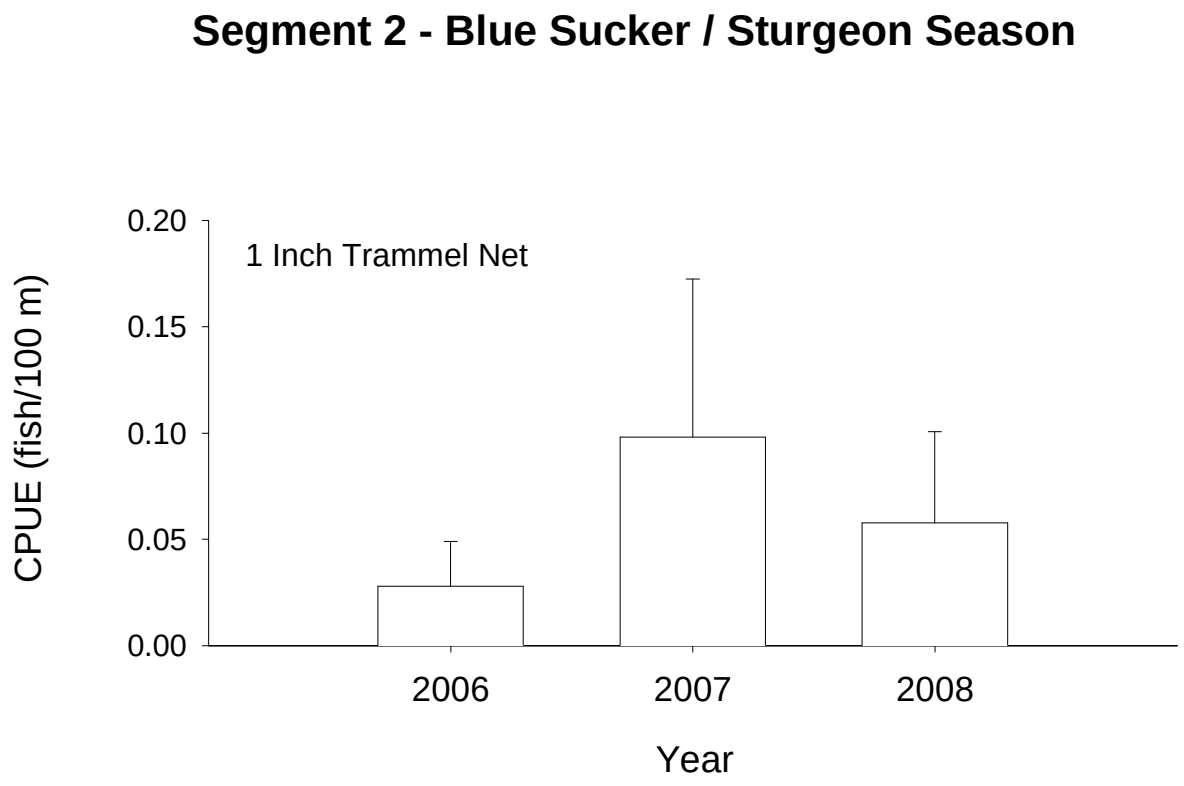

Figure 39. Mean annual catch per unit effort (+/- 2 SE) of blue sucker with 1 inch trammel nets in segment 2 of the Missouri River during sturgeon season 2006-2008.

Segment 2 - Blue Sucker / Fish Community Season

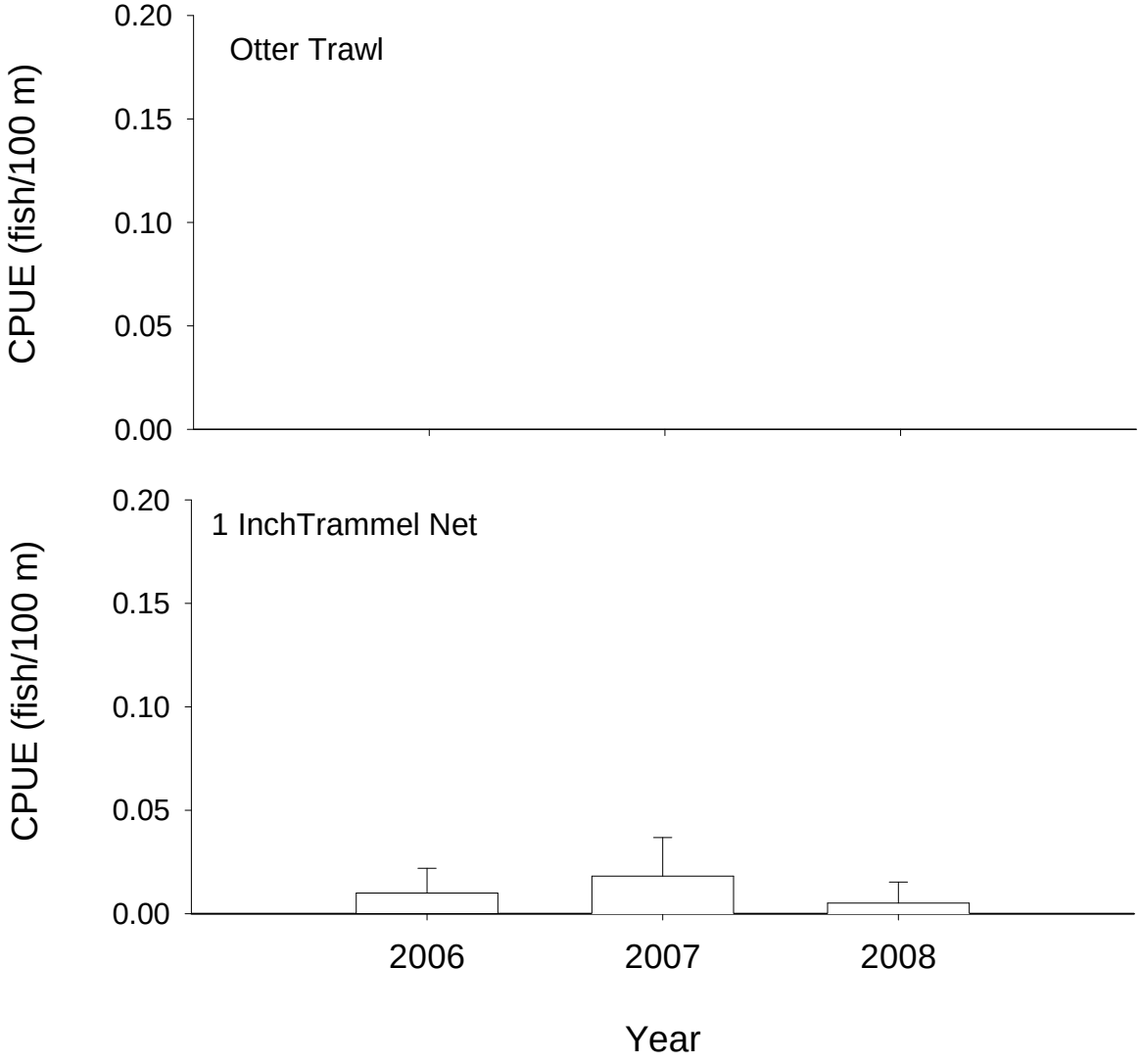

Figure 41. Mean annual catch per unit effort (+/- 2 SE) of blue sucker using otter trawls and 1 inch trammel nets in segment 2 of the Missouri River during fish community season 2006-2008.

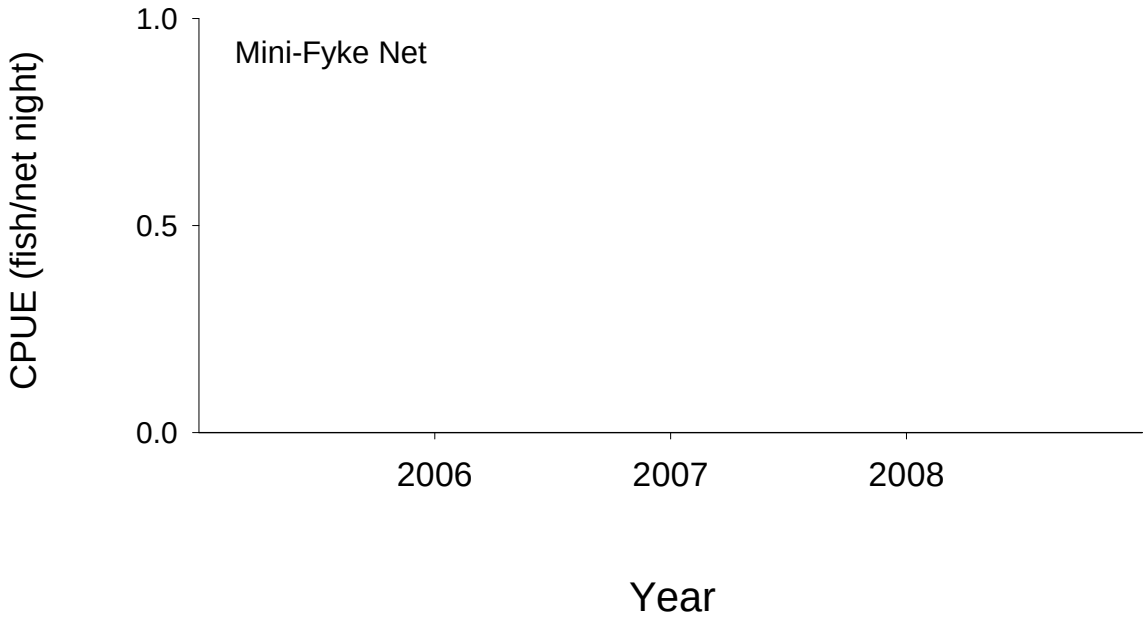

Figure 42. Mean annual catch per unit effort (+/- 2 SE) of blue sucker using mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

