2009 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

By:

Tyler Haddix, John Hunziker and Landon Holte

Montana Fish, Wildlife & Parks
PO Box 165
Fort Peck, MT 59223

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EXECUTIVE SUMMARY

Montana Fish, Wildlife & Parks sampled 12 random river bends with standard gears in segment 2 of the Missouri River during both the sturgeon and fish community seasons in 2009. In addition, trotlines were deployed in all 12 random bends once throughout both seasons. The sampling season began on the 13th of April and ended on the 28th of October. In all, 220 otter trawl samples were deployed averaging 266 m in distance for a total of 58.5 km trawled. Trammel nets were drifted 210 times averaging 229 m per drift for a total of 47.8 km. An additional 96 mini fyke nets were set during the fish community season and 96 trotlines were set over the entire sampling period.

More pallid sturgeon *Scaphirhynchus albus* were sampled in segment 2 during 2009 (n = 35) than any previous year of sampling. Over the four year sampling period a total of 87 pallid sturgeon have been sampled in segment 2. Overall pallid sturgeon catch rates using trammel nets have increased in each year of sampling to a high in 2009 of 0.014 fish/100 m drifted. However, while the overall pallid sturgeon catch rate for the otter trawl in 2009 (0.021 fish/ 100 m) was nearly double the 2008 estimate, it was similar to the 2007 and 2006 rate. The higher total catch of pallid sturgeon in segment 2 can in part be attributed to the use of trotlines. Trotlines captured 14 pallid sturgeon in 2009, even though they were only deployed once in each river bend throughout both seasons. Although trotlines were used in 2008, they were set throughout the seasons and had a lower catch rate likely due to filamentous algae adhering to the hooks in the summer months. In 2009 trotlines were mainly set during the early spring and fall months, which tended to eliminate much of the filamentous algae problem.

The size structure of pallid sturgeon sampled in segment 2 over the past four years has not shown an appreciable change. The proportion of sub-stock and stock sized fish captured in the fish community season has remained very constant. The proportion of fish by size class has fluctuated during the sturgeon season, mainly from smaller fish being captured soon after a stocking event. A total of 7 year classes of pallid sturgeon were sample in segment 2 during 2009. The 2006 year class was the most abundant year class followed by the 2007 making up 36% and 27% of the samples, respectively. Three pallid sturgeon from the 2001 year class were sampled, which was the oldest year class found in segment 2. In contrast, 11 year classes were sampled in segment 3, including the 1998 and 1997 year classes.

Pallid sturgeon sampled in segment 2 tend to have slower growth than those captured in segment 3. Although sample size is limited, the three pallid sturgeon from the 2001 year class captured in segment 2 averaged 374 mm FL, while five of the same cohort captured in segment 3 averaged 417 mm FL. These 2001 year class fish sampled in segment 2 had just over half the growth rate as the same year class captured in segment 3. The segment 2 had an estimated average growth rate of 0.037 mm/d growth since they were stocked, while the segment 3 fish had an estimate growth of 0.070 mm/d. A similar pattern was seen in all other age classes sampled in both segments.

In contrast to pallid sturgeon, shovelnose sturgeon *Scaphirhynchus platorynchus* catch rates are higher in segment 2 when compared to segment 3. A total of 829 shovelnose sturgeon were sample in segment 2 during 2009, while only 375 were sampled in segment 3. Furthermore, segment 2 had less than half of the total effort of segment 3 when including standard and wild sampling. The trammel net catch rate for quality and above sized shovelnose sturgeon was 0.88 fish/ 100 m in segment 2 during 2009, six times higher than the 0.14 fish/ 100 m estimate of segment 3. However, over the past four years of sampling the smallest shovelnose sturgeon sampled in segment 2 was a 309 mm FL fish captured in 2009. For comparison, 53 shovelnose sturgeon of this size or smaller have been sampled in segment 3 during the same time period. Additionally, the relative weights of shovelnose sturgeon in segment 2 are on average lower than those sampled in segment 3.

The catch rates of both western silver minnows *Hybognathus argyritis* and sturgeon chubs *Macrhybopsis gelida* were at a four year low in 2009. This was observed for both segment 2 and segment 3. No sicklefin chubs *M. meeki* were collected in 2009, similar to 2008. Catch rates of sauger *Sander canadense*, blue suckers *Cycleptus elongates* and sand shiners *Notropis stramineus* were all within the ranges seen in previous years of sampling.

In all 6,486 fish consisting of 32 species were sampled in segment 2 during 2009. Segment 2 continues to be a diverse section of river in both terms of fish community structure and habitat. Segment 2 transitions from a cold, clear, nutrient poor river with gravel and cobble substrate near Fort Peck Dam to a warmer, turbid river with sand substrate river near Wolf Point, MT. These physical habitat differences are manifested in the fish community structure, where various non-native species such as rainbow trout *Oncorhynchus mykiss* are prevalent near the dam and native species such as sturgeon chubs become more abundant in the downstream

portions. Monitoring a variety of species within this reach including pallid sturgeon over many years will help us better understand how dam operations, tributary inputs and environmental conditions are affecting the fish community.

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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 (Welker and Drobish 2009). 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 (Welker and Drobish 2009). 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 confluence of the Yellowstone River, 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 and swift current and therefore 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 less than 1.2 m in depth and smaller bodied fishes.

Trotlines were used as an evaluation gear in 2009 to evaluate their effectiveness at capturing pallid sturgeon. All randomly selected river bends were sampled once with trotlines throughout the two seasons.

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 (Welker and Drobish 2009). 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 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 the 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 and clear in the upper most reaches to warmer and more turbid 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 (Welker and Drobish 2009), 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 Welker and Drobish (2009). 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 2009 as an experimental gear with the intent to further evaluate its use as a pallid sturgeon gear. Four randomly chosen river bends were

sampled with trotlines during the sturgeon season and eight 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 2009.

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 see Welker and Drobish (2009).

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 each with a 3/0 Eagle Claw circle hook. Experimental 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 Welker and Drobish (2009). 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.

Size Classes of Pallid and Shovelnose Sturgeon

We used the length categories proposed by Shuman et al. (2006) for pallid sturgeon and Quist et al. (1998) for shovelnose sturgeon when looking at the total proportion of fish captured by length. 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 size classes.

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.

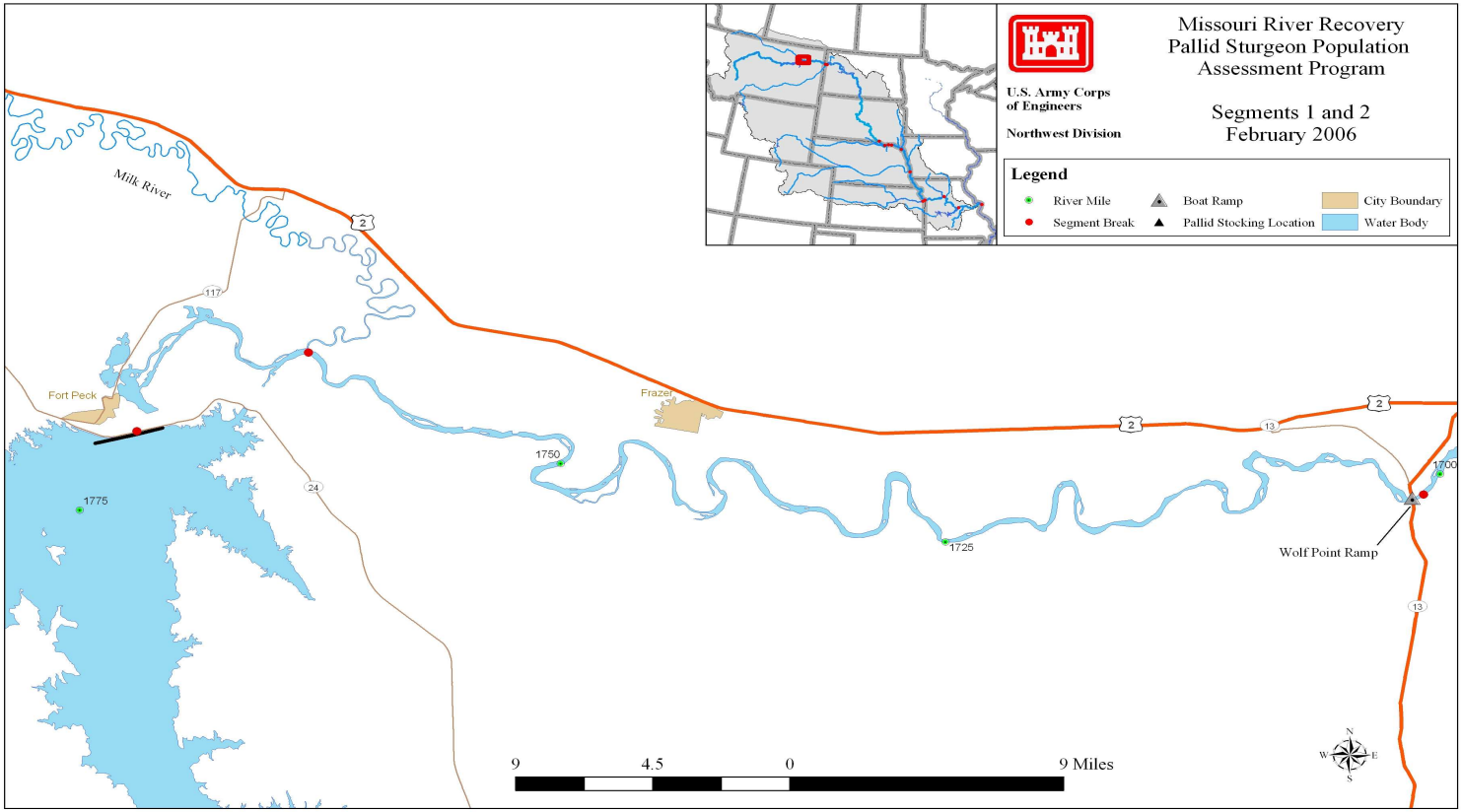

Figure 1. Map of segment 2 of the Missouri River with major tributaries, common landmarks, and historic stocking locations for pallid sturgeon. Segment 2 encompasses the Missouri River from the mouth of the Milk River (River Mile 1760.0) to Wolf Point, MT (River Mile 1701.0)

Results

Effort

A total of 12 random river bends were sampled during both the sturgeon and fish community seasons during 2009 (Table 1). Otter trawl and trammel nets were deployed on average eight times within each bend during each season. Mini fyke nets were deployed on average 7.67 times per bend during the fish community season. The otter trawl was pulled a total of 56 km in segment 2 during 2009, 51 km for random samples and 5 km for non-random duplicate samples. Trammel nets were drifted a total of 46.2 km in segment 2 during 2009, with 43.8 km being random samples and 2.4 km non-random duplicate samples.

Experimental trotlines were deployed in 12 river bends over the sturgeon and fish community seasons. Each bend was chosen by sampling the first upstream river bend from the random bend selected for otter trawl and trammel net drifting. This allowed us to use trotlines within the same day that drifting and trawling occurred.

Pallid Sturgeon

During 2009 a total of 35 pallid sturgeon were sampled in segment 2 of the Missouri River, all of which were of hatchery origin (Figure 9). This was a substantial increase from 16 pallid sturgeon sampled in 2008, 22 in 2007 and 14 in 2006. To date, no wild pallid sturgeon have been sampled in segment 2 by the population assessment crew. Temporally, 14 and 21 pallid sturgeon were sampled during the sturgeon and fish community seasons, respectively. For standard gears, more pallid sturgeon were sampled using the otter trawl (n = 15) than trammel nets (n = 6) or mini fyke nets, which caught none. Even though experimental trotlines were only used once in each bend over both seasons, compared to the otter trawl and trammel nets which were deployed once in each season, troltines captured a total of 14 pallid sturgeon in segment 2 during 2009.

No pallid sturgeon were sampled in the first 10 river miles of segment 2, downstream of the mouth of the Milk River. Seven pallid sturgeon (16.3%) were sampled between river mile 1751 and 1738, while the majority (73.7%) were sampled at or downstream of river mile 1722, which is approximately 20 river miles upstream of the Wolf Point stocking location.

Total trammel net CPUE of pallid sturgeon was at an all time high in 2009 at 0.015 fish/100 m (Figure 6). Similarly, trammel net CPUE during the sturgeon season was also at a four year high of 0.029 fish/100 m, while no pallid sturgeon were sampled during the fish community season. This was opposite of 2008 where no pallid sturgeon were sampled during the sturgeon season and the fish community season had a CPUE of 0.017 fish/100 m (Figure 6). Overall trammel net CPUE has slightly increased during the last four sampling seasons.

Conversely to trammel nets, otter trawl CPUE has not shown an increasing pattern over the past four years of sampling (Figure 7). Overall otter trawl CPUE was similar in 2009 (0.021 fish/100 m) to 2007 (0.022 fish/100 m) and only slightly higher than 2006 (0.019 fish/100 m). However, the 2009 CPUE was almost double that of 2008 (0.011 fish/ 100 m). In addition, no distinct seasonal patterns have been observed.

Pallid sturgeon averaged 313 mm fork length and 107 g total weight in segment 2 during 2009. The largest pallid captured measured 511 mm and weighed 364 g, while the smallest measured 185 mm and weighed 20 g. The average length of pallid sturgeon was slightly higher in 2009 than the 2008 average of 308 mm. On average trotlines captured the largest pallid sturgeon (354 mm fork length), while trammel nets (291 mm fork length) and otter trawls (284 mm fork length) captured similar sized fish. The length frequency of pallid sturgeon captured in 2009 still indicates that the population is dominated by fish smaller than 400 mm fork length (Figure 8), with only three fish being larger than 400 mm. Two of the three largest pallid sturgeon captured were sampled with trotlines.

The relative condition (Kn) of pallid sturgeon in segment 2 by size class is shown in Figure 4. The two sub-stock size classes have not shown an appreciable change over the past four years. However, the stock category has had a lower Kn than the sub-stock in all years. Additionally, the Kn of the stock category has decreased since 2007 to a four year low in 2009. No fish of quality size or larger have been captured in segment 2 over the past four years.

Of the 35 pallid sturgeon sampled in segment 2 during 2009 28 were from known stocking locations, all of which were from the Missouri River in RPMA 2. Nineteen fish came from the Wolf Point stocking location, five from Culbertson and four from the School Trust Site. On average, pallid sturgeon from known stocking locations moved 22 miles upstream from their stocking location from the time of stocking till the time of recapture. The majority (86%) had net upstream movements. The longest net migration was approximately 96.5 river miles

upstream by a 2007 year class fish that was stocked at Culbertson in 2008. The shortest net movement was 1.5 miles upstream by two fish, one from the 2007 year class stocked in 2008 and one by a 2008 year class fish stocked in 2009.

A total of seven year classes of pallid sturgeon were sampled in segment 2 during 2009, an increase from four year classes sampled during 2008 (Table 3). The most abundant year class sampled was the 2006 year class (n = 12), followed by 2007 (n = 9), 2008 (n = 5), 2001 (n = 3), 2005 (n = 2), 2004 (n = 1) and 2003 (n = 1) (Table 3). Even with the additional year classes being sampled, we have not seen a discernable change in the size structure of pallid sturgeon in segment 2 over the past four years (Figure 3). Sub-stock size pallid sturgeon (0-329 mm) dominate the total catch in both seasons. The size distribution of pallid sturgeon has remained very constant during the fish community season over the years, while some variability has occurred in the sturgeon season.

The specific habitat measurements for pallid sturgeon captured in random deployments by macro and meso habitat is displayed in Table 2. Additionally, Table 4 through 7 shows the number of pallid sturgeon captured by random deployments by gear and macro habitat, as well as effort expended in those macro habitats. In total, standard gears sampled 16 pallid sturgeon in random deployments, 11 of which were in the otter trawl and 5 in trammel nets.

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 the sturgeon season and fish community season in 2009. 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
Sturgeon Season																
1.0" Trammel Net	12	8	N-E	32	N-E	N-E	N-E	30	27	7	0	N-E	N-E	N-E	0	N-E
Gill Net																
Otter Trawl	12	8	N-E	31	N-E	N-E	N-E	31	27	7	0	N-E	N-E	N-E	0	N-E
Fish Community Season																
1.0" Trammel Net	12	8.00	N-E	30	N-E	N-E	N-E	30	30	6	0	N-E	N-E	N-E	0	N-E
Mini-Fyke Net	12	7.67	N-E	21	N-E	N-E	N-E	37	11	16	5	N-E	N-E	N-E	2	N-E
Otter Trawl	12	8.00	N-E	29	N-E	N-E	N-E	33	28	6	0	N-E	N-E	N-E	0	N-E

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

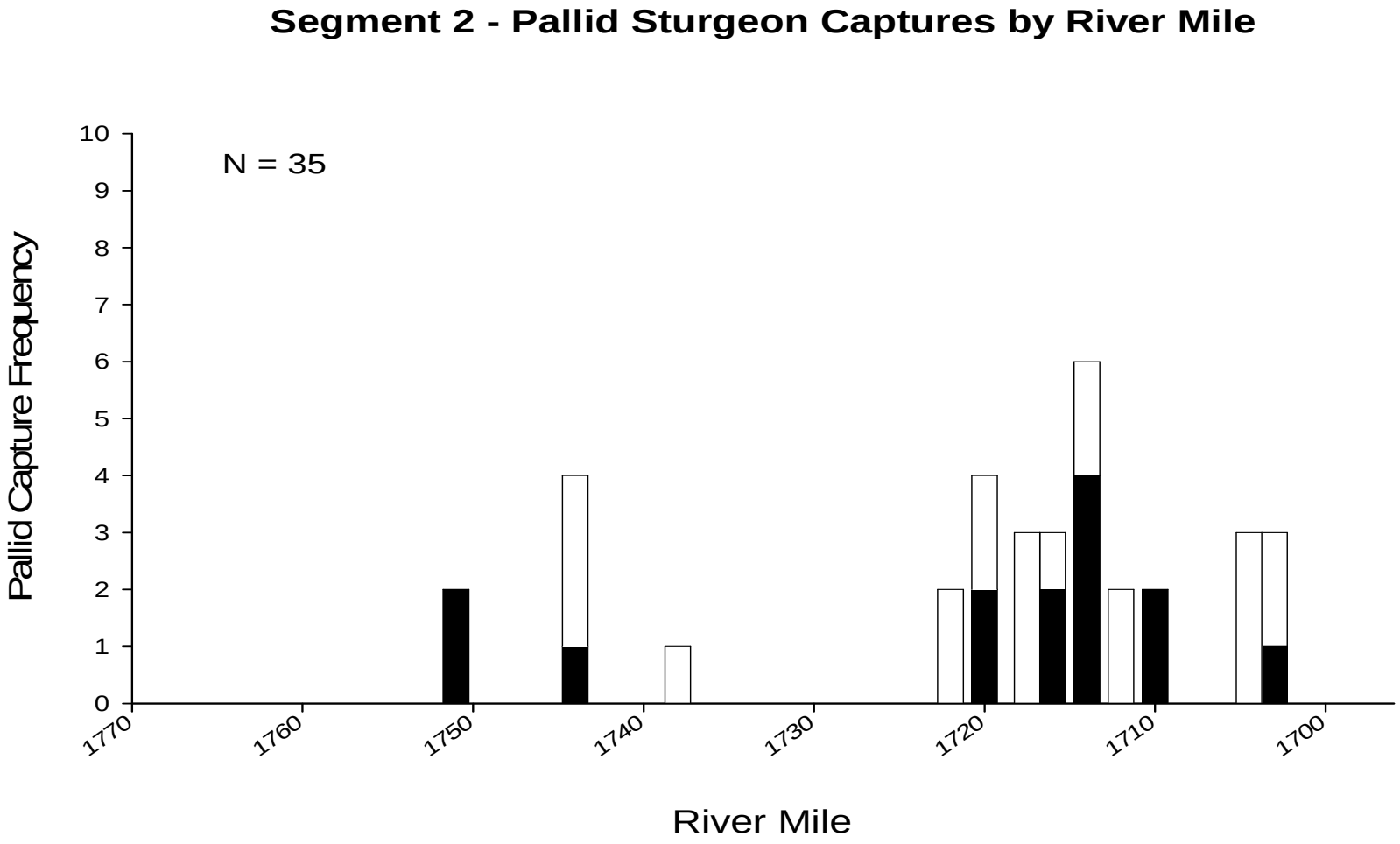

Figure 2. Distribution of pallid sturgeon captures by river mile for Segment 2 of the Missouri River during 2009. Black bars represent pallid captures during the sturgeon season and white bars during the fish community season. Figure includes all pallid captures including non-random and wild samples.

Table 2. Pallid sturgeon capture summaries for all gears relative to habitat type and environmental variables on the Missouri River during 2009. Means (minimum and maximum) are presented. Habitat definitions and codes presented in Appendix B.

