2014 Annual Report

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

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

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EXECUTIVE SUMMARY

The 2014 sampling year marked the ninth field season for the Pallid Sturgeon Population Assessment Program (Program) crew in Segment 2 of the Missouri River. Field crews were excited to see if the post-2011 pallid sturgeon captures rates would remain elevated within Segment 2. Although "status quo" flows are slowly returning the river to pre-2011 form, positive correlations still seem to exist.

A total of 12 randomly selected bends were sampled once each during sturgeon and fish community seasons throughout Segment 2 in 2014, resulting in deployment 314 trammel nets totaling 79.2 km of water sampled. Additionally, 195 otter trawls were deployed, totaling 55.3 km of sampling. Passive gears were once again a staple of the 2014 field season within Segment 2; including ninety-six overnight mini-fyke net sets and 1,920 worm-baited hooks attached to trotlines.

Pallid sturgeon captures (N=123) in Segment 2 during 2014 were up from 2013 (N=101), but fell below the all-time high witnessed in 2012 (N=166). Among seasons, 21 pallid sturgeon were sampled during sturgeon season, while 102 were handled during fish community season. Although this pattern was different from 2012 and 2013, when more pallid sturgeon captures took place during sturgeon season, it is slightly exaggerated by a targeted, non-random event that took place within bend 15 from September, 22 through September, 25; when an additional forty hatchery-reared pallid sturgeon were sampled.

Although trotlines normally yield the highest proportion of catch, the aforementioned targeted effort during the 2014 field season helped trammel nets become the largest contributor to total catch (58.5%). Trotlines were yet again a valuable sampling gear, yielding 28.5% of the catch, followed by otter trawl (11.4%) and lastly, angling, resulting in 1.6% of the total catch of pallid sturgeon in Segment 2 for the 2014 sampling year.

In relation to gears; trammel net catch per unit effort (CPUE) in Segment 2 across both seasons was recorded at 0.037 fish/100m, which was the third highest CPUE since the Program's implementation in 2006. Among seasons, trammel net CPUE was reported at 0.025 fish/100m and 0.040 fish/100m for sturgeon season and fish community season, respectively. The CPUE recorded during fish community season was a new record for Segment 2. The combined otter trawl CPUE for both seasons in Segment 2 for 2014 was documented at 0.021 fish/100m, which

places it in the realm of the long-term average. Among seasons, CPUEs of 0.015 and 0.027 fish/100m were noted during the sturgeon and fish community seasons, respectively.
A trotline CPUE calculated at 0.146 fish/20 hooks during sturgeon season and an above average CPUE (0.583 fish/20 hooks) during fish community season, a modest CPUE of 0.365 fish/20 hooks was observed across both seasons. For comparison, this combined-season CPUE fell behind the record observed in 2012 (0.573 fish/20 hooks) and the second best calculated in 2013 (0.479 fish/20 hooks). Trotlines remain an effective sampling gear in regards to the pallid sturgeon that reside in Segment 2 of the Missouri River.

All 123 pallid sturgeon, representing 13 year classes, captured in Segment 2 in 2014 were hatchery-reared and of known year class. Year classes in rank of abundance were; 2009 (N=35), 2008 (N=28), 2010 (N=18), 2006 (N=15), 2007 (N=7), 2005 (N=5), three fish coming from the 1997, 2001 and 2012 year classes, respectively, two pallid sturgeon each from the 2004 and 2013 year classes, respectively, and one each from the 2003 and 2014 year classes, respectively. This was the third year in a row in which a 1997 year class pallid sturgeon was sampled in Segment 2, including the largest hatchery-reared juvenile pallid sturgeon ever captured by Montana Population Assessment crews, an individual measuring 1170 mm and 5950 g. Of the 123 pallid sturgeon captured in Segment 2 in 2014, 85 were of known stocking location; all originating in RPMA 2. When comparing the two stocking rivers, the Missouri and the Yellowstone, the majority (68%) of the pallid sturgeon sampled in Segment 2 in 2014 were stocked in the Missouri. Further analysis breaking down stocking location in rank from most to least abundant is as follows; Wolf Point (N=32), Culbertson (N=23), Intake (N=14), Fallon (N=5), four fish from each Forsyth and Sidney, and three pallid sturgeon stocked at the School Trust site. Pallid sturgeon, stocked even in the upper areas of the Yellowstone, continue to be regularly sampled in Segment 2 of the Missouri River.

Hatchery-reared pallid sturgeon captured in Segment 2 in 2014 averaged 423 mm in fork length and 334 g in weight. Both of these totals are record highs for Segment 2; indicating that these hatchery released juveniles are continuing to recruit towards adulthood, as well as larger individuals increasing their usage of upper part of the Missouri River below Fort Peck Dam. The relative condition (Kn) for the sub-stock category (200-329 mm) of hatchery-reared pallid sturgeon during the 2014 field season in Segment 2 exhibited an sharp increase, however, when looking at the data, the Kn was based off of a very small sample size (N=2) and it appears a

recorded weight for one of these fish may be an error (L=273, W=175). Meanwhile, the relative condition for both the stock and quality class of pallid sturgeon appears to be on a small but steady increase since 2012. The Kn for preferred and memorable/trophy classes of pallid sturgeon continues to be based on small sample size, and has only surfaced in the last few field seasons.

Shovelnose sturgeon continue to be one of the most frequently sampled species across all of Segment 2 of the Missouri River, with sampling resulting in the capture of 2,014 individuals. Shovelnose sturgeon captured this past year averaged 608 mm in fork length and 907 g in weight. Since the commencement of this project in 2006, the population of shovelnose sturgeon in Segment 2 has been dominated by individuals greater than 400 mm in FL, with only two percent measuring smaller than 400 mm in 2013. All standard gears, except mini-fyke nets, remain effective at catching shovelnose sturgeon.

All standard gears, except mini-fyke nets, remain effective at catching shovelnose sturgeon. Among catch rates for these gears; trammel net CPUE for both seasons, of quality and larger shovelnose sturgeon in Segment 2 for the 2014 sampling year was observed at 1.16 fish/100m, which is the highest catch rate ever recorded. This record was the result of an average CPUE during sturgeon season (0.83 fish/100m) combined with a record high observed during fish community season (1.49 fish/100m). Otter trawl CPUE within the quality or larger size class for combined seasons, (0.18 fish/100m) was only slightly higher than the all time low witnessed in 2013 (0.15 fish/100m). This was due to the slightly below average CPUE calculated for both sturgeon (0.22 fish/100m) and fish community (0.07 fish/100m) seasons, respectively. Similarly to trammel nets, CPUE for the stock and sub-stock size categories remains low. Combined-season trotline CPUE for quality or larger shovelnose sturgeon in Segment 2 during the 2014 sampling season reached an all time low (2.25 fish/20 hooks). This record low can be attributed to the second lowest observed CPUE during sturgeon season (2.15 fish/20 hooks) and a new low calculated during fish community season (2.35 fish/20 hooks). Although these lower capture rates are at or near all time lows, the magnitude of CPUE change is very small and remains quite comparable from previous years.

A total of 16 sturgeon chubs were sampled in Segment 2 during the 2014 field season; with 12 of them being captured during random sampling events, and an additional 4 observed during non-random, duplicate sampling. Unlike previous years, the majority of sturgeon chubs

were captured during fish community season (88%). Furthermore, sturgeon chubs were only witnessed in three bends (27, 28 and 29, respectively). All sturgeon chubs captured in Segment 2 in 2014 were sampled in the otter trawl. With a catch per unit effort approaching zero fish/100m during sturgeon season and a near average CPUE during fish community season (0.041 fish/100m) an all time record low was observed for a combined-season CPUE (0.026 fish/100m). The average total length for sturgeon chubs captured in Segment 2 in 2014 was 84 mm, which is identical to the past two field seasons. As indicated by this phenomenon, the size structure of sturgeon chubs in Segment 2 continues to be dominated by adult age classes.

Sicklefin chubs were virtually nonexistent in Segment 2 in 2014, with only one being sampled the entire field season. This one specimen, which was captured during a non-random duplicate otter trawl, resulted in a CPUE of 0 fish/100m. Although a zero catch seems alarming, it has been witnessed before, as in the sampling years of 2008 and 2009. When sickelfin chubs do occur in Segment 2, they exhibit the same pattern as sturgeon chubs, with adult age classes normally being sampled during sturgeon season.

Sampling of Segment 2 during 2014 resulted in the capture of 207 sand shiners, with all but one (otter trawl) being sampled via mini-fyke net. Although not as high as the catch rate observed in 2013, catch rates in 2014 (2.31 fish/net night) were still substantially higher than those seen in 2011 and 2012, and were only slightly lower than those witnessed in 2010 (3.78 fish/net night). The average total length for sand shines observed in Segment 2 during the 2014 sampling year was 39 mm, with a range of 22 mm to 65 mm. This average length fits well within the realm witnessed in previous years.

A total of 25 *Hybotnathus* spp. were captured during the Segment 2 sampling effort in Segment 2, which was down drastically from the numbers observed in 2013 (N=172). Mini-fyke nets accounted for the majority of samples collected (N=22). After a significant increase of mini-fyke net CPUE from 2012 (0.04 fish/net night) to 2013 (2.63 fish/net night), catch rates dipped drastically again in 2014 (0.23 fish/net night). Total length average for the *Hybotnathus* spp. sampled throughout Segment 2 in 2014 was 87 mm, which was much more similar to the TL average witnessed in 2012 (94mm) than that observed in 2013 (45 mm).

A total of 44 blue suckers were captured in Segment 2 in 2014, which bested the previous high recorded in 2007 (N=36). More than half (59%) of these captures can be attributed one

sampling event which took place April 24 at bend 2 (RM 1760). By gear, trammel nets captured the largest proportion of blue suckers (N=41), while the otter trawl accounted for three.
A new record high for trammel net CPUE was observed in both combined-season CPUE (0.07 fish/100m) and sturgeon season CPUE (0.13 fish/100m), while fish community season posted a modest (0.02 fish/100m). Otter trawl CPUE for blue suckers, despite setting new records in both combined-season CPUE (0.009 fish/100m) and fish community season (0.012fish/100m), continues to be low in comparison to trammel nets CPUE. The average TL for blue suckers handled in Segment 2 during the 2014 field season was 709 mm, which is essentially the same as previous years. The sampled population of blue suckers continues to be dominated by adult size classes of fish, with only two young of the year blue suckers ever sampled in Segment 2.

Sampling regimens during the 2014 field season throughout Segment 2 resulted in the capture of 152 sauger. Sauger observations continue to be common in all gears, with rank in order of abundance were; trammel net (N=102), otter trawl (N=33), mini-fyke net (N=16) and one additional sauger sampled on trotline. Similar to past years, sauger were more frequently seen during sturgeon season, with 61% of them being witnessed during that time. Catch per unit of effort for trammel net sampling across both seasons within Segment 2 exhibited a combined-season CPUE of 0.20 fish/100m. Within seasons, CPUE for sturgeon season was recorded at 0.27 fish/100m, while catch rates for fish community season were tabulated at 0.12 fish/100m. Otter trawl CPUE for sauger in Segment 2 showed a sizeable increase during sturgeon season, setting a new record at 0.12 fish/100m. The catch rate observed during sturgeon season, combined with an average catch rate during fish community season (0.02 fish/100m) also created a record high CPUE witnessed for combined-seasons, which was set at 0.07 fish/100m. Sauger occurrence in mini-fyke nets was once again a common occurrence during Segment 2 sampling in 2014. The associated CPUE was calculated at 0.15 fish/net night, which remains quite similar to previous years. To illustrate, the highest recorded mini-fyke net CPUE regarding sauger was set in 2013 at 0.17 fish/net night, while the lowest recorded CPUE occurred in 0.06 fish/net night. The average TL for sauger within Segment 2 in 2014 was 344 mm, ranging in size from 250 mm to 560 mm, which remains comparable with previous years.

Although Segment 2 of the Missouri River continues to exhibit a highly altered landscape due to the regulated flows of Fort Peck Dam, Segment 2 appears to be relevant in terms of pallid sturgeon survival and growth. The high-water year of 2011 brought pallid sturgeon changes

never before seen in this segment, however, as flows revert back to “status-quo”, the older, larger age classes of fish seem to still be residing in this area. With the largest recorded hatchery-reared juvenile pallid sturgeon ever captured by Montana Program crews, combined with the presence of other large hatchery fish, it is obvious that these pallid sturgeon are finding some kind of suitable habitat parameter within the waters of Segment 2. However, if this influx of older, larger pallid sturgeon, combined with the recruitment of younger year classes, continues to coincide with an already robust adult shovelnose sturgeon population, food availability within this highly altered reach of river may become an issue. High-water and the resulting movement patterns of hatchery-reared juvenile pallid sturgeon post 2011, coupled with improved condition factors, shows that flow alterations from Fort Peck Dam may further benefit not only pallid sturgeon, but other native species.

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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 2011). 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 2011). 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. Trotlines became a standard gear starting in 2010. 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

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 2011). 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 2011), 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 (2011). A general description of those guidelines follows

Sampling Site Selection and Habitat 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 (April 5 through June 28) and the Fish Community Season (July 12 through October 12) during 2010.

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 switched from an experimental gear, in 2009, to a standard gear for 2010 in segment 2. Twelve random trotline bends were selected by moving upstream one river bend from the 12 bends that were randomly selected for sampling by standard gears. This was done to the minimize the possibility of an attractant effect of trotlines to our standard gears and to optimize our time spent on any particular bend, since overnight trotlines require an additional trip to each sampled bend. Trotline bends were only sampled once, as opposed to standard bends, which were sampled by standard gears in both sturgeon season and fish community season. Half (N=6) were sampled with trotline in sturgeon season and half (N=6) were sampled during fish community season.

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 (2011).

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 is 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. 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 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 (2011). 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 relative condition factor calculated by Shuman et al. (2011).

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.

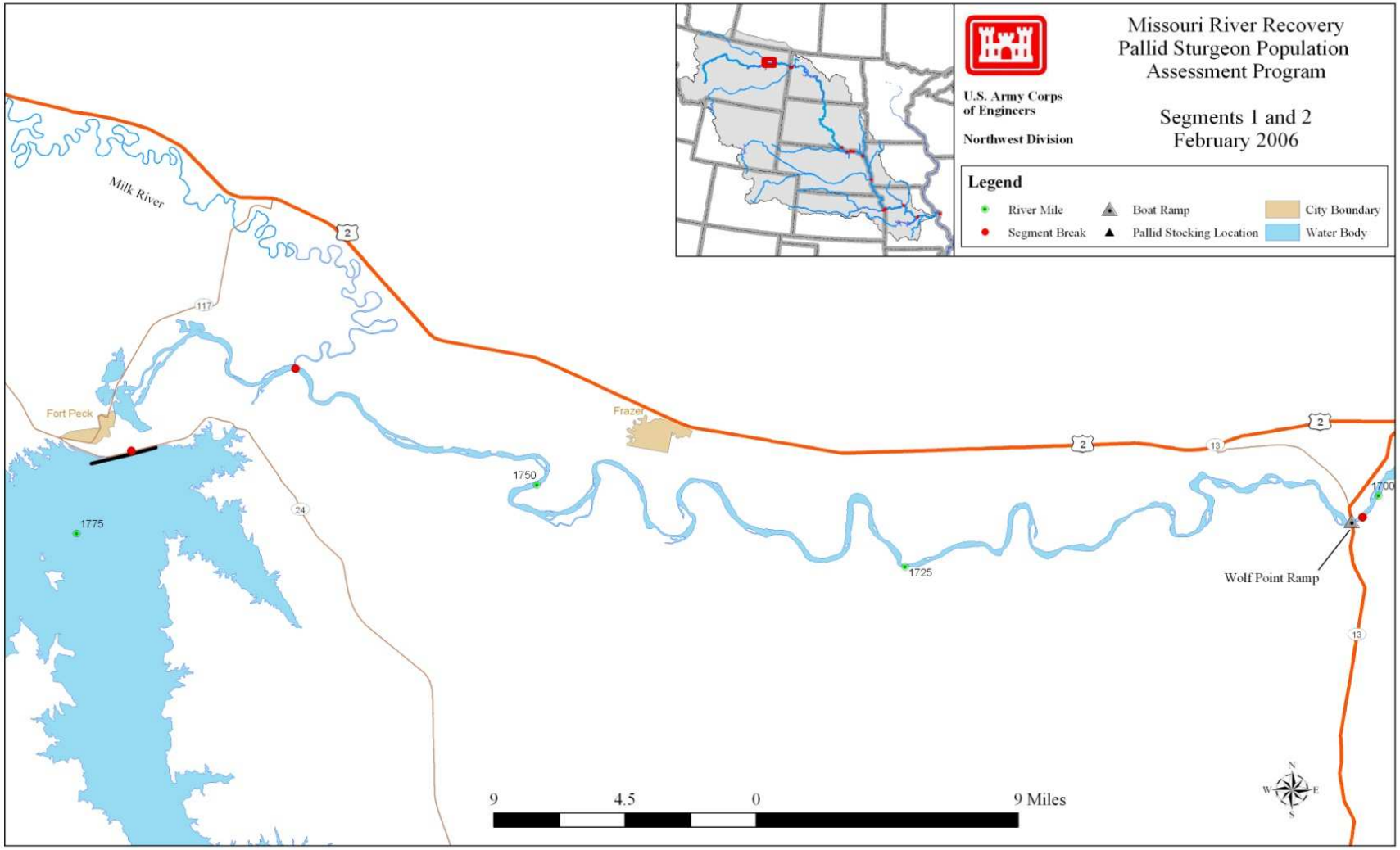


Figure 1. Map of Segment 2 of the Missouri River with major tributaries, common landmarks, and historic stocking locations for pallid sturgeon. Segment 2 encompasses the Missouri River from the mouth of the Milk River (River Mile 1761.5) to Wolf Point, MT (River Mile 1701.5).