Table 36. Total number of blue suckers captured for each gear during each season and the proportion caught within each macrohabitat type in segment 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	10	0	40	0	N-E	N-E	20	40	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	1	0	0	0	N-E	N-E	100	0	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	0	0	0	0	N-E	N-E	0	0	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Table 37. Total number of blue suckers captured for each gear during each season and the proportion caught within each mesohabitat type in segment 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	10	0	100	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	1	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	0	0	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	0	0	0	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Segment 2 - Blue Sucker

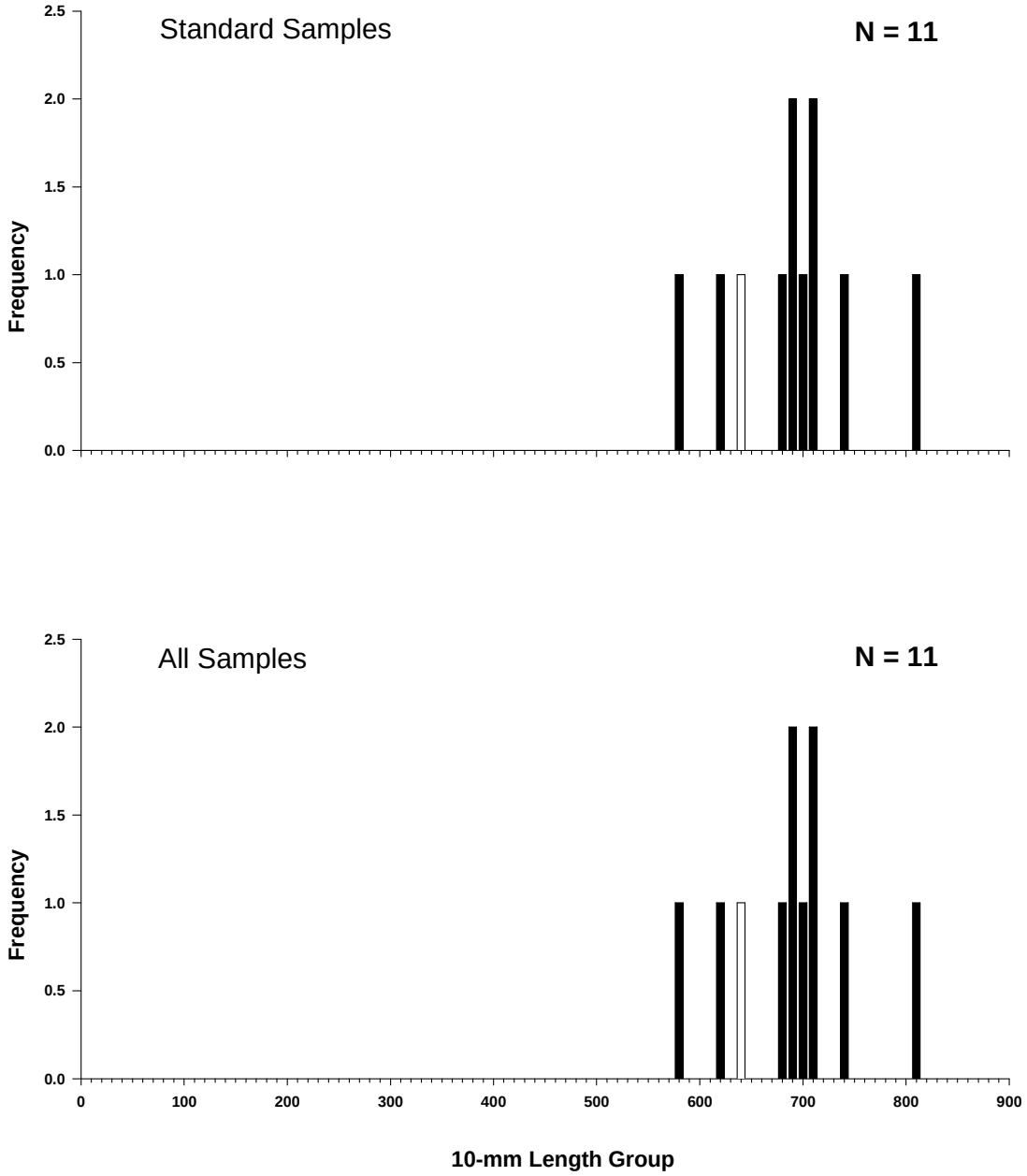

Figure 44. Length frequency of blue sucker during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2008.

Sauger

A total of 98 sauger were sampled in segment 2 during 2008, a decrease from 157 in 2006, but slightly up from 84 in 2006. Trammel nets were the most effective gear for sampling sauger with 75 captured, followed by the otter trawl (n = 16), mini fyke nets (n = 6) and trotlines (n = 1). Of the total, 65 sauger were sampled in the sturgeon season and 33 during the fish community season Figure 51. Trammel net CPUE of sauger using trammel nets remained relatively constant during the sturgeon season in 2008 with an estimate of 0.25 fish/ 100 m compared to 0.27 fish/ 100 m during 2007, although both years were higher than 0.17 fish/ 100 m during 2006 (Figure 46). For the otter trawl, there has been a decrease in sturgeon season CPUE over the past three years (Figure 45). The CPUE for 2008 was 0.02 fish/ 100 m, whereas 2007 and 2006 CPUE's were 0.05 and 0.06 fish/ 100 m, respectively (Figure 45).

Both trammel nets and otter trawl CPUE show a similar pattern for the past three years during the fish community season (Figure 48). The highest CPUE for both gears occurred in 2007, with both 2006 and 2008 being similar to one another. Although the mini fyke net data does not follow the same pattern as trammel nets or the otter trawl, few sauger have been collected in mini fyke nets in segment 2 throughout all years making comparisons less meaningful. Additionally, for sauger, mini fyke nets are used to monitor the YOY production and little rearing of YOY sauger has been documented in segment 2 in the past three years of sampling.

Sauger averaged 339 mm TL in segment 2 during 2008 with a minimum size of 155 mm and a maximum of 465 mm. The length frequency histogram in Figure 51 shows a population made up primarily of age-2 and older fish, with a few age-1 fish and only two age-0 fish. Differences in the size of sauger were observed between gears in 2008. Sauger averaged 348 mm in trammel nets, 306 mm in otter trawls and 300 mm in mini fyke nets.

Sauger were spatially distributed throughout segment 2 in a relatively even manner. Temporally sauger were more abundant in the sturgeon season than in the fish community season, with the bulk of the catch occurring from mid May to mid June. There was no apparent longitudinal difference in the size of sauger captured in segment 2.

For the specific macro and meso habitats sauger were sampled in and the proportion those habitats were sampled see Tables 38 and 39.

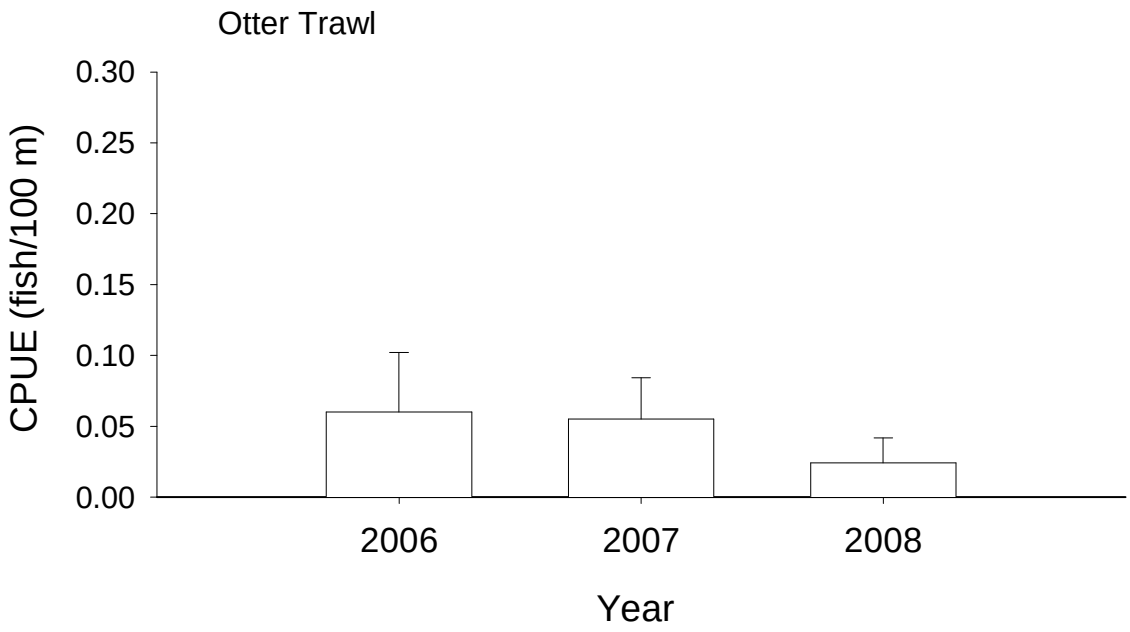

Figure 45. Mean annual catch per unit effort (+/- 2 SE) of sauger using gill nets and otter trawls in segment 2 of the Missouri River during sturgeon season 2006-2008.