Habitat		Depth (m)		Bottom Velocity (m/s)		Temperature (^{o}C)		Turbidity (ntu)		Total pallids caught
Macro-	Meso-	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	
BRAD	BARS									
	CHNB									
	DTWT									
	ITIP									
	POOL									
	TLWG									
CHXO	BARS	0.3 (0.1-0.6)		0.05 (0.00-0.16)		15.0 (9.3-19.5)		31 (7-86)		.
	CHNB	1.5 (0.8-2.9)	1.3 (1.1-2.1)	0.64 (0.31-0.91)	0.59 (0.31-0.76)	12.3 (4.5-17.8)	12.1 (4.6-16.7)	126 (5-1844)	41 (9-143)	14
	DTWT									
	ITIP									
	POOL									
	TLWG									
CONF	BARS									
	CHNB									
	DTWT									
	ITIP									
	POOL									

Habitat		Depth (m)		Bottom Velocity (m/s)		Temperature (^{o}C)		Turbidity (ntu)		Total pallids caught
Macro-	Meso-	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	
	TLWG									
DRNG	BARS									
	CHNB									
	DTWT									
	ITIP									
	POOL									
	TLWG									
ISB	BARS	0.4 (0.1-0.6)		0.08 (0.00-0.22)		14.6 (9.4-18.6)		30 (6-120)		.
	CHNB	1.4 (0.6-4.0)	1.2 (0.8-1.8)	0.61 (0.08-0.95)	0.59 (0.20-0.81)	12.4 (4.9-17.5)	12.0 (9.0-16.2)	131 (4-1800)	66 (7-173)	10
	DTWT									
	ITIP									
	POOL									
	TLWG									
OSB	BARS	0.4 (0.1-0.6)		0.10 (0.08-0.18)		12.5 (9.3-14.1)		16 (8-42)		.
	CHNB	1.9 (0.9-4.2)	2.4 (1.5-3.5)	0.66 (0.22-0.96)	0.57 (0.22-0.80)	12.0 (4.8-17.6)	10.4 (7.8-16.3)	130 (5-1830)	50 (10-185)	8
	DTWT									
	ITIP									
	POOL									
	TLWG									

Habitat		Depth (m)		Bottom Velocity (m/s)		Temperature (^{o}C)		Turbidity (ntu)		Total pallids caught
Macro-	Meso-	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	
SCCL	BARS	0.4 (0.1-0.6)		0.10 (0.01-0.20)		15.1 (10.9-17.9)		24 (9-83)		.
	CHNB	1.3 (0.9-2.1)	1.1 (0.9-1.2)	0.58 (0.43-0.83)	0.60 (0.45-0.83)	13.8 (6.9-16.8)	15.3 (13.3-16.5)	52 (7-185)	87 (9-185)	3
	DTWT									
	ITIP									
	POOL									
	TLWG									
SCCS	BARS	0.5 (0.3-0.6)		0.06 (0.02-0.09)		17.8 (16.3-19.5)		33 (24-42)		.
	CHNB									
	DTWT									
	ITIP									
	POOL									
	TLWG									
SCN	BARS									
	CHNB									
	DTWT									
	ITIP									
	POOL									
	TLWG									
TRIB	BARS									

Habitat		Depth (m)		Bottom Velocity (m/s)		Temperature (^{o}C)		Turbidity (ntu)		Total pallids caught
Macro-	Meso-	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	
	CHNB									
	DTWT									
	ITIP									
	POOL									
	TLWG									
TRML	BARS									
	CHNB									
	DTWT									
	ITIP									
	POOL									
	TLWG									
TRMS	BARS	0.5 (0.3-0.6)		0.00 (0.00-0.00)		14.0 (13.9-14.0)		11 (11-11)		.
	CHNB									
	DTWT									
	ITIP									
	POOL									
	TLWG									

Table 3. Mean fork length, weight, relative condition factor (Kn) and absolute growth rates for hatchery-reared pallid sturgeon captures by year class at the time of stocking and recapture during 2009 from Segment 2 of the Missouri River. Relative condition factor was calculated using the equation in Shuman et al. (In review).

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	3	230	.	.	374	175.3	0.951	0.037	.
	·	.	.	.	82	97.2	0.221	.	.
2003	1	.	.	.	303	104.0	1.161	.	.
	·	.	.	.	.	.	.	.	.
2004	1	.	.	.	365	161.0	0.962	.	.
	·	.	.	.	.	.	.	.	.
2005	2	.	.	.	315	99.5	0.984	.	.
	·	.	.	.	15	1.0	0.147	0.116	0.074
2006	12	239	46.8	1.123	317	96.6	0.926	0.021	0.012
	·	22	17.1	0.086	11	10.9	0.067	0.112	0.002
2007	9	303	154.1	1.279	315	125.4	0.956	0.023	0.059
	·	86	126.2	0.263	77	87.1	0.107	0.260	0.023
2008	5	274	73.4	1.101	278	69.0	0.990	0.047	0.081
	·	58	41.0	0.176	54	34.9	0.162	0.047	0.081

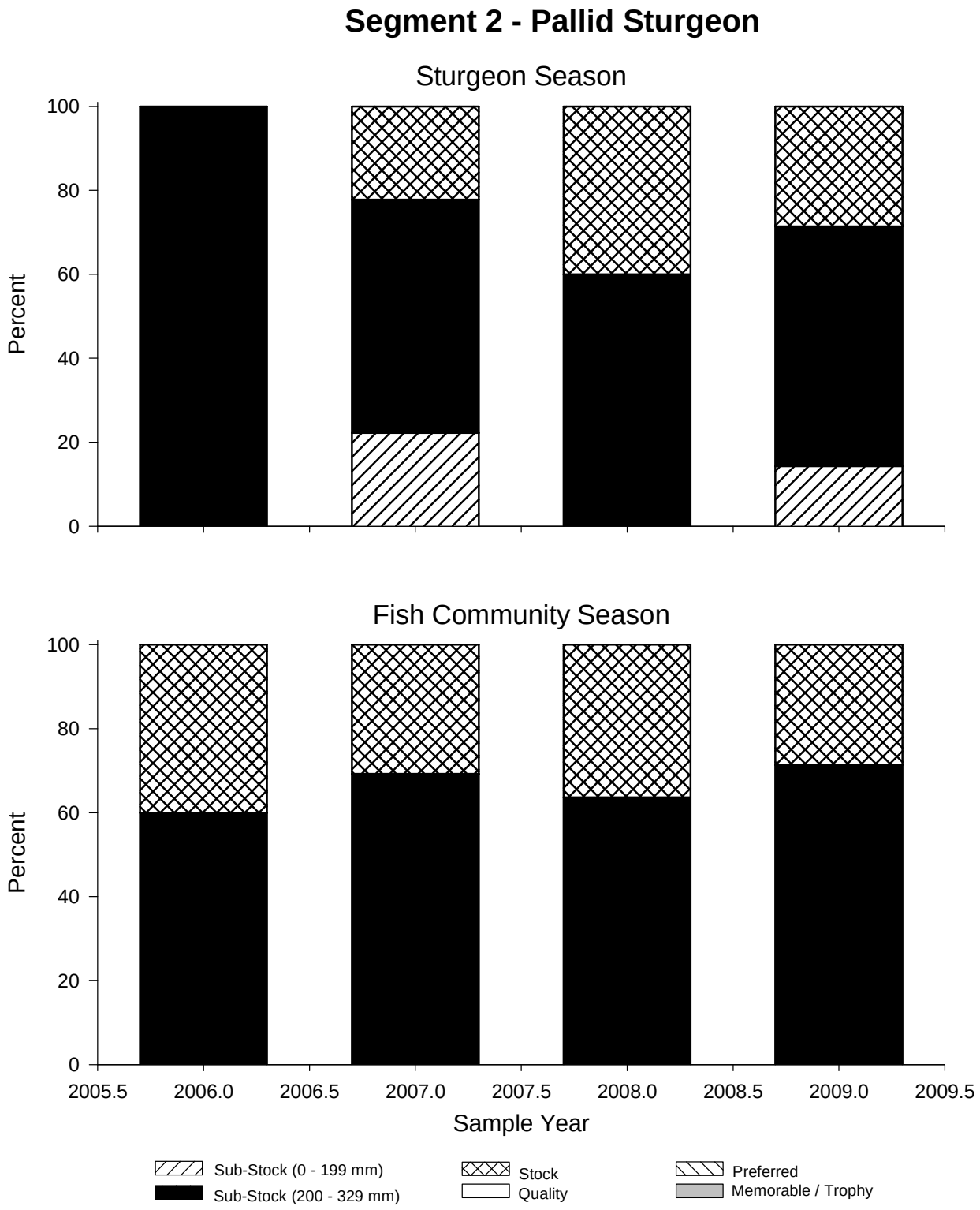

Figure 3. Proportion of fish sampled for all pallid sturgeon captured with all gear by length category from 2006-2009 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Shuman et al. (2006).

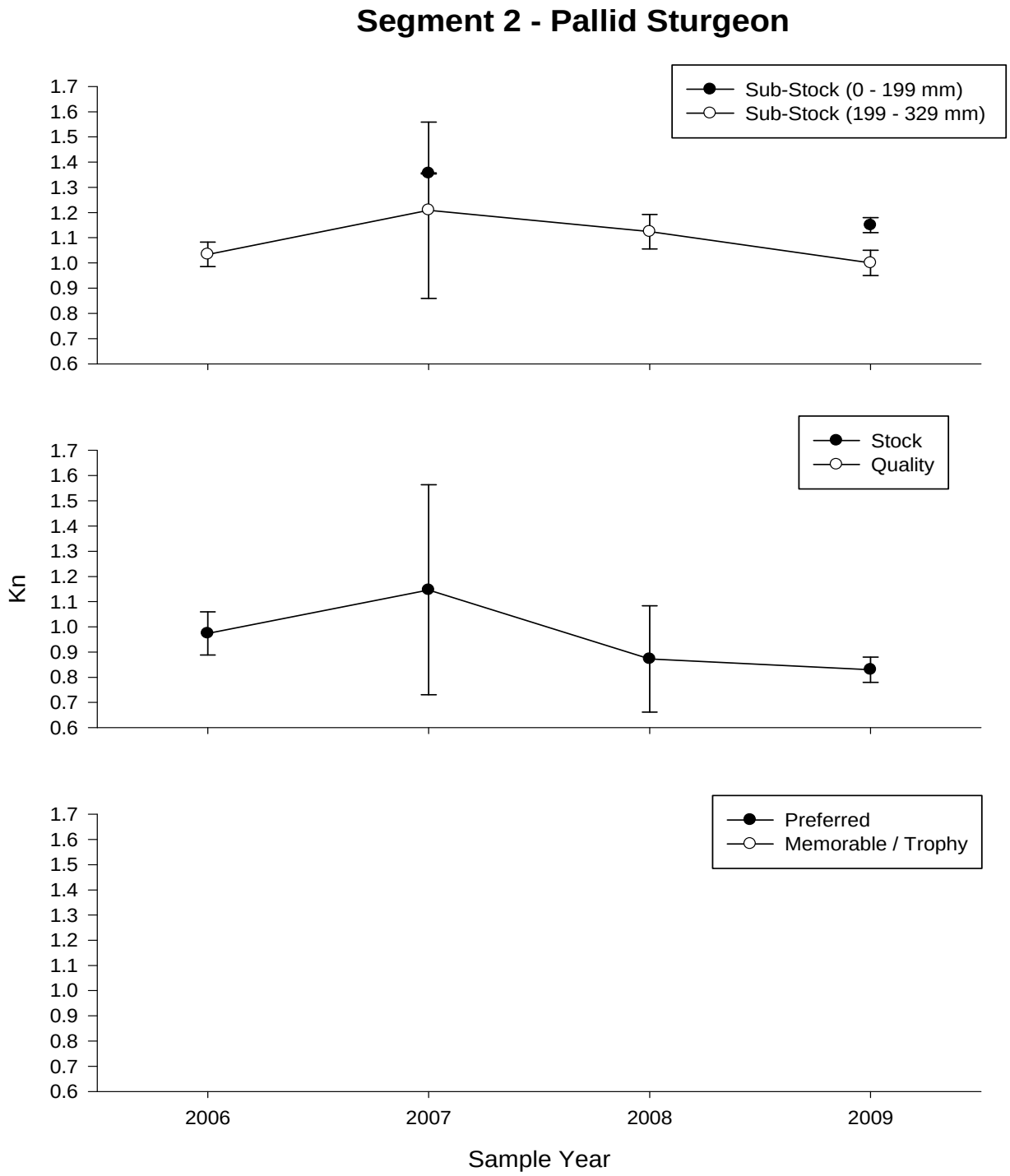

Figure 4. Relative condition factor (Kn) for all pallid sturgeon captured with all gear by incremental relative stock density (RSD) length category from 2006-2009 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Shuman et al. (2006). Relative condition factor was calculated using the equation in Shuman et al. (In review).

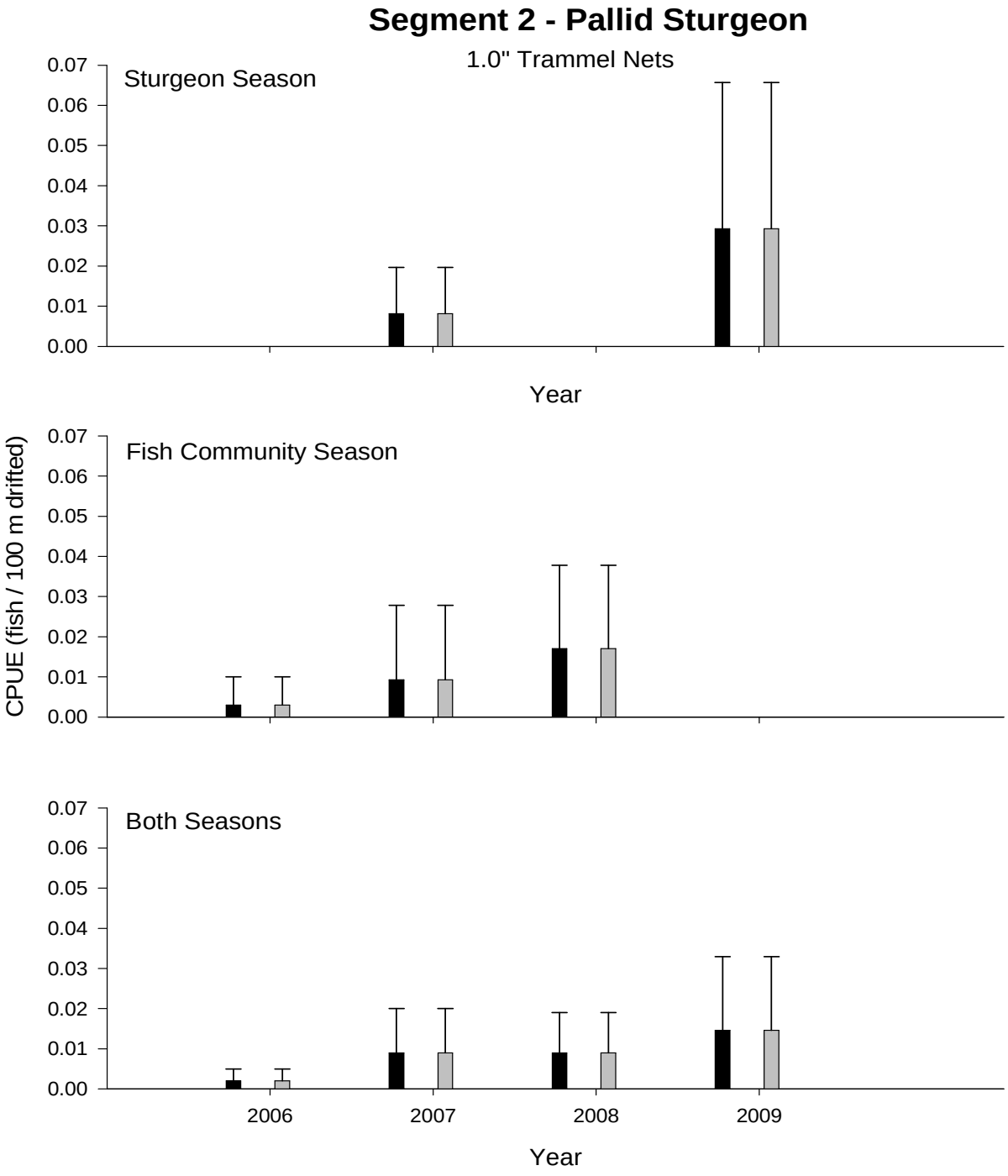

Figure 6. Mean annual catch per unit effort (+/- 2 SE) of all (black bars), wild (white bars), hatchery reared (gray bars), and unknown origin (cross-hatched bars) pallid sturgeon using 1.0” trammel nets in Segment 2 of the Missouri River from 2006-2009.

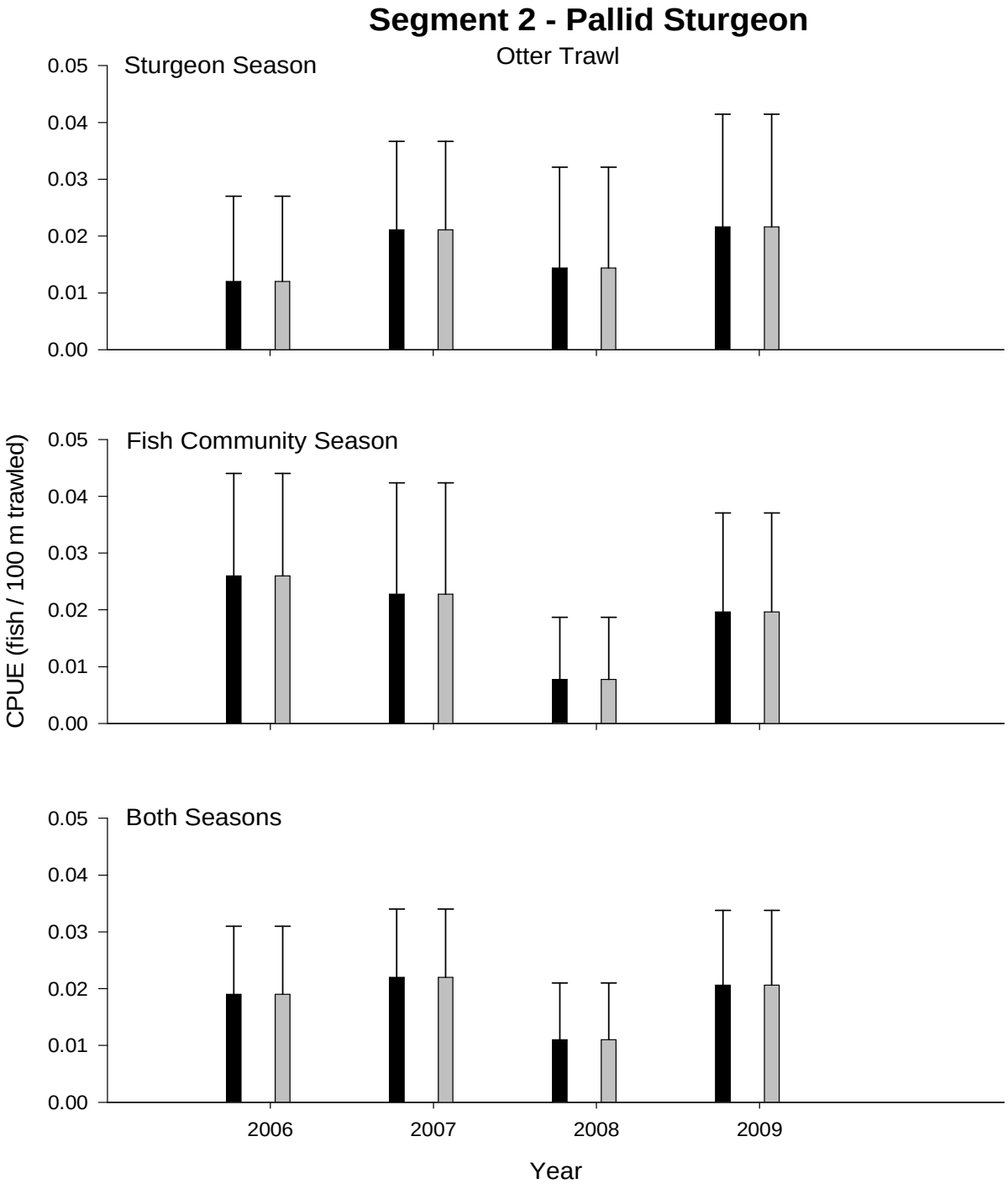

Figure 7. Mean annual catch per unit effort (+/- 2 SE) of all (black bars), wild (white bars), hatchery reared (gray bars), and unknown origin (cross-hatched bars) pallid sturgeon using otter trawls in Segment 2 of the Missouri River from 2006-2009. Pallid sturgeon of unknown origin are awaiting genetic verification.