Results

Effort

A total of twelve randomly selected bends were sampled once each during sturgeon and fish community seasons throughout Segment 2 in 2014 (Table 1). Additionally, trotlines were deployed once each for all 12 river bends, half of which were deployed during sturgeon season, while the other half were deployed during fish community season. Trotline bends are unique in that they are selected by sampling the next immediate upstream bend from the randomly selected bend. Because this method was used, only 11 unique bends were sampled with trotlines, with bend 1 being sampled once each during sturgeon and fish community season, respectively. Mean deployment was equal for all gears, except trotlines, across all seasons (8), which is the minimum number of subsamples that must be performed per bend. Due to the same bend being sampled twice, mean deployments per bend for trotlines was 8.73.

A total of 314 trammel net drifts were performed in Segment 2 during the 2014 field season. The aforementioned drifts resulted in the sampling of 79.2 km of river, of which 35.5 km (N=192) were deployed in a random fashion, while 43.7 km (N=122) of the drifts occurred in non-random scenarios. Aside from duplicate sampling, other non-random drifting distance can be attributed to 27.3 km (N=89) of nets that were drifted in bend 15 during a targeted effort taking place between September, 22-25.

In comparison, a total of 195 otter trawls were deployed in Segment 2 in 2014, resulting in 55.3 km of the Missouri River being sampled. Of the total sampling, 49.6 km (N=176) were trawled in random fashion, while the other 5.7 km (N=19) can be attributed to non-random duplicate deployments. Additionally, bend 2 was omitted from any otter trawl sampling in 2014, due to the presence of cobble and large boulders as the dominating substrate found in that bend.

Using our standard of eight trotlines per bend, while sampling all twelve bends, a total of 96 overnight trotline sets were performed in Segment 2 during the 2013 field season. With each trotline consisting of 20 hooks, a total of 1920 worm-baited hooks were set across Segment 2 in this year. Because each bend is only sampled once with trotlines, six bends were sampled during sturgeon season, while the other six were sampled during fish community season.

Like trotlines, mini-fyke nets are also set overnight. With all mini-fyke net sampling taking place during fish community season, each bend was set with eight nets giving us a total of 96 mini-fyke net deployments within Segment 2 during the 2014 sampling year.

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 2014. N-E indicates the habitat is non-existent in the segment.

Gear	Number of Bends	Mean Effort	Macrohabitat[a]							
			CHXO	CONF	ISB	OSB	SCCL	SCCS	SCN	TRML
Sturgeon Season										
1.0” Trammel Net	12	8	30	2	31	29	2	0	0	2
Otter Trawl	11	8	31	3	28	24	2	0	0	0
Fish Community Season										
1.0” Trammel Net	12	8	36	4	29	27	0	0	0	0
Mini-Fyke Net	12	8	25	2	39	12	5	3	8	2
Otter Trawl	11	8	30	2	28	28	0	0	0	0
Both Seasons										
Trot Line	11	8.73	32	7	31	26	0	0	0	0

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

Pallid Sturgeon

Pallid sturgeon captures (N=123) in Segment 2 during 2014 were up from 2013 (N=101), but fell below the all-time high witnessed in 2012 (N=166). Comparisons to other years can be found in Figure 9. Among seasons, 21 pallid sturgeon were sampled during sturgeon season, while 102 were handled during fish community season. For comparison, the previous two field seasons saw a higher proportion of hatchery-reared pallid sturgeon captured during sturgeon season (67% & 61%, 2012 & 2013, respectively), while in 2014 pallid sturgeon captures in Segment 2 were represented by 17% and 83% for the sturgeon and fish community seasons, respectively. Although different than the past two years, the 2014 seasons fits more inline with those years previous to 2012. Furthermore, the proportion is even further exaggerated by a targeted, non-random event that took place within bend 15 from September, 22 through September, 25; when an additional forty hatchery-reared pallid sturgeon were sampled.

Although trotlines normally yield the highest proportion of catch, the aforementioned targeted effort during the 2014 field season helped trammel nets become the largest contributor to total catch (58.5%). Trotlines were yet again a valuable sampling gear, yielding 28.5% of the catch, followed by otter trawl (11.4%) and lastly, angling, resulting in 1.6% of the total catch of pallid sturgeon in Segment 2 for the 2014 sampling year.

Trammel net catch per unit effort (CPUE) in Segment 2 across both seasons was recorded at 0.037 fish/100m (Figure 5), which was the third highest CPUE since the Program's implementation in 2006. The CPUE for both seasons recorded in 2014 fell only to the record high observed in 2012 (0.046 fish/100m) and neared the CPUE calculated in 2013 (0.040 fish/100m). Among seasons, trammel net CPUE was reported at 0.025 fish/100m and 0.040 fish/100m for sturgeon season and fish community season, respectively. The catch per unit of effort noted during the fish community season in 2014 was also a new all-time high for Segment Two. However, it is important to note that CPUE, particularly among seasons, remains sporadic with no real pattern emerging.

The combined otter trawl CPUE for both seasons in Segment 2 for 2014 was documented at 0.021 fish/100m (Figure 6), which places it in the realm of the long-term average. Among seasons, CPUEs of 0.015 and 0.027 fish/100m were noted during the sturgeon and fish

community seasons, respectively. When attempting to detect catch rate differences, it should be noted that increases and decreases in CPUE are based on very minimal changes; furthermore catch rates seem to be even slightly more erratic during fish community season.

The catch per unit of effort regarding trotlines within Segment 2 during the 2014 field season can be located in Figure 7. With a below average CPUE (0.146 fish/20 hooks) during sturgeon season and an above average CPUE (0.583 fish/20 hooks) during fish community season, a modest CPUE of 0.365 fish/20 hooks was observed across both seasons. For comparison, this combined-season CPUE fell behind the record observed in 2012 (0.573 fish/20 hooks) and the second best calculated in 2013 (0.479 fish/20 hooks).

Hatchery-reared pallid sturgeon captured in Segment 2 in 2014 averaged 423 mm in fork length and 334 g in weight. Both of these totals are record highs for Segment 2; indicating that these hatchery released juveniles are continuing to recruit towards adulthood, as well as larger individuals increasing their usage of upper part of the Missouri River below Fort Peck Dam. In addition, the largest hatchery-reared juvenile pallid sturgeon ever captured by the Montana Population Assessment crew was handled on October 14. It was caught in bend 6 (RM 1754.5) on a trotline, with a fork-length of 1170 mm and weighed 5950 g. In relation to gear, trotlines captured the largest individuals, averaging 458 mm, followed by trammel net (412 mm) and otter trawl (397 mm). Further details pertaining to incremental relative stock density (RSD) in Segment 2 can be found in Figure 3, while length frequency can be viewed in Figure 8.

The relative condition (Kn) for pallid sturgeon examined in Segment 2 is shown in Figure 4. The Kn for the sub-stock category (200-329 mm) of hatchery-reared pallid sturgeon during the 2014 field season in Segment 2 exhibited an sharp increase, however, when looking at the data, the Kn was based off of a very small sample size (N=2) and it appears a recorded weight for one of these fish may be an error (L=273, W=175). Meanwhile, the relative condition for both the stock and quality class of pallid sturgeon appears to be on a small but steady increase since 2012. The Kn for preferred and memorable/trophy classes of pallid sturgeon continues to be based on small sample size, and has only surfaced in the last few field seasons.

Pallid sturgeon distribution in Segment 2 (Figure 2) remains variable; however, captures of pallid sturgeon in the upper section of Segment 2 are much more common than they were during the initial years of the Program. It is also important to note that while the distribution figure gives an overall visual of where pallid sturgeon were captured in Segment 2, these data

can be biased depending on which random bends are selected and where they are located. For example, the non-random targeted effort performed in bend 15 resulted in an additional 40 pallid sturgeon captures to the overall total.

All one hundred and twenty-three pallid sturgeon, representing thirteen year classes, captured in Segment 2 in 2014 were hatchery-reared and of known year class (Table 3). Year classes in rank of abundance were; 2009 (N=35), 2008 (N=28), 2010 (N=18), 2006 (N=15), 2007 (N=7), 2005 (N=5), three fish coming from the 1997, 2001 and 2012 year classes, respectively, two pallid sturgeon each from the 2004 and 2013 year classes, respectively, and one each from the 2003 and 2014 year classes, respectively. This was the third year in a row in which a 1997 year class pallid sturgeon was sampled in Segment 2. Additionally, large stocking events in 2008 and 2009 continue to be reflected in the abundance of those year classes showing up in sampling.

Of the 123 pallid sturgeon captured in Segment 2 in 2014, eighty-five were of known stocking location; all originating in RPMA 2. When comparing the two stocking rivers, the Missouri and the Yellowstone, the majority (68%) of the pallid sturgeon sampled in Segment 2 in 2014 were stocked in the Missouri. Further analysis breaking down stocking location in rank from most to least abundant is as follows; Wolf Point (N=32), Culbertson (N=23), Intake (N=14), Fallon (N=5), four fish from each Forsyth and Sidney, and three pallid sturgeon stocked at the School Trust site. Pallid sturgeon, stocked even in the upper areas of the Yellowstone, continue to be regularly sampled in Segment 2 of the Missouri River.

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.

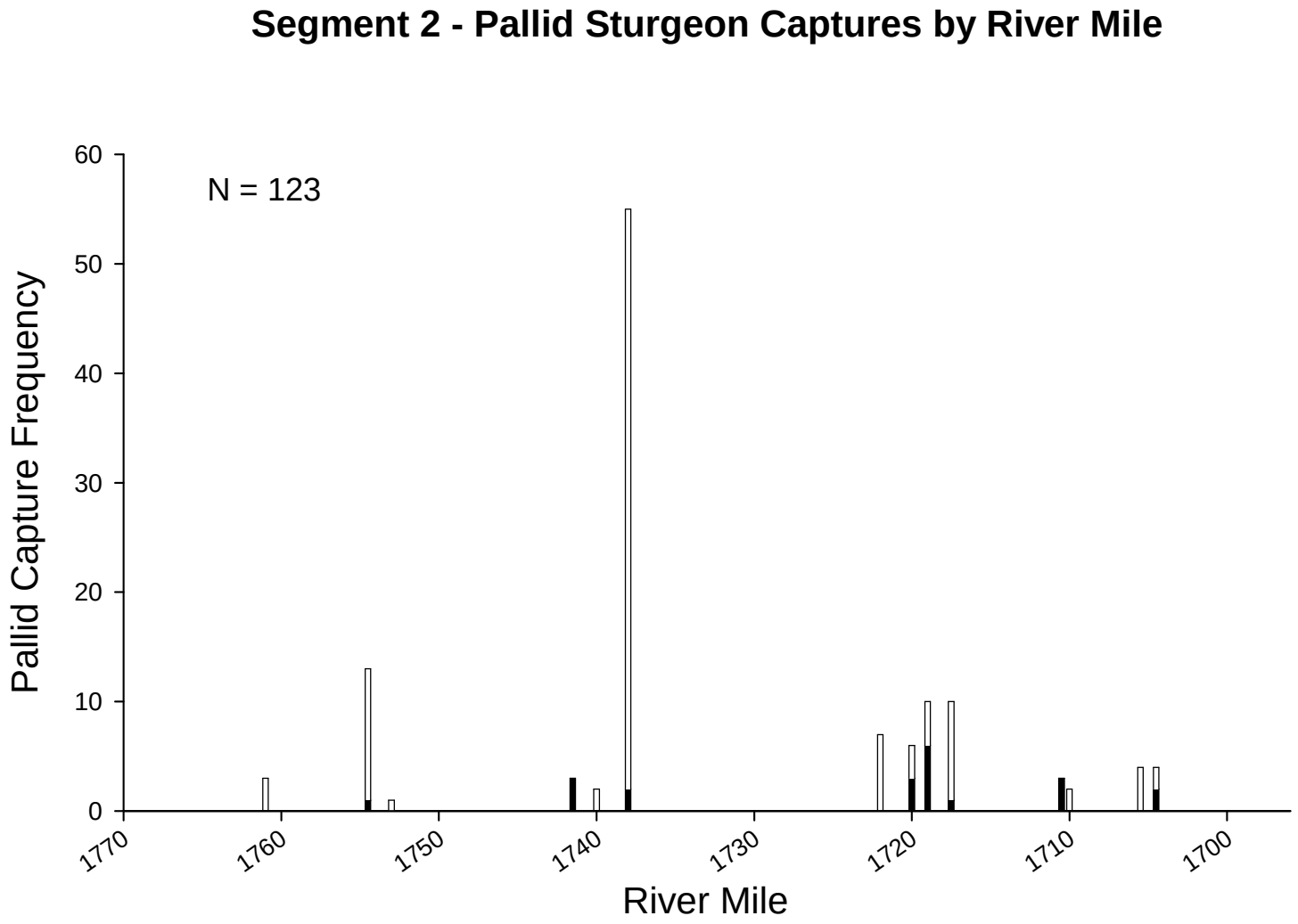


Figure 2. Distribution of pallid sturgeon captures by river mile for Segment 2 of the Missouri River during 2014. Black bars represent pallid sturgeon captures during sturgeon season and white bars represent pallid sturgeon captures during fish community season. Figure includes all pallid captures including non-random and wild samples.

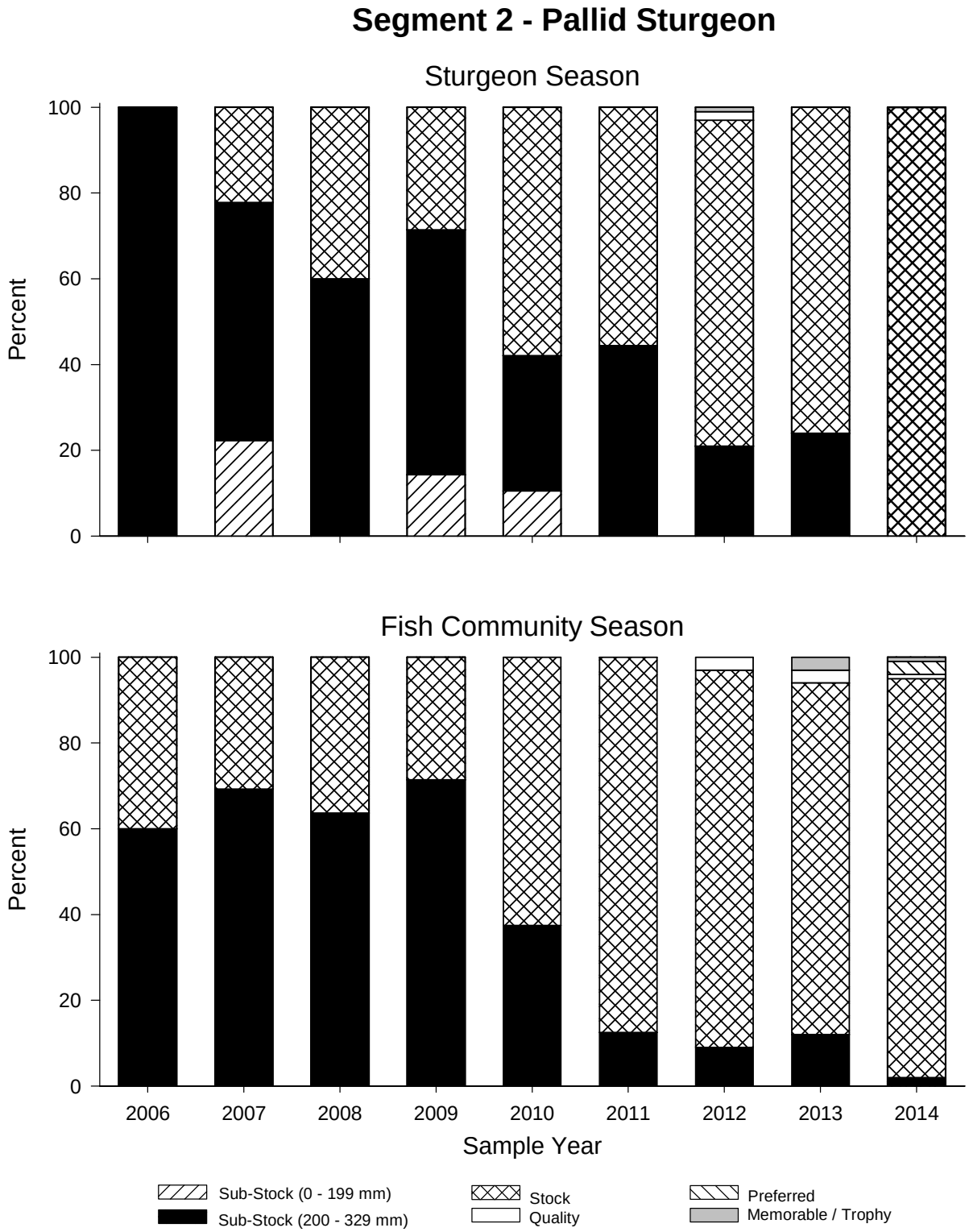
Table 2. Pallid sturgeon capture summaries for all gears relative to habitat type and environmental variables on the Missouri River during 2014. Means (minimum and maximum) are presented. Habitat definitions and codes presented in Appendix B. Table includes all pallid sturgeon captures including non-random samples.