Segment 2 - Sauger / Sturgeon Season

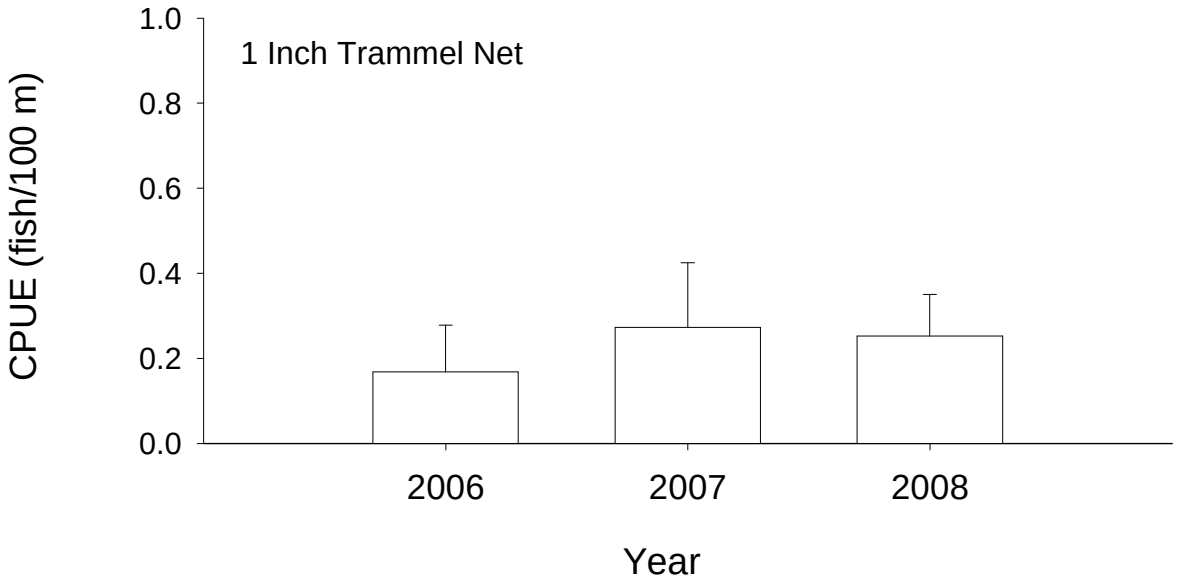

Figure 46. Mean annual catch per unit effort (+/- 2 SE) of sauger using 1 inch trammel nets in segment 2 of the Missouri River during sturgeon season 2006-2008.

Segment 2 - Sauger / Fish Community Season

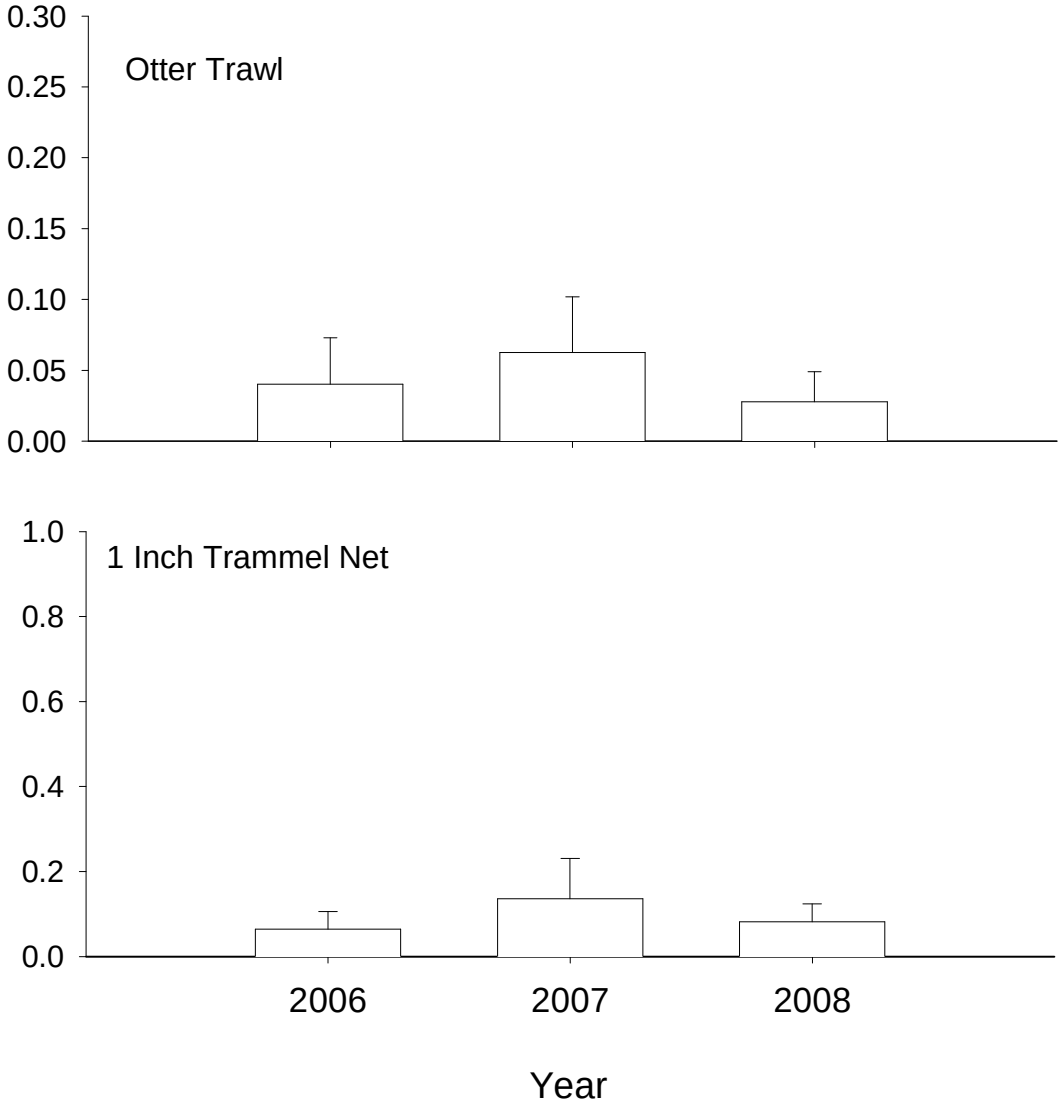

Figure 48. Mean annual catch per unit effort (+/- 2 SE) of sauger using otter trawls and 1 inch trammel nets in segment 2 of the Missouri River during fish community season 2006-2008.

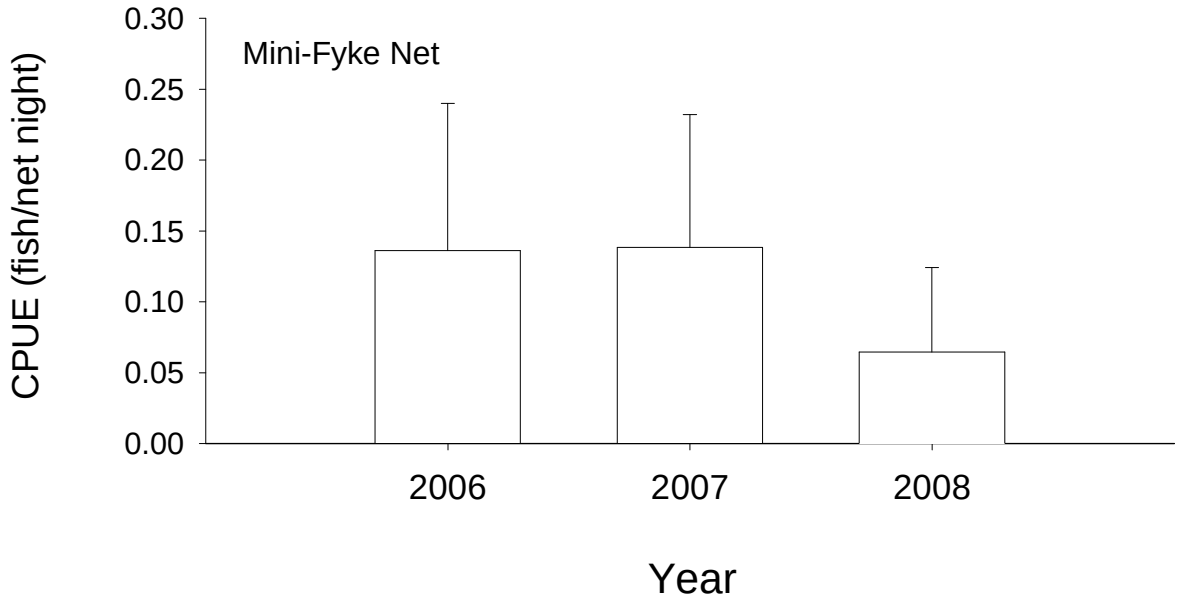

Figure 49. Mean annual catch per unit effort (+/- 2 SE) of sauger using mini-fyke nets in segment 2 of the Missouri River during fish community season 2006-2008.

Table 38. Total number of saugers captured for each gear during each season and the proportion caught within each macrohabitat type in segment 2 of the Missouri River during 2008. 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[a]													
		BRAD	CHXO	CONF	DEND	DRNG	ISB	OSB	SCCL	SCCS	SCN	TRIB	TRML	TRMS	WILD
Sturgeon Season (Fall through Spring)															
1 Inch Trammel Net	56	0	34	0	N-E	N-E	43	23	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(32)	(26)	(5)	0	0	0	0	0	0
Gill Net					N-E	N-E									
Otter Trawl	7	0	0	0	N-E	N-E	14	71	14	0	0	0	0	0	0
	.	0	(34)	0	0	0	(33)	(28)	(5)	0	0	0	0	0	0
Fish Community Season (Summer)															
1 Inch Trammel Net	17	0	41	0	N-E	N-E	24	35	0	0	0	0	0	0	0
	.	0	(37)	0	0	0	(31)	(27)	(5)	0	0	0	0	0	0
Mini-Fyke Net	6	0	17	0	N-E	N-E	50	0	0	17	17	0	0	0	0
	.	0	(25)	0	0	0	(34)	(2)	(12)	(25)	(2)	0	0	0	0
Otter Trawl	8	0	25	0	N-E	N-E	50	25	0	0	0	0	0	0	0
	.	0	(33)	0	0	0	(34)	(27)	(5)	0	0	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B.