Table 4. 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 2009. 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															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	1	0	0	0	0	0	0	100	0	0	0	0	0	0	0
	.	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 5. 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 2009. 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															
1.0" Trammel Net	4	0	25	0	0	0	75	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	2	0	100	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	5	0	20	0	0	0	40	20	20	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 6. 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 2009. 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															
1.0" Trammel Net	1	0	0	0	0	0	0	0	100	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	3	0	33	0	0	0	67	0	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 7. 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 2009. 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															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 8. Total number of 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 2009. 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															
1.0" Trammel Net	5	0	20	0	0	0	60	0	20	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	6	0	50	0	0	0	33	17	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	5	0	20	0	0	0	40	20	20	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

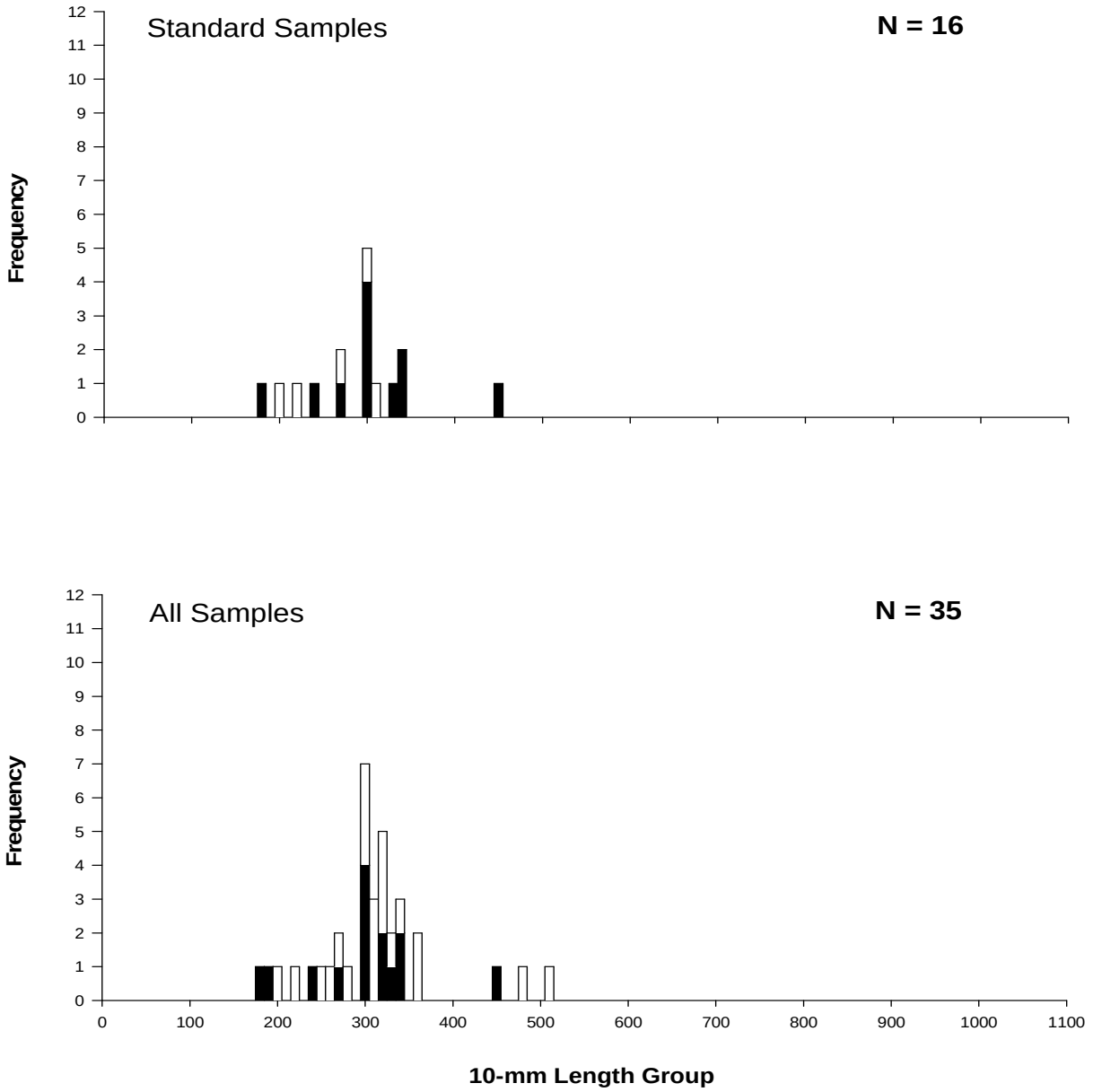

Figure 8. Length frequency of pallid sturgeon captured during the sturgeon season (black bars) and fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009. Pallid sturgeon of unknown origin are awaiting genetic verification.

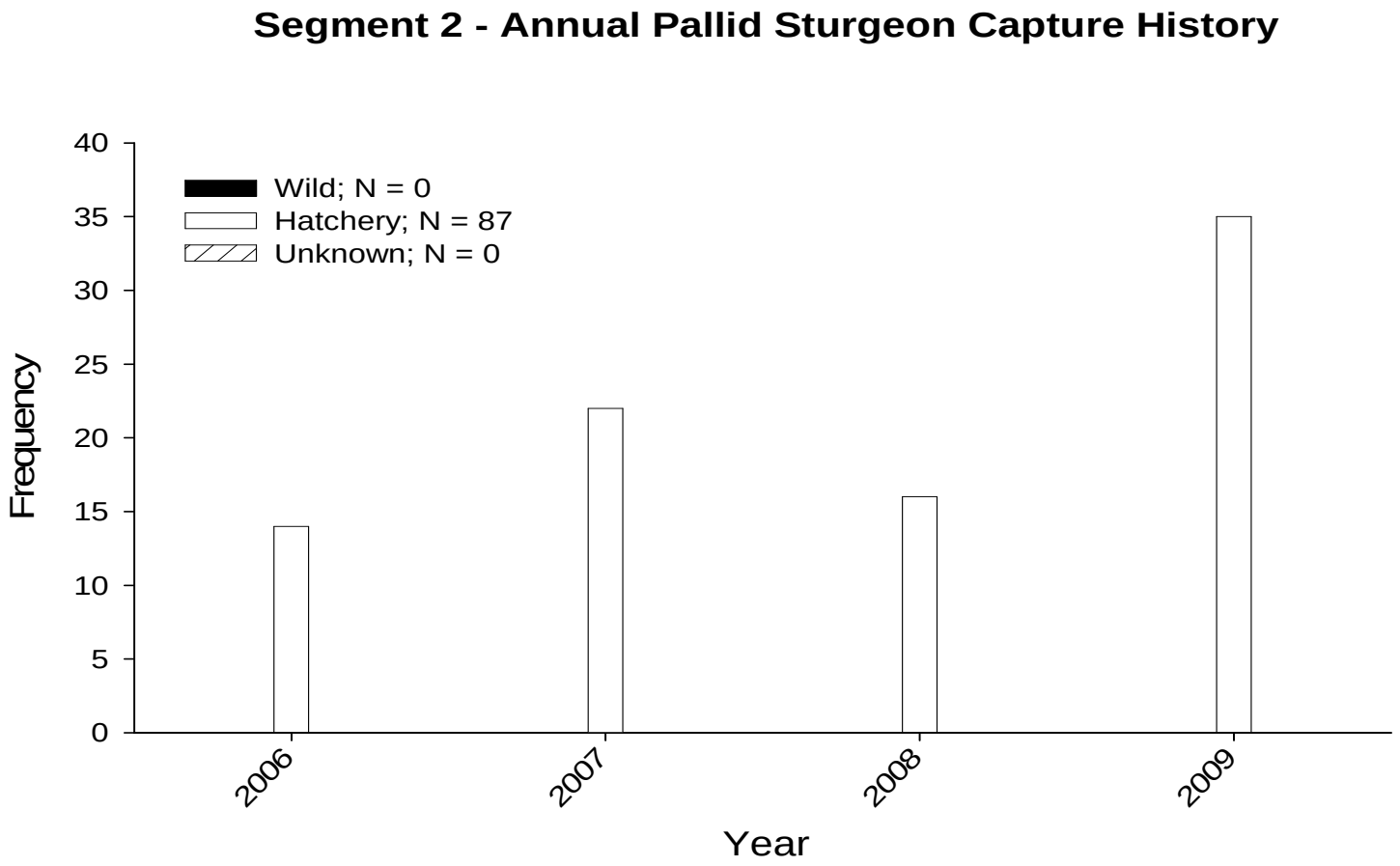

Figure 9. Annual capture history of wild (black bars), hatchery reared (white bars), and unknown origin (cross-hatched bars) pallid sturgeon collected in Segment 2 of the Missouri River from 2006-2009. Figure is designed to compare overall pallid sturgeon captures from year to year and is biased by variable effort among years. Figure includes all pallid captures including non-random and wild samples.

Shovelnose X Pallid Sturgeon Hybrid

No shovelnose sturgeon x pallid sturgeon hybrids were collected in segment 2 during 2009.

Targeted Native River Species

Shovelnose Sturgeon

A total of 829 shovelnose sturgeon were sampled in segment 2 during 2009, 490 during the fish community season and 339 during the sturgeon season. More shovelnose sturgeon were sampled using trammel nets (n = 445) than either the otter trawl (n = 124) or trotlines (n = 260). However, trotlines were only used in each bend once over both seasons while the otter trawl and trammel nets were used in each bend twice, once during each season. No shovelnose sturgeon have been sampled in mini fyke nets in all four years of sampling.

The long-term total trammel net CPUE for shovelnose sturgeon has stayed relatively consistent throughout the four years of sampling, especially during the fish community season (Figure 11). The CPUE during the sturgeon season has been more variable than that of the fish community season with 2009 and 2008 being substantially higher than 2006 and 2007. For both seasons combined, trammel nets caught 0.88 shovelnose sturgeon per 100 m drifted in 2009, which was identical to the 2008 rate (0.88 fish/ 100 m).

Shovelnose sturgeon CPUE for the otter trawl was lower during the sturgeon season in 2009 (0.14 fish/ 100m) when compared to previous years (Figure 12). However, during the fish community season it was the highest (0.24 fish/100 m) it has been in all four years of sampling. The combined CPUE was similar to previous years.

Shovelnose sturgeon averaged 550 mm fork length and 644 g in segment 2 during 2009. The vast majority of shovelnose sturgeon sampled in segment 2 over the past four years have been larger than 420 mm fork length (Figure 13). All three gears (otter trawl, trammel nets and troltines) sampled similar sizes of shovelnose sturgeon in 2009. The size distribution of shovelnose sturgeon sampled in the four years of sampling has remained similar (Figure 14). No

young of the year shovelnose sturgeon have been captured in segment 2 over the four sampling seasons.

The relative weights of shovelnose sturgeon has not significantly changed since 2006 (Figure 15). However, as shovelnose grow into larger size classes their relative weights on average decrease. The memorable and trophy size class has the lowest average relative weight of all size classes sampled.

The specific macro habitats where shovelnose were sampled by gear and size class is depicted in Tables 9-12. Table 13 shows the total number of shovelnose sampled by gear and macro habitat. More shovelnose sturgeon were sampled in channel crossover macro habitats than inside or outside bend habitats.

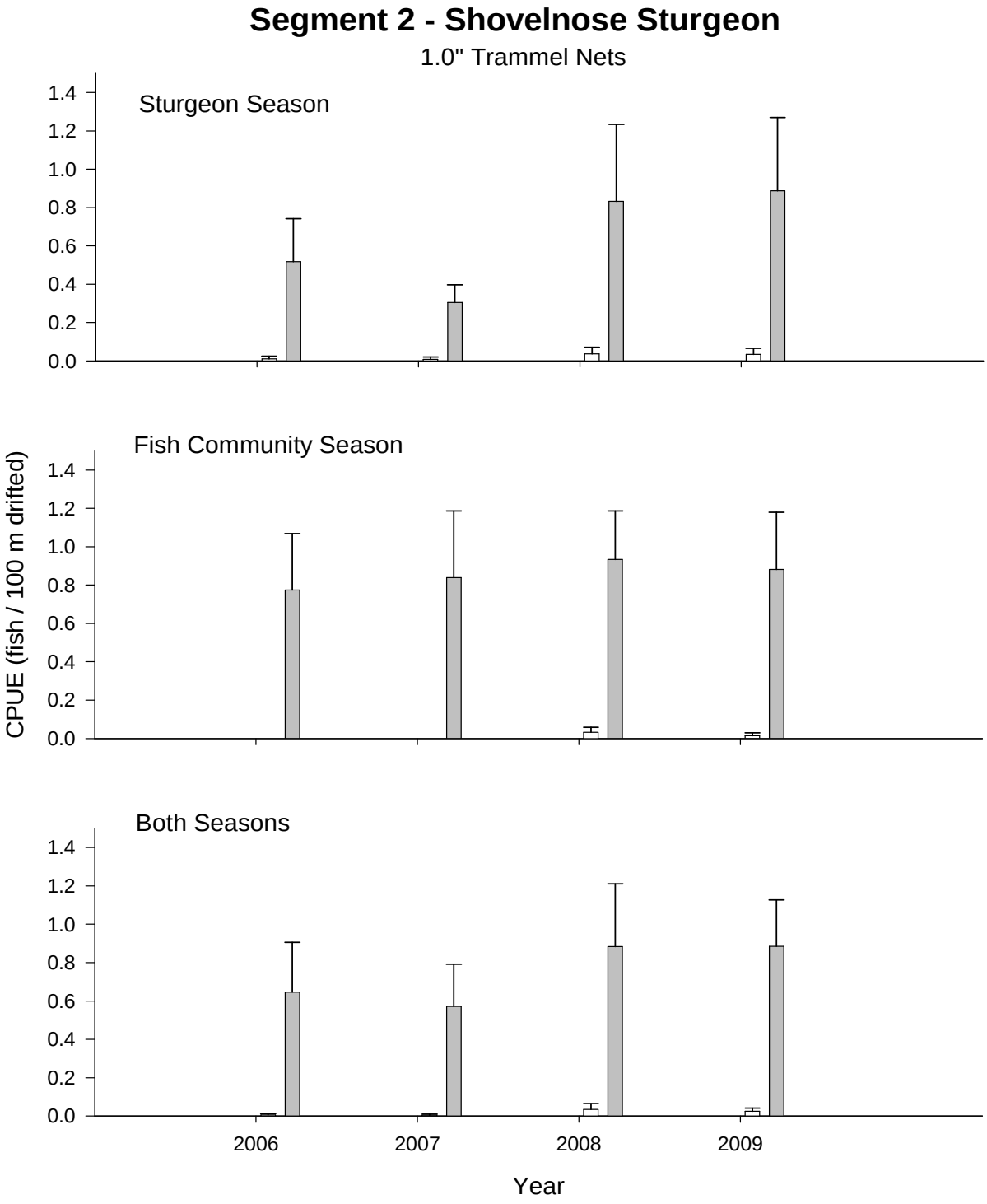

Figure 11. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; cross-hatched bars), sub-stock size (150-249 mm; black bars), stock size (250-379 mm; white bars), and quality and above size (> 380 mm; gray bars) shovelnose sturgeon using 1.0” trammel nets in Segment 2 of the Missouri River from 2006-2009.

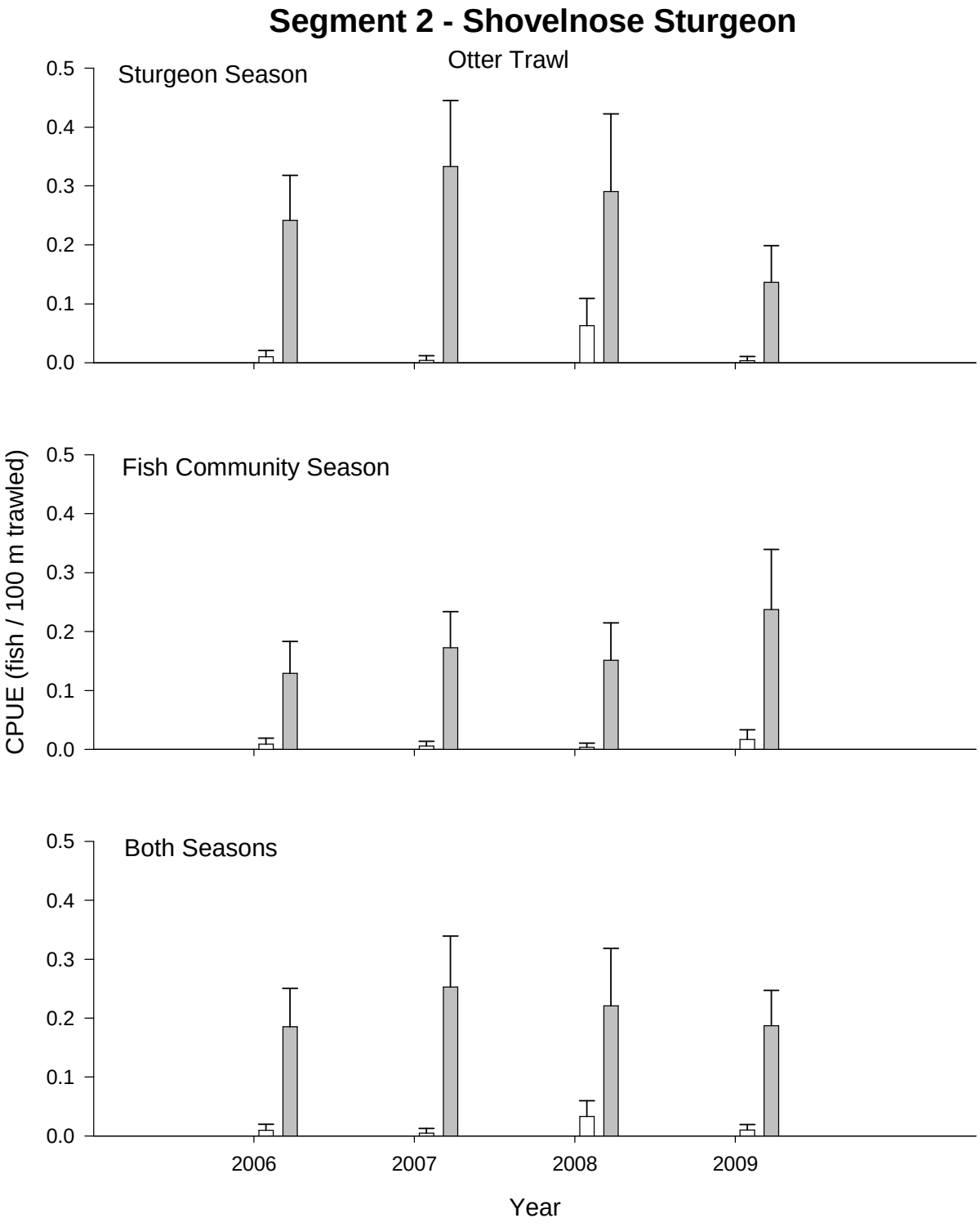

Figure 12. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; cross-hatched bars), sub-stock size (150-249 mm; black bars), stock size (250-379 mm; white bars), and quality and above size (> 380 mm; gray bars) shovelnose sturgeon using otter trawls in Segment 2 of the Missouri River from 2006-2009.

Table 9. 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 2009. 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															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 10. 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 2009. 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															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 11. 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 2009. 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															
1.0" Trammel Net	7	0	43	0	0	0	43	14	0	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	1	0	100	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	3	0	33	0	0	0	33	33	0	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	4	0	25	0	0	0	0	50	25	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 12. 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 2009. 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															
1.0” Trammel Net	185	0	44	0	0	0	25	28	4	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	35	0	54	0	0	0	29	17	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0” Trammel Net	203	0	38	0	0	0	15	41	5	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	66	0	35	0	0	0	18	44	3	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

Table 13. Total number of 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 2009. 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															
1.0” Trammel Net	192	0	44	0	0	0	26	27	4	0	0	0	0	0	0
	·	0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	36	0	56	0	0	0	28	17	0	0	0	0	0	0	0
	·	0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0” Trammel Net	206	0	38	0	0	0	16	41	5	0	0	0	0	0	0
	·	0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	·	0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	70	0	34	0	0	0	17	44	4	0	0	0	0	0	0
	·	0	31	0	0	0	35	28	6	0	0	0	0	0	0

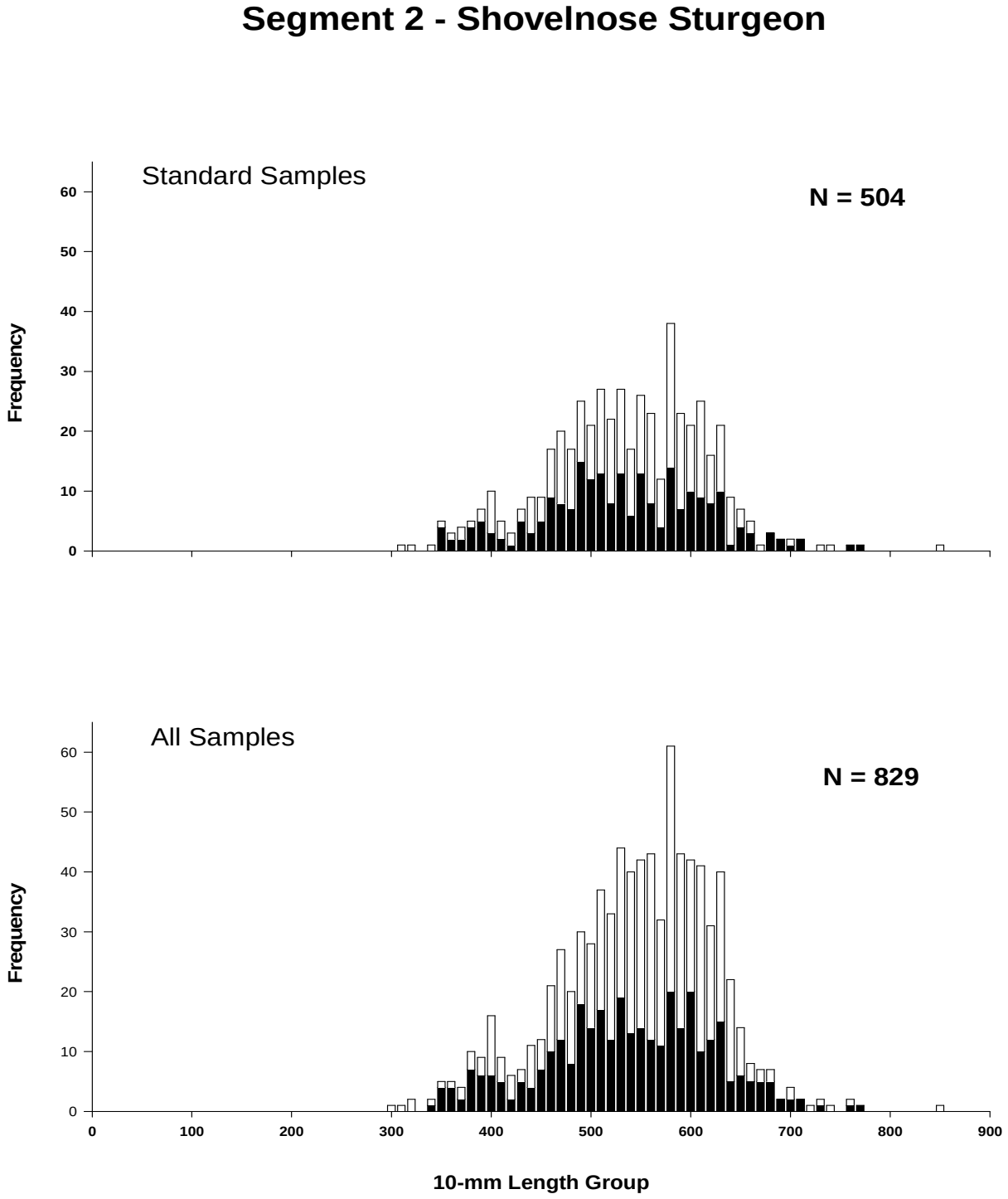

Figure 13. Length frequency of shovelnose sturgeon during the sturgeon season (black bars) and fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009.