Habitat		Depth (m)		Bottom Velocity (m/s)		Temperature (°C)		Turbidity (ntu)		Total Pallids caught
MACRO	MESO	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	
CHXO	BARS	0.4 (0.2-0.6)		0.06 (0.00-0.17)		15.5 (13.0-17.4)		43 (10-88)		.
	CHNB	1.6 (0.3-3.6)	1.6 (1.1-3.4)	0.56 (0.00-0.94)	0.36 (0.00-0.72)	13.4 (6.0-17.5)	14.3 (6.0-17.0)	178 (6-1100)	140 (6-900)	73
CONF	BARS	0.4 (0.2-0.5)		0.00 (0.00-0.00)		21.7 (21.0-22.3)		125 (125-125)		.
	CHNB	1.8 (1.2-4.0)		0.00 (0.00-0.00)		12.7 (5.0-20.0)		272 (43-500)		.
ISB	BARS	0.4 (0.2-0.6)		0.03 (0.00-0.11)		15.4 (13.0-18.0)		38 (6-90)		.
	CHNB	1.7 (1.0-3.3)	1.4 (1.0-2.0)	0.57 (0.00-0.94)	0.50 (0.00-0.78)	12.8 (5.0-20.0)	13.3 (7.4-17.0)	147 (5-1000)	116 (6-720)	29
OSB	BARS	0.4 (0.2-0.6)		0.00 (0.00-0.00)		14.9 (13.0-17.5)		34 (10-80)		.
	CHNB	2.1 (0.7-4.0)	1.8 (1.3-2.4)	0.64 (0.00-0.87)	0.68 (0.25-0.85)	12.6 (6.0-17.3)	13.3 (7.4-17.1)	172 (6-1200)	182 (6-1200)	21
SCCL	BARS	0.5 (0.4-0.6)		0.09 (0.00-0.17)		15.2 (13.1-16.8)		46 (16-75)		.
	CHNB	1.3 (1.2-1.3)		. (.-.)		13.7 (13.3-14.0)		520 (520-520)		.
SCCS	BARS	0.4 (0.3-0.6)		0.00 (0.00-0.00)		15.5 (14.7-17.1)		55 (55-55)		.
	CHNB									.
SCN	BARS	0.5 (0.3-0.6)		0.00 (0.00-0.00)		15.7 (13.0-18.0)		9 (6-11)		.
	CHNB									.
TRML	BARS	0.4 (0.2-0.6)		0.00 (0.00-0.00)		25.4 (24.4-26.4)		125 (125-125)		.
	CHNB	1.4 (1.2-1.6)		. (.-.)		5.1 (5.0-5.1)		520 (520-520)		.

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 2014 from Segment 2 of the Missouri River. Relative condition factor was calculated using the equation in Shuman et al. (2011). Table includes all hatchery-reared pallid sturgeon captures including non-random and wild samples.

Year Class	N	Length (mm)	Weight (g)	Kn	Length (mm)	Weight (g)	Kn	Length (mm/d)	Weight (g/d)
1997	3	.	.	.	1006	3983.33	0.903	.	.
.	.	.	.	.	172	1980.18	0.112	.	.
2001	3	250	.	.	724	1333.67	0.851	0.141	.
.	.	.	.	.	179	863.55	0.092	.	.
2003	1	.	.	.	562	620.00	0.984	.	.
.	.	.	.	.	.	.	.	.	.
2004	2	.	.	.	445	297.00	1.012	.	.
.	.	.	.	.	20	66.00	0.076	.	.
2005	5	205	.	.	446	308.80	1.036	0.082	.
.	.	41	.	.	25	66.91	0.037	0.030	.
2006	15	232	71.00	2.748	434	259.67	0.962	0.075	0.072
.	.	59	15.28	2.773	11	18.77	0.045	0.010	0.020
2007	7	220	39.00	1.335	408	233.43	1.041	0.082	0.084
.	.	51	24.00	0.177	27	51.07	0.046	0.023	0.022
2008	28	238	40.50	1.089	399	207.25	1.007	0.090	0.079
.	.	0	0.00	0.000	9	16.44	0.041	0.001	0.004
2009	35	270	74.14	1.169	389	197.00	1.030	0.096	0.109
.	.	40	31.53	0.081	11	20.05	0.027	0.018	0.031
2010	18	289	77.13	0.950	377	176.94	1.082	0.085	0.091
.	.	41	37.33	0.137	21	23.57	0.228	0.019	0.017
2012	3	356	197.00	1.272	400	182.33	0.877	0.130	0.035
.	.	23	.	.	26	38.68	0.010	0.019	.
2013	2	295	95.00	1.260	361	130.50	0.901	0.294	0.163
.	.	.	.	.	41	21.00	0.192	.	.
2014	1	275	75.00	1.253	317	99.00	1.036	0.261	0.149
.	.	.	.	.	.	.	.	.	.

Figure 3. Incremental relative stock density (RSD) for all pallid sturgeon captured with all gear by length category from 2006-2014 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Shuman et al. (2006).



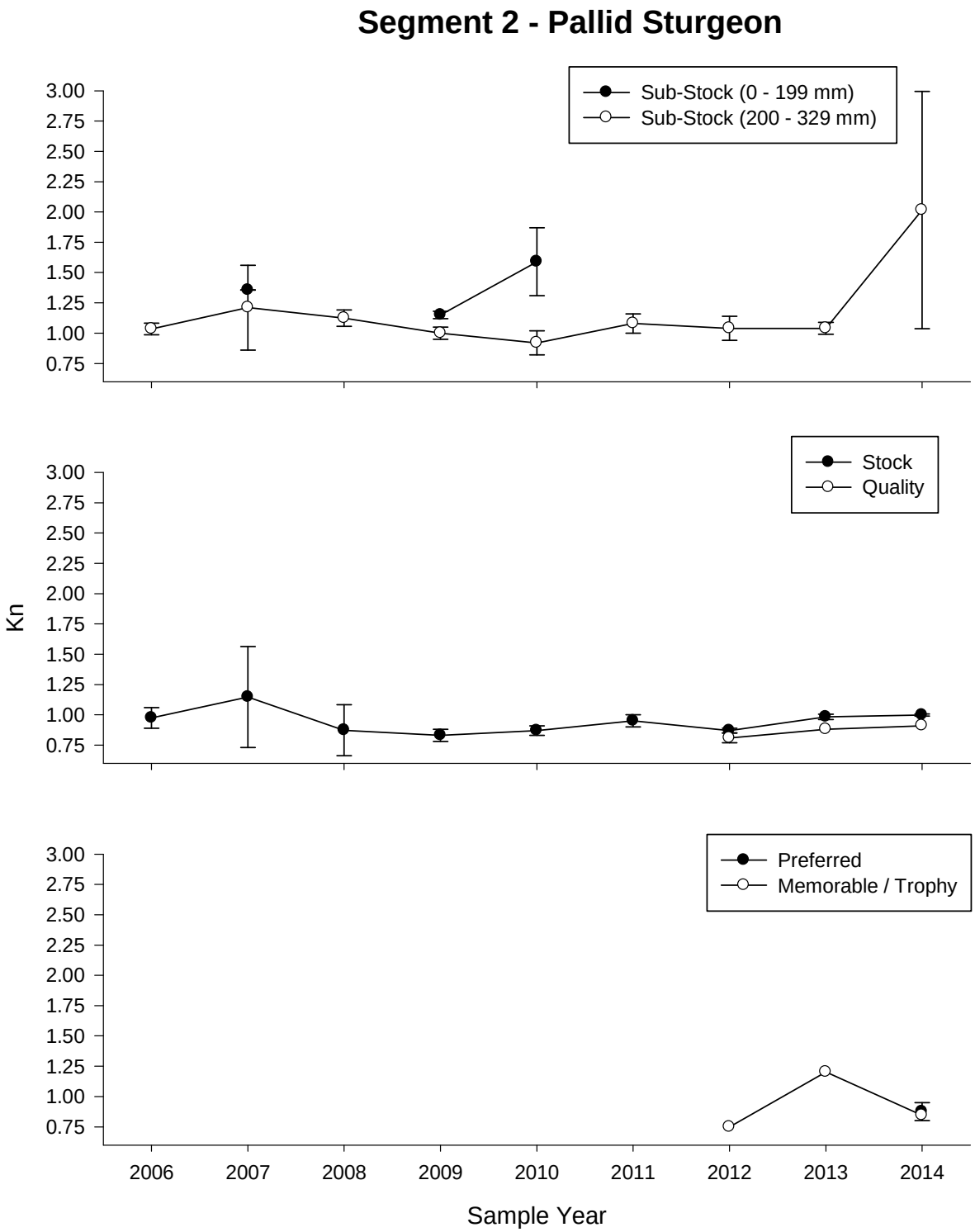


Figure 4. Relative condition factor (Kn) for all pallid sturgeon captured with all gear by incremental relative stock density (RSD) length category from 2006-2014 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Shuman et al. (2006). Relative condition factor was calculated using the equation in Shuman et al. (2011).

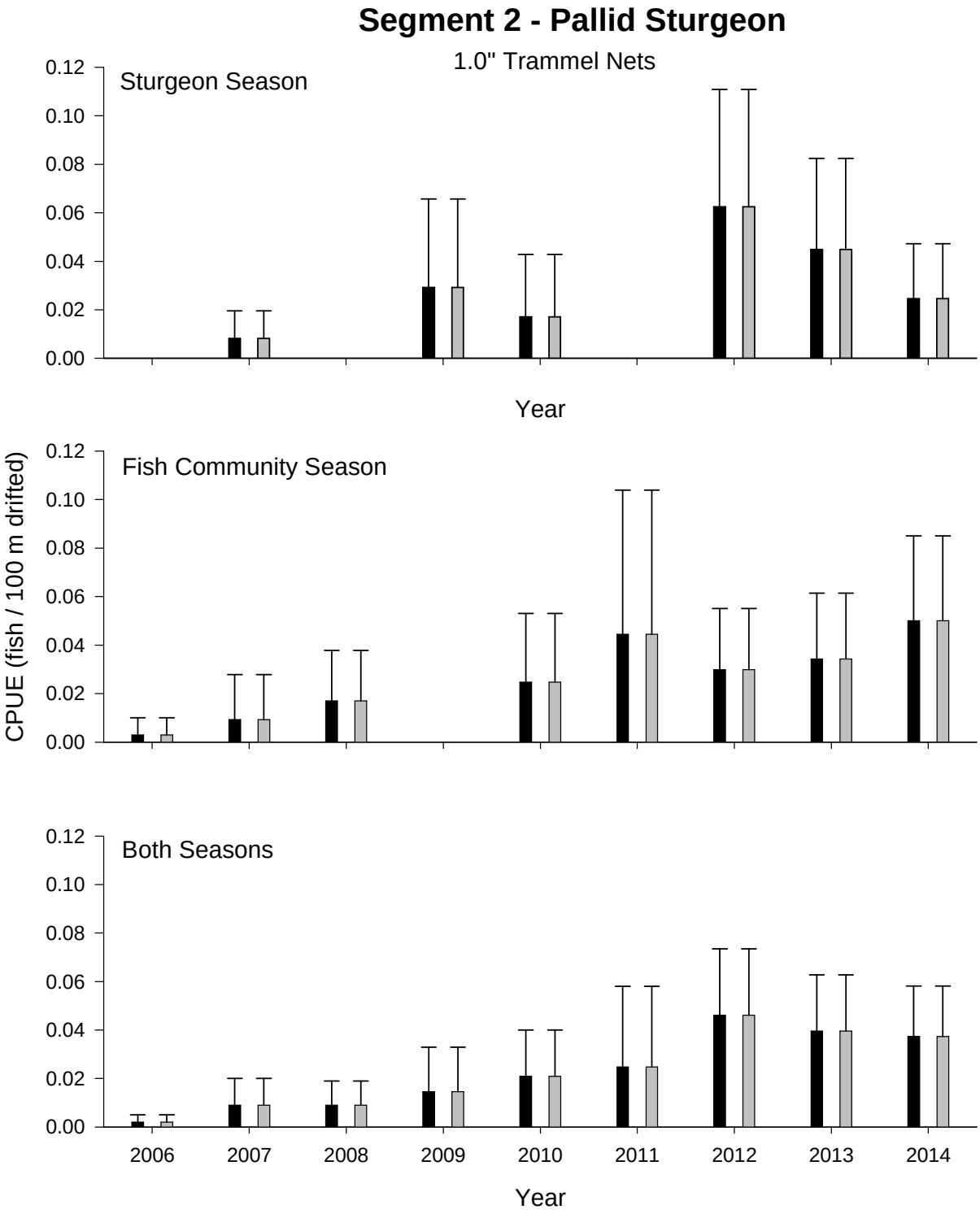


Figure 5. Mean annual catch per unit effort (+/- 2 SE) of all (black bars), wild (white bars), hatchery reared (gray bars), and unknown origin (cross-hatched bars) pallid sturgeon using 1.0" trammel nets in Segment 2 of the Missouri River from 2006-2014. Pallid sturgeon of unknown origin are awaiting genetic verification.

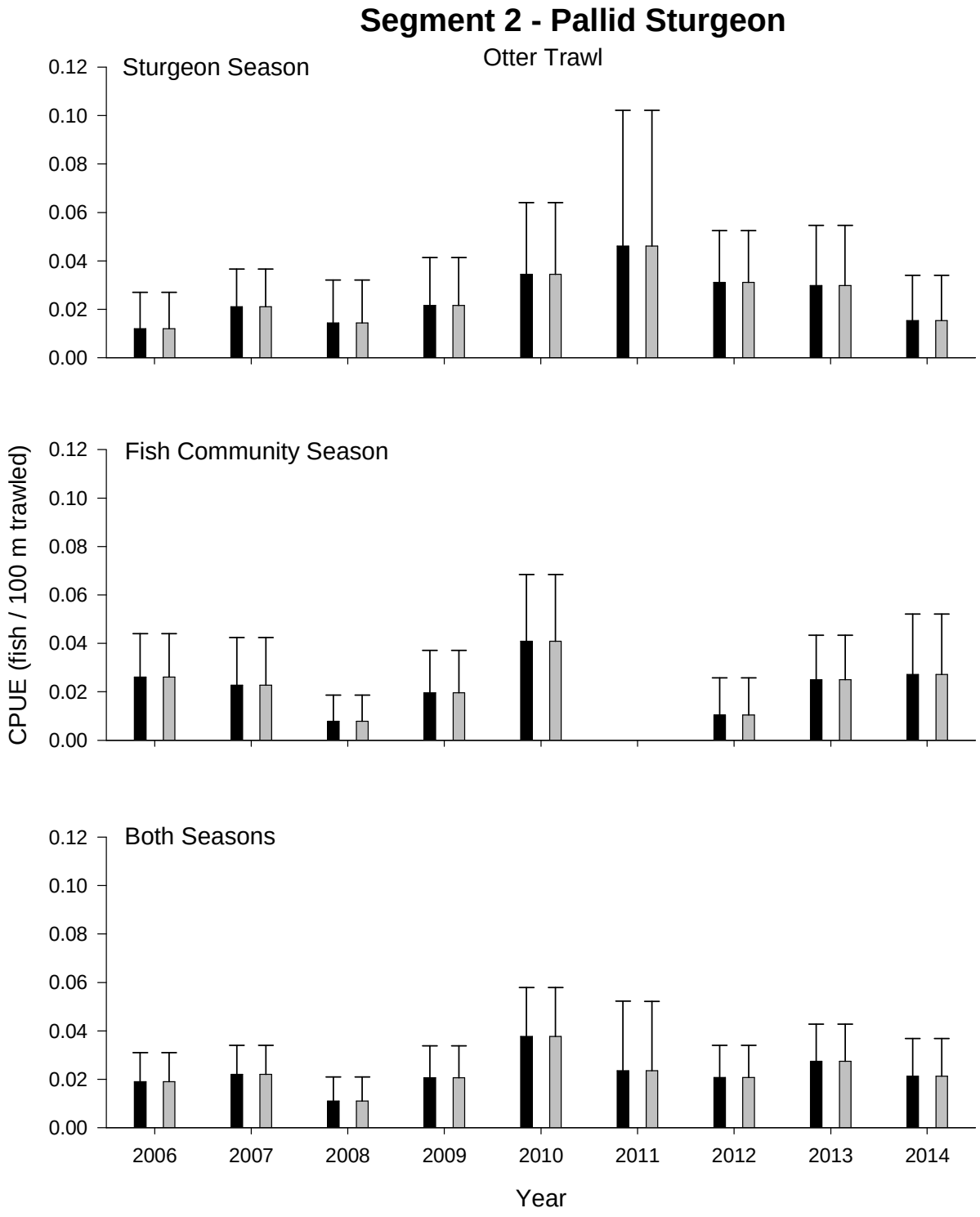


Figure 6. Mean annual catch per unit effort (+/- 2 SE) of all (black bars), wild (white bars), hatchery reared (gray bars), and unknown origin (cross-hatched bars) pallid sturgeon using otter trawls in Segment 2 of the Missouri River from 2006-2014. Pallid sturgeon of unknown origin are awaiting genetic verification.