Table 39. Total number of saugers captured for each gear during each season and the proportion caught within each mesohabitat type in segment 2 of the Missouri River during 2008. 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[a]					
		BARS	CHNB	DTWT	ITIP	POOL	TLWG
Sturgeon Season (Fall through Spring)							
1 Inch Trammel Net	56	0	100	N-E	0	N-E	0
	.	0	(98)	0	(2)	0	0
Gill Net				N-E		N-E	
Otter Trawl	7	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Fish Community Season (Summer)							
1 Inch Trammel Net	17	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0
Mini-Fyke Net	6	100	0	N-E	0	N-E	0
	.	(100)	0	0	0	0	0
Otter Trawl	8	0	100	N-E	0	N-E	0
	.	0	(100)	0	0	0	0

[a] Habitat abbreviations and definitions presented in Appendix B

Segment 2 - Sauger

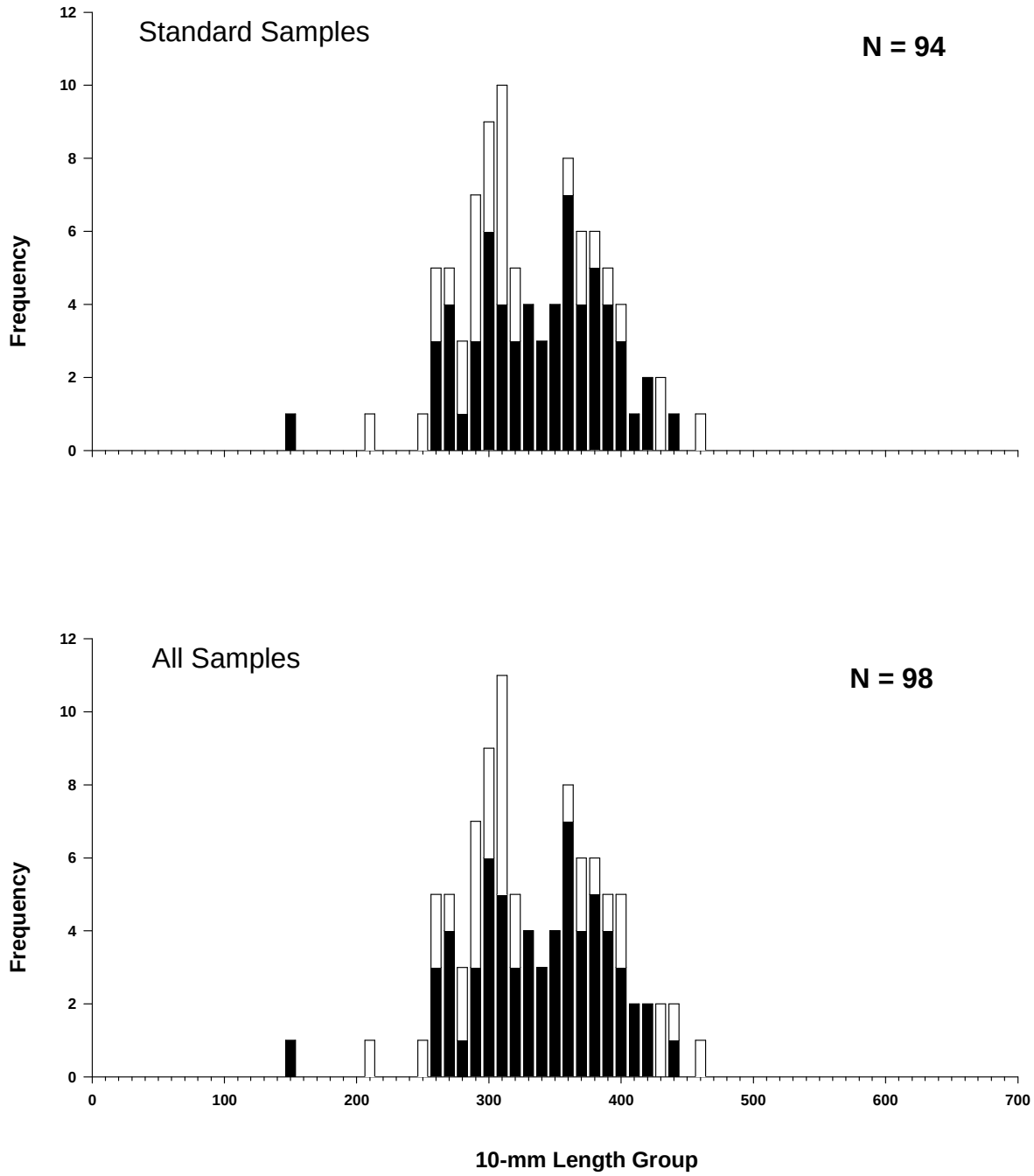

Figure 51. Length frequency of sauger during fall through spring (sturgeon season; black bars) and summer (fish community season; white bars) in segment 2 of the Missouri River during 2008. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2008.

Missouri River Fish Community

During 2008 a total of 13,003 fishes of 29 species were sampled in segment 2. Of the 29 species sampled 24 are native to this section of the Missouri River while 5 are not. Mini fyke nets sampled 90% of the total catch, while trammel nets sampled 5%, trotlines 3% and the otter trawl 2%.

White suckers *Catostomus commersoni* were the most abundant fish with 5,014 sampled, of which over 99% were YOY. Additionally, over 99% of all white suckers were sampled in mini fyke nets. However, the sizes of all white sucker sampled ranged from 476 mm to 23 mm. White suckers were found throughout the length of segment 2. The total catch of white suckers was substantially up from 262 sampled in 2007, but still minimal to 2006 when 48,920 were sampled. These total catches equated to a mini fyke net CPUE of 53.6 fish/net night in 2008, 2.4 fish/net night during 2007 and 494.6 fish/net night in 2006.

River carpsuckers *Carpiodes carpio* were the second most abundant fish sampled in 2008 with 2,455 sampled. The overall catch of river carpsuckers in 2008 was similar to 2007 when 2,039 were sampled, but both years were significantly higher than the 396 sampled during 2006. Similar to white suckers, 99% of the river carpsuckers were sampled using mini fyke nets, most all of which were YOY. Mini fyke nets averaged 26.0 river carpsuckers/net night in 2008, 20.8 in 2007 and 3.6 during 2006. Twenty-nine adult river carpsuckers were sampled using trammel nets and averaged 487 mm in length and 1,596 g in weight. Both YOY and adult river carpsuckers were sampled throughout the length of segment 2.

Several other species were relatively abundant in the mini fyke net catch of segment 2 during 2008. The species, number collected and their mini fyke net CPUE are as follows: fathead minnows *Pimephales promelas* (n = 1,142; CPUE = 12.3 fish/ net night), longnose suckers *Catostomus catostomus* (n = 617; CPUE of 6.3 fish/ net night), longnose dace *Rhinichthys cataractae* (n = 559; CPUE of 6.0 fish/ net night), common carp *Cyprinus carpio* (n = 342; CPUE 3.6 fish/net night), emerald shiners *Notropis atherinoides* (n = 280; CPUE = 3.0 fish/net night), flathead chubs *Platygobio gracilis* (n = 277; CPUE = 2.4 fish/ net night).

Goldeye *Hiodon alosoides* and shorthead redhorses *Moxostoma macrolepidotum* were sampled in a variety of gears. A total of 103 goldeye were sampled, adults were sampled in trammel nets (n = 74) and trotlines (n = 16), while YOY (n = 13) were sampled in mini fyke

nets. Adult shorthead redhorses were collected in trammel nets (n = 13), trotlines (n = 12) and otter trawls (n = 7), while YOY (n = 20) were collected in mini fyke nets.

In total, 70 channel catfish *Ictalurus punctatus* were collected using trotlines (n = 40), trammel nets (n = 21) and otter trawls (n = 9). Channel catfish averaged 368 mm in length and 419 g in weight with a length range of 280 to 590 mm. There was not a large difference in the average size of channel catfish captured between gears. No YOY channel catfish were sampled in segment 2 during 2008, while 10 were in captured in 2007 and 4 during 2006.

Other species that were sampled in numbers lower than 50 for segment 2 during 2008 include, bigmouth buffalo *Ictiobus cyprinellus* (n = 11), smallmouth buffalo *Ictiobus bubalus* (n = 10), spotail shiner *Notropis hudsonius* (n = 7), burbot *Lota lota* (n = 5), white crappie *Pomoxis annularis* (n = 4), rainbow trout *Onchorhynchus mykiss* (n = 3), yellow perch *Perca flavescens* (n = 2), walleye *Sander vitreum* (n = 1), stonecat *Noturus flavus* (n = 1) and lake chub *Couesius plumbeus* (n = 1).

Many native fishes in segment 2 have had large fluctuations in their YOY abundance over the last three years. Discharge in the Missouri and Milk Rivers has changed each year and is most likely influencing these species, and may be influencing different species in different ways. For instance, during 2006 flows in the Milk River stayed below 250 cfs from late April through summer, while in 2007 daily average discharge exceeded 4,250 cfs on three separate times during May through June. While flows in the Milk River were not nearly as large or often in 2008 as during 2007, daily average discharge peaked at near 3,000 cfs in the middle of June far surpassing the highest flows of 2006. Discharge on the Missouri River below Fort Peck Dam has been relatively similar over the past three years. During the spring spawning season the main differences in Missouri River discharge has been observed downstream of the Milk River where its influence can be seen. In addition to flows, turbidity in the Missouri River dramatically increased when flows increased out of the Milk River. For instance, on June 7, 2007 during a flow event of approximately 4,250 cfs in the Milk River, turbidity samples averaged 719 NTU's in segment 2 of the Missouri River. In contrast, during the same time period in 2008 and 2006 when Milk River flows did not exceed 250 cfs, turbidity averaged only 11 NTU's on June 5, 2008 and 16 NTU's on June 5 in segment 2 of the Missouri River. It is important to note that for all practical purposes there is no source of suspended sediment for the Missouri River upstream of its confluence with the Milk River.

The YOY relative abundance of flathead chubs and river carpsuckers seems to be positively influenced by spring flows out of the Milk River. Mini fyke net CPUE of flathead

chubs, in 2006 was 1.0 fish/net night, 6.7 fish/ net night in 2007 and 2.4 fish/ net night in 2008. Similarly, CPUE of river carpsuckers was at a low in 2006 of 3.6 fish/net night and increased to 20.8 and 26.0 fish/ net night in 2007 and 2008, respectively. To other species might be showing the opposite pattern as to flathead chubs and river carpsuckers. Fathead minnow CPUE was at a high during 2006 with 52.3 fish/net night and decreased in 2007 to 7.9 fish/net night and went up again in 2008 to 12.3 fish/ net night. White suckers were at a high during the low flow year of 2006 at a CPUE of 494.6 fish/net night and decreased in 2007 to 2.4 fish/net night and increased again to 53.6 fish/net night in 2008. More analysis needs to be done to directly tie the relationship of many Missouri River fishes to the flows in both the Missouri and Milk Rivers.