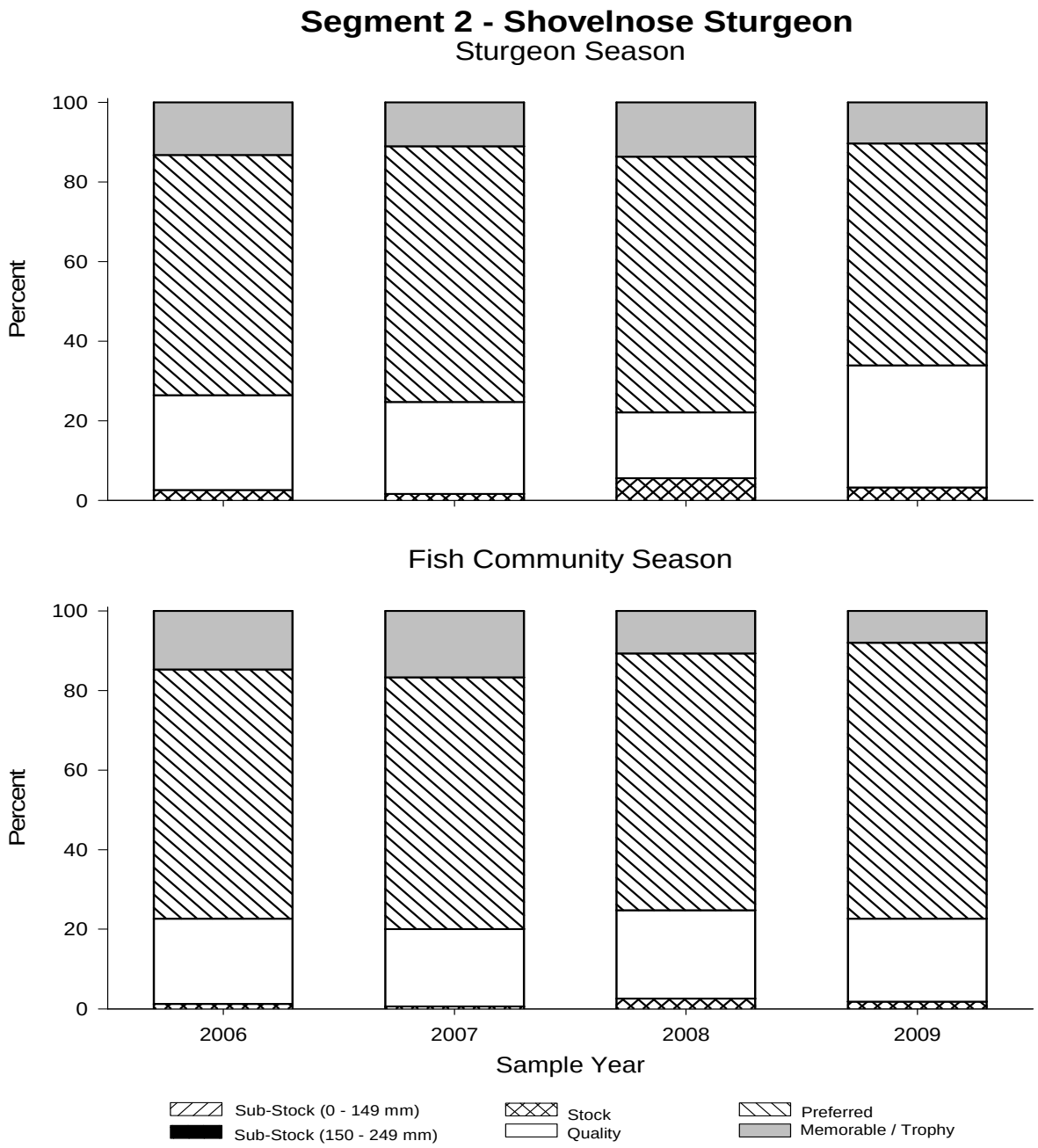

Figure 14. Incremental relative stock density (RSD) for all shovelnose sturgeon captured with all gear by length category from 2006 to 2009 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Quist (1998).

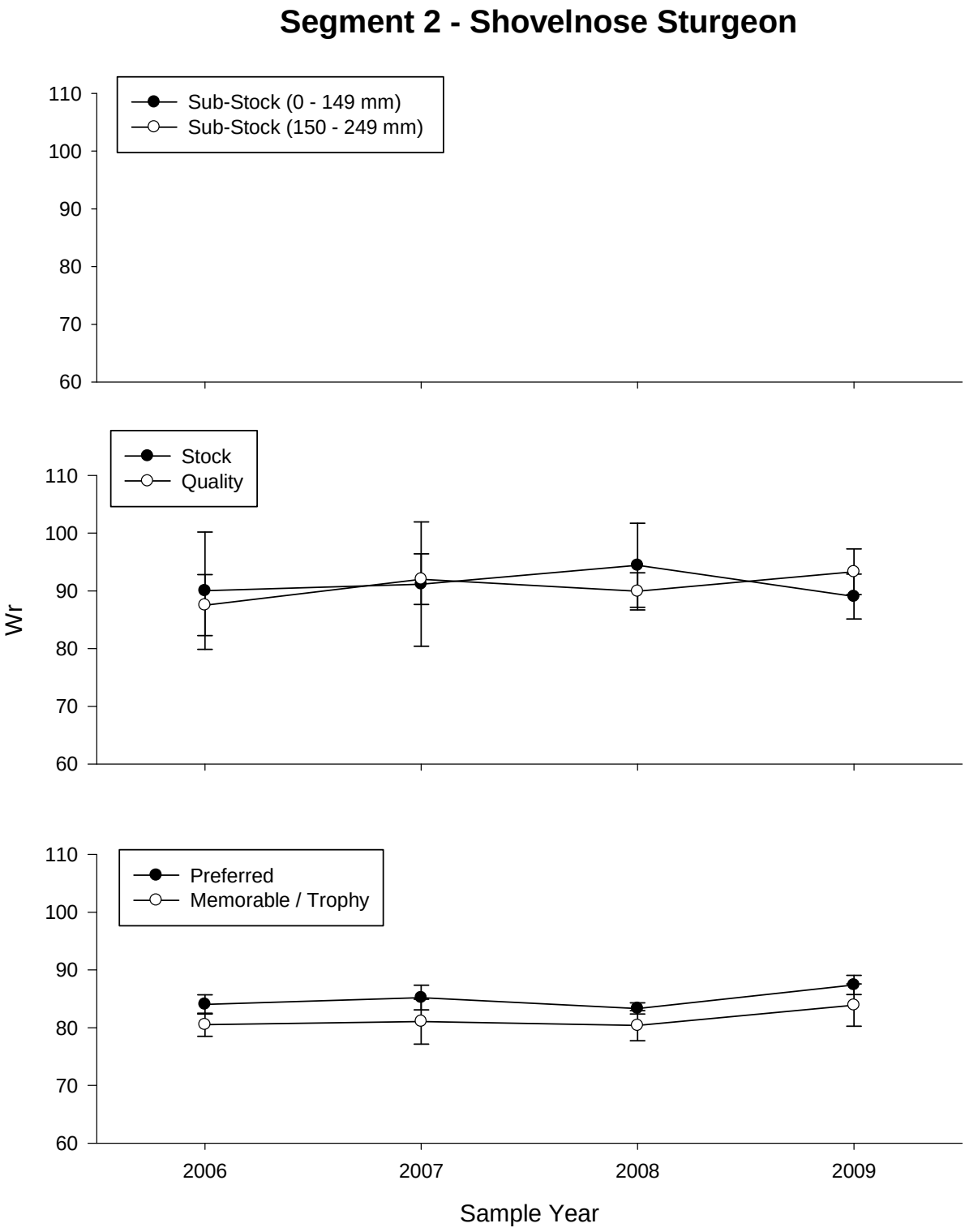

Figure 15. Relative weight (Wr) for all shovelnose sturgeon captured with all gear by incremental relative stock density (RSD) length category from 2006-2009 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Quist (1998).

Sturgeon Chub

At total of 47 sturgeon chubs were sampled in segment 2 during 2009, a decrease from 2008 (n = 71), 2007 (n = 150) and 2006 (n = 113). However, all sturgeon chubs were sampled via the otter trawl in 2009 and 2008, while in 2007 the push trawl accounted for 9 of the specimens and beam trawl captured 24 and bag seine 2 during 2006. Nevertheless, sturgeon chub CPUE for the otter trawl was at a four year low in 2009 at 0.09 fish/ 100 m for both seasons combined (Figure 16). Sturgeon chub have been more abundant during the sturgeon season than in fish community season in all years of sampling (Figure 16). This is likely due to sturgeon chubs moving upstream during the spring to spawning areas. We have seen sturgeon chub catches increase further upriver as suspended sediment levels increase in the spring due to increases in tributary inputs.

Sturgeon chubs averaged 72.4 mm TL in 2009, similar to the average of 72.5 mm TL in 2008. The average size of sturgeon chubs did not differ much between the sturgeon season (72.8 mm TL) and the fish community season (71.1 mm TL). The smallest sturgeon chub sampled was 34 mm, with all others being at or larger than 57 mm TL (Figure 17). These data suggest that the majority of the segment 2 sturgeon chub catch is composed of age-2 fish (Herman et al. 2008).

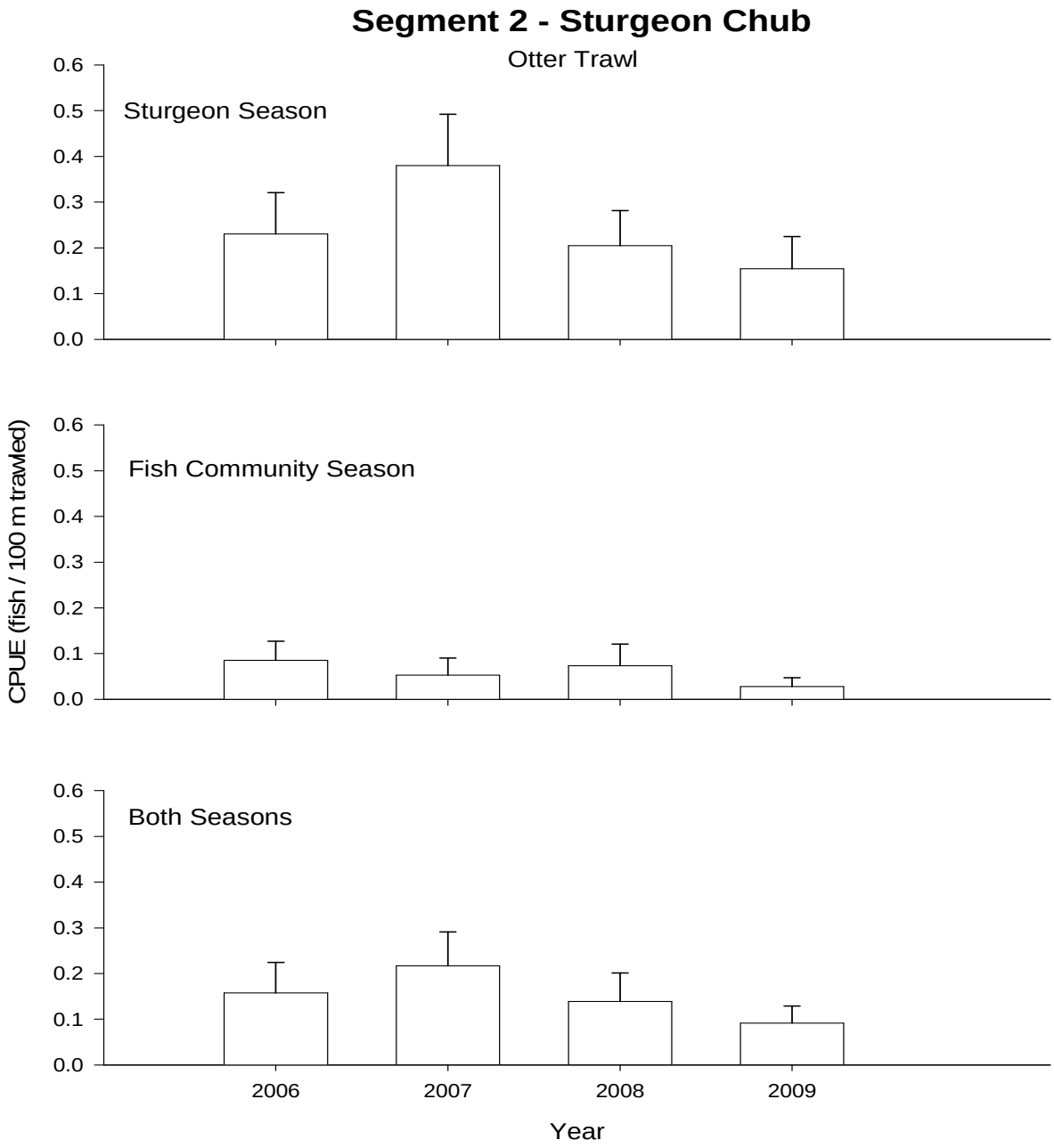

Figure 16. Mean annual catch per unit effort (+/- 2 SE) of sturgeon chub using otter trawls in Segment 2 of the Missouri River from 2006-2009.

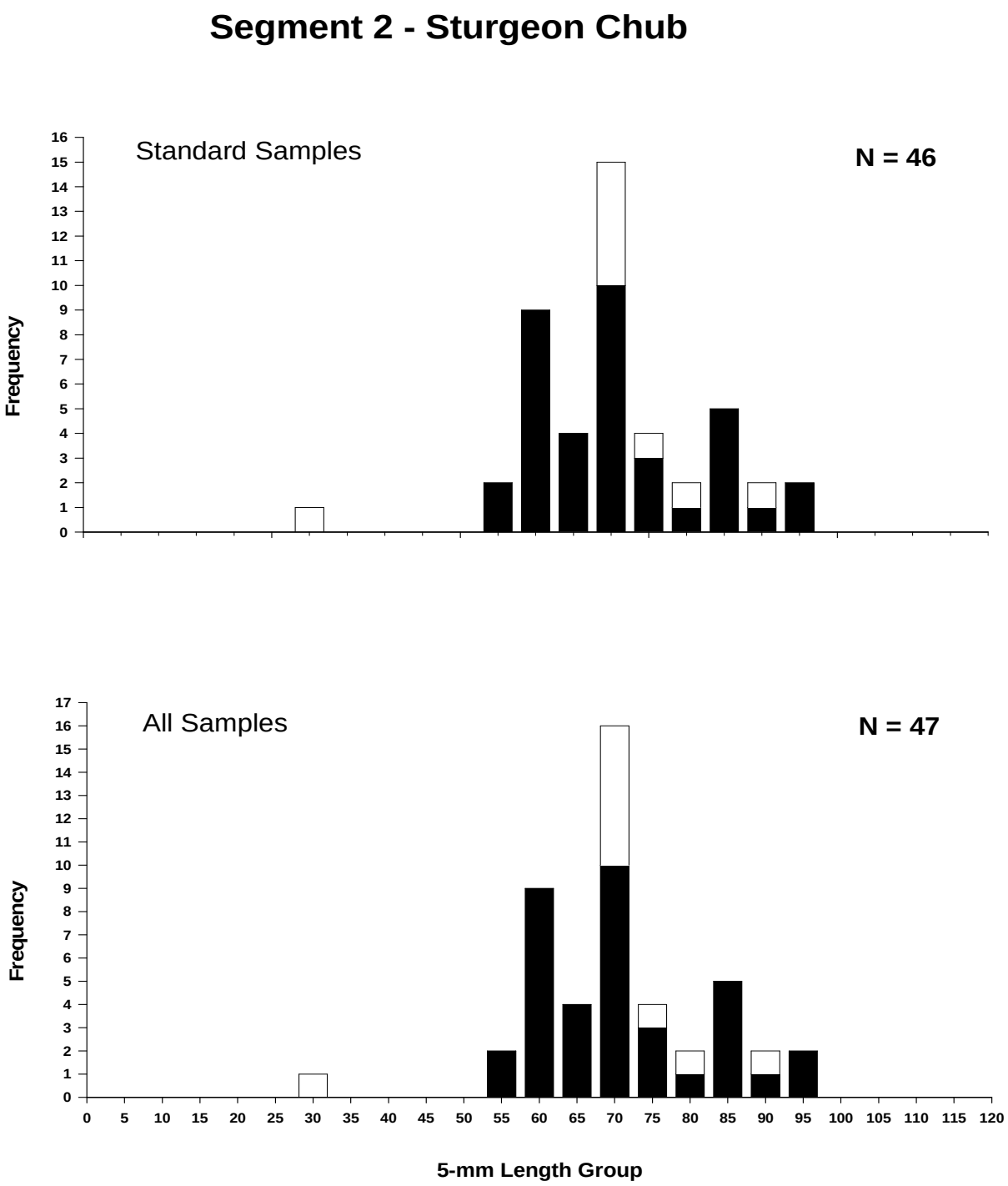

Figure 17. Length frequency of sturgeon chub during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009.

Sicklefin Chub

No sicklefin chubs were collected in segment 2 during 2009. This was similar to 2008 when only one sicklefin chub was collected and 2007 and 2006 when two and one sicklefin chubs were collected, respectively (Figure 18).

Sicklefin chubs are more common in the segment 3 and in particular in the downstream most portions of segment 3 where water temperatures and suspended sediment levels are much more normalized than that of the highly altered segment 2. The amount of quality sicklefin chub habitat seems to be significantly reduced in the Missouri River downstream of Fort Peck Dam from the presence of the dam and the altered nature of the river.