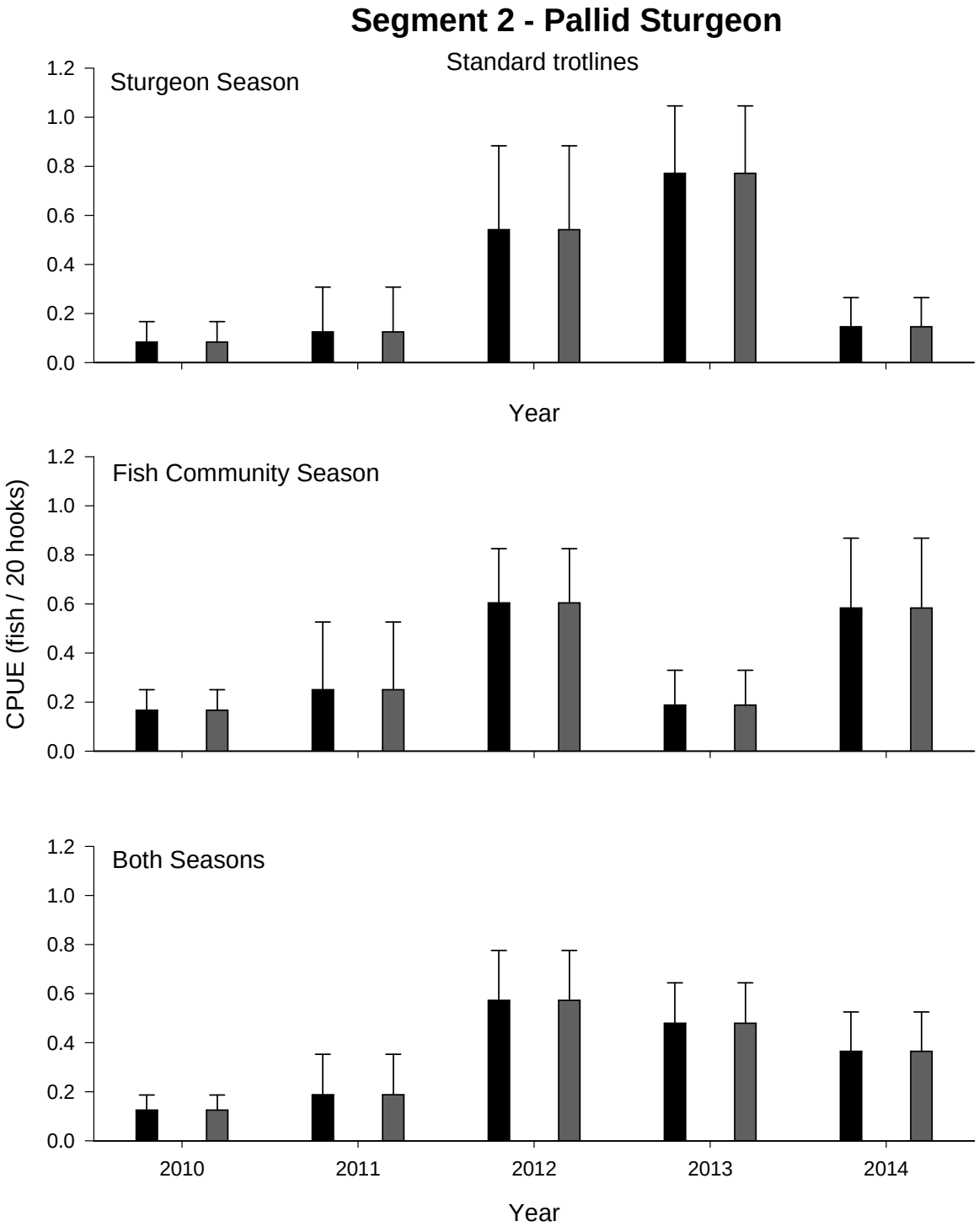


Figure 7. Mean annual catch per unit effort (+/- 2 SE) of all (black bars), wild (white bars), hatchery reared (gray bars), and unknown origin (cross-hatched bars) pallid sturgeon using trot lines in Segment 2 of the Missouri River from 2010-2014. Pallid sturgeon of unknown origin are awaiting genetic 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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	0	0	0	0	0	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	0	0	0	0	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	0	0	0	0	0	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	0	0	0	0	0	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	0	0	0	0	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	0	0	0	0	0	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	5	40	0	20	40	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	4	0	0	50	50	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	11	27	0	9	64	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	7	57	0	43	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	32	53	0	38	9	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	0	0	0	0	0	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	0	0	0	0	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	3	33	0	0	67	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	5	40	0	20	40	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	4	0	0	50	50	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	11	27	0	9	64	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	7	57	0	43	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	35	51	0	34	14	0	0	0	0
		33	7	32	27	0	0	0	0

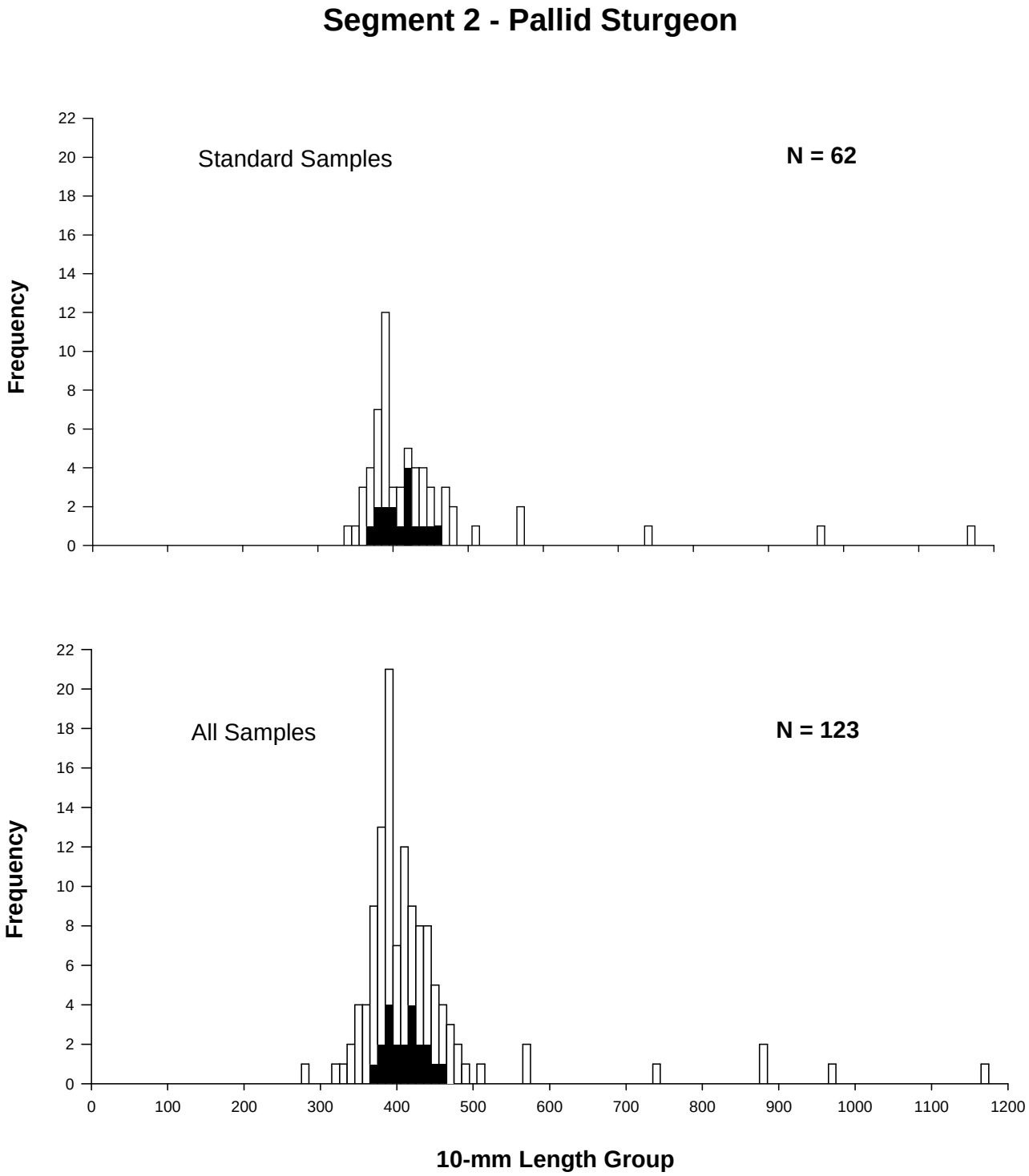


Figure 8. Length frequency of pallid sturgeon captured in Segment 2 of the Missouri River during 2013. Black bars represent captures during sturgeon season, while white bars represent captures during fish community season. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2013. Pallid sturgeon of unknown origin are awaiting genetic verification.

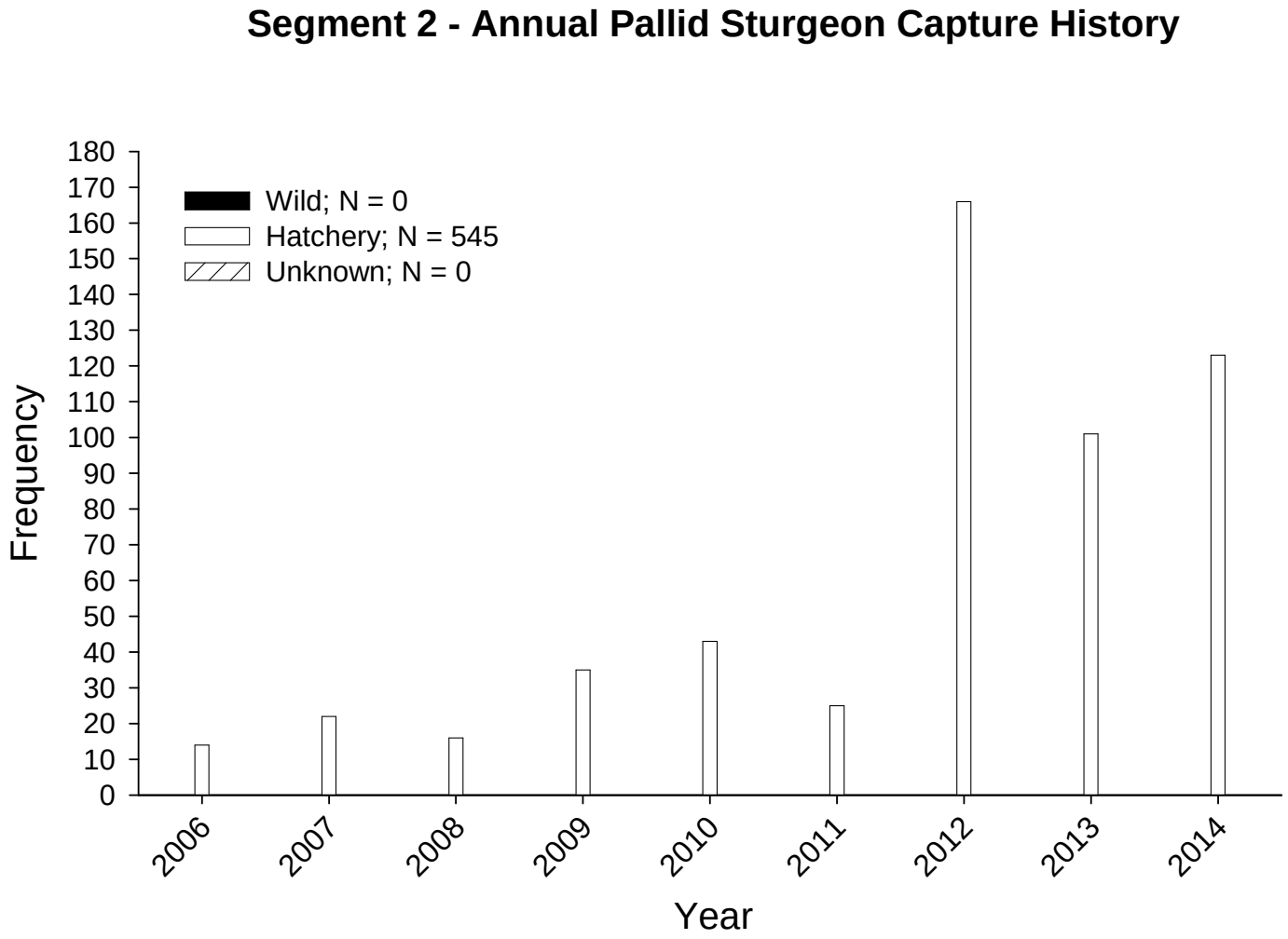


Figure 1. Annual capture history of wild (black bars), hatchery reared (white bars), and unknown origin (cross-hatched bars) pallid sturgeon collected in Segment 2 of the Missouri River from 2006-2014. Figure is designed to compare overall pallid sturgeon captures from year to year and is biased by variable effort among years. Figure includes all pallid captures including non-random and wild samples.

Shovelnose X Pallid Sturgeon Hybrids

No shovelnose sturgeon x pallid sturgeon hybrids have been collected in Segment 2 from 2006-2014.

Targeted Native River Species

Shovelnose Sturgeon

Shovelnose sturgeon continue to be highly abundant across Segment 2 of the Missouri River, particularly in the upper reaches. Sampling in 2014 resulted in the collection of 2,014 shovelnose sturgeon, which by far bested the previous high observed in 2012 (N=1,264). The caveat to this sample size is related to the non-random, targeted effort stated earlier. Between September 22 and September 25, that non-random sampling event alone witnessed 948 shovelnose sturgeon being captured. Omitting the data from that week, analysis is as follows; 36% of shovelnose observations occurred during sturgeon season, with the remaining 64% being witnessed during fish community season. Of the gears, trammel nets were most effective at sampling shovelnose sturgeon in Segment 2, capturing 70%, followed by trotlines (20%) and otter trawl (10%).

The combined trammel net CPUE (Figure 10), for both seasons, of quality and larger shovelnose sturgeon in Segment 2 for the 2014 sampling year was observed at 1.16 fish/100m, which is the highest catch rate ever recorded. This record was the result of an average CPUE during sturgeon season (0.83 fish/100m) combined with a record high observed during fish community season (1.49 fish/100m). Although both combined-season and fish community season CPUEs were at all time highs, these records are still based on very small increases over the previous record. Trammel net CPUE remains very low for the stock and sub-stock categories due to the age structure of shovelnose sturgeon in Segment 2 of the Missouri River (Figure 13).

Otter trawl CPUE within the quality or larger size class (Figure 11), for combined seasons, (0.18 fish/100m) was only slightly higher than the all time low witnessed in 2013 (0.15 fish/100m). This was due to the slightly below average CPUE calculated for both sturgeon (0.22 fish/100m) and fish community (0.07 fish/100m) seasons, respectively. Similarly to trammel nets, CPUE for the stock and sub-stock size categories remains low.

Combined-season trotline CPUE for quality or larger shovelnose sturgeon (Figure 12) in Segment 2 during the 2014 sampling season reached an all time low (2.25 fish/20 hooks). This record low can be attributed to the second lowest observed CPUE during sturgeon season (2.15 fish/20 hooks) and a new low calculated during fish community season (2.35 fish/20 hooks).

Although these lower capture rates are at or near all time lows, the magnitude of CPUE change is very small and remains quite comparable from previous years.

A detailed length frequency histogram can be found in Figure 13. Shovelnose sturgeon within Segment 2 in 2014 averaged 608 mm in fork length and 907 g in weight. The average length and weight observed in 2014 falls in line with those calculated in previous years, especially since the smaller size classes remain nearly absent in Segment 2. To illustrate, less than 1% of the total shovelnose captures measured less than 400 mm in fork length. In comparison, smaller size classes of shovelnose sturgeon are much more frequently captured in the downstream segments of RPMA 2.