Discussion

Fewer pallid sturgeon were sampled in segment 2 during 2008 (n = 16) than in 2007 (n = 22), but more than in 2006 (n = 14). However, during 2007 the push trawl was employed in half the bends sampled in segment 2, which accounted for a total of 4 pallid sturgeon and in 2008 trotlines were deployed once in all river bends sampling 8 pallid sturgeon. Therefore, the best comparison of relative abundance throughout the three years of sampling is the overall trammel net and otter trawl CPUE data, two gears that have been used twice a year in all bends through the past three years. The overall CPUE for pallid sturgeon using trammel nets was 0.009 fish/100 m for both 2008 and 2007 and 0.002 fish/100 m during 2006. For the otter trawl, pallid sturgeon CPUE was at a low in 2008 at 0.011 fish/ 100m, when compared to 0.022 and 0.019 fish/100 m in 2007 and 2006, respectively.

During both 2008 and 2007 pallid sturgeon captured in the otter trawl were on average smaller than those captured in trammel nets. During 2008 and 2007 otter trawl sampled pallid sturgeon averaged 253 and 269 mm FL, respectively, while pallid sturgeon sampled in trammel nets averaged 309 and 303 mm FL. If trammel nets do a better job capturing larger pallid sturgeon than otter trawls, we might expect to see a an increase in trammel net CPUE of stocked pallid sturgeon as they grow into larger size classes. From 2006 to 2008 the proportion of age-1 pallid sturgeon in the catch has decreased from a high of 70% in 2006 to 55% in 2007 and was at a low of 13% in 2008. Thus, we are likely to see the CPUE of size specific gears change as these fish recruit into certain gears and other gears are not as effective at capturing them. For example, a larger proportion of the otter trawl catch in segment 2 is composed of shovelnose sturgeon smaller than 350 mm when compared to trammel nets. Trammel nets seem to be more effective overall at sampling shovelnose sturgeon than the otter trawl since almost three times as many shovelnose sturgeon were captured in trammel nets (n = 382) than in the otter trawl (n = 131), which is likely due to the greater area that trammel nets fish compared to the otter trawl. In summary, as the size structure of pallid sturgeon in segment 2 changes we would expect to see differences in the catchability of certain gears thus often making straight comparisons of CPUE blurry.

During 2008 trotlines were used as a wild gear to begin evaluating their use in capturing hatchery reared juvenile pallid sturgeon. All river bends were sampled once with eight trotlines each consisting of 20 octopus style circle hooks of either size 2 or 2/0. Hence, approximately

half the effort at the river bend scale was used with trotlines when compared to the otter trawl or trammel nets, which were both used twice at each river bend, once each during the sturgeon and fish community seasons. Of the 16 total pallid sturgeon sampled in segment 2 during 2008, 8 were captured on trotlines. The largest four pallid sturgeon sampled in segment 2 were trotlines. Trotlines were used in segment 2, 3 and 4 in a similar manner to allow for comparisons between trammel nets and the otter trawl. We defined CPUE as the number of pallid sturgeon captured per the number river bends sampled, where if a river bend was sampled twice in the same year with one gear it was counted as two river bends. When we combined all data for the three segments, on average trotlines had a similar CPUE at the river bend level as trammel nets and otter trawls. During 2008, trotlines captured 1.09 pallid sturgeon/river bend, while trammel nets averaged 1.06 and the otter trawl averaged 0.95. However, in all three segments, the average size of pallid sturgeon captured on trotlines was larger than for the other gears, which could be important in determining the survival or relative abundance of hatchery pallid sturgeon as they age. Specifically for segment 2, trotline CPUE was 0.66 pallid sturgeon / river bend in, it much higher than for the otter trawl (CPUE = 0.21 pallid sturgeon/ river bend) and trammel nets (CPUE = 0.13). These data in all three segments sampled or alone in segment 2 suggest that trotlines may be a very effective gear in sampling pallid sturgeon and therefore are going to be used again in 2009 in an experimental manner, which will help determine their long-term benefit to the Population Assessment Program.

The fish community of segment 2 is greatly affected by the presence and operations of Fort Peck Dam. The distribution of numerous native species including sicklefin chubs, sturgeon chubs and stonecats appear to be greatly influenced by the altered habitat conditions. While these species are quite common in the Missouri River above Fort Peck Dam and in segment 3, they are extremely rare in areas downstream of the dam in segment 2. Similarly, the majority of YOY shovelnose sturgeon and sauger appear to be rearing in segment 3. This could be due to the larval drift of both species or tied to quality rearing habitat, which may be limited in segment 2 when compared to segment 3. Warmer late-spring and summer water temperatures, increased suspended sediment and higher spring flows all need to be considered when thinking about rehabilitating portions of the Missouri River downstream of Fort Peck Dam.

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
Carassus auratus	Goldfish	GDFH
Carassus auratus X Cyprinius carpio	Goldfish-Common carp hybrid	GFCC
Couesis 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 platyrhyncus	Mountain sucker	MTSK
Catastomus spp.	Unidentified *Catastomus* spp.	UCA
Cycleptus elongates	**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
Ameiurusnebulosus	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 nocturnes	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	Bonniville 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 daphanus	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	
Culea 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 punctatus	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 caproides	Logperch	LGPH
Percina cymatotaenia	Bluestripe darter	BTDR
Percina evides	Gilt darter	GLDR
Percina maculate	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
Dendric	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	SCN
Tributary	Macro	Any river or stream flowing into 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

Appendix B. (continued).

Habitat	Scale	Definition	Code
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
Dam Tailwaters	Meso	Immediate downstream of a dam	DTWT
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 2 for the long-term pallid sturgeon and associated fish community sampling program. Long-term monitoring began in 2006 for Segment 2.

Gear	Code	Type	Season	Years	CPUE units
Gillnet – 4 meshes, small mesh set upstream	GN14	Standard	Sturgeon	Not Used	fish/net night
Gillnet – 4 meshes, large mesh set upstream	GN41	Standard	Sturgeon	Not Used	fish/net night
Gillnet – 8 meshes, small mesh set upstream	GN18	Standard	Sturgeon	Not Used	fish/net night
Gillnet – 8 meshes, large mesh set upstream	GN81	Standard	Sturgeon	Not Used	fish/net night
Mini-fyke net	MF	Standard	Fish Comm.	2006 - Present	fish/net night
Push Trawl – 8 ft 4mm x 4mm	POT02	Wild	Fish Comm.	2007	fish/ m trawled
Trammel net – 1 inch inner mesh	TN	Standard	All	2006 - Present	fish/100 m drift
Trot Line – Circle hooks*	TLC_	Wild	Sturgeon	Not Used	fish/hook night
Trot Line – Octopus hooks*	TLO_	Wild	Sturgeon	2007-Present	fish/hook night
Trot Line – O'Shaughnessy hooks*	TLS_	Wild	Sturgeon	Not Used	fish/hook night
Otter trawl – 16 ft head rope	OT16	Standard	All	2006 - Present	fish/100 m trawled
Otter trawl – 16 ft SKT 4mm x 4mm HB2 MOR	OT01	Wild	Fish Comm.	Not Used	fish/100 m trawled
Beam trawl – 6.4 ft width 1/8 inch inner mesh	BT	Wild	All	2006	Fish/100 m trawled

*Code ends with line length in feet (1 = 105 ft, 2 = 205 ft, 3 = 305 ft, 4 = 405 ft). Hooks are placed between 5 and 10 feet apart.

Appendix D. Stocking locations and codes 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
KS/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 2 of the Missouri River (RPMA 2)

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
1998	Big Sky Bend	255	1997	8/11/1998	Yearling	PIT Tag	Elastomer
1998	Confluence	40	1997	8/11/1998	Yearling	PIT Tag	Elastomer
1998	Nohly Bridge	255	1997	8/11/1998	Yearling	PIT Tag	Elastomer
1998	Sidney	230	1997	8/11/1998	Yearling	PIT Tag	Elastomer
2000	Culbertson	34	1998	10/11/2000	2 yr Old	PIT Tag	
2000	Fairview	66	1998	10/11/2000	2 yr Old	PIT Tag	
2000	Sidney	66	1998	10/11/2000	2 yr Old	PIT Tag	
2000	Wolf Point	34	1998	10/11/2000	2 yr Old	PIT Tag	
2000	Culbertson	89	1999	10/17/2000	Yearling	PIT Tag	
2000	Fairview	150	1999	10/17/2000	Yearling	PIT Tag	
2000	Sidney	149	1999	10/17/2000	Yearling	PIT Tag	
2000	Wolf Point	90	1999	10/17/2000	Yearling	PIT Tag	
2002	Culbertson	270	2001	7/18/2002	Yearling	CWT	Elastomer
2002	Fairview	270	2001	7/18/2002	Yearling	CWT	Elastomer
2002	Intake	199	2001	7/18/2002	Yearling	CWT	Elastomer
2002	Sidney	271	2001	7/18/2002	Yearling	CWT	Elastomer
2002	Wolf Point	269	2001	7/18/2002	Yearling	CWT	Elastomer
2002	Culbertson	317	2001	7/26/2002	Yearling	PIT Tag	
2002	Fairview	360	2001	7/26/2002	Yearling	PIT Tag	
2002	Intake	97	2001	7/26/2002	Yearling	PIT Tag	
2002	Sidney	427	2001	7/26/2002	Yearling	PIT Tag	
2002	Wolf Point	425	2001	7/26/2002	Yearling	PIT Tag	
2002	Intake	155	2001	9/18/2002	Yearling	PIT Tag	
2003	Culbertson	1033	2002	8/7/2003	Yearling	PIT Tag	Elastomer
2003	Fairview	887	2002	8/7/2003	Yearling	PIT Tag	Elastomer
2003	Intake	1040	2002	8/7/2003	Yearling	PIT Tag	Elastomer
2003	Wolf Point	926	2002	8/7/2003	Yearling	PIT Tag	Elastomer
2004	Milk River	821	2003	4/13/2004	Yearling	Elastomer	
2004	Culbertson	523	2003	8/9/2004	Yearling	PIT Tag	Elastomer
2004	Intake	347	2003	8/9/2004	Yearling	PIT Tag	Elasomer
2004	Sidney	397	2003	8/9/2004	Yearling	PIT Tag	Elastomer
2004	Wolf Point	379	2003	8/9/2004	Yearling	PIT Tag	Elastomer
2004	Larval Drift	30000	2004	7/2/2004	Fry		
2004	Larval Drift	50000	2004	7/8/2004	Fry		
2004	Larval Drift	25000	2004	7/20/2004	Fry		
2004	Larval Drift	25000	2004	7/23/2004	Fry		
2004	Larval Drift	25000	2004	7/27/2004	Fry		
2004	Culbertson	3819	2004	9/10/2004	Fingerling	CWT	Elastomer
2004	Sidney	2991	2004	9/10/2004	Fingerling	CWT	Elastomer
2004	Wolf Point	4040	2004	9/10/2004	Fingerling	CWT	Elastomer