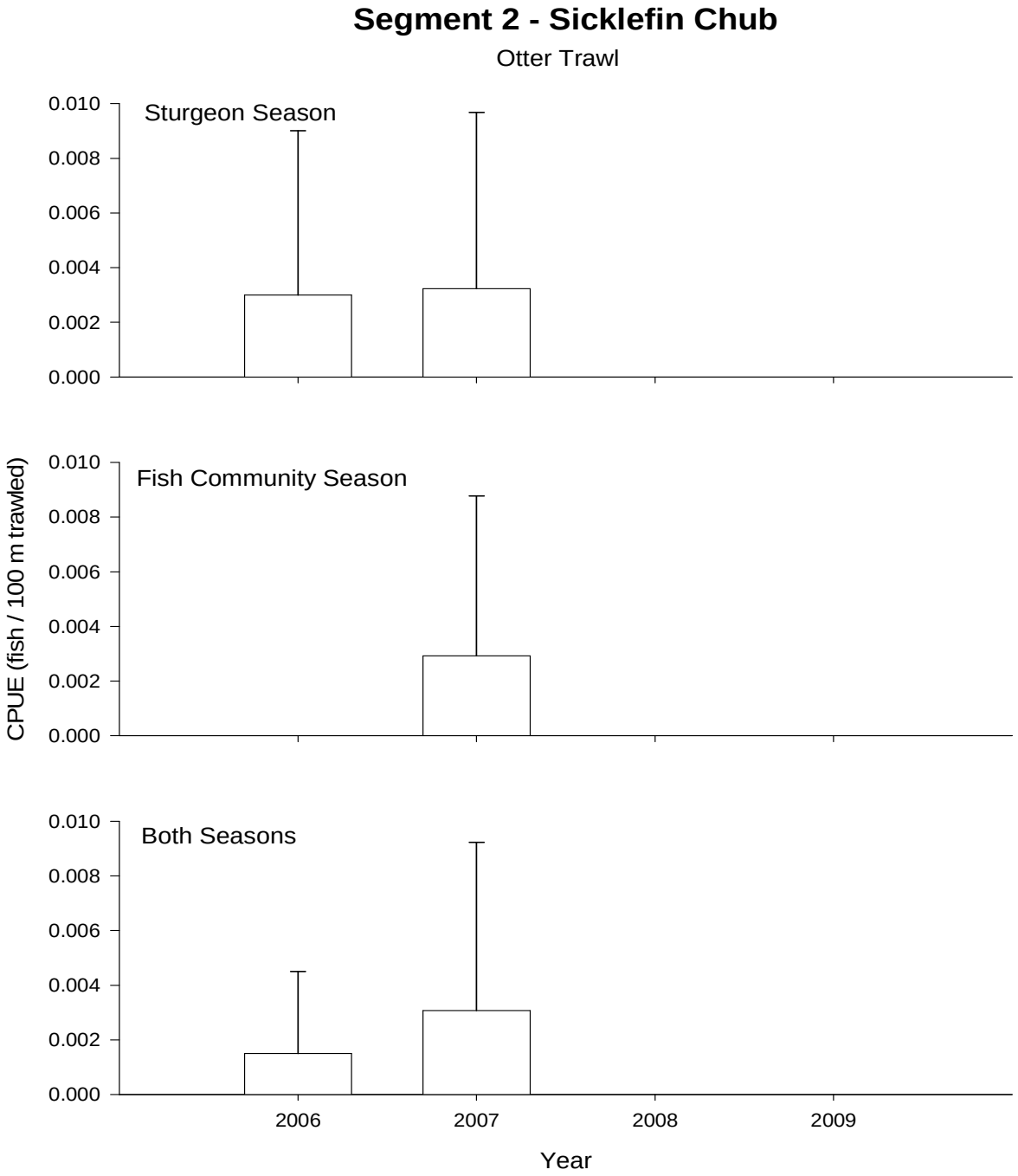

Figure 18. Mean annual catch per unit effort (+/- 2 SE) of sicklefin chub using otter trawls in Segment 2 of the Missouri River from 2006-2009.

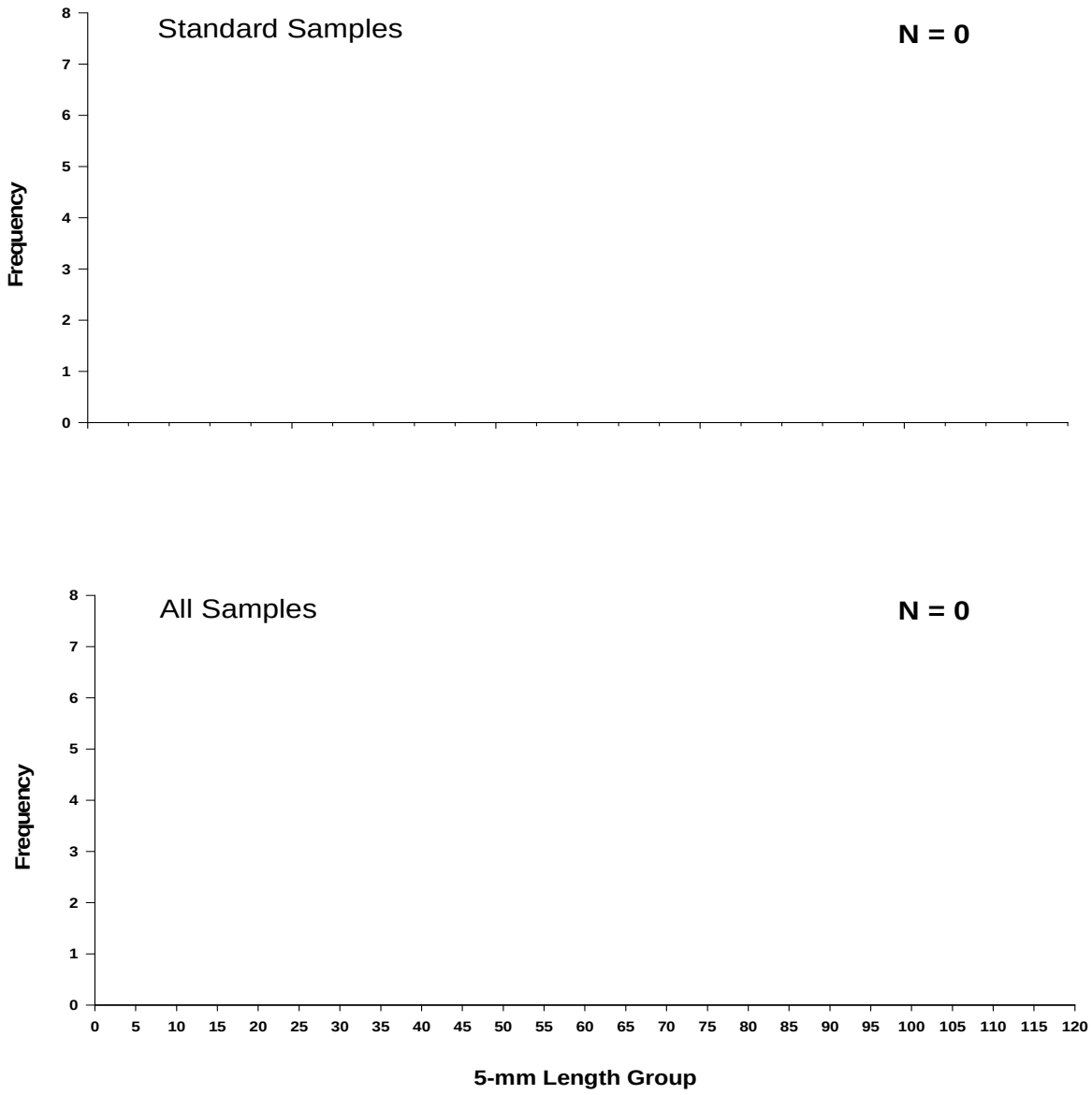

Figure 19. Length frequency of sicklefin chub during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009.

Sand Shiner

A total of 487 sand shiners were collected in segment 2 during 2009. Mini fyke nets captured all but one sand shiner, while the otter trawl collected one during the sturgeon season. Mini fyke net CPUE of sand shiners was lower in 2009 at 5.3 fish/ net night when compared to 2008 (8.2 fish/ net night) and 2007 (8.5 fish/ net night), but still higher than 2006 (4.5 fish/ net night) (Figure 22).

Sand shiners were sampled in 10 out of the 12 river bends sampled with mini fyke nets in segment 2 during 2009. However, 448 were collected in just three river bends (river miles 1751, 1736.5 and 1726.5). Thus, they were distributed throughout the segment but their relative abundance was patchy, a similar pattern seen in previous years of sampling.

The average length of sand shiners was 49.6 mm TL in 2009, a slight increase from 46.7 mm TL observed during 2008. The largest sand shiner collected in 2009 was 98 mm TL, while the smallest was 27 mm TL (Figure 23). The length frequency histogram for sand shiners collected in 2009 was similar to previous years and indicates a population mainly composed of age-0 and age-1 fish (Datillo et al. 2008a).

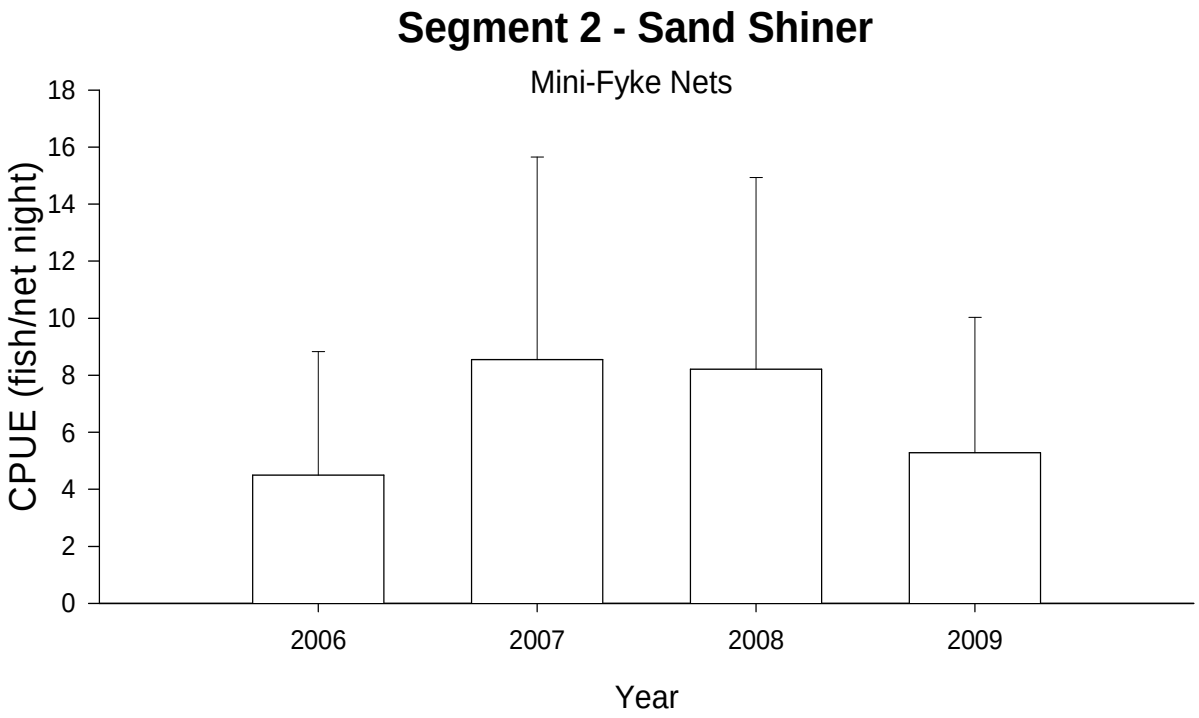

Figure 22. Mean annual catch per unit effort (+/- 2 SE) of sand shiner with mini-fyke nets in Segment 2 of the Missouri River during fish community season 2006-2009.

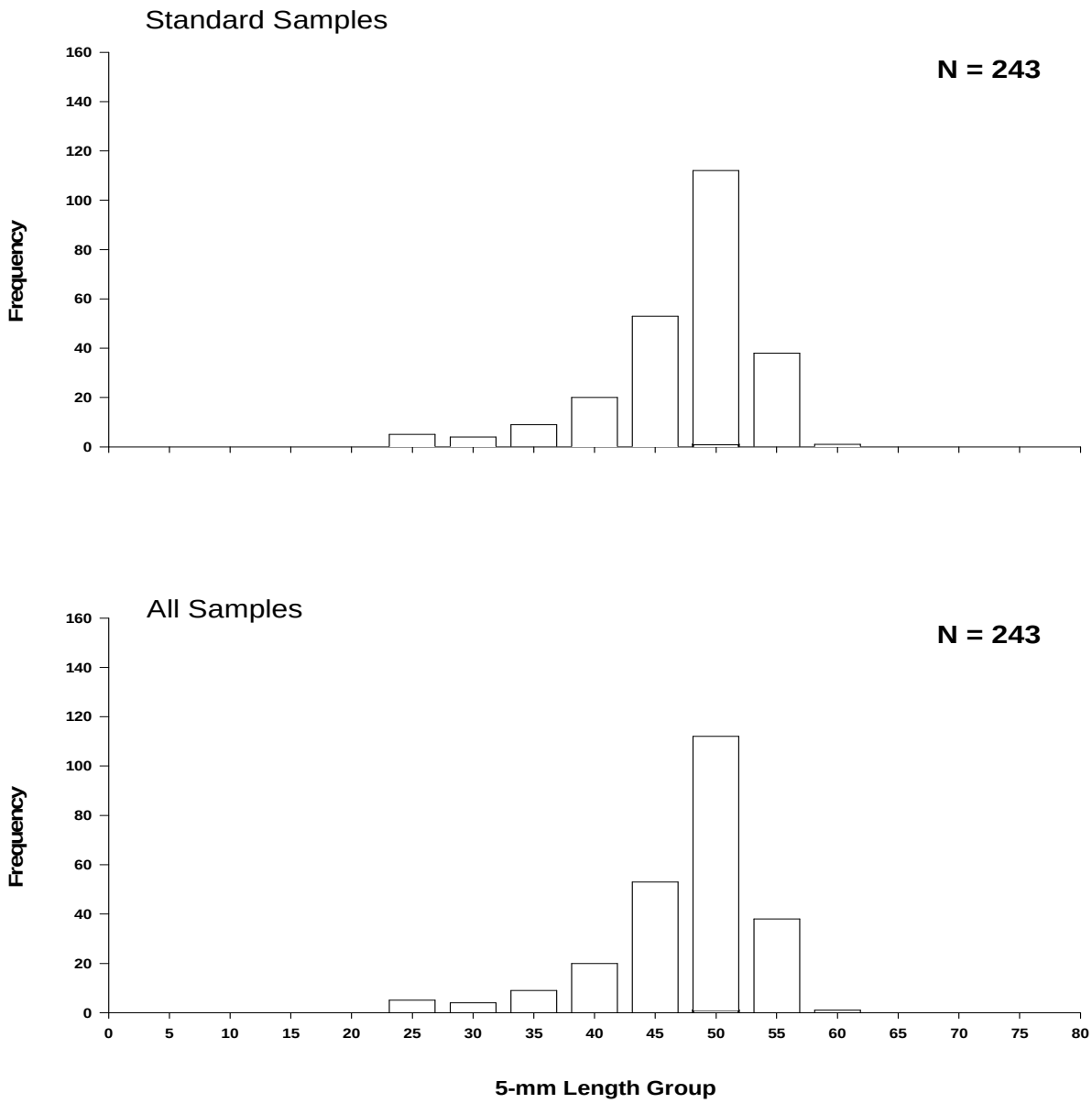

Figure 23. Length frequency of sand shiner during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009.

***Hybognathus* spp**.

A total of 13 western silvery minnows were sampled in segment 2 during 2009, all of which were sampled using mini fyke nets. No plains or brassy minnows were sampled in segment 2 during 2009. The mini fyke net CPUE of western silvery minnows was at a four year low in 2009 at 0.14 fish/ net night, compared to 2008 (0.35 fish/ net night), 2007 (0.64 fish/ net night) and 2006 (0.63 fish/ net night)(Figure 24).

Western silvery minnows averaged 90.5 mm TL during 2009, an increase from 60.7 mm TL in 2008. The largest western silvery minnow measured 110 mm TL, while the smallest was 52 mm TL. The length frequency histogram in Figure 25 indicates a population made up of primarily age-1 fish (Datillo et al. 2008b). During 2008 a much stronger class of age-0 was observed and those fish likely made up the majority of age-1 fish found in 2009. But few age-0 fish were observed in 2009. During 2007 higher numbers of age-0, age-1 and age-2 fish were observed when compared to both 2008 and 2009.

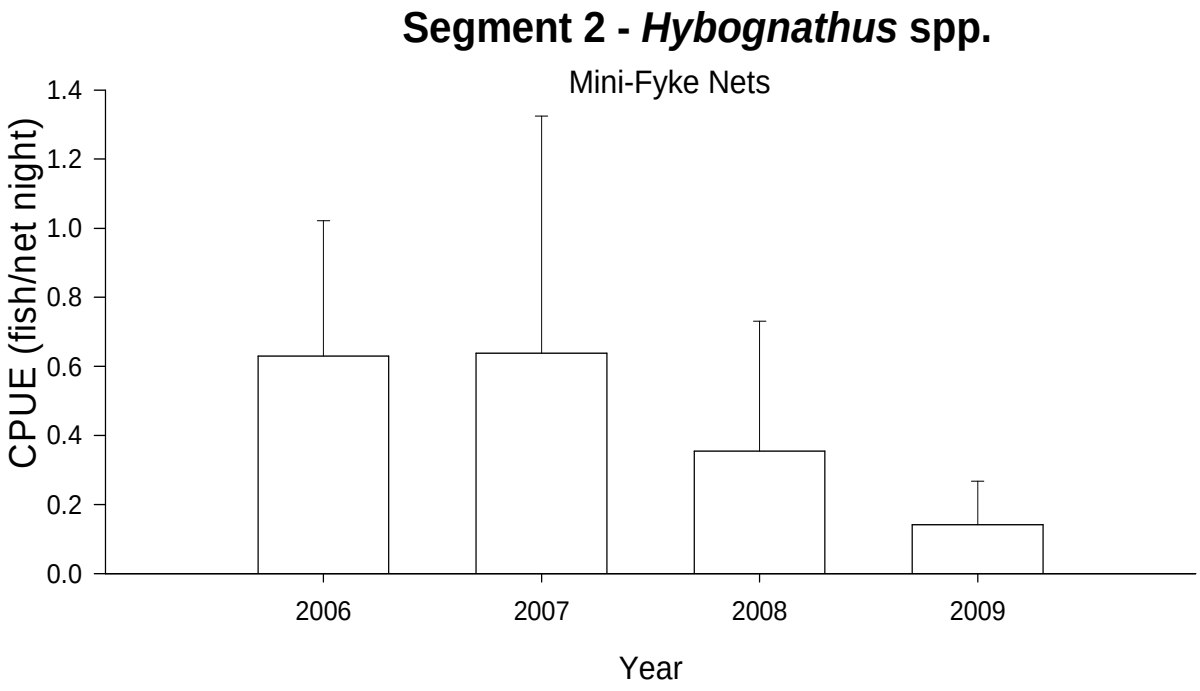

Figure 24. Mean annual catch per unit effort (+/- 2 SE) of *Hybognathus* spp. with mini-fyke nets in Segment 2 of the Missouri River during fish community season 2006-2009.

Segment 2 - *Hybognathus* spp.

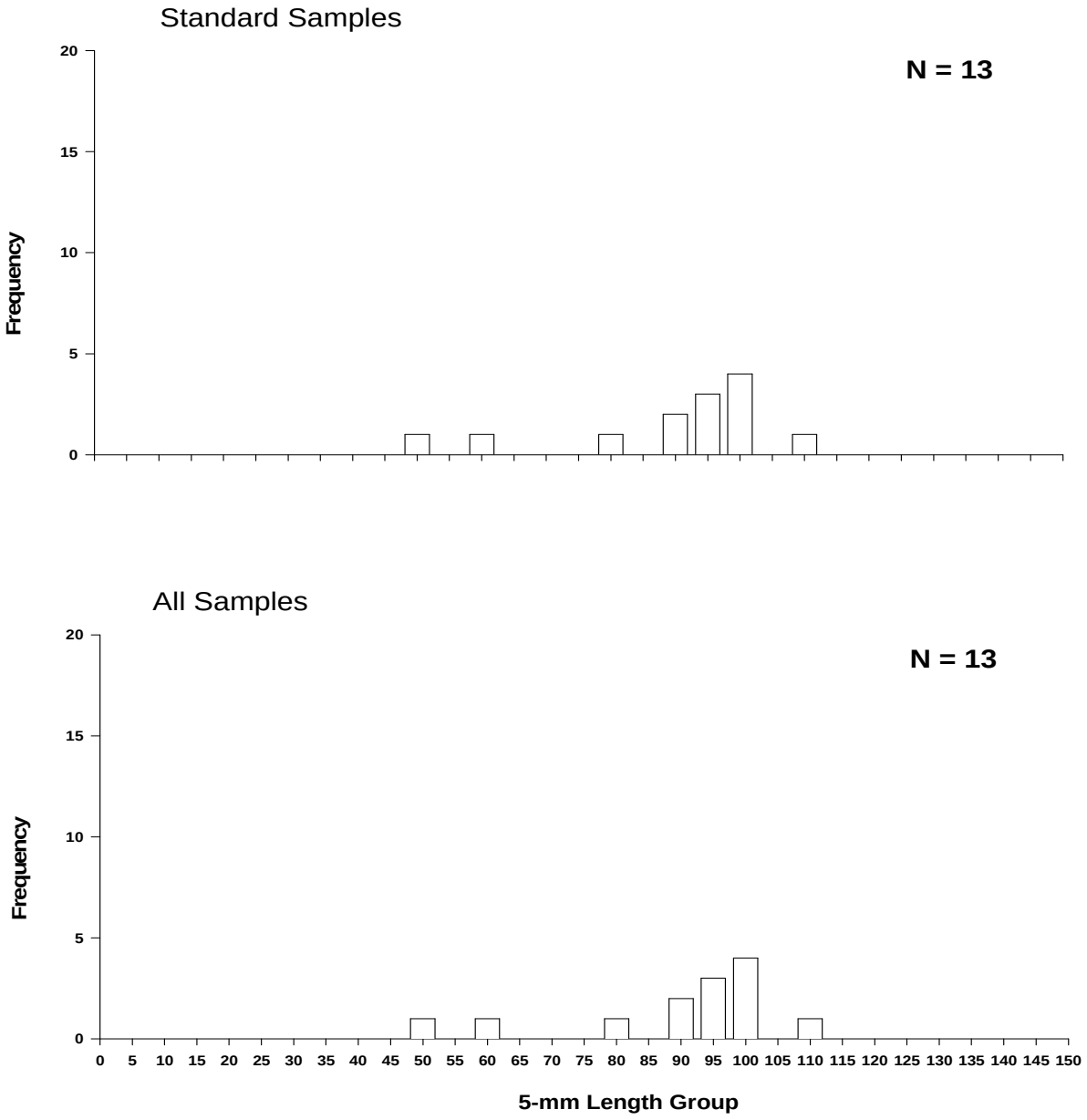

Figure 25. Length frequency of *Hybognathus* spp. caught during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009.