Shovelnose sturgeon relative weight (Wr) continues to vary, yet be comparable within the stock category (Figure 15). The Wr for the preferred and above classes is much less variable and has shown a very slight decline since 2012. The pattern observed for the preferred and above size classes is perceivable, given that it is based on such a large sample size. Conversely, the variation and error associated with the stock category can be attributed to a small sample size year after year.

The specific macro habitats where shovelnose sturgeon were sampled in 2014, 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.

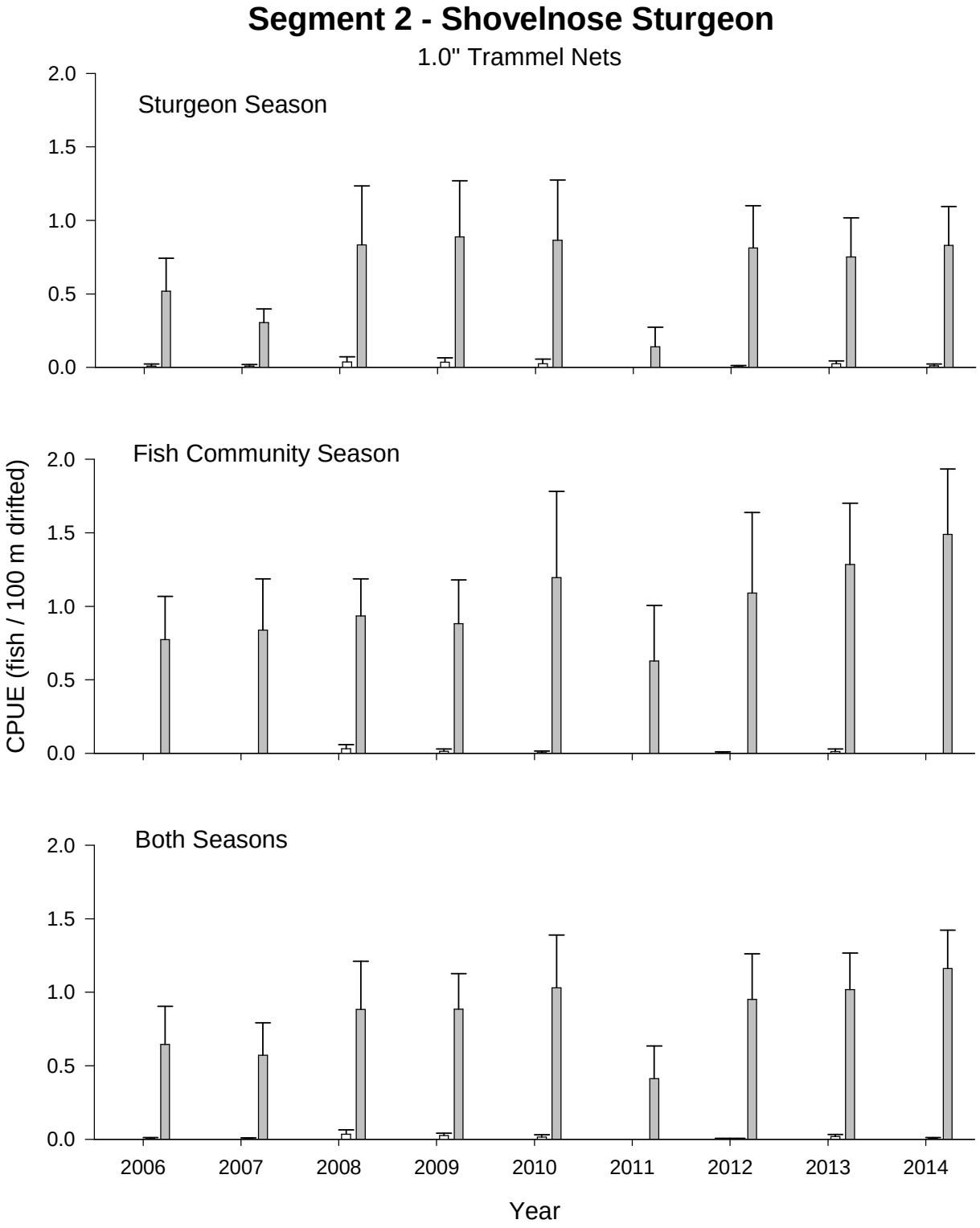


Figure 2. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; cross-hatched bars), sub-stock size (150-249 mm; black bars), stock size (250-379 mm; white bars), and quality and above size (> 380 mm; gray bars) shovelnose sturgeon using 1.0" trammel nets in Segment 2 of the Missouri River from 2006-2014.

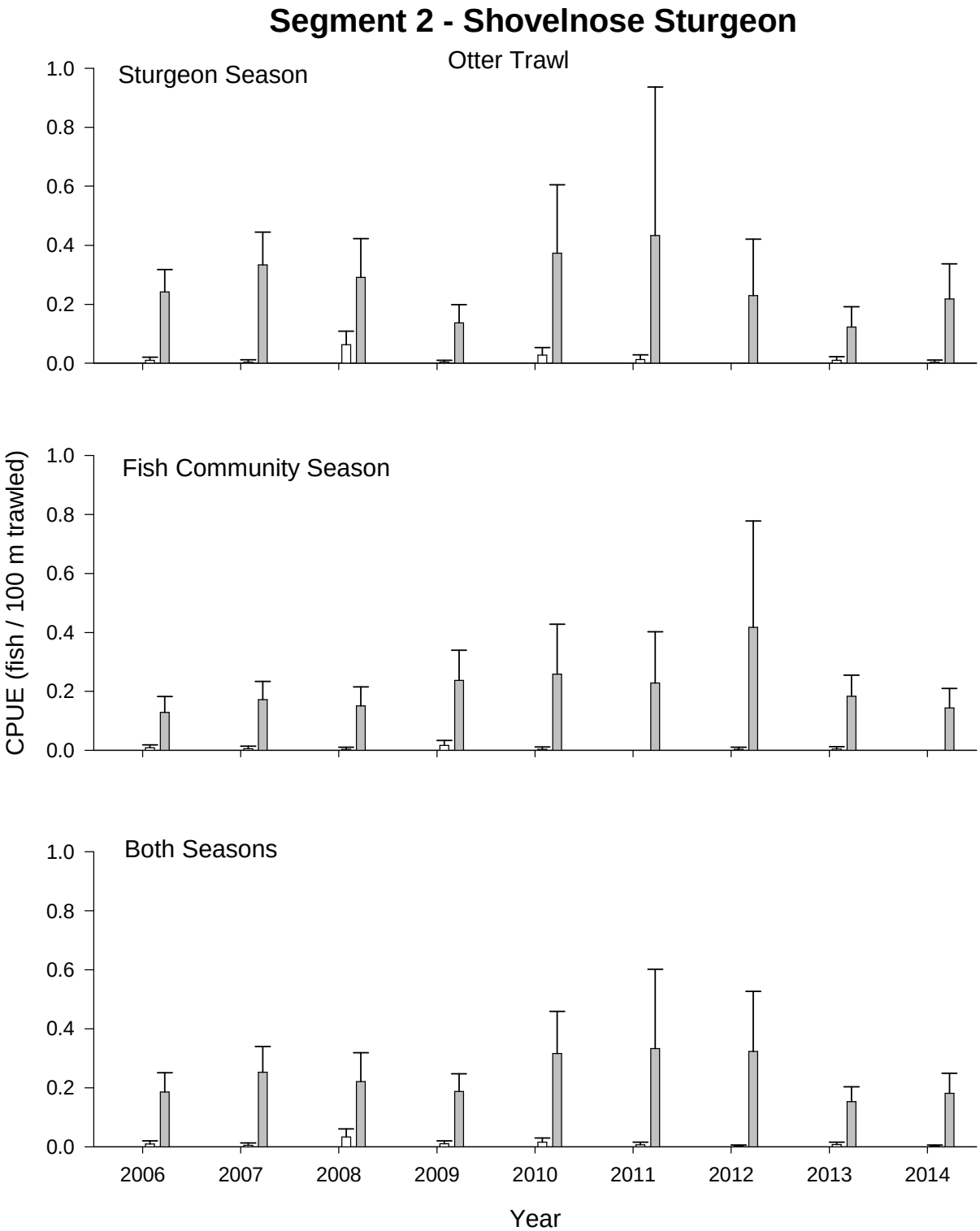


Figure 3. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; cross-hatched bars), sub-stock size (150-249 mm; black bars), stock size (250-379 mm; white bars), and quality and above size (> 380 mm; gray bars) shovelnose sturgeon using otter trawls in Segment 2 of the Missouri River from 2006-2014.

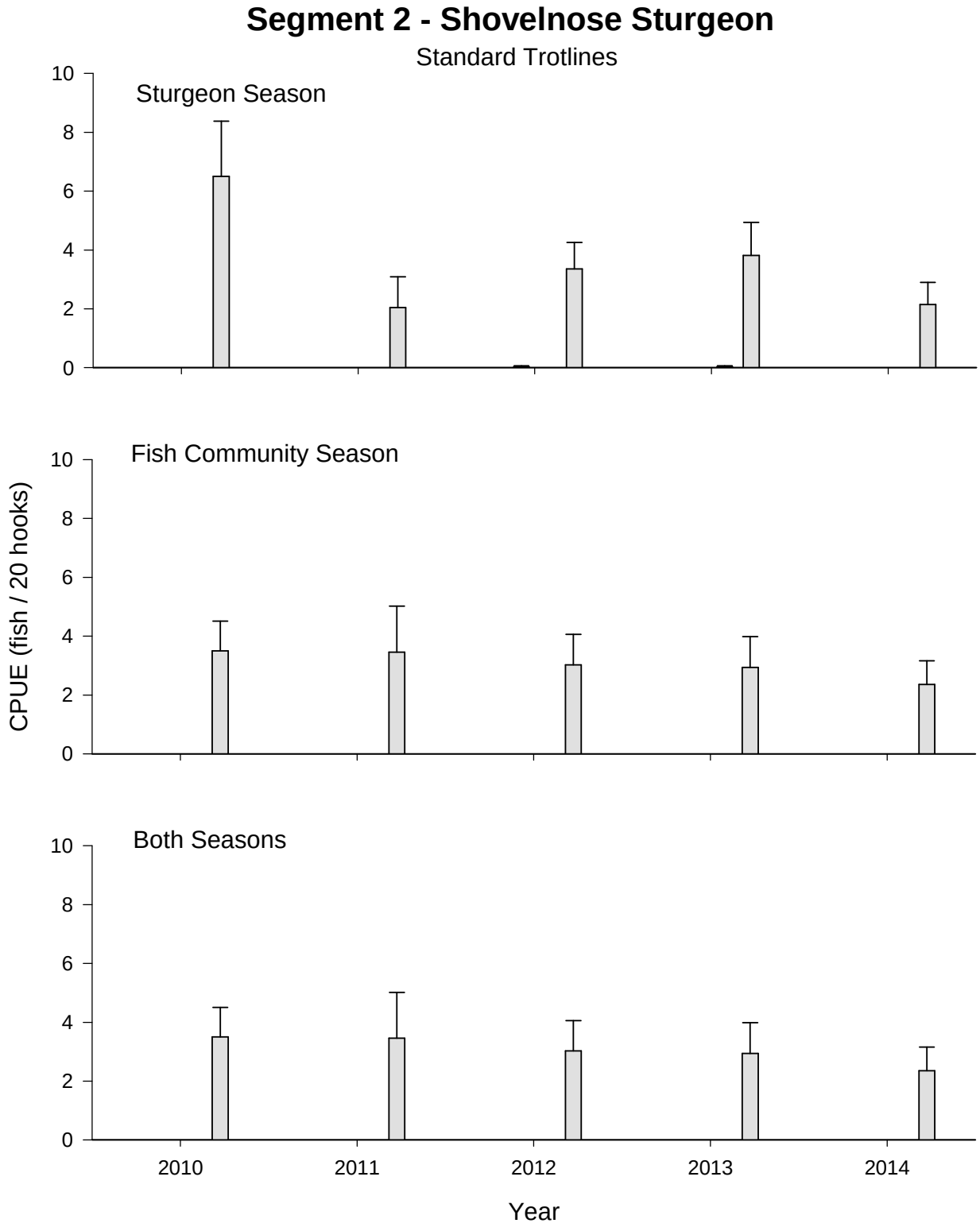


Figure 4. Mean annual catch per unit effort (+/- 2 SE) of sub-stock size (0-149 mm; cross-hatched bars), sub-stock size (150-249 mm; black bars), stock size (250-379 mm; white bars), and quality and above size (> 380 mm; gray bars) shovelnose sturgeon using trot lines in Segment 2 of the Missouri River from 20010-2014.

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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	0	0	0	0	0	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	0	0	0	0	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	0	0	0	0	0	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	0	0	0	0	0	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	0	0	0	0	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	0	0	0	0	0	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	3	33	0	33	33	0	0	0	0
		35	2	30	28	3	0	0	1
Otter Trawl	1	100	0	0	0	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	0	0	0	0	0	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	0	0	0	0	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	0	0	0	0	0	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	192	29	1	26	39	5	0	0	1
		35	2	30	28	3	0	0	1
Otter Trawl	57	32	0	54	14	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	355	28	0	43	29	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	38	34	8	32	26	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	216	36	1	44	20	0	0	0	0
		33	7	32	27	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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	195	29	1	26	38	5	0	0	1
		35	2	30	28	3	0	0	1
Otter Trawl	58	33	0	53	14	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	355	28	0	43	29	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	38	34	8	32	26	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	216	36	1	44	20	0	0	0	0
		33	7	32	27	0	0	0	0

Segment 2 - Shovelnose Sturgeon

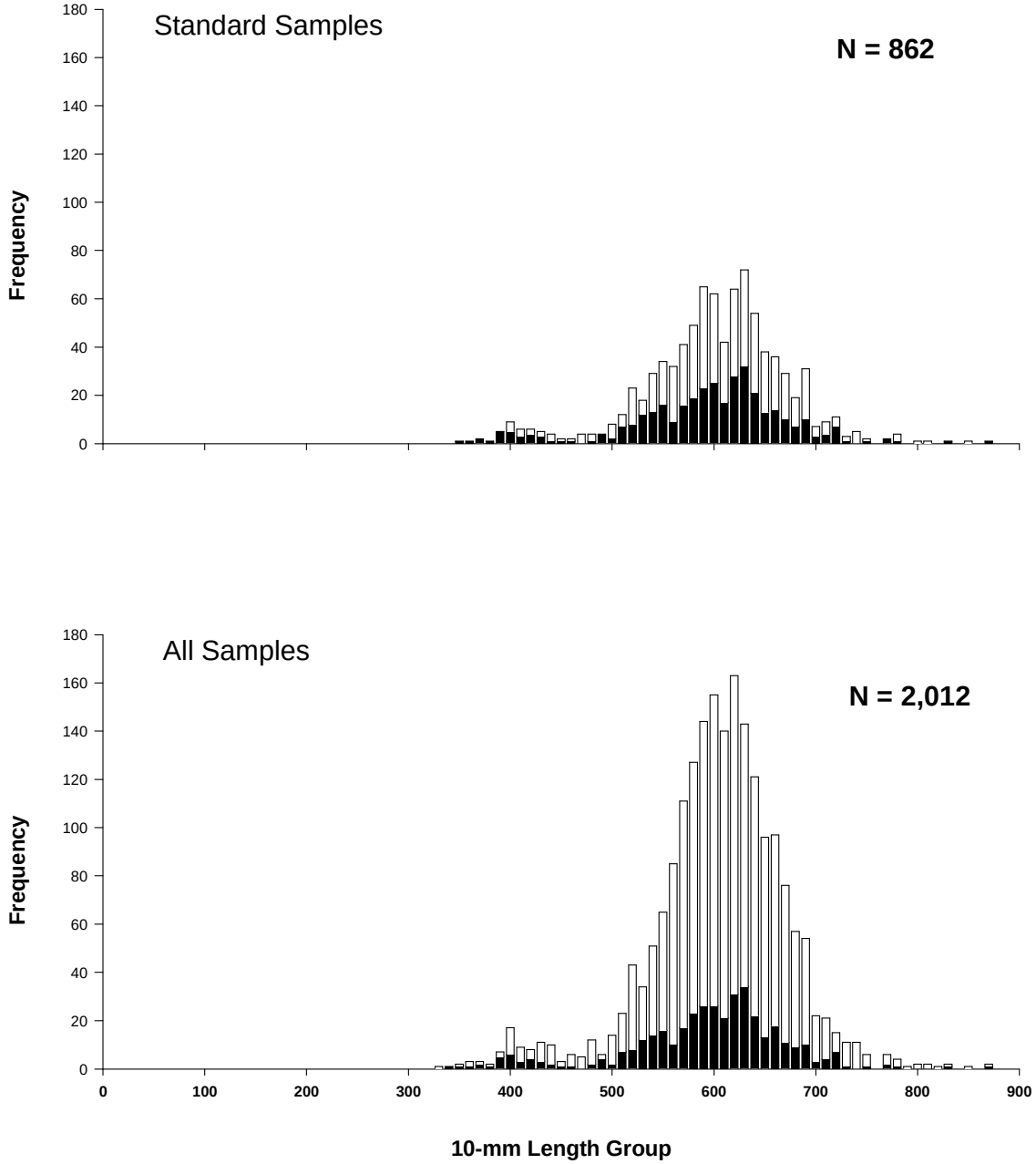


Figure 13. Length frequency of shovelnose sturgeon during the sturgeon season (black bars) and fish community season (white bars) in Segment 2 of the Missouri River during 2014. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2014.