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
2004	Mouth of Milk	3482	2004	10/15/2004	Advanced Fingerling	CWT	Elastomer
2004	Intake	2477	2004	11/18/2004	Advanced Fingerling	CWT	Elastomer
2005	Culbertson	288	2004	4/12/2005	Yearling	CWT	Elastomer
2005	Intake	309	2004	4/12/2005	Yearling	CWT	Elastomer
2005	Wolf Point	271	2004	4/12/2005	Yearling	CWT	Elastomer
2005	Intake	175	2004	8/19/2005	Yearling	PIT Tag	Elastomer
2005	Brockton	229	2005	10/5/2005	Advanced Fingerling	CWT	Elastomer
2005	Culbertson	226	2005	10/5/2005	Advanced Fingerling	CWT	Elastomer
2005	Intake	456	2005	10/5/2005	Advanced Fingerling	CWT	Elastomer
2005	Milk River	232	2005	10/5/2005	Advanced Fingerling	CWT	Elastomer
2005	Sidney	122	2005	10/5/2005	Advanced Fingerling	CWT	Elastomer
2005	Wolf Point	611	2005	10/12/2005	Advanced Fingerling	CWT	Elastomer
2005	Brockton	371	2005	10/13/2005	Advanced fingerling		
2005	Culbertson	1736	2005	10/13/2005	Advanced Fingerling	CWT	Elastomer
2005	Culbertson	182	2005	10/13/2005	Advanced Fingerling		
2005	Intake	313	2005	10/13/2005	Advanced Fingerling		
2005	Milk River	845	2005	10/13/2005	Advanced Fingerling	CWT	Elastomer
2005	Mouth of Milk	371	2005	10/13/2005	Advanced Fingerling		
2005	Sidney	105	2005	10/13/2005	Advanced Fingerling		
2005	Wolf Point	1521	2005	10/13/2005	Advanced Fingerling	CWT	Elastomer
2005	Wolf Point	371	2005	10/13/2005	Advanced Fingerling		
2005	Culbertson	651	2005	10/19/2005	Advanced Fingerling	CWT	Elastomer
2005	Intake	2120	2005	10/19/2005	Advanced Fingerling	CWT	Elastomer
2005	Milk River	485	2005	10/19/2005	Advanced Fingerling	CWT	Elastomer
2005	Sidney	882	2005	10/19/2005	Advanced Fingerling	CWT	Elastomer
2005	Wolf Point	650	2005	10/19/2005	Advanced Fingerling	CWT	Elastomer
2006	Culbertson	235	2005	3/28/2006	Advanced Fingerling	Elastomer	
2006	Intake	327	2005	3/28/2006	Advanced Fingerling	Elastomer	
2006	Mouth of Milk	134	2005	3/28/2006	Advanced fingerling	Elastomer	
2006	Sidney	113	2005	3/28/2006	Advanced Fingerling	Elastomer	
2006	Wolf Point	232	2005	3/28/2006	Advanced Fingerling	Elastomer	
2006	Intake	970	2005	4/3/2006	Yearling	PIT Tag	Elastomer
2006	Sidney	314	2005	4/3/2006	Yearling	PIT Tag	Elastomer
2006	Culbertson	844	2005	4/5/2006	Yearling	PIT Tag	Elastomer
2006	Mouth of Milk	1007	2005	4/5/2006	Yearling	PIT Tag	Elastomer
2006	Wolf Point	866	2005	4/5/2006	Yearling	PIT Tag	Elastomer
2006	Culbertson	669	2005	5/1/2006	Yearling	PIT Tag	Scute Removed
2006	Intake	765	2005	5/1/2006	Yearling	PIT Tag	Scute Removed
2006	Mouth of Milk	650	2005	5/1/2006	Yearling	PIT Tag	Scute Removed
2006	Sidney	228	2005	5/1/2006	Yearling	PIT Tag	Scute Removed
2006	Wolf Point	653	2005	5/1/2006	Yearling	PIT Tag	Scute Removed
2006		1355	2005	5/1/2006	Yearling	PIT Tag	Scute Removed
2006	Culbertson	1544	2006	10/24/2006	Advanced Fingerling	Elastomer	
2006	Intake	1680	2006	10/24/2006	Advanced Fingerling	Elastomer	
2006	Mouth Milk	1117	2006	10/24/2006	Advanced Fingerling	Elastomer	

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
2006	Sidney	586	2006	10/24/2006	Advanced Fingerling	Elastomer	
2006	Wolf Point	1553	2006	10/24/2006	Advanced Fingerling	Elastomer	
2006	School Trust	436	2006	11/8/2006	Advanced Fingerling	Elastomer	
2007	Culbertson	651	2006	4/5/2007	Yearling	PIT Tag	Scute Removed
2007	Fallon	491	2006	4/3/2007	Yearling	PIT Tag	Scute Removed
2007	Forsyth	492	2006	4/3/2007	Yearling	PIT Tag	Scute Removed
2007	Sidney	983	2006	4/3/2007	Yearling	PIT Tag	Scute Removed
2007	School Trust	639	2006	4/5/2007	Yearling	PIT Tag	Scute Removed
2007	Wolf Point	651	2006	4/5/2007	Yearling	PIT Tag	Scute Removed
2007	Wolf Point	428285	2007	7/9/2007	Fry		
2007	Grand Champs	5558	2007	7/13/2007	Fry		
2007	Miles City	13125	2007	7/18/2007	Fry		
2007	Intake	20763	2007	8/9/2007	Fry		
2007	Miles City	13675	2007	8/9/2007	Fry		
2007	Intake	336	2007	8/27/2007	Fingerling		
2007	Miles City	336	2007	8/27/2007	Fingerling		
2007	Wolf Point	672	2007	8/27/2007	Fingerling		
2007	Forsyth	690	2007	8/31/2007	Fingerling	CWT	
2007	Intake	615	2007	8/31/2007	Fingerling	CWT	
2007	School Trust	1160	2007	9/6/2007	Fingerling	CWT	
2007	Intake	293	2007	9/12/2007	Fingerling		
2007	Miles City	293	2007	9/12/2007	Fingerling		
2007	Wolf Point	586	2007	9/12/2007	Fingerling		
2007	Culbertson	6455	2007	9/14/2007	Fingerling	Elastomer	
2007	Fallon	4827	2007	9/14/2007	Fingerling	Elastomer	
2007	Forsyth	5370	2007	9/14/2007	Fingerling	Elastomer	
2007	Intake	7812	2007	9/14/2007	Fingerling	Elastomer	
2007	School Trust	6096	2007	9/14/2007	Fingerling	Elastomer	
2007	Sidney	1934	2007	9/14/2007	Fingerling	Elastomer	
2007	Wolf Point	6455	2007	9/14/2007	Fingerling	Elastomer	
2008	Culbertson	1384	2007	5/7/2008	Yearling	PIT Tag	Scute
2008	Culbertson	643	2007	3/26/2008	Yearling	Elastomer	
2008	Fallon	1307	2007	5/7/2008	Yearling	PIT Tag	Scute
2008	Forsyth	1384	2007	5/7/2008	Yearling	PIT Tag	Scute
2008	Forsyth	106	2007	3/26/2008	Yearling	Elastomer	
2008	Intake	2395	2007	5/7/2008	Yearling	PIT Tag	Scute
2008	Intake	103	2007	3/26/2008	Yearling	Elastomer	
2008	School Trust	1325	2007	5/7/2008	Yearling	PIT Tag	Scute
2008	School Trust	654	2007	3/26/2008	Yearling	Elastomer	
2008	Sidney	149	2007	5/7/2008	Yearling	PIT Tag	Scute
2008	Sidney	67	2007	3/26/2008	Yearling	Elastomer	

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
2008	Wolf Point	1328	2007	5/7/2008	Yearling	PIT Tag	Scute
2008	Wolf Point	416	2007	3/26/2008	Yearling	Elastomer	
2008	Miles City	4797	2008	7/30/2008	Fry		
2008	Grand Champs	24395	2008	7/30/2008	Fry		
2008	Culbertson	15630	2008	9/24/2008	Fingerling	Elastomer	
2008	Fallon	7930	2008	9/29/2008	Fingerling	Elastomer	
2008	Forsyth	7723	2008	9/29/2008	Fingerling	Elastomer	
2008	Intake	12642	2008	9/29/2008	Fingerling	Elastomer	
2008	Sidney	3186	2008	9/29/2008	Fingerling	Elastomer	
2008	Wolf Point	11717	2008	9/24/2008	Fingerling	Elastomer	

[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 2 of the Missouri River during 2008. 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 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	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
BESN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BHCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BHMW	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BKCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BKSS	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BLCF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BLGL	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BMBF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BNMW	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
BRBT	1	0.002 [0.005]	0 [0]				0.007 [0.015]		0 [0]		0 [0]	0		
BUSK*	**11**	**0.031 [0.022]**	**0.025 [0.026]**				**0.027 [0.034]**		**0.048 [0.059]**		**0 [0]**	**0**		
CARP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
CLSR	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
CNCF	21	0.052 [0.03]	0.058 [0.061]				0.054 [0.052]		0.045 [0.047]		0.054 [0.108]	0		
CNLP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
CNSN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
ERSN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
FHCB	8	0.019 [0.014]	0.031 [0.032]				0.022 [0.025]		0.006 [0.013]		0 [0]	0		
FHCF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
FHMW	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		

Appendix F2 (continued).