Blue Sucker

A total of 20 blue suckers were sampled in segment 2 during 2009, 18 in trammel nets and the remaining 2 in the otter trawl. Of the total, 14 were sampled during the sturgeon season and 6 during the fish community season. Total trammel net CPUE for blue suckers has been low throughout the four years of sampling ranging from a high in 2007 of 0.06 fish/100 m to a low in 2009 of 0.02 fish/ 100 m (Figure 27). Blue sucker CPUE for trammel nets has been higher during the sturgeon season in all years when compared to the fish community season. Due to the low estimates and the relatively high variability it is extremely hard to decipher differences in relative abundance between years if any exists. So few blue suckers have been captured in the otter trawl that using those data to compare relative abundance is not warranted, however this gear should help us detect recruitment of younger aged blue suckers if they begin to recruit to segment 2 in the future.

Blue suckers were sampled at six of the 12 river bends sampled in segment 2 during 2009, although 11 of the 20 were sampled at one river bend during the sturgeon season at river mile 1745 on June 8th.

During 2009 blue suckers averaged 686 mm TL, similar to the 2008 average size of 693 mm TL. The smallest blue sucker captured in each of the four years of sampling is as follows, 523 mm during 2009, 583 mm in 2008, 600 mm in 2007 and 635 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 29). Recruitment of blue suckers has not been documented in segments 2 of the Missouri River during the past four years of sampling.

The total number of blue suckers captured by gear in the specific macro habitats is displayed in Table 14.

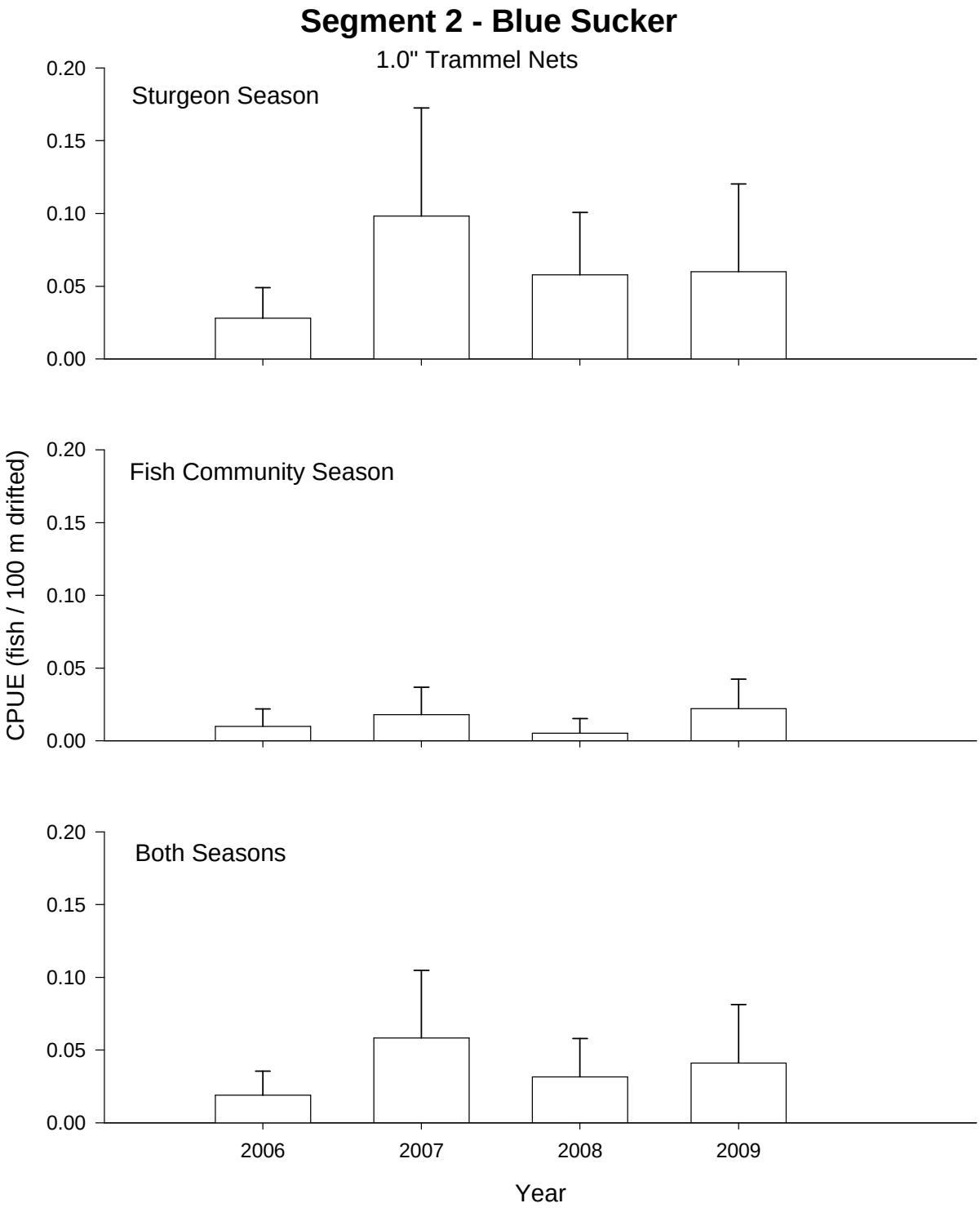

Figure 27. Mean annual catch per unit effort (+/- 2 SE) of blue sucker using 1.0” trammel nets in Segment 2 of the Missouri River from 2006-2009.

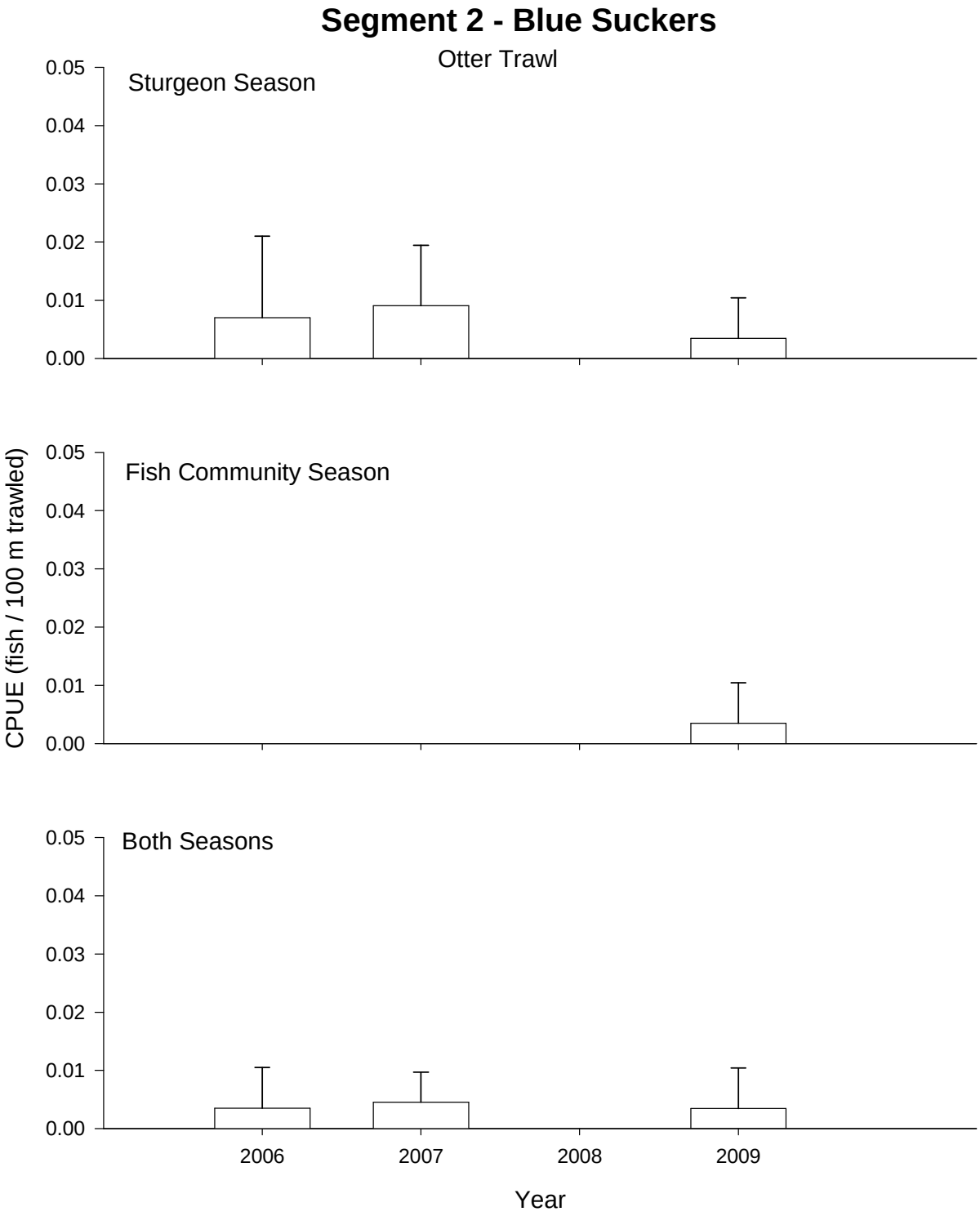

Figure 28. Mean annual catch per unit effort (+/- 2 SE) of blue sucker using otter trawls in Segment 2 of the Missouri River from 2006-2009.

Table 14. 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 2009. 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															
1.0" Trammel Net	13	0	15	0	0	0	23	62	0	0	0	0	0	0	0
		0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	1	0	100	0	0	0	0	0	0	0	0	0	0	0	0
		0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0" Trammel Net	5	0	20	0	0	0	0	80	0	0	0	0	0	0	0
		0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	1	0	100	0	0	0	0	0	0	0	0	0	0	0	0
		0	31	0	0	0	35	28	6	0	0	0	0	0	0

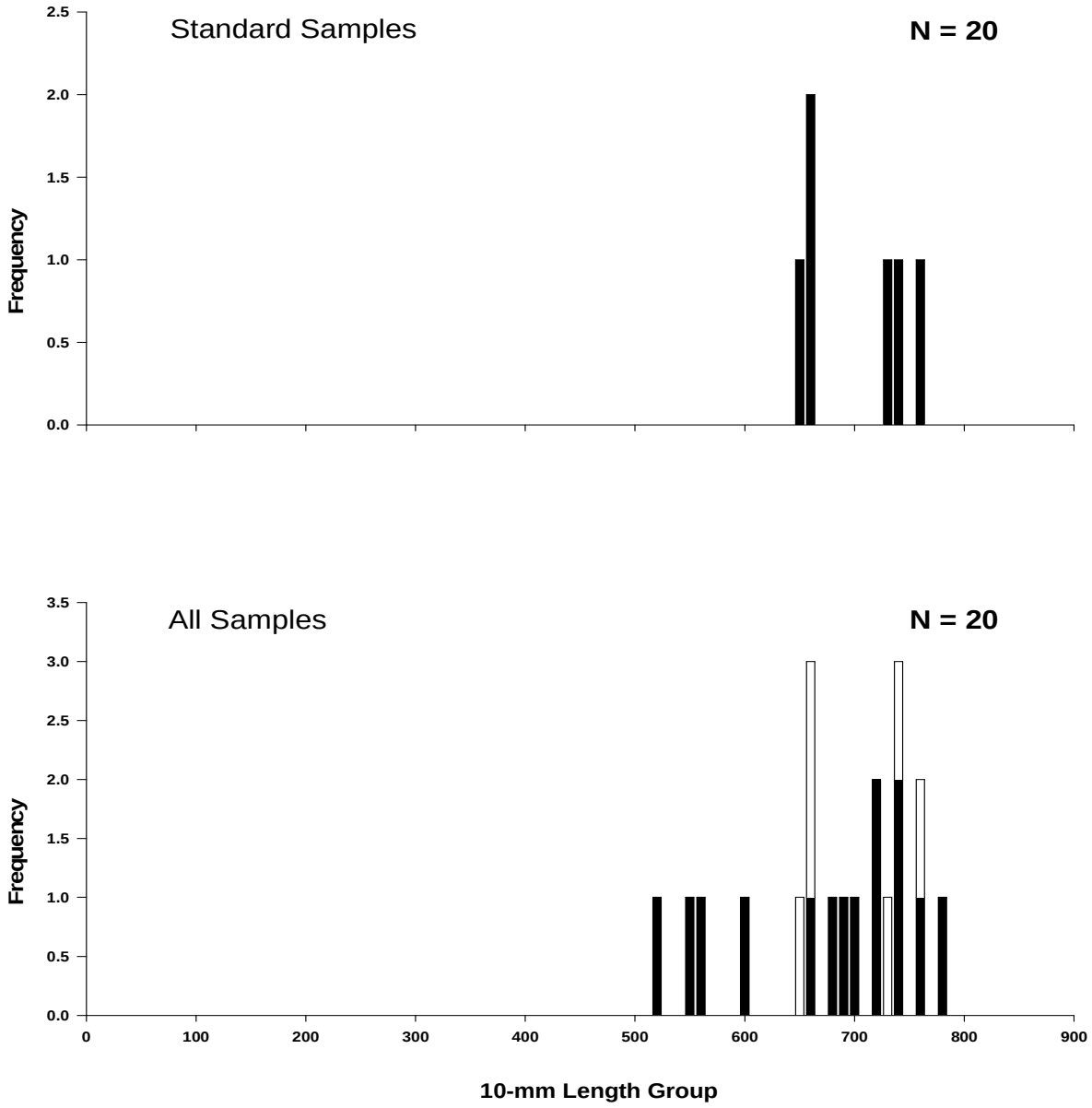

Figure 29. Length frequency of blue sucker during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009.

Sauger

A total of 101 sauger were sampled in segment 2 during 2009, 68 during the sturgeon season and 33 during the fish community season. Trammel nets were the most efficient gear samplings sauger with 72 being caught, followed by otter trawls (n = 19), mini fyke nets (n = 8) and trotlines (n = 2). Overall trammel net CPUE of sauger has remained relatively constant over the past four years of sampling (Figure 31). Trammel net CPUE has been about twice as high in during the sturgeon season when compared to the fish community season for all years sampled.

Otter trawl CPUE of sauger has remained relatively low in all sampling years, with the highest occurring in 2007 at 0.06 fish/ 100 m and the lowest during 2008 at 0.03 fish / 100 m (Figure 32). Mini fyke nets are useful in detecting young-of-the-year (YOY) sauger. No YOY sauger were collected in segment 2 during 2009. The overall sauger CPUE for mini fyke nets has fluctuated between a high of 0.14 fish / net night in 2006 and 2007 to a low of 0.06 fish / net night in 2008. The 2009 estimate for sauger in mini fyke nets was 0.09 fish/ net night (Figure 30).

Sauger were collected in all randomly sampled river bends in segment 2 during 209. The highest daily catches occurred during the month of May, likely when sauger were in the upper sections of segment 2 spawning.

Sauger averaged 337 mm TL and 308 g wet weight in 2009, similar to previous years sampling. The length frequency histogram in Figure 33 shows a population likely made up of primarily of age-2 and older fish, with a few age-1 fish and no age-0 fish. The size of sauger sampled is influenced by gear. On average trotlines caught the largest sauger with a 366 mm TL average, followed by trammel nets (343 mm TL), otter trawl (327 mm TL) and mini fyke nets (300 mm TL). The largest sauger sampled in 2009 was 496 mm TL and the smallest measured 263 mm TL (Figure 33).

The total number of sauger sampled by gear in specific macro habitats is depicted in Table 15.

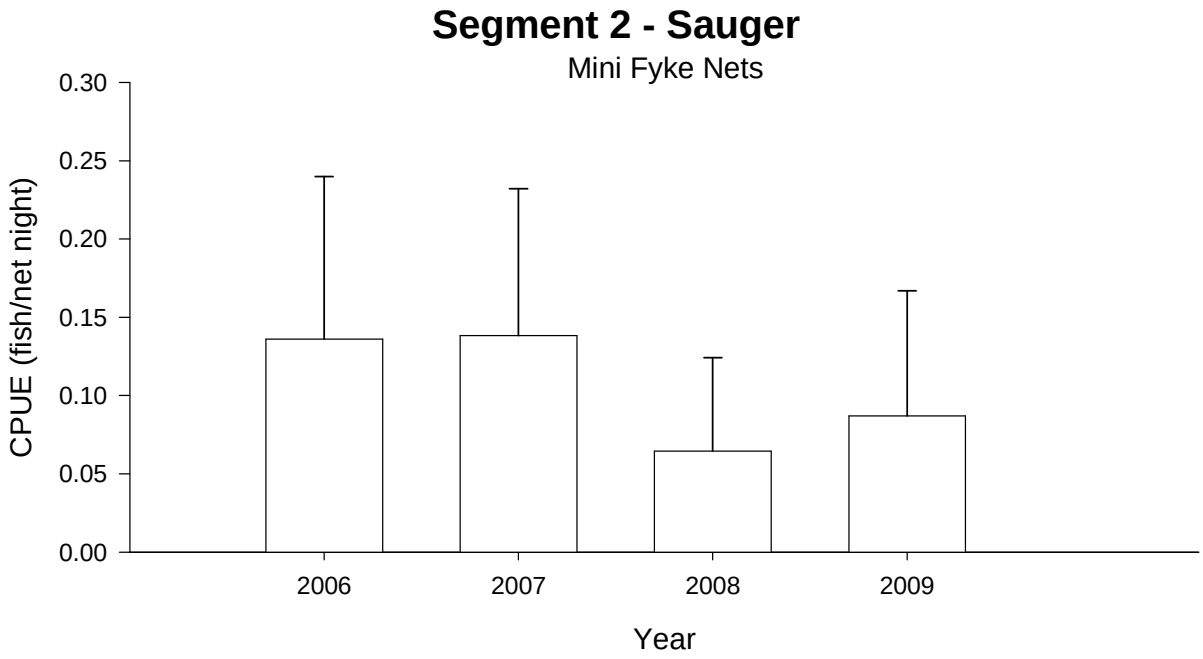

Figure 30. Mean annual catch per unit effort (+/- 2 SE) of sauger using mini fyke nets in Segment 2 of the Missouri River from 2006-2009.

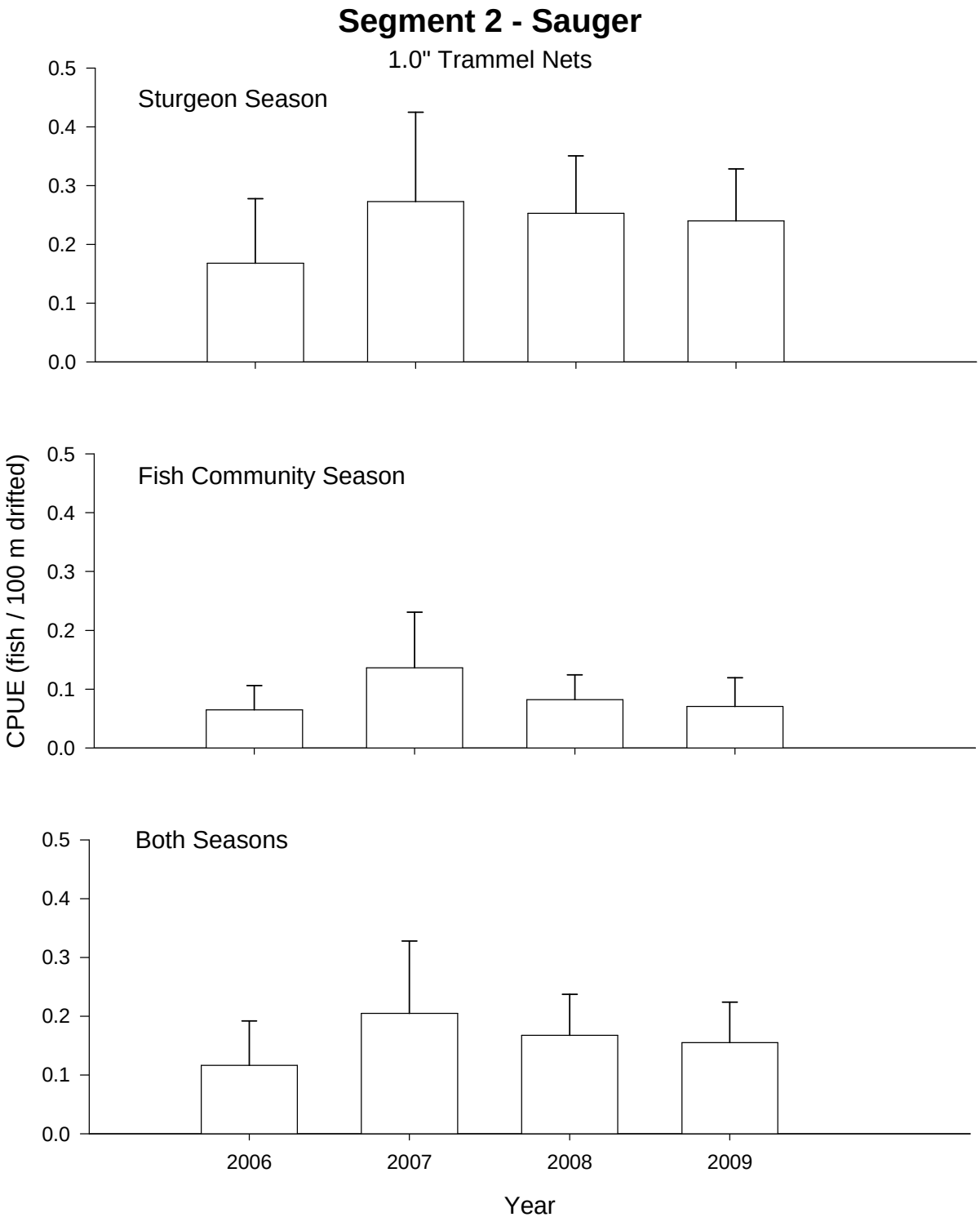

Figure 31. Mean annual catch per unit effort (+/- 2 SE) of sauger using 1.0” trammel nets in Segment 2 of the Missouri River from 2006-2009.