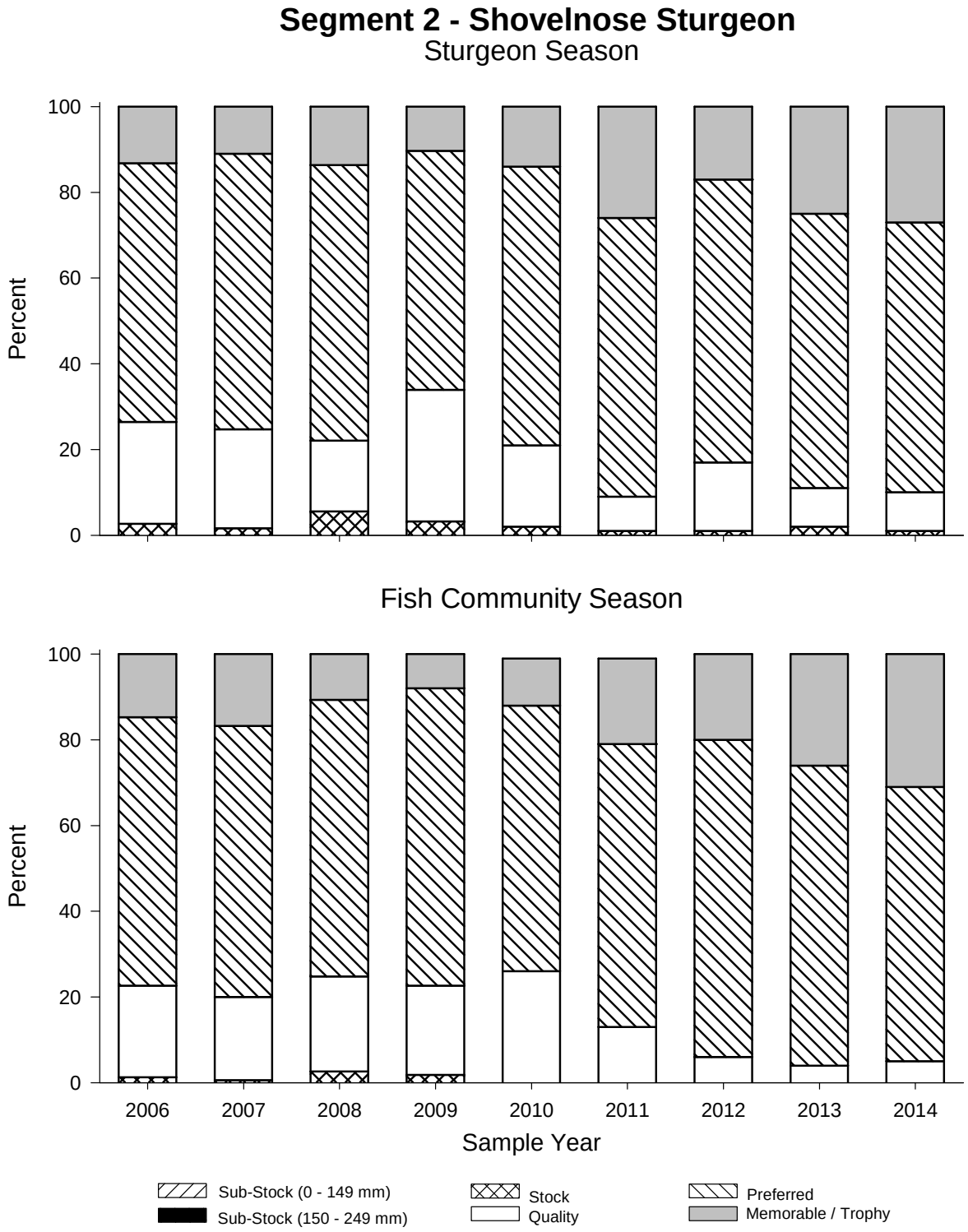


Figure 5. Incremental relative stock density (RSD) for all shovelnose sturgeon captured with all gear by length category from 2006 to 2014 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Quist (1998).

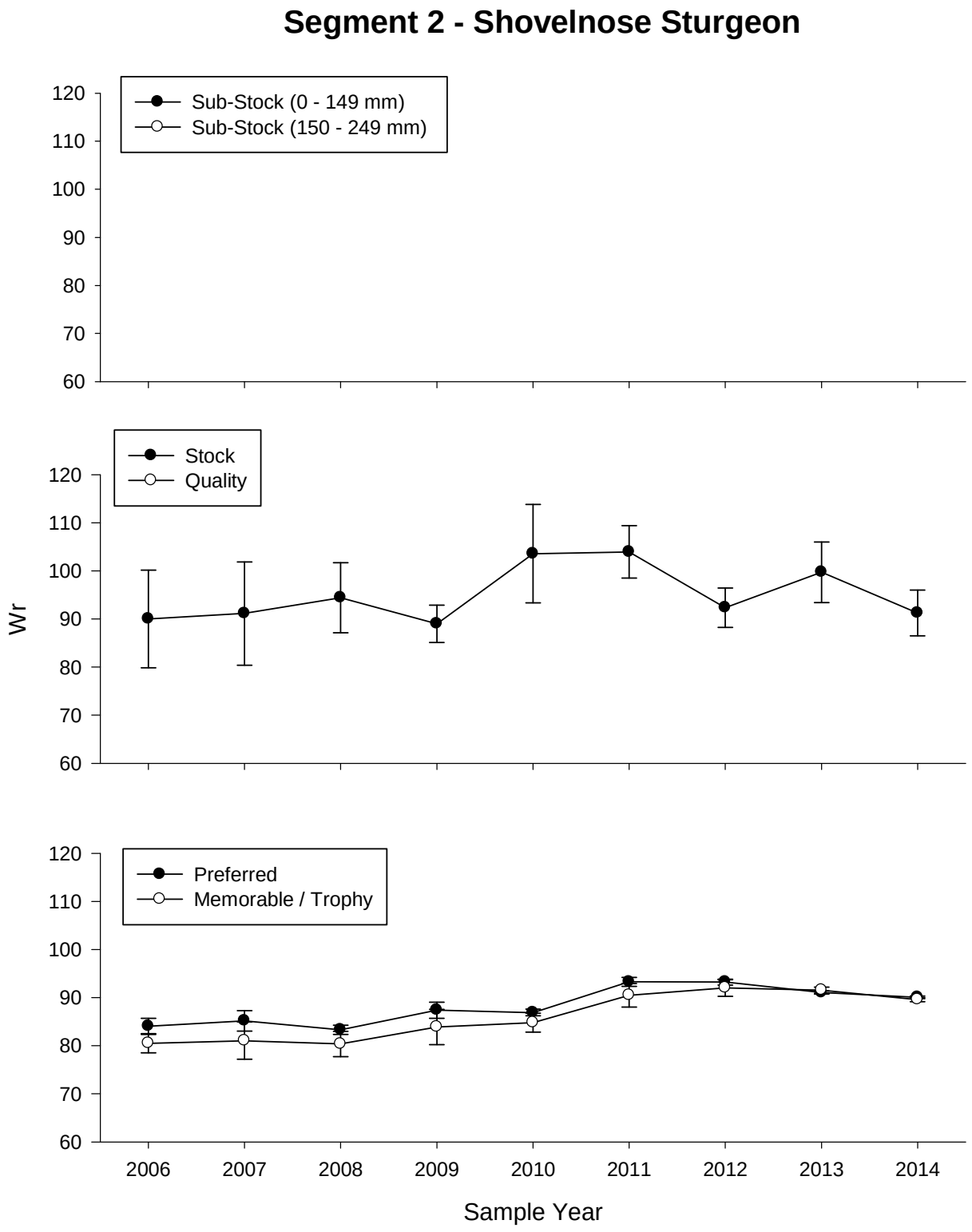


Figure 6. Relative weight (Wr) for all shovelnose sturgeon captured with all gear by incremental relative stock density (RSD) length category from 2006-2014 in Segment 2 in the Missouri River. Length categories determined using the methods proposed by Quist (1998).

Sturgeon Chub

A total of sixteen sturgeon chubs were sampled in Segment 2 during the 2014 field season; with 12 of them being captured during random sampling events, and an additional four observed during non-random, duplicate sampling. Unlike previous years, the majority of sturgeon chubs were captured during fish community season (88%). Furthermore, sturgeon chubs were only witnessed in three bends (27, 28 and 29, respectively). All sturgeon chubs captured in Segment 2 in 2014 were sampled in the otter trawl.

With a catch per unit effort approaching zero fish/100m during sturgeon season and a near average CPUE during fish community season (0.041 fish/100m) an all time record low was observed for a combined-season CPUE (0.026 fish/100m). A full comparison of years 2006-2014 can be seen in Figure 16.

The average total length for sturgeon chubs captured in Segment 2 in 2014 was 84 mm, which is identical to the past two field seasons. As indicated by this phenomenon, the size structure of sturgeon chubs in Segment 2 continues to be dominated by adult age classes. An illustration of complete size structure can be found in Figure 17.

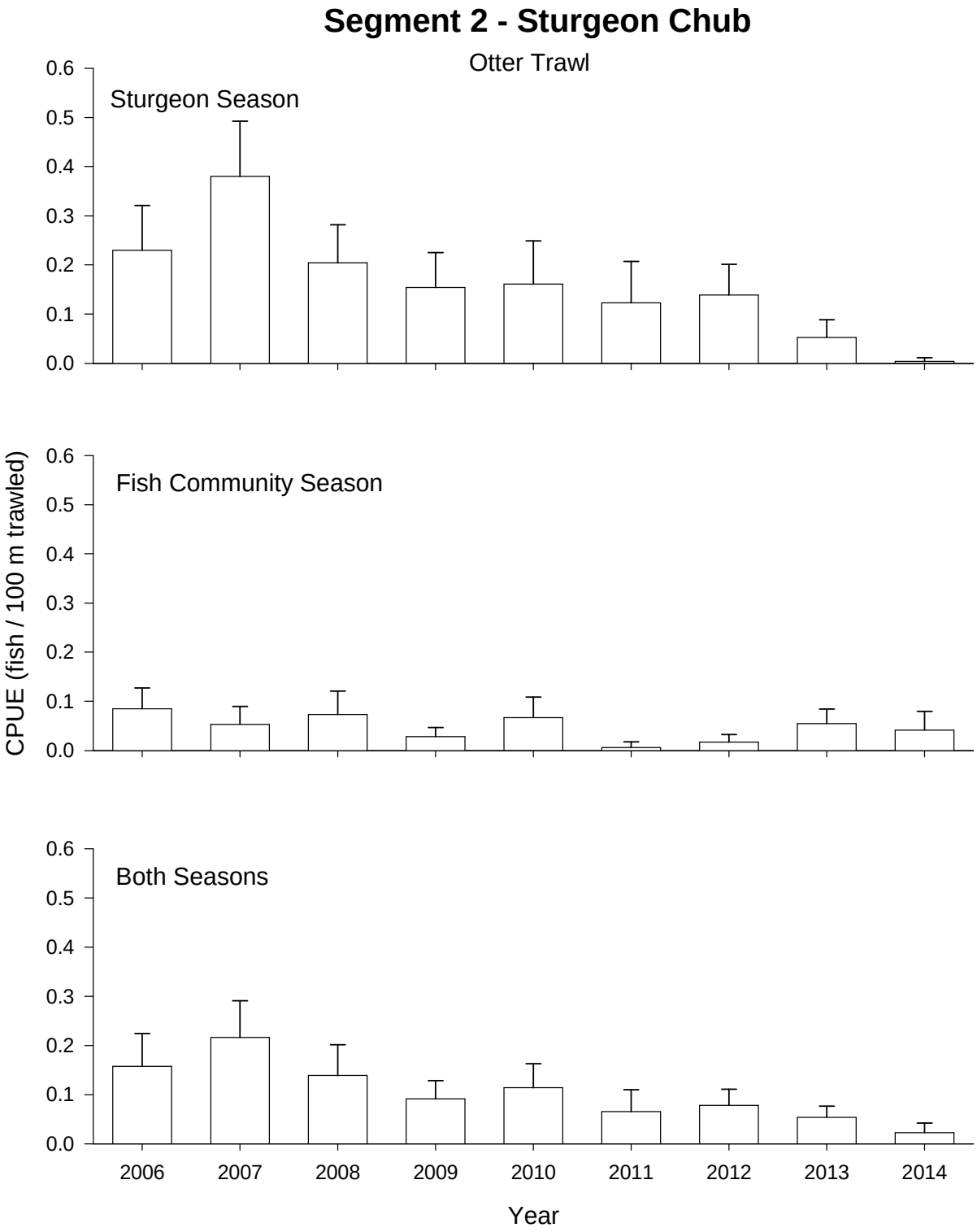


Figure 7. Mean annual catch per unit effort (+/- 2 SE) of sturgeon chub using otter trawls in Segment 2 of the Missouri River from 2006-2014.

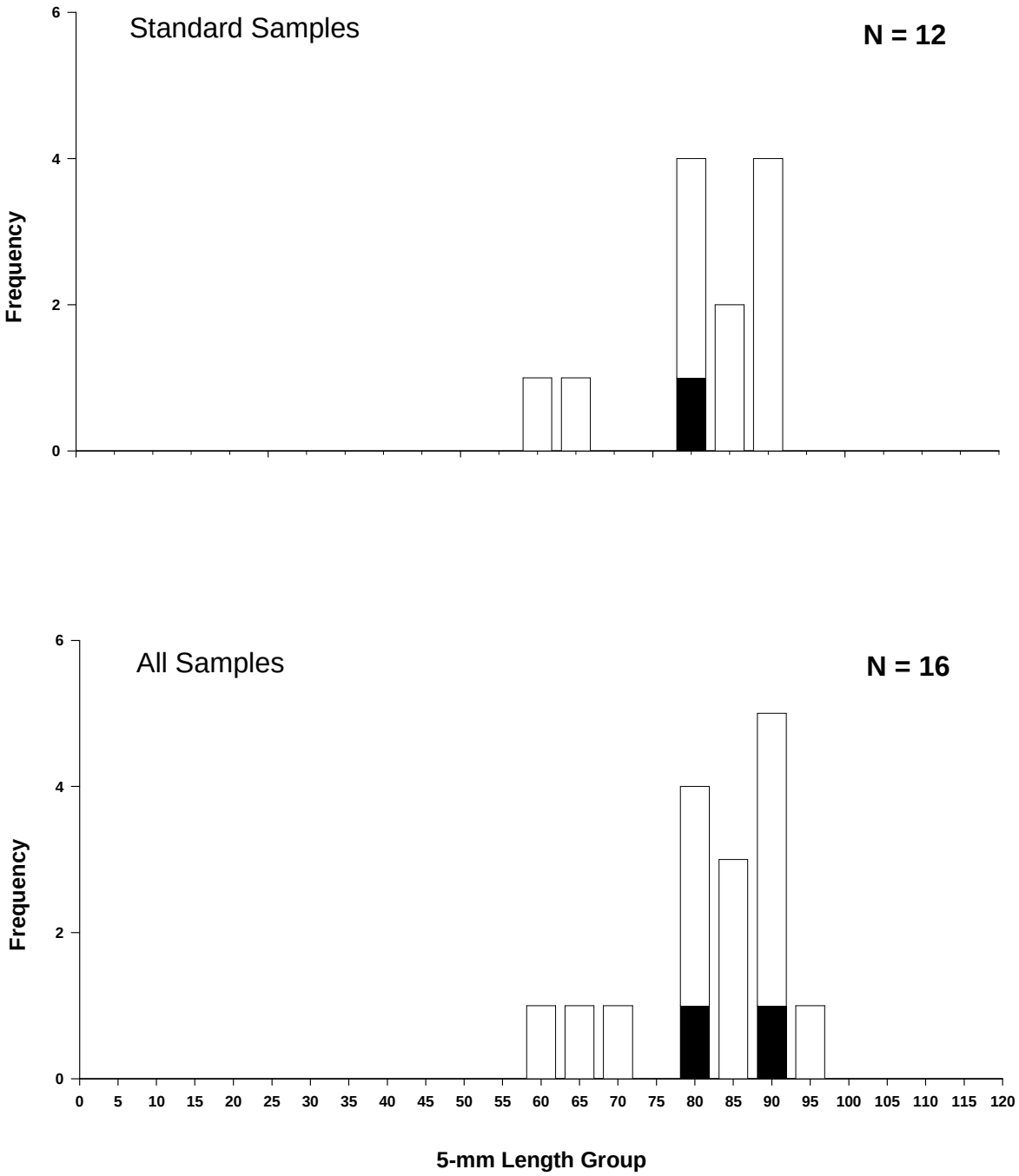


Figure 8. Length frequency of sturgeon chub during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2014. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2014.