Species	Total Catch	Overall CPUE	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
FWDM	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
GDEY	72	0.199 [0.164]	0.112 [0.068]				0.11 [0.073]		0.374 [0.531]		0.214 [0.223]	0.906		
GDRH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
GNSF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
GSCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
GZSD	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
HBNS*	**0**	**0** **[0]**	**0** **[0]**				**0** **[0]**		**0** **[0]**		**0** **[0]**	**0**		
HFCS	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
LGPH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
LKCB	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
LKSG	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
LMBS	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
LNDC	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
LNGR	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
LNSK	14	0.032 [0.021]	0.031 [0.035]				0.055 [0.053]		0.015 [0.022]		0 [0]	0		
MMSN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
MNEY	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
MQTF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
NFSH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		

Appendix F2 (continued).

Species	Total Catch	Overall CPUE	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
OSSF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
PDFH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
PDSG*	**3**	**0.009** **[0.01]**	**0.005** **[0.01]**				**0.008** **[0.016]**		**0** **[0]**		**0.09** **[0.181]**	**0**		
RBTT	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
RVCS	28	0.074 [0.044]	0.048 [0.037]				0.071 [0.07]		0.102 [0.115]		0 [0]	0.906		
SGCB*	**0**	**0** **[0]**	**0** **[0]**				**0** **[0]**		**0** **[0]**		**0** **[0]**	**0**		
SGER*	**73**	**0.167** **[0.054]**	**0.156** **[0.086]**				**0.213** **[0.11]**		**0.162** **[0.102]**		**0** **[0]**	**0**		
SHRH	13	0.03 [0.019]	0.027 [0.023]				0.006 [0.012]		0.051 [0.052]		0.074 [0.147]	0		
SMBF	4	0.011 [0.013]	0 [0]				0.011 [0.022]		0.025 [0.038]		0 [0]	0		
SNSG*	**379**	**0.918** **[0.239]**	**1.068** **[0.539]**				**0.749** **[0.305]**		**1.007** **[0.413]**		**0.462** **[0.373]**	**0.302**		
SNSN*	**0**	**0** **[0]**	**0** **[0]**				**0** **[0]**		**0** **[0]**		**0** **[0]**	**0**		
STCT	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
STSN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
UBF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
UCA	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
UCY	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
UNID	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
WLYE	1	0.002 [0.004]	0.006 [0.013]				0 [0]		0 [0]		0 [0]	0		
WSMW*	**0**	**0** **[0]**	**0** **[0]**				**0** **[0]**		**0** **[0]**		**0** **[0]**	**0**		

Appendix F2 (continued).

Species	Total Catch	Overall CPUE	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
WTCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]	0		
WTSK	8	0.018 [0.014]	0.032 [0.033]				0 [0]		0.018 [0.021]		0.049 [0.098]	0		
YWPH	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	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
BESN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BHCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BHMW	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BKCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BKSS	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BLCF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BLGL	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BMBF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BNMW	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
BRBT	1	0.002 [0.003]	0 [0]				0.005 [0.011]		0 [0]		0 [0]			
BUSK*	**0**	**0 [0]**	**0 [0]**				**0 [0]**		**0 [0]**		**0 [0]**			
CARP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
CLSR	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
CNCF	9	0.021 [0.019]	0.012 [0.024]				0.03 [0.042]		0.017 [0.034]		0.033 [0.067]			
CNLP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
CNSN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
ERSN	2	0.004 [0.008]	0 [0]				0.013 [0.026]		0 [0]		0 [0]			
FHCB	31	0.064 [0.038]	0.071 [0.05]				0.083 [0.095]		0.046 [0.05]		0 [0]			
FHCF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
FHMW	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			

Appendix F4 (continued).

Species	Total Catch	Overall CPUE	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
FWDM	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
GDEY	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
GDRH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
GNSF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
GSCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
GZSD	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
HBNS*	**0**	**0** **[0]**	**0** **[0]**				**0** **[0]**		**0** **[0]**		**0** **[0]**			
HFCS	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
LGPH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
LKCB	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
LKSG	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
LMBS	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
LNDC	2	0.004 [0.005]	0 [0]				0 [0]		0.012 [0.017]		0 [0]			
LNGR	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
LNSK	15	0.03 [0.02]	0.044 [0.043]				0.031 [0.038]		0.018 [0.021]		0 [0]			
MMSN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
MNEY	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
MQTF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
NFSH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			

Appendix F4 (continued).

Species	Total Catch	Overall CPUE	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
OSSF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
PDFH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
PDSG*	**5**	**0.011** **[0.01]**	**0.024** **[0.029]**				**0.011** **[0.015]**		**0** **[0]**		**0** **[0]**			
RBTT	2	0.004 [0.006]	0.007 [0.014]				0.007 [0.013]		0 [0]		0 [0]			
RVCS	5	0.009 [0.009]	0.016 [0.024]				0.01 [0.015]		0 [0]		0 [0]			
SGCB*	**69**	**0.139** **[0.046]**	**0.103** **[0.064]**				**0.111** **[0.068]**		**0.214** **[0.113]**		**0.098** **[0.1]**			
SGER*	**15**	**0.026** **[0.014]**	**0.011** **[0.015]**				**0.026** **[0.023]**		**0.04** **[0.033]**		**0.033** **[0.067]**			
SHRH	7	0.015 [0.012]	0.017 [0.019]				0.018 [0.028]		0.012 [0.017]		0 [0]			
SMBF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
SNSG*	**125**	**0.254** **[0.085]**	**0.387** **[0.156]**				**0.077** **[0.066]**		**0.329** **[0.211]**		**0.133** **[0.108]**			
SNSN*	**0**	**0** **[0]**	**0** **[0]**				**0** **[0]**		**0** **[0]**		**0** **[0]**			
STCT	1	0.002 [0.004]	0.006 [0.013]				0 [0]		0 [0]		0 [0]			
STSN	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
UBF	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
UCA	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
UCY	1	0.002 [0.003]	0 [0]				0.005 [0.011]		0 [0]		0 [0]			
UNID	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
WLYE	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
WSMW*	**1**	**0.002** **[0.004]**	**0** **[0]**				**0.006** **[0.013]**		**0** **[0]**		**0** **[0]**			

Appendix F4 (continued).

Species	Total Catch	Overall CPUE	CHXO		CONF		ISB		OSB		SCCL		SCCS	TRML
			CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	POOL	CHNB	ITIP	ITIP	TLWG
WTCP	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			
WTSK	14	0.026 [0.015]	0.036 [0.033]				0.029 [0.029]		0.018 [0.02]		0 [0]			
YWPH	0	0 [0]	0 [0]				0 [0]		0 [0]		0 [0]			

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

species	Total Catch	Overall CPUE	CHXO BARS	ISB BARS	OSB BARS	SCCL BARS	SCCS BARS	SCN BARS
BMBF	11	0.118	0.043	0	0	0	0.435	0
	.	0.195	0.087	0	0	0	0.783	0
BRBT	1	0.011	0	0.031	0	0	0	0
	.	0.022	0	0.063	0	0	0	0
BUSK	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
CARP	337	3.624	0.174	0.031	0.5	0.091	14.217	1.5
	.	6.023	0.162	0.063	1	0.182	24.21	1
CNCF	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
ERSN	278	2.989	2.391	1.031	3	14.636	0.957	0.5
	.	2.544	2.844	1.272	6	19.587	0.978	1
FHCB	227	2.441	2.174	0.375	2	10.364	1.696	4
	.	2.361	2.414	0.321	2	19.148	1.26	8
FHMW	1142	12.28	2.609	0.594	5	0.545	19.913	294.5
	.	13.811	2.473	0.439	4	0.495	28.052	527
GDEY	13	0.14	0.087	0	0	0	0.391	1
	.	0.182	0.174	0	0	0	0.697	2
LKCB	1	0.011	0.043	0	0	0	0	0
	.	0.022	0.087	0	0	0	0	0
LNDC	557	5.989	4.087	0.281	81	0.182	12.565	0.5
	.	6.063	4.363	0.205	58	0.364	21.907	1
LNSK	582	6.258	5	1.5	0	1.818	17.348	0
	.	6.075	6.978	1.341	0	1.636	23.234	0
NFSH	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
PDSG	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
RBTT	1	0.011	0	0.031	0	0	0	0
	.	0.022	0	0.063	0	0	0	0
RVCS	2421	26.032	3.957	3.781	2	0.636	77.435	208.5
	.	24.251	4.714	2.801	4	0.619	92.766	63
SGCB	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
SGER	6	0.065	0.043	0.094	0	0	0.043	0.5
	.	0.06	0.087	0.138	0	0	0.087	1
SHRH	20	0.215	0.043	0.125	0	0	0.087	6.5
	.	0.295	0.087	0.25	0	0	0.174	13
SMBF	5	0.054	0.043	0	0	0	0.174	0
	.	0.088	0.087	0	0	0	0.348	0
SNSG	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
SNSN	763	8.204	9.435	1.156	139.5	2.182	8.913	0.5
	.	6.725	9.501	0.73	241	3.441	12.32	1

Appendix F6 (continued).

species	Total Catch	Overall CPUE	CHXO BARS	ISB BARS	OSB BARS	SCCL BARS	SCCS BARS	SCN BARS
STCT	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
STSN	7	0.075	0.043	0.031	2.5	0	0	0
	.	0.111	0.087	0.063	5	0	0	0
UBF	4	0.043	0.043	0	0	0	0.13	0
	.	0.052	0.087	0	0	0	0.191	0
UCA	286	3.075	6.304	1.75	0	7.364	0.174	0
	.	3.167	11.272	2.461	0	10.687	0.348	0
UCY	2	0.022	0.087	0	0	0	0	0
	.	0.03	0.12	0	0	0	0	0
UNID	1	0.011	0.043	0	0	0	0	0
	.	0.022	0.087	0	0	0	0	0
WLYE	0	0	0	0	0	0	0	0
	.	0	0	0	0	0	0	0
WSMW	33	0.355	0.739	0.063	0	0.545	0.261	1
	.	0.375	1.39	0.087	0	1.091	0.314	2
WTCP	4	0.043	0.13	0.031	0	0	0	0
	.	0.068	0.261	0.063	0	0	0	0
WTSK	4982	53.57	10.565	14.719	221	6.182	154.739	99.5
	.	44.459	9.696	21.201	290	6.3	169.603	151
YWPH	2	0.022	0.043	0	0.5	0	0	0
	.	0.03	0.087	0	1	0	0	0

Appendix G. Hatchery names, locations, and abbreviations.