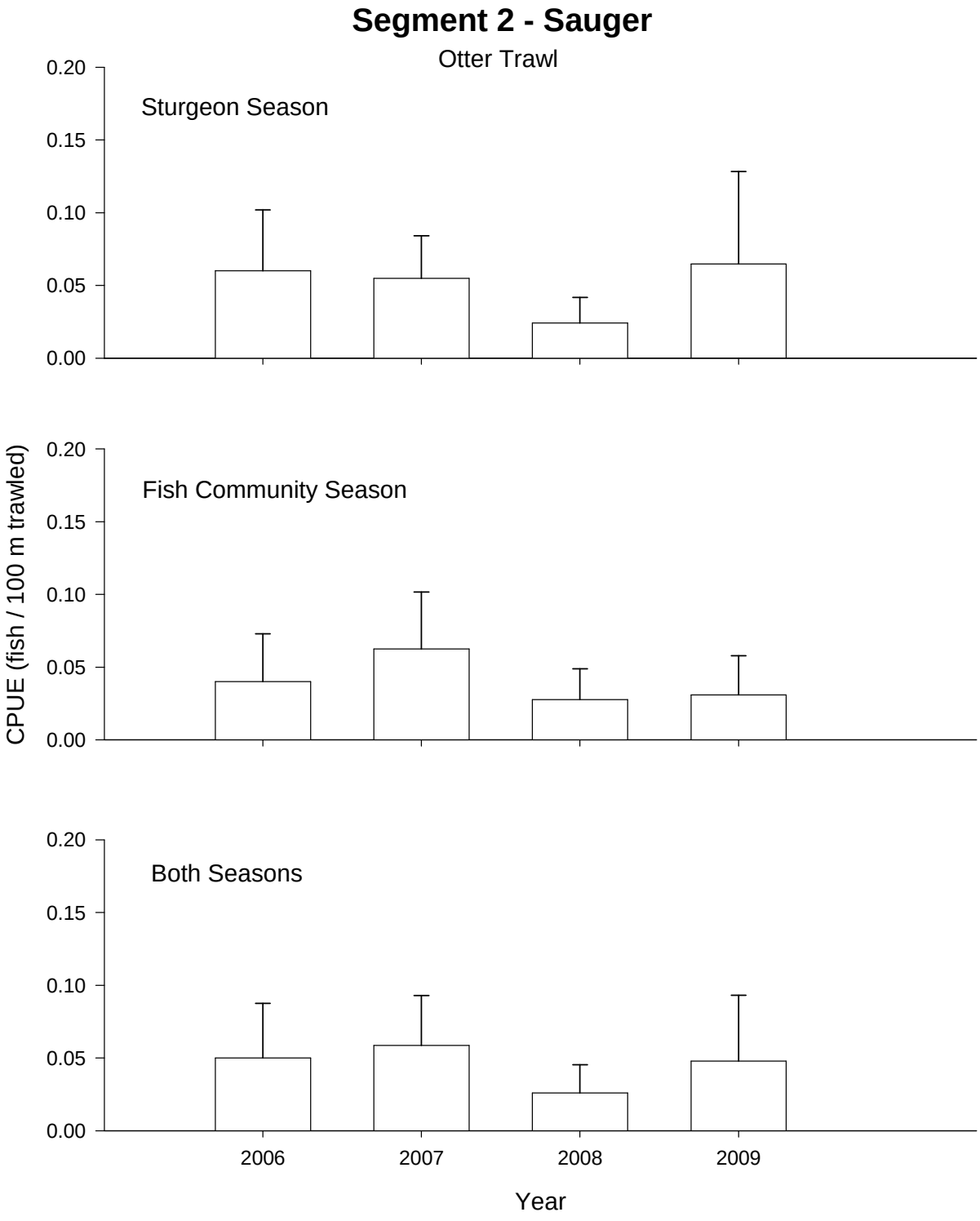

Figure 32. Mean annual catch per unit effort (+/- 2 SE) of sauger using otter trawls in Segment 2 of the Missouri River from 2006-2009.

Table 15. Total number of sauger captured for each gear during each season and the proportion caught within each macrohabitat type in Segment 2 of the Missouri River during 2009. 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															
1.0” Trammel Net	51	0	51	0	0	0	31	14	4	0	0	0	0	0	0
		0	34	0	0	0	32	26	7	0	0	0	0	0	0
Gill Net															
Otter Trawl	9	0	33	0	0	0	22	44	0	0	0	0	0	0	0
		0	33	0	0	0	34	27	6	0	0	0	0	0	0
Fish Community Season															
1.0” Trammel Net	13	0	23	0	0	0	62	8	8	0	0	0	0	0	0
		0	34	0	0	0	30	30	7	0	0	0	0	0	0
Mini-Fyke Net	8	0	13	0	0	0	25	0	13	50	0	0	0	0	0
		0	23	0	0	0	40	12	17	5	0	0	0	2	0
Otter Trawl	8	0	63	0	0	0	0	38	0	0	0	0	0	0	0
		0	31	0	0	0	35	28	6	0	0	0	0	0	0

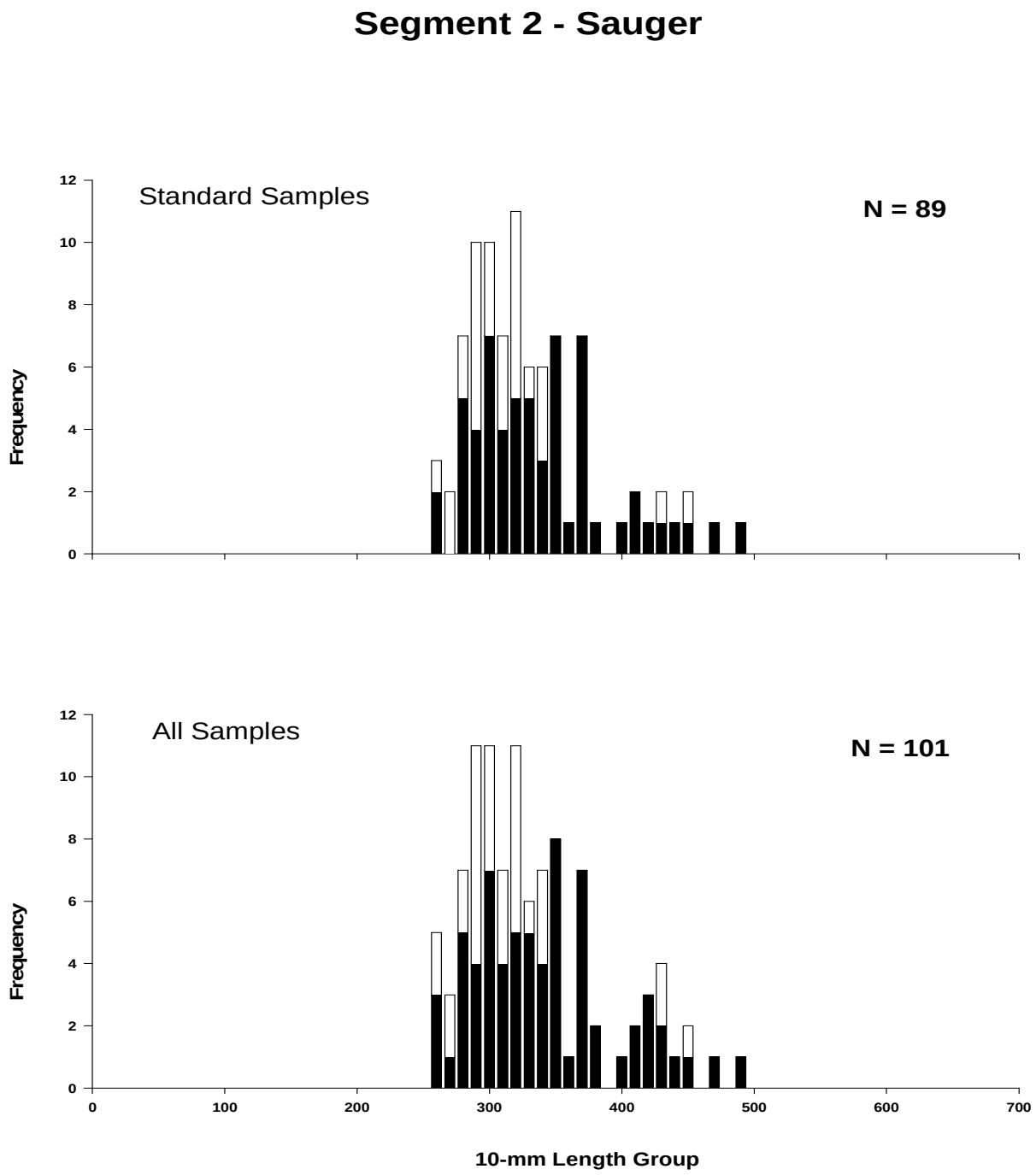

Figure 33. Length frequency of sauger during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2009. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2009.

Missouri River Fish Community

During 2009 a total of 6,486 fish consisting of 32 species were sampled in segment 2 of the Missouri River. Longnose suckers *Catostomus catostomus* and white suckers *C. commersonii* were the two most abundant species sampled with 2,185 and 1,289 collected, respectively. The majority of both *Catostomus spp.* were YOY caught in mini fyke nets. Fathead minnows *Pimephales promelas* were the fourth most abundant species in 2009 with 509 being collected in mini fyke nets. This was a decrease from 2008 when 1,142 were sampled. Longnose dace *Rhinichthys cataractae* were the sixth most abundant fish sampled with 161 collected, all but 2 using mini fyke nets. Longnose dace are much more prevalent in segment 2 than segment 3, where only two were collected in 2009. Goldeye *Hiodon alosoides* were the seventh most abundant species collected (n = 150), all of which were adults. Juvenile goldeye were collected downstream in segment 3 during 2009.

Both YOY and adult river carpsuckers *Carpiodes carpio* (n = 138) were sampled in segment 2. Adults were sampled using trammel nets and the otter trawl, while YOY were caught using mini fyke nets. The total number of river carpsuckers sampled was a substantial decrease from 2008 when 2,455 were collected. During 2008 the majority of river carpsuckers were YOY. The number of adults sampled between the two years was similar.

Channel catfish *Ictalurus punctatus* were sampled throughout the length of segment 2 with a total of 96 being collected. More channel catfish were sampled using trotlines (n = 37) than trammel nets (n = 34) or otter trawls (n = 25). The average length of channel catfish was higher for fish sampled using trotlines (mean = 357 mm TL) than those sampled using trammel nets or the otter trawl, both of which had a mean of 314 mm TL. The largest channel catfish sampled was 463 mm TL, while the smallest was 56 mm TL. Only one channel catfish smaller than 202 mm TL was sample.

A total of 66 emerald shiners *Notropis atherinoides* were sampled in segment 2 in 2009 a decrease from 280 that were collected in 2008. Emerald shiners ranged from 33 to 100 mm TL during 2009, which was very similar to the size distribution seen in 2008.

The total number of flathead chub *Platygobio gracilis* captured in 2009 (n = 66) was down from 2008 (n = 277). Flathead chubs were sampled in all four gears that were used and were most commonly sampled using the otter trawl (n = 42). Flathead chubs ranged from 48 mm to 275 mm TL, with the majority of fish being larger than 100 mm TL.

Fifty four shorthead redhorse *Moxostoma macrolepidotum* were sampled during 2009, which was very similar to 2008 when 52 were sampled. Shorthead redhorses ranged from 24 mm to 474 mm TL during 2009, with the majority being adults.

Other species that were sampled in segment 2 during 2009 but had a sample size less than 50 included common carp *Cyprinus carpio* (n = 46), smallmouth buffalo *Ictiobus bubalus* (n = 9), yellow perch *Perca flavescens* (n = 7), burbot *Lota lota* (n = 6), walleye *Sander vitreus* (n = 6), pumpkinseed *Lepomis gibbosus* (n = 6), brook stickleback *Culae inconstans* (n = 3), spottail shiner *Notropis hudsonius* (n = 3), lake chub *Ctenopharyngodon idella* (n = 2), bigmouth buffalo *Ictiobus cyprinellus* (n = 2), freshwater drum *Aplodinotus grunniens* (n = 1), green sunfish *Lepomis cyanellus* (n = 1), northern pike *Esox lucius*(n = 1), rainbow trout *Oncorhynchus mykiss* (n = 1) and stonecat *Noturus flavus* (n = 1).

Discussion

More pallid sturgeon were sampled in segment 2 during 2009 than the three previous years. Although the total number of pallid sturgeon captured has increased, no substantial differences have been observed in either trammel net or otter trawl CPUE over the four years of sampling. The increased total catch has largely been due to the use of trotlines as an experimental gear. Although the use of trotlines in downstream segment 3 has produced many larger sized pallid sturgeon, the same has not been realized in segment 2. Although the size distribution of pallid sturgeon sampled in segment 2 has changed over the four years of sampling in the sturgeon season, it has not during the fish community season. Few fish have been sampled from the 2005 and older year classes, which may explain the relatively constant sizes of pallid sturgeon captured, due to younger year classes being sampled. A general patter has been observed that pallid sturgeon sampled in segment 2 are from the more recent stocking events, while fish from older age classes are captured at a higher frequency in segment 3.

While catch rates of pallid sturgeon are substantially lower in segment 2 when compared to segment 3, the opposite is true for shovelnose sturgeon. Shovelnose sturgeon trammel net CPUE was more than six times higher in segment 2 and otter trawl CPUE was almost four times as high as segment 3. The overall ratio of shovelnose sturgeon captures to pallid sturgeon captures in 2009 was 23:1and 2:1 in segment 2 and 3, respectively. It is still not understood why shovelnose sturgeon are relatively so abundant in segment 2 when compared to segment 3, especially since segment 2 is much more altered due to the existence and management of Fort Peck Dam, when compared to the more naturalized reaches of river existing in segment 3.

While overall shovelnose sturgeon catch rates in both trammel nets and otter trawls is relatively high in segment 2, almost all fish captured are adults. The smallest shovelnose captured in 2009 was 309 mm FL, which was the smallest sampled over the four year sampling period. In comparison, 53 shovelnose sturgeon smaller than 309 mm FL have been captured in segment 3 over the four year period. In addition, on average the relative weights of shovelnose sturgeon sampled in segment 2 are lower than those sampled in segment 3. The abundance and condition of shovelnose sturgeon in segment 2 may have implications for pallid sturgeon recovery. Although the entire river between Fort Peck Dam and Lake Sakakawea is accessible to stocked pallid sturgeon, competition may impact pallid sturgeon from attaining desired growth

rates in the upper portions of the river within segment 2. Therefore, the total available quality habitat for pallid sturgeon in RPMA 2 may be less than once thought.

Segment 2 is a diverse segment of river. It begins as a clear, cold and nutrient poor river that begins at Fort Peck Dam and gradually morphs into a relatively warm, turbid and more nutrient rich river near Wolf Point, MT. The differences in water quality and substrate are manifested in the fish community structure. Near Fort Peck Dam a healthy wild rainbow trout fishery exists and as you go downstream the fish community begins to appear more natural, with species such as sturgeon chubs becoming more abundant. The data collected in segment 2 for this report are pooled at the segment level, however very sharp contrast exists in both the abiotic and biotic features of the river within this segment. To better understand species tolerances and preferences one may need to take a finer spatial scale approach to evaluating these interactions within this segment.

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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	
	Acipenseridae – 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
	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

Appendix A. (continued).

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

Appendix A. (continued).

Scientific name	Common name	Letter Code
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 vigilax	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 erythrophthalmus	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 commersonii	White sucker	WTSK
Catostomus platyrhynchus	Mountain sucker	MTSK
Catostomus spp.	Unidentified *Catostomus* spp.	UCA
Cycleptus elongatus	**Blue sucker**	**BUSK***
Hypentelium nigricans	Northern hog sucker	NHSK
Ictiobus bubalus	Smallmouth buffalo	SMBF
Ictiobus cyprinellus	Bigmouth buffalo	BMBF
Ictiobus niger	Black buffalo	BKBF
Ictiobus spp.	Unidentified buffalo	UBF
Minytrema melanops	Spotted sucker	SPSK
Moxostoma anisurum	Silver redhorse	SVRH
Moxostoma carinatum	River redhorse	RVRH
Moxostoma duquesnei	Black redhorse	BKRH
Moxostoma erythrurum	Golden redhorse	GDRH
Moxostoma macrolepidotum	Shorthead redhorse	SHRH
Moxostoma spp.	Unidentified redhorse	URH
Catostomidae - suckers	Unidentified Catostomidae	UCT
	ORDER SILURIFORMES	
	Ictaluridae – bullhead catfishes	
Ameiurus melas	Black bullhead	BKBH
Ameiurus natalis	Yellow bullhead	YLBH
Ameiurus nebulosus	Brown bullhead	BRBH
Ameiurus spp.	Unidentified bullhead	UBH
Ictalurus furcatus	Blue catfish	BLCF

Appendix A. (continued).

Scientific name	Common name	Letter Code
Ictalurus punctatus	Channel catfish	CNCF
I. furcatus X I. punctatus	Blue-channel catfish hybrid	BCCC
Ictalurus spp.	Unidentified *Ictalurus* spp.	UCF
Noturus exilis	Slender madtom	SDMT
Noturus flavus	Stonecat	STCT
Noturus gyrinus	Tadpole madtom	TPMT
Noturus nocturnus	Freckled madtom	FKMT
Pylodictis olivaris	Flathead catfish	FHCF
	ORDER SALMONIFORMES	
	Esocidae - pikes	
Esox americanus vermiculatus	Grass pickerel	GSPK
Esox lucius	Northern pike	NTPK
Esox masquinongy	Muskellunge	MSKG
E. lucius X E. masquinongy	Tiger Muskellunge	TGMG
	Umbridae - mudminnows	
Umbra limi	Central mudminnow	MDMN
	Osmeridae - smelts	
Osmerus mordax	Rainbow smelt	RBST
	Salmonidae - trouts	
Coregonus artedi	Lake herring or cisco	CSCO
Coregonus clupeaformis	Lake whitefish	LKWF
Oncorhynchus aguabonita	Golden trout	GDTT
Oncorhynchus clarkii	Cutthroat trout	CTTT
Oncorhynchus kisutch	Coho salmon	CHSM
Oncorhynchus mykiss	Rainbow trout	RBTT
Oncorhynchus nerka	Sockeye salmon	SESM
Oncorhynchus tshawytscha	Chinook salmon	CNSM
Prosopium cylindraceum	Bonneville cisco	BVSC
Prosopium williamsoni	Mountain whitefish	MTWF
Salmo trutta	Brown trout	BNTT
Salvelinus fontinalis	Brook trout	BKTT
Salvelinus namaycush	Lake trout	LKTT
Thymallus arcticus	Arctic grayling	AMGL
	ORDER PERCOPSIFORMES	
	Percopsidae – trout-perches	
Percopsis omiscomaycus	Trout-perch	TTPH
	ORDER GADIFORMES	
	Gadidae - cods	
Lota lota	Burbot	BRBT
	ORDER ATHERINIFORMES	
	Cyprinodontidae - killifishes	
Fundulus catenatus	Northern studfish	NTSF
Fundulus diaphanus	Banded killifish	BDKF
Fundulus notatus	Blackstripe topminnow	BSTM
Fundulus olivaceus	Blackspotted topminnow	BPTM
Fundulus sciadicus	Plains topminnow	PTMW

Appendix A. (continued).

Scientific name	Common name	Letter Code
Fundulus zebrinus	Plains killifish	PKLF
	Poeciliidae - livebearers	
Gambusia affinis	Western mosquitofish	MQTF
	Atherinidae - silversides	
Labidesthes sicculus	Brook silverside	BKSS
	ORDER GASTEROSTEIFORMES	
	Gasterosteidae - sticklebacks	
Culaea 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	Sacramento 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 megalotis	Longear sunfish	LESF
Lepomis microlophus	Redear sunfish	RESF
L. cyanellus X L. macrochirus	Green sunfish-bluegill hybrid	GSBG
	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 punctulatus	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 Centrarchidae	UCN
	Percidae - perches	
Ammocrypta asprella	Crystal darter	CLDR

Appendix A. (continued).

Scientific name	Common name	Letter Code
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	Orange throated darter	OTDR
Etheostoma tetrazonum	Missouri saddled darter	MSDR
Etheostoma zonale	Banded darter	BDDR
Etheostoma spp.	Unidentified Etheostoma spp.	UET
Perca flavescens	Yellow perch	YWPH
Percina caprodes	Logperch	LGPH
Percina cymatotaenia	Bluestripe darter	BTDR
Percina evides	Gilt darter	GLDR
Percina maculata	Blackside darter	BSDR
Percina phoxocephala	Slenderhead darter	SHDR
Percina shumardi	River darter	RRDR
Percina spp.	Unidentified Percina spp.	UPN
	Unidentified darter	UDR
Sander canadense	**Sauger**	**SGER***
Sander vitreus	Walleye	WLEY
S. canadense X S. vitreus	Sauger-walleye 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
	No fish caught	NFSH
	Unidentified larval fish	LVFS
	Unidentified	UNID
	Net Malfunction (Did Not Fish)	NDNF
	Turtles	
Chelydra serpentine	Common Snapping Turtle	SNPT
Chrysemys picta bellii	Western Painted Turtle	PATT
Emydoidea blandingii	Blanding's Turtle	BLDT
Graptemys pseudogeographica	False Map Turtle	FSMT
Trachemys scripta	Red-Eared Slider Turtle	REST
Apalone mutica	Smooth Softshell Turtle	SMST
Apalone spinifera	Spiny Softshell Turtle	SYST
Terrapene ornata ornata	Ornate Box Turtle	ORBT
Sternotherus odoratus	Stinkpot Turtle	SPOT
Graptemys geographica	Map Turtle	MAPT
Graptemys kohnii	Mississippi Map Turtle	MRMT
Graptemys ouachitensis	Ouachita Map Turtle	OUMT
Pseudemys concinna metteri	Missouri River Cooter Turtle	MRCT
Terrapene carolina triunguis	Three-toed Box Turtle	TTBT

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

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

Appendix C. List of standard and wild gears (type), their corresponding codes in the database, seasons deployed, 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 - 2009	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 - 2009	fish/100 m drift
Trot Line – Circle hooks*	TLC_	Wild	Sturgeon	Not Used	fish/hook night
Trot Line – Octopus hooks*	TLO_	Wild	Sturgeon	2007 - 2009	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 - 2009	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

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

State(s)	RPMA	Site Name	Code	River	R.M.
MT	2	Forsyth	FOR	Yellowstone	253.2
MT	2	Cartersville	CAR	Yellowstone	235.3
MT	2	Miles City	MIC	Yellowstone	181.8
MT	2	Fallon	FAL	Yellowstone	124.0
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	Grand Champs	GRC	Missouri	1741.0
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	Sloan	SLN	Missouri	709.0
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
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 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

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
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
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

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
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	
2006	Sidney	586	2006	10/24/2006	Advanced Fingerling	Elastomer	
2006	Wolf Point	1553	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	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 Removed
2008	Culbertson	643	2007	3/26/2008	Yearling	Elastomer	

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
2008	Fallon	1307	2007	5/7/2008	Yearling	PIT Tag	Scute Removed
2008	Forsyth	1384	2007	5/7/2008	Yearling	PIT Tag	Scute Removed
2008	Forsyth	106	2007	3/26/2008	Yearling	Elastomer	
2008	Intake	2395	2007	5/7/2008	Yearling	PIT Tag	Scute Removed
2008	Intake	103	2007	3/26/2008	Yearling	Elastomer	
2008	School Trust	1325	2007	5/7/2008	Yearling	PIT Tag	Scute Removed
2008	School Trust	654	2007	3/26/2008	Yearling	Elastomer	
2008	Sidney	149	2007	5/7/2008	Yearling	PIT Tag	Scute Removed
2008	Sidney	67	2007	3/26/2008	Yearling	Elastomer	
2008	Wolf Point	1328	2007	5/7/2008	Yearling	PIT Tag	Scute Removed
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	
2009	Culbertson	1387	2008	4/13/2009	Yearling	PIT Tag	Scute Removed
2009	Fallon	1155	2008	4/13/2009	Yearling	PIT Tag	Scute Removed
2009	Forsyth	1166	2008	4/13/2009	Yearling	PIT Tag	Scute Removed
2009	Intake	2181	2008	4/13/2009	Yearling	PIT Tag	Scute Removed
2009	Sidney	710	2008	4/13/2009	Yearling	PIT Tag	Scute Removed
2009	Wolf Point	2162	2008	4/13/2009	Yearling	PIT Tag	Scute Removed
2009	Miles City	46260	2009	7/31/2009	Fry		
2009	Wolf Point	26175	2009	7/22/2009	Fry		
2009	Culbertson	10238	2009	9/24/2009	Fingerling	Elastomer	
2009	Fallon	5133	2009	9/23/2009	Fingerling	Elastomer	
2009	Forsyth	5386	2009	9/23/2009	Fingerling	Elastomer	

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
2009	Intake	8374	2009	9/23/2009	Fingerling	Elastomer	
2009	Sidney	1865	2009	9/23/2009	Fingerling	Elastomer	
2009	Wolf Point	9946	2009	9/23/2009	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 2009. 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. 1.0” trammel net: overall season and segment summary. Lists CPUE (fish/100 m) and 2 standard errors on second line.

Species	Total Catch	Overall CPUE	CHXO CHNB	ISB CHNB	OSB CHNB	SCCL CHNB
	0	0	0	0	0	0
BKSB		0	0	0	0	0
	1	0.002	0.005	0	0	0
BMBF		0.003	0.011	0	0	0
	1	0.002	0	0.006	0	0
BRBT		0.003	0	0.011	0	0
	18	**0.041**	**0.012**	**0.033**	**0.09**	**0**
BUSK*		**0.032**	**0.017**	**0.049**	**0.091**	**0**
	2	0.003	0.011	0	0	0
CARP		0.005	0.015	0	0	0
	31	0.078	0.146	0.045	0.048	0.044
CNCF		0.039	0.1	0.04	0.051	0.089
	0	0	0	0	0	0
ERSN		0	0	0	0	0
	10	0.023	0.011	0.012	0.034	0.081
FHCB		0.014	0.015	0.016	0.034	0.11
	0	0	0	0	0	0
FHMW		0	0	0	0	0
	95	0.23	0.246	0.201	0.238	0.128
GDEY		0.076	0.128	0.128	0.159	0.24
	0	0	0	0	0	0
GNSF		0	0	0	0	0
	0	0	0	0	0	0
LKCB		0	0	0	0	0
	0	0	0	0	0	0
LNDC		0	0	0	0	0
LNSK	22	0.051	0.07	0.053	0.041	0

Species	Total Catch	Overall CPUE	CHXO CHNB	ISB CHNB	OSB CHNB	SCCL CHNB
		0.029	0.047	0.07	0.043	0
	0	0	0	0	0	0
NFSH		0	0	0	0	0
	0	0	0	0	0	0
NTPK		0	0	0	0	0
	5	**0.015**	**0.018**	**0.022**	**0**	**0.029**
PDSG*		**0.018**	**0.036**	**0.044**	**0**	**0.059**
	0	0	0	0	0	0
PNSD		0	0	0	0	0
	0	0	0	0	0	0
RBTT		0	0	0	0	0
	59	0.153	0.197	0.123	0.092	0.349
RVCS		0.062	0.136	0.104	0.077	0.24
	0	**0**	**0**	**0**	**0**	**0**
SGCB*		**0**	**0**	**0**	**0**	**0**
	64	**0.155**	**0.22**	**0.179**	**0.069**	**0.111**
SGER*		**0.052**	**0.123**	**0.088**	**0.05**	**0.119**
	21	0.049	0.11	0.026	0.018	0
SHRH		0.03	0.079	0.039	0.02	0
	6	0.014	0.007	0.011	0.024	0.026
SMBF		0.016	0.013	0.016	0.048	0.051
	398	**0.908**	**1.036**	**0.624**	**1.154**	**0.534**
SNSG*		**0.244**	**0.432**	**0.285**	**0.588**	**0.551**
	0	**0**	**0**	**0**	**0**	**0**
SNSN*		**0**	**0**	**0**	**0**	**0**
	0	0	0	0	0	0
STSN						
	0	0	0	0	0	0
UCA		0	0	0	0	0
WLYE	5	0.013	0.017	0	0.025	0

Species	Total Catch	Overall CPUE	CHXO CHNB	ISB CHNB	OSB CHNB	SCCL CHNB
		0.012	0.02	0	0.036	0
	0	**0**	**0**	**0**	**0**	**0**
WSMW*		**0**	**0**	**0**	**0**	**0**
	8	0.017	0.024	0.021	0	0.032
WTSK		0.012	0.023	0.025	0	0.064
	0	0	0	0	0	0
YWPH		0	0	0	0	0

Appendix F3. Otter trawl: overall season and segment summary. Lists CPUE (fish/100 m) and 2 standard errors on second line.

	Total	Overall	CHXO	ISB	OSB	SCCL
Species	Catch	CPUE	CHNB	CHNB	CHNB	CHNB
	0	0	0	0	0	0
BKSB		0	0	0	0	0
	1	0.002	0	0	0	0.027
BMBF		0.004	0	0	0	0.053
	4	0.007	0.006	0	0.006	0.051
BRBT		0.008	0.011	0	0.012	0.103
	2	**0.003**	**0.011**	**0**	**0**	**0**
BUSK*		**0.005**	**0.016**	**0**	**0**	**0**
	5	0.01	0.021	0.011	0	0
CARP		0.01	0.024	0.021	0	0
	24	0.048	0.04	0.071	0.033	0.026
CNCF		0.025	0.045	0.054	0.029	0.051
	0	0	0	0	0	0
ERSN		0	0	0	0	0
	29	0.056	0.06	0.073	0.012	0.135
FHCB		0.028	0.047	0.062	0.017	0.166
	0	0	0	0	0	0
FHMW		0	0	0	0	0
	1	0.002	0	0.005	0	0
GDEY		0.003	0	0.01	0	0
	0	0	0	0	0	0
GNSF		0	0	0	0	0
	0	0	0	0	0	0
LKCB		0	0	0	0	0
	2	0.004	0	0.011	0	0
LNDC		0.005	0	0.016	0	0
	14	0.029	0.017	0.026	0.036	0.077
LNSK		0.021	0.019	0.031	0.051	0.154

Species	Total Catch	Overall CPUE	CHXO CHNB	ISB CHNB	OSB CHNB	SCCL CHNB
	0	0	0	0	0	0
NFSH		0	0	0	0	0
	0	0	0	0	0	0
NTPK		0	0	0	0	0
	11	**0.021**	**0.024**	**0.021**	**0.013**	**0.039**
PDSG*		**0.013**	**0.028**	**0.02**	**0.018**	**0.078**
	0	0	0	0	0	0
PNSD		0	0	0	0	0
	0	0	0	0	0	0
RBTT		0	0	0	0	0
	18	0.049	0.041	0.083	0.006	0.093
RVCS		0.046	0.051	0.124	0.012	0.185
	45	**0.091**	**0.097**	**0.113**	**0.075**	**0.026**
SGCB*		**0.037**	**0.058**	**0.087**	**0.052**	**0.051**
	17	**0.048**	**0.06**	**0.01**	**0.089**	**0**
SGER*		**0.035**	**0.051**	**0.015**	**0.106**	**0**
	12	0.022	0.036	0.01	0.025	0
SHRH		0.013	0.028	0.015	0.03	0
	0	0	0	0	0	0
SMBF		0	0	0	0	0
	106	**0.197**	**0.267**	**0.114**	**0.243**	**0.091**
SNSG*		**0.062**	**0.111**	**0.07**	**0.155**	**0.099**
	1	**0.002**	**0.005**	**0**	**0**	**0**
SNSN*		**0.003**	**0.01**	**0**	**0**	**0**
	2	0.004	0	0.012	0	0
STSN		0.008	0	0.024	0	0
	0	0	0	0	0	0
UCA		0	0	0	0	0
	0	0	0	0	0	0
WLYE		0	0	0	0	0

Species	Total Catch	Overall CPUE	CHXO CHNB	ISB CHNB	OSB CHNB	SCCL CHNB
	0	**0**	**0**	**0**	**0**	**0**
WSMW*		**0**	**0**	**0**	**0**	**0**
	8	0.014	0.006	0.016	0.024	0
WTSK		0.014	0.011	0.023	0.038	0
	0	0	0	0	0	0
YWPH		0	0	0	0	0

Appendix F4. Mini-fyke net: overall season and segment summary. Lists CPUE (fish/net night) and 2 standard errors on second line.

Species	Total Catch	Overall CPUE	CHXO BARS	ISB BARS	OSB BARS	SCCL BARS	SCCS BARS	TRML BARS
	3	0.033	0.048	0.027	0	0.063	0	0
BKSB		0.037	0.095	0.054	0	0.125	0	0
	0	0	0	0	0	0	0	0
BMBF		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
BRBT		0	0	0	0	0	0	0
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BUSK*		**0**	**0**	**0**	**0**	**0**	**0**	**0**
	34	0.37	0.286	0.324	0.182	0.75	0.2	0.5
CARP		0.252	0.313	0.347	0.244	1.133	0.4	1
	0	0	0	0	0	0	0	0
CNCF		0	0	0	0	0	0	0
	66	0.717	0.476	1.027	0.909	0.375	0.4	0
ERSN		0.291	0.509	0.561	0.952	0.359	0.8	0
	4	0.043	0	0.108	0	0	0	0
FHCB		0.043	0	0.104	0	0	0	0
	590	6.413	5.143	2.459	12.091	8.125	0.4	63
FHMW		3.944	7.368	1.814	16.715	10.347	0.49	90
	0	0	0	0	0	0	0	0
GDEY		0	0	0	0	0	0	0
	1	0.011	0	0	0.091	0	0	0
GNSF		0.022	0	0	0.182	0	0	0
	2	0.022	0	0	0	0.125	0	0
LKCB		0.043	0	0	0	0.25	0	0
	159	1.728	0.667	1.946	3.364	1.625	0	5
LNDC		1.014	0.785	2.056	2.97	2.337	0	6
LNSK	2142	23.283	48.381	12.838	47.455	8.063	0	0
		20.315	69.116	15.602	93.911	11.082	0	0

Species	Total Catch	Overall CPUE	CHXO BARS	ISB BARS	OSB BARS	SCCL BARS	SCCS BARS	TRML BARS
	0	0	0	0	0	0	0	0
NFSH		0	0	0	0	0	0	0
	1	0.011	0	0	0	0.063	0	0
NTPK		0.022	0	0	0	0.125	0	0
PDSG*	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**
	6	0.065	0	0	0.273	0	0	1.5
PNSD		0.068	0	0	0.39	0	0	1
	1	0.011	0	0	0.091	0	0	0
RBTT		0.022	0	0	0.182	0	0	0
	50	0.543	0.19	0.676	0.091	1.25	0	0
RVCS		0.369	0.297	0.689	0.182	1.297	0	0
	1	**0.011**	**0**	**0**	**0**	**0**	**0.2**	**0**
SGCB*		**0.022**	**0**	**0**	**0**	**0**	**0.4**	**0**
	8	**0.087**	**0.048**	**0.054**	**0**	**0.063**	**0.8**	**0**
SGER*		**0.08**	**0.095**	**0.075**	**0**	**0.125**	**1.166**	**0**
	5	0.054	0.095	0.027	0.182	0	0	0
SHRH		0.048	0.131	0.054	0.244	0	0	0
	2	0.022	0	0.027	0	0.063	0	0
SMBF		0.031	0	0.054	0	0.125	0	0
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SNSG*		**0**	**0**	**0**	**0**	**0**	**0**	**0**
	486	**5.283**	**6.667**	**2.486**	**3.636**	**13.188**	**0.6**	**0**
SNSN*		**4.747**	**7.527**	**1.912**	**6.684**	**24.913**	**0.49**	**0**
	1	0.011	0	0.027	0	0	0	0
STSN		0.022	0	0.054	0	0	0	0
	64	0.696	0.476	0.73	0.091	1.625	0	0
UCA		0.398	0.611	0.618	0.182	1.537	0	0
	0	0	0	0	0	0	0	0
WLYE		0	0	0	0	0	0	0

Species	Total Catch	Overall CPUE	CHXO BARS	ISB BARS	OSB BARS	SCCL BARS	SCCS BARS	TRML BARS
	13	**0.141**	**0.048**	**0.297**	**0**	**0.063**	**0**	**0**
WSMW*		**0.126**	**0.095**	**0.299**	**0**	**0.125**	**0**	**0**
	1260	13.696	15.619	10.784	18.091	20.375	0	4
WTSK		9.323	15.827	15.627	21.725	31.321	0	6
	7	0.076	0	0.054	0.273	0	0	1
YWPH		0.071	0	0.075	0.39	0	0	2

Appendix G. Hatchery names, locations and abbreviations.

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

Appendix H. Alphabetic list of Missouri River fishes with total catch per unit effort by gear type for the sturgeon season and the fish community season during 2009 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			Fish Community Season		
	Gill Net	Otter Trawl	1.0” Trammel Net	Otter Trawl	1.0” Trammel Net	Mini-Fyke Net
BKSB		0	0	0	0	0.033
BMBF		0	0.003	0.004	0	0
BRBT		0.014	0	0	0.003	0
BUSK*		**0.003**	**0.06**	**0.003**	**0.022**	**0**
CARP		0.016	0.004	0.004	0.003	0.37
CNCF		0.071	0.066	0.025	0.091	0
ERSN		0	0	0	0	0.717
FHCB		0.026	0.042	0.085	0.004	0.043
FHMW		0	0	0	0	6.413
FWDM		0	0	0	0	0
GDEY		0.003	0.231	0	0.228	0
GNSF		0	0	0	0	0.011
LKCB		0	0	0	0	0.022
LNDC		0.007	0	0	0	1.728
LNSK		0.017	0.077	0.042	0.026	23.283
NFSH		0	0	0	0	0
NTPK		0	0	0	0	0.011
PDSG*		**0.022**	**0.029**	**0.02**	**0**	**0**
PNSD		0	0	0	0	0.065
RBTT		0	0	0	0	0.011
RVCS		0.09	0.192	0.007	0.114	0.543
SGCB*		**0.154**	**0**	**0.028**	**0**	**0.011**
SGER*		**0.065**	**0.24**	**0.031**	**0.071**	**0.087**
SHRH		0.02	0.057	0.024	0.041	0.054
SMBF		0	0.004	0	0.025	0.022

Species Code	Sturgeon Season			Fish Community Season		
	Gill Net	Otter Trawl	1.0” Trammel Net	Otter Trawl	1.0” Trammel Net	Mini-Fyke Net
SNSG*		**0.14**	**0.922**	**0.254**	**0.895**	**0**
SNSN*		**0.003**	**0**	**0**	**0**	**5.283**
STCT		0	0	0	0	0
STSN		0	0	0.008	0	0.011
UCA		0	0	0	0	0.696
WLYE		0	0.026	0	0	0
WSMW*		**0**	**0**	**0**	**0**	**0.141**
WTSK		0.004	0.021	0.024	0.012	13.696
YWPH		0	0	0	0	0.076

Appendix I. Comprehensive list of bend numbers and bend river miles for Segment 2 of the Missouri River comparing bend selection for both sturgeon season (ST) and fish community season (FCS) between years from 2006 - 2009.

Bend Number	Bend River Mile	Coordinates		2006	2007	2008	2009
		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	48.0268	106.1985			ST, FC	
7	1753	48.02938	106.16258		ST, FC	ST, FC	
8	1751	48.0312	106.13605			ST, FC	ST, FC
9	1749.5	48.02872	106.12263	ST, FC			
10	1747						
11	1745						ST, FC
12	1744	48.03534	106.08521	ST, FC	ST, FC	ST, FC	ST, FC
13	1741.5						ST, FC
14	1740	48.00255	106.02716		ST, FC		
15	1738						
16	1736.5	48.03137	106.001		ST, FC		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	48.019	105.87228	ST, FC	ST, FC		ST, FC
24	1725.5	48.00855	105.85176			ST, FC	

Bend Number	Bend River Mile	Coordinates					
		Lattidude	Longitude	2006	2007	2008	2009
25	1723.5	48.01666	105.82971			ST, FC	
26	1722	48.02402	105.79479		ST, FC		
27	1720						ST, FC
28	1719	48.04468	105.76749	ST, FC	ST, FC		
29	1717.5						
30	1716						ST, FC
31	1714						ST, FC
32	1712	48.05313	105.66531		ST, FC	ST, FC	
33	1710.5	48.04739	105.66245	ST, FC		ST, FC	
34	1710	48.05159	105.64158	ST, FC			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		ST, FC
38	1705.5						
39	1704.5	48.08012	105.58631	ST, FC	ST, FC	ST, FC	
40	1703						ST, FC