Sicklefin Chub

Sickelfin chub captures, which are never exceptional in Segment 2, were dismal in 2014. Only one sickelfin chub was captured this past field season; the result of a non-random, duplicate otter trawl. Heretofore, CPUE for individual, as well as combined seasons, was 0 fish/100m. A detailed CPUE for previous years can found in Figure 18.

Given the fact that the one sickefin chub (Figure 19) that was captured was a large adult (99mm), the previous pattern of an adult-only population residing in Segment 2 has been kept true. In contrast, sickelfin chubs captured in 2014 residing in Segment 3 (N=162) ranged from 43 mm to 125 mm, indicating multiple age classes exist.

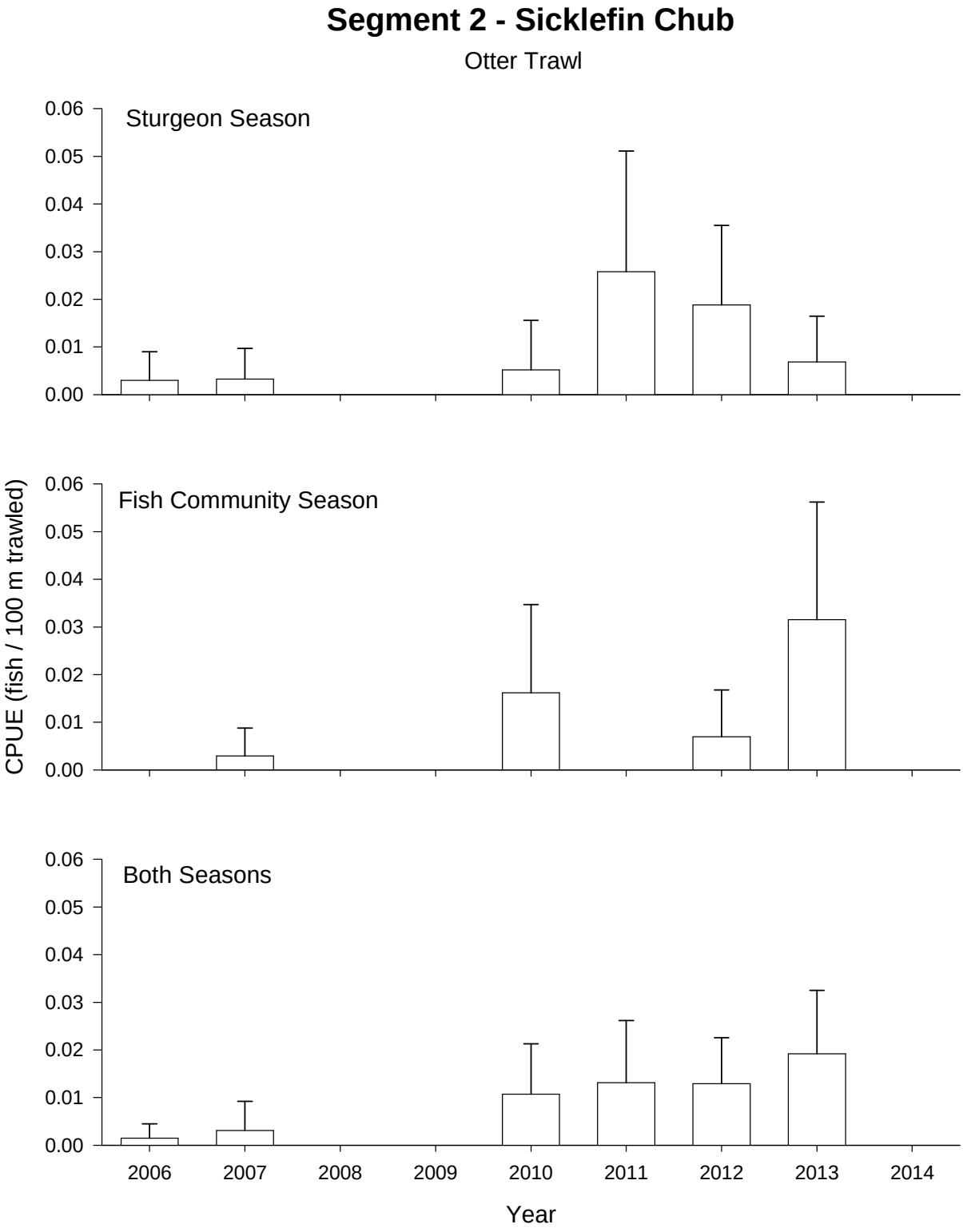


Figure 9. Mean annual catch per unit effort (+/- 2 SE) of sicklefin chub using otter trawls in Segment 2 of the Missouri River from 2006-2014.

Segment 2 - Sicklefin Chub

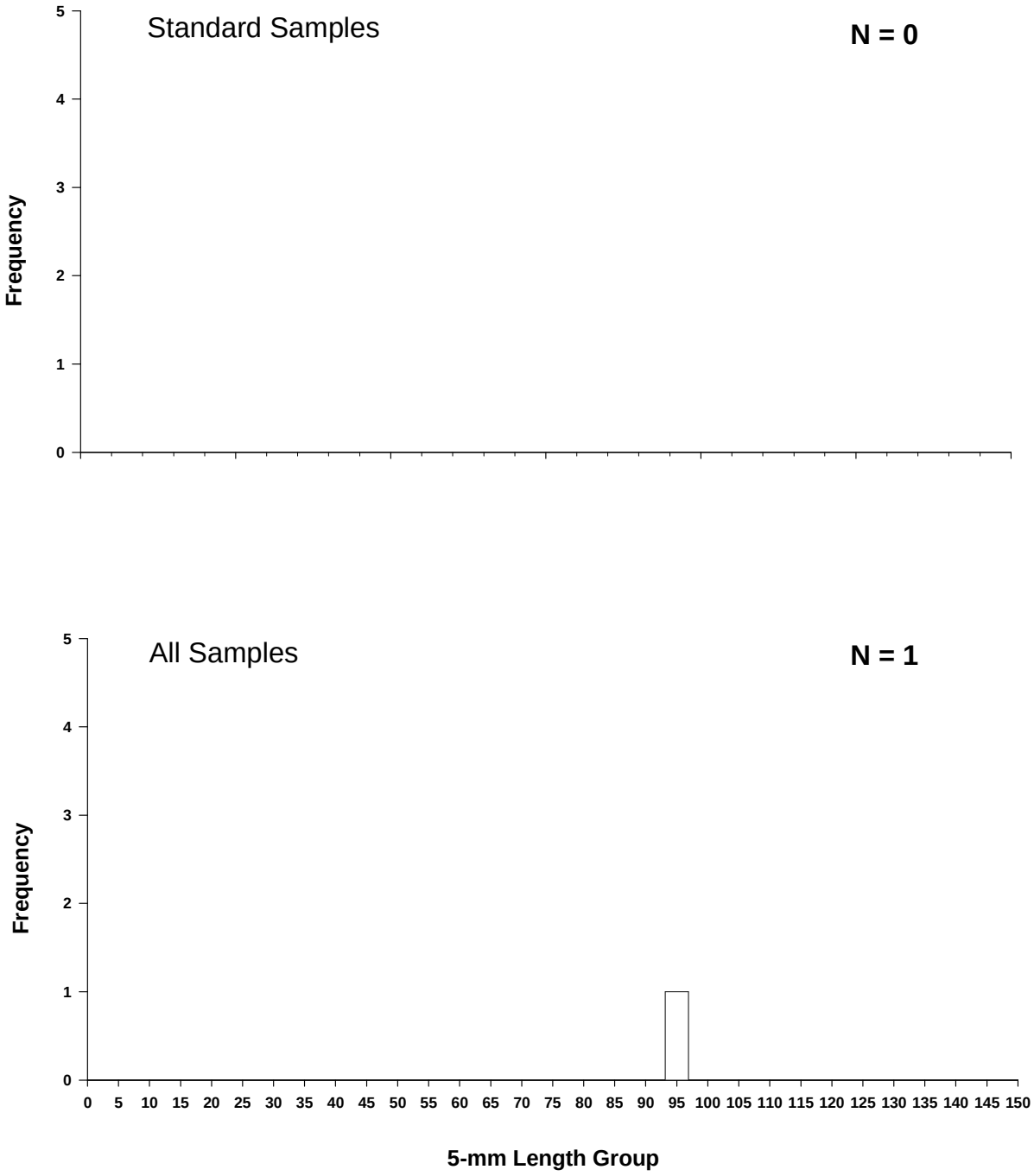


Figure 10. Length frequency of sicklefin chub during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2014. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2014.

Sand Shiner

Sampling of Segment 2 during 2014 resulted in the capture of 207 sand shiners, with all but one (otter trawl) being sampled via mini-fyke net. After very poor mini-fyke net catch rates (Figure 20) during the high-water year of 2011 (0.67 fish/net night), a dismal catch rate in 2012 (0.09 fish/net night), catch rates rebounded in 2013 (3.04 fish/net night). Although not as high as the catch rate observed in 2013, catch rates in 2014 (2.31 fish/net night) were still substantially higher than those seen in 2011 and 2012, and were only slightly lower than those witnessed in 2010 (3.78 fish/net night). A full CPUE comparison for years 2006-present can be seen in Figure 19.

The average total length for sand shines observed in Segment 2 during the 2014 sampling year was 39 mm, with a range of 22 mm to 65 mm. This average length fits well within the realm witnessed in previous years, additionally; the range of size (Figure 21) indicates multiple year classes were present.

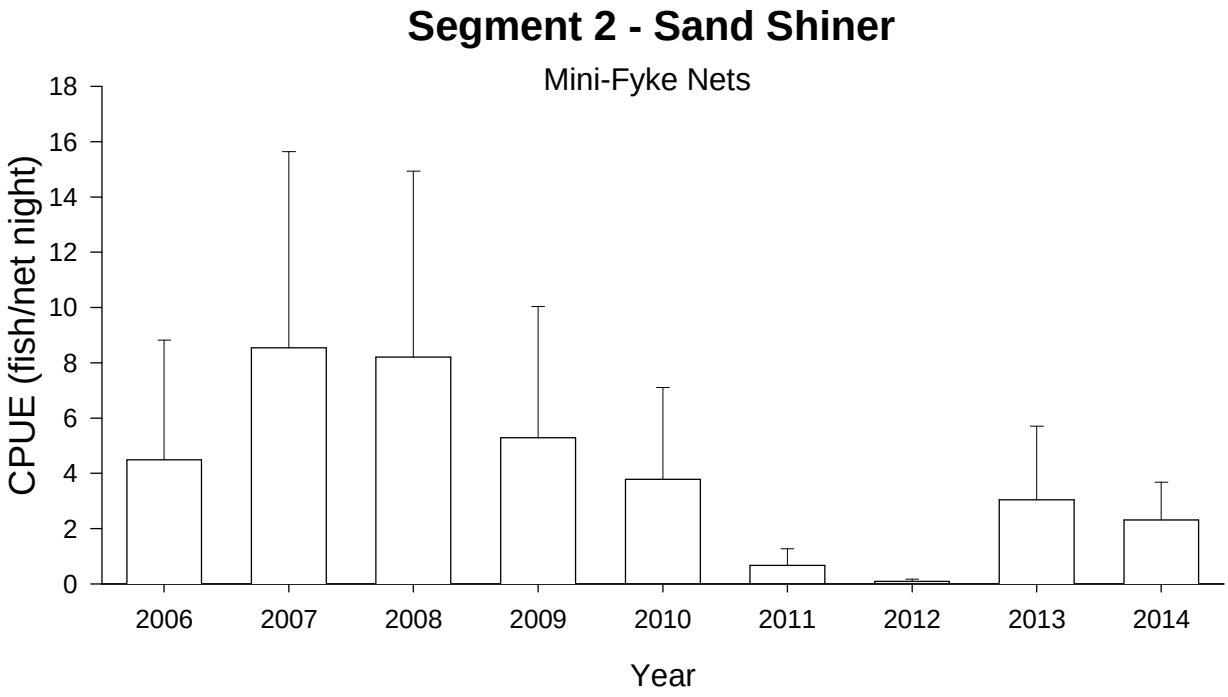


Figure 11. Mean annual catch per unit effort (+/- 2 SE) of sand shiner with mini-fyke nets in Segment 2 of the Missouri River during fish community season 2006-2014.

Segment 2 - Sand Shiner

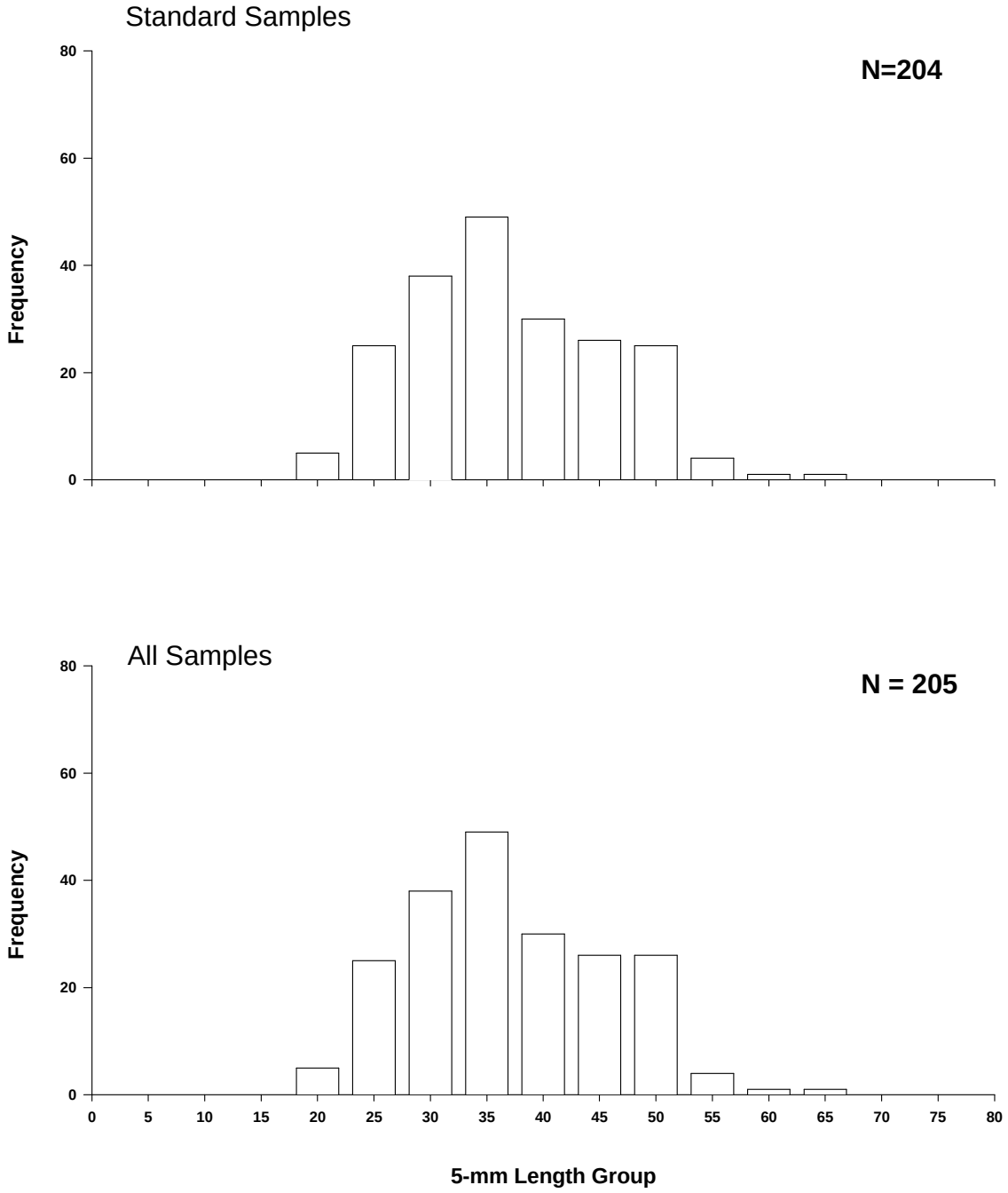


Figure 12. Length frequency of sand shiner during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2014. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2014.

Hybognathus spp.

A total of 25 *Hybotnathus* spp. were captured during the Segment 2 sampling effort in Segment 2, which was down drastically from the numbers observed in 2013 (N=172). Mini-fyke nets accounted for the majority of samples collected (N=22). After a significant increase of mini-fyke net CPUE (Figure 22) from 2012 (0.04 fish/net night) to 2013 (2.63 fish/net night), catch rates dipped drastically again in 2014 (0.23 fish/net night).

Total length for the *Hybotnathus* spp. sampled throughout Segment 2 in 2014 was 87 mm, which was much more similar to the TL average witnessed in 2012 (94mm) than that observed in 2013 (45 mm). It appears as though the younger year classes captured during the 2013 field season recruited into the adult size class of fish, however, unlike 2013, the smaller size classes of fish were not observed in 2014.). A full description of length frequency data can be observed in Figure 23.

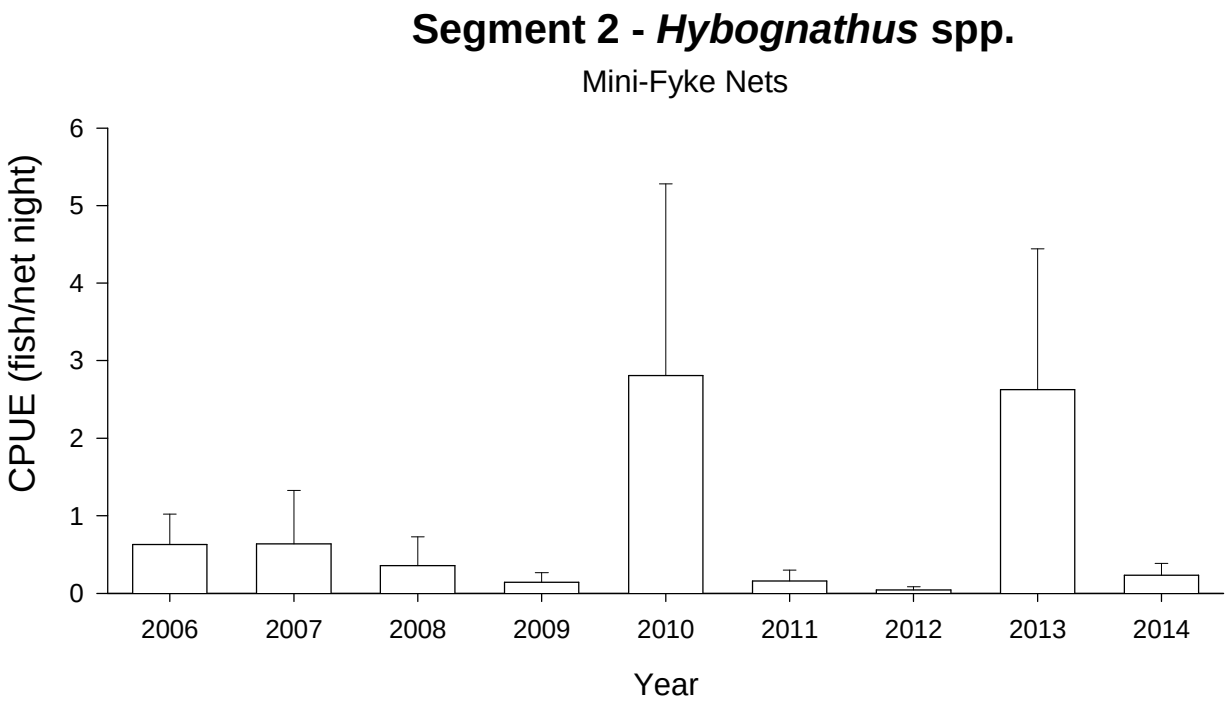


Figure 13. Mean annual catch per unit effort (+/- 2 SE) of *Hybognathus* spp. with mini-fyke nets in Segment 2 of the Missouri River during fish community season 2006-2014.

Segment 2 - *Hybognathus* spp.

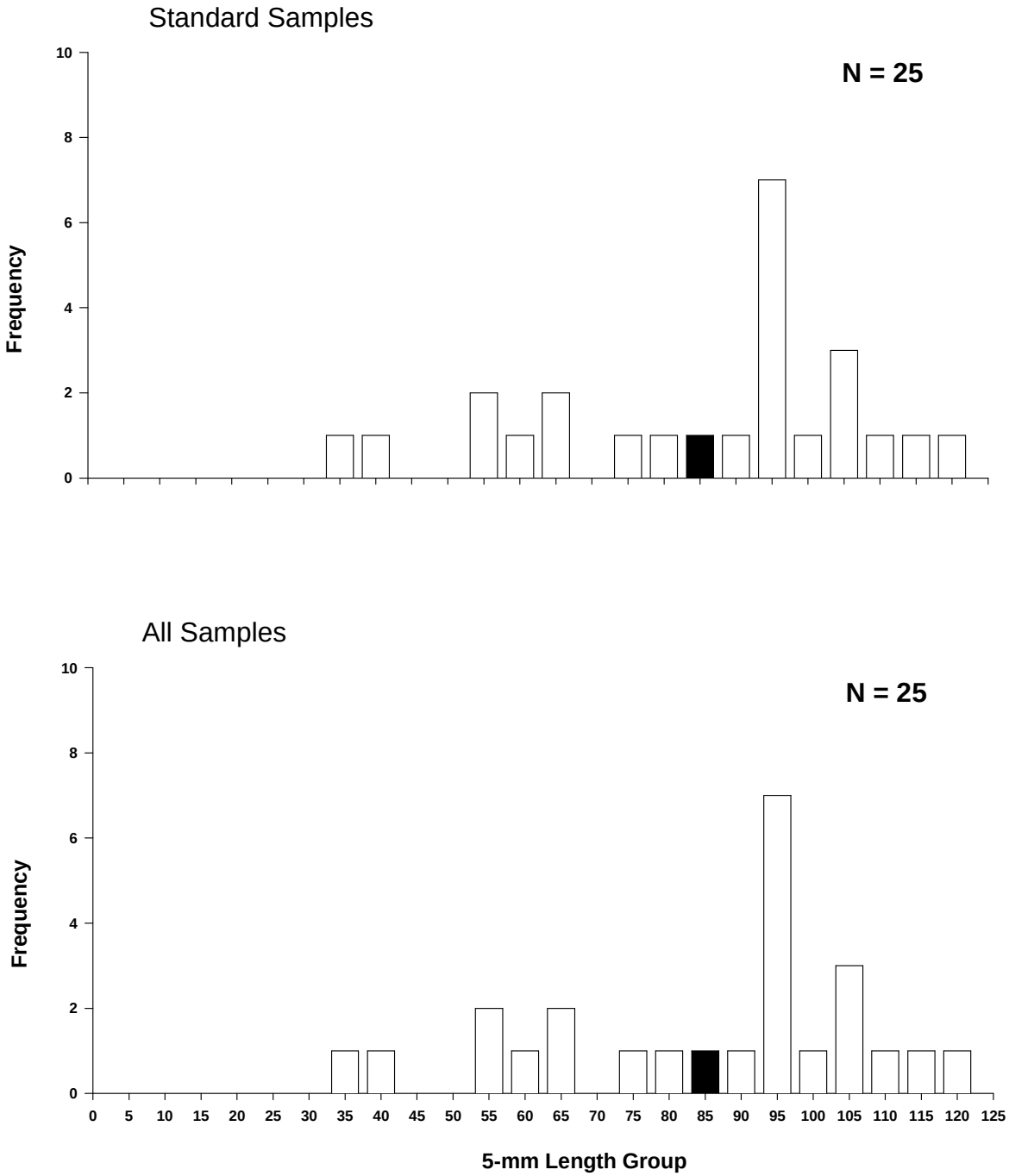


Figure 14. Length frequency of *Hybognathus* spp. caught during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2014. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2014.

Blue Sucker

A total of forty-four blue suckers were captured in Segment 2 in 2014, which bested the previous high recorded in 2007 (N=36). More than half (59%) of these captures can be attributed one sampling event which took place April 24 at bend 2 (RM 1760). By gear, trammel nets captured the largest proportion of blue suckers (N=41), while the otter trawl accounted for three.

A new record high for trammel net CPUE (Figure 24) was observed in both combined-season CPUE (0.07 fish/100m) and sturgeon season CPUE (0.13 fish/100m), while fish community season posted a modest (0.02 fish/100m). The pattern of higher CPUE during sturgeon season remains a constant across Segment 2 in a suspected relation to spring-time spawning movements made by adult blue suckers.

Otter trawl CPUE for blue suckers, despite setting new records in both combined-season CPUE (0.009 fish/100m) and fish community season (0.012fish/100m), continued to be low in 2014, indicating, in combination with previous years, that the otter trawl may not be the best gear for sampling adult blue suckers. A complete comparison for year to year otter trawl CPUE can be found in Figure 25.

The average TL for blue suckers handled in Segment 2 during the 2014 field season was 709 mm, which is essentially the same as previous years. As indicated by the length frequency in Figure 26, the sampled population of blue suckers was once again comprised of adult fish. In fact, only two presumed young of the year blue suckers have been sampled in Segment 2, one each in 2010 and 2011.

Further information regarding the specific macro habitat and associated capture information can be viewed in Table 14.

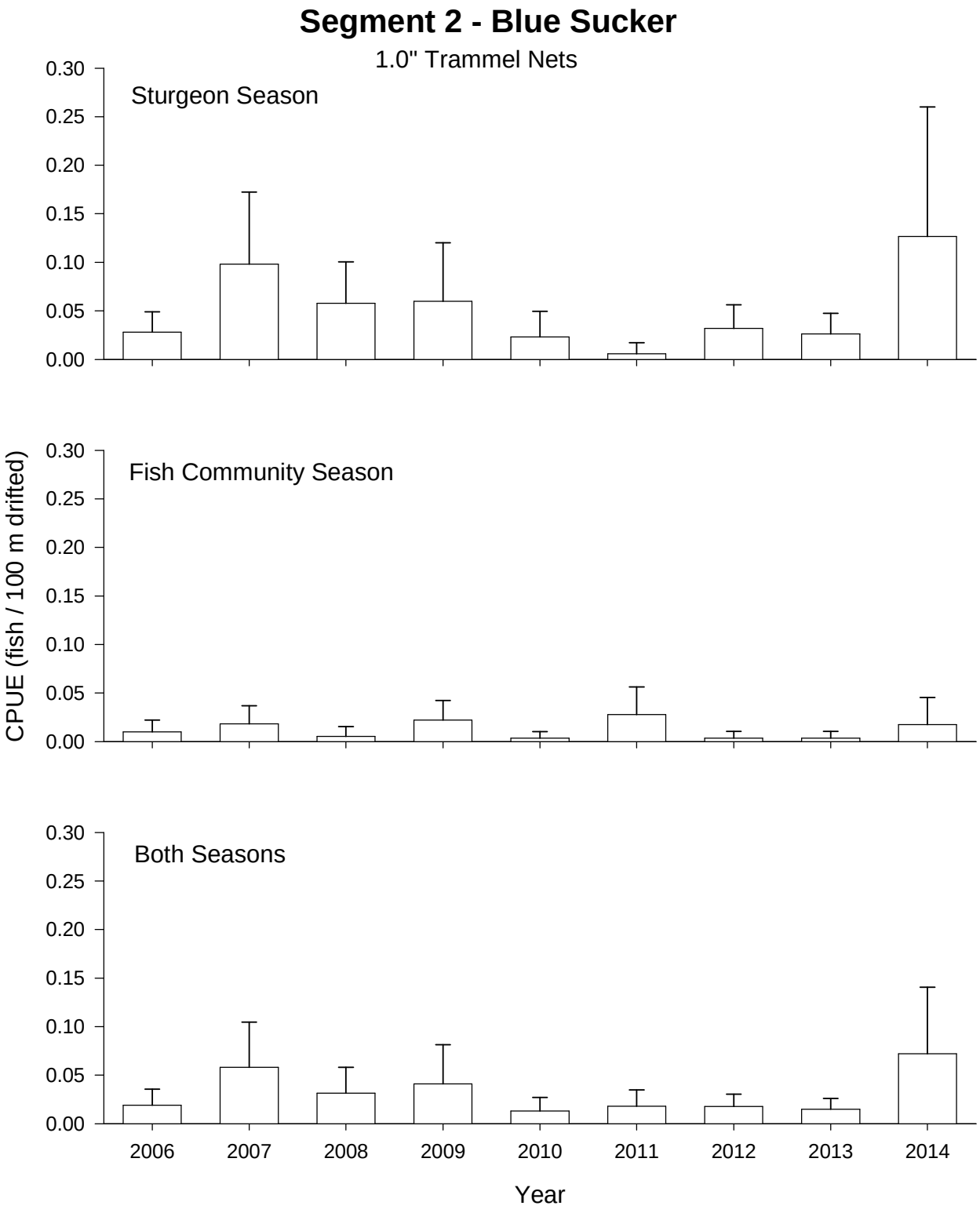


Figure 15. Mean annual catch per unit effort (+/- 2 SE) of blue sucker using 1.0” trammel nets in Segment 2 of the Missouri River from 2006-2014.

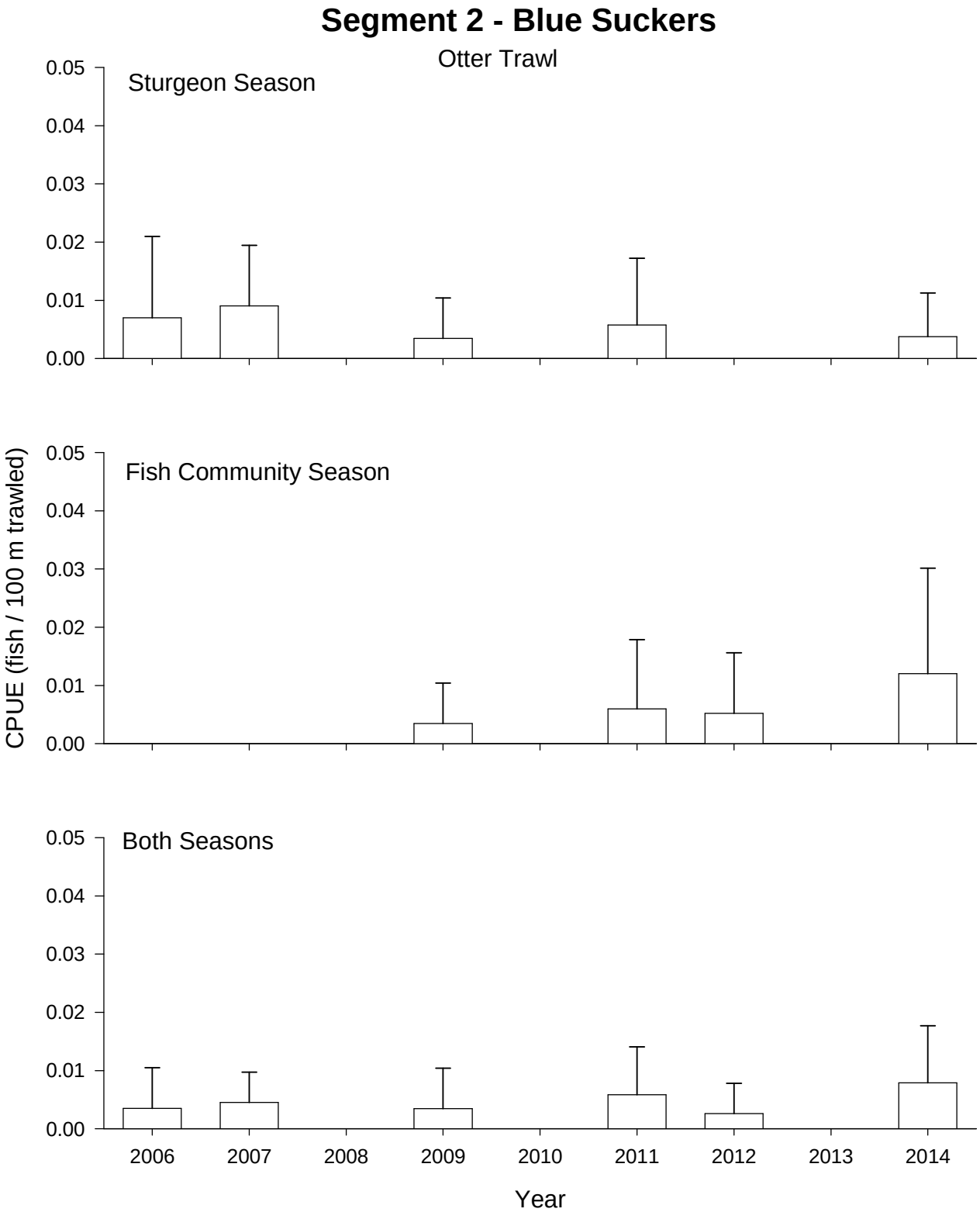


Figure 16. Mean annual catch per unit effort (+/- 2 SE) of blue sucker using otter trawls in Segment 2 of the Missouri River from 2006-2014.

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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	31	61	6	19	10	0	0	0	3
		35	2	30	28	3	0	0	1
Otter Trawl	1	100	0	0	0	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	3	33	67	0	0	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	0	0	0	0	0	0	0	0	0
		26	2	41	13	5	3	8	2
Otter Trawl	2	0	0	100	0	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	0	0	0	0	0	0	0	0	0
		33	7	32	27	0	0	0	0

Segment 2 - Blue Sucker