Hatchery	State	Abbreviation
Blind Pony State Fish Hatchery	MO	BLP
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 2007-2008 for segment 2 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)**			
	Gill Net	Otter Trawl	1 Inch Trammel Net	Otter Trawl	Push Trawl	1 Inch Trammel Net	Mini-Fyke Net
ALSD							
ALWF							
AMEL							
AMGL							
BCCC							
BDDR							
BDKF							
BDSN							
BDSP							
BESN							
BHCP							
BHMW							
BKBF							
BKBH							
BKCP							
BKRH							
BKSB							
BKSS							
BKTT							
BLCF							
BLGL							
BMBF		0.000	0.000	0.000		0.000	0.118
BMSN							
BNDC							
BNMW							
BNSN							
BNTT							
BPTM							
BRBT		0.003	0.005	0.000		0.000	0.011

Appendix H. (continued).

Species Code	Sturgeon Season (Fall through Spring)			Fish Community Season (Summer)			
	Gill Net	Otter Trawl	1 Inch Trammel Net	Otter Trawl	Push Trawl	1 Inch Trammel Net	Mini-Fyke Net
BSDR							
BSMN							
BSTM							
BTDR							
BUSK*		0.000	0.058	0.000		0.005	0.000
BVSC							
BWFN							
CARP		0.000	0.000	0.000		0.000	3.624
CHSM							
CKCB							
CLDR							
CLSR							
CMSN							
CNCF		0.038	0.074	0.004		0.031	0.000
CNLP							
CNSM							
CNSN							
CSCO							
CTTT							
ERSN		0.000	0.000	0.008		0.000	2.989
FCSC							
FHCB		0.071	0.012	0.057		0.027	2.441
FHCF							
FHMW		0.000	0.000	0.000		0.000	12.280
FKMT							
FSDC							
FTDR							
FWDM							
GDEY		0.000	0.266	0.000		0.133	0.140
GDFH							

Appendix H. (continued).

Species Code	Sturgeon Season (Fall through Spring)			Fish Community Season (Summer)			
	Gill Net	Otter Trawl	1 Inch Trammel Net	Otter Trawl	Push Trawl	1 Inch Trammel Net	Mini-Fyke Net
GDTT							
GFCC							
GLDR							
GDRH							
GDSN							
GN*?							
GNSF							
GSBG							
GSCP							
GSDR							
GSOS							
GSPK							
GSTS							
GTSN							
GVCB							
GZSD							
HBNS*							
HFCS							
HHCB							
IODR							
JYDR							
LESF							
LGPH							
LKCB		0.000	0.000	0.000		0.000	0.011
LKSG							
LKTT							
LKWF							
LMBS							
LNDC		0.004	0.000	0.003		0.000	5.989
LNGR							

Appendix H. (continued).

Species Code	Sturgeon Season (Fall through Spring)			Fish Community Season (Summer)			
	Gill Net	Otter Trawl	1 Inch Trammel Net	Otter Trawl	Push Trawl	1 Inch Trammel Net	Mini-Fyke Net
LNSK		0.025	0.032	0.034		0.032	6.258
LSSR							
LTDR							
LVLP							
MDSP							
MMSN							
MNEY							
MQTF							
MSDR							
MSKG							
MTSK							
MTWF							
NBLP							
NFSH		0.000	0.000	0.000		0.000	0.000
NHSK							
NRBD							
NTPK							
NTSF							
OSSF							
OTDR							
OZMW							
PDFH							
PDSG*		**0.014**	**0.000**	**0.008**		**0.017**	**0.000**
PEMT							
PKLF							
PLDC							
PNMW							
PNMW*							
PNSD							
PTMW							
QLBK							
LSSR							
LTDR							

Appendix H. (continued).

Species Code	Sturgeon Season (Fall through Spring)			Fish Community Season (Summer)			
	Gill Net	Otter Trawl	1 Inch Trammel Net	Otter Trawl	Push Trawl	1 Inch Trammel Net	Mini-Fyke Net
RBDR							
RBST							
RBTT		0.000	0.000	0.009		0.000	0.011
RDSN							
RDSS							
RKBS							
RRDR							
RUDD							
RVCS		0.007	0.102	0.010		0.046	26.032
RVRH							
RVSN							
RYSN							
SBLR							
SBSN							
SBWB							
SCSC							
SDBS							
SDMT							
SESM							
SFCB*							
SFSN							
SGCB*		**0.205**	**0.000**	**0.073**		**0.000**	**0.000**
SGER*		**0.024**	**0.253**	**0.028**		**0.082**	**0.065**
SGWE							
SHDR							
SHRH		0.014	0.045	0.015		0.014	0.215
SJHR							
SKCB*							
SLDR							
SMBF		0.000	0.012	0.000		0.010	0.054

Appendix H. (continued).

Species Code	Sturgeon Season (Fall through Spring)			Fish Community Season (Summer)			
	Gill Net	Otter Trawl	1 Inch Trammel Net	Otter Trawl	Push Trawl	1 Inch Trammel Net	Mini-Fyke Net
SMBS							
SMMW							
SNGR							
SNPD							
SNSG*		**0.353**	**0.869**	**0.155**		**0.966**	**0.000**
SNSN*		**0.000**	**0.000**	**0.000**		**0.000**	**8.204**
SPSK							
SPSN							
SPST							
SRBD							
SSPS							
STBS							
STCT		0.000	0.000	0.004		0.000	0.000
STGR							
STPD							
STSN		0.000	0.000	0.000		0.000	0.075
SVCB							
SVCP							
SVLP							
SVMW							
SVRH							
TFSD							
TPMT							
TPSN							
TTPH							
UAC							
UBF		0.000	0.000	0.000		0.000	0.043
UCA		0.000	0.000	0.000		0.000	3.075
UCF							
UCN							
UCS							

Appendix H. (continued).

Species Code	Sturgeon Season (Fall through Spring)			Fish Community Season (Summer)			
	Gill Net	Otter Trawl	1 Inch Trammel Net	Otter Trawl	Push Trawl	1 Inch Trammel Net	Mini-Fyke Net
UCT							
UCY		0.000	0.000	0.003		0.000	0.022
UDR							
UET							
UHY							
ULP							
ULY							
UNID		0.000	0.000	0.000		0.000	0.011
UNO							
UPC							
UPN							
URH							
USG							
UST							
WLYE		0.000	0.004	0.000		0.000	0.000
WRFS							
WRMH							
WSMW*		**0.000**	**0.000**	**0.004**		**0.000**	**0.355**
WSSN							
WTBS							
WTCP		0.000	0.000	0.000		0.000	0.043
WTPH							
WTSK		0.030	0.023	0.022		0.014	53.570
YLBH							
YWBS							
YWPH		0.000	0.000	0.000		0.000	0.022

Appendix I. Comprehensive list of bend numbers and locations for Segment 2 of the Missouri River comparing bend selection for both sturgeon season (ST) and fish community season (FC) between years from 2006-2008.

Bend Number	Bend River Mile	Coordinates*		2006	2007	2008
		Lattidude	Longitude			
1	1761	48.05581	106.32055	ST, FC		
2	1760					
3	1759	48.04416	106.28819		ST, FC	
4	1757.5					
5	1756					
6	1754.5	48.02680	106.1985			ST, FC
7	1753	48.02938	106.16258		ST, FC	ST, FC
8	1751	48.03120	106.13605			ST, FC
9	1749.5	48.02872	106.12263	ST, FC		
10	1747					
11	1745					
12	1744	48.03534	106.08521	ST, FC	ST, FC	ST, FC
13	1741.5					
14	1740	48.00255	106.02716		ST, FC	
15	1738					
16	1736.5	48.03137	106.001		ST, FC	
17	1735	48.02545	105.98821			ST, FC
18	1733	48.01287	105.95323	ST, FC		
19	1732	48.01149	105.93182	ST, FC	ST, FC	
20	1730.5					
21	1728.5	48.03616	105.89557			ST, FC
22	1727.5					
23	1726.5	48.01900	105.87228	ST, FC	ST, FC	
24	1725.5	48.00855	105.85176			ST, FC
25	1723.5	48.01666	105.82971			ST, FC
26	1722	48.02402	105.79479		ST, FC	
27	1720					
28	1719	48.04468	105.76749	ST, FC	ST, FC	
29	1717.5					
30	1716					
31	1714					
32	1712	48.05313	105.66531		ST, FC	ST, FC
33	1710.5	48.04739	105.66245	ST, FC		ST, FC

Bend Number	Bend River Mile	Coordinates*		2006	2007	2008
		Lattidude	Longitude			
34	1710	48.05159	105.64158	ST, FC		
35	1709	48.0696	105.64798	ST, FC		
36	1707.5	48.07648	105.64107			ST, FC
37	1706.5	48.07407	105.62061	ST, FC	ST, FC	
38	1705.5					
39	1704.5	48.08012	105.58631	ST, FC	ST, FC	ST, FC
40	1703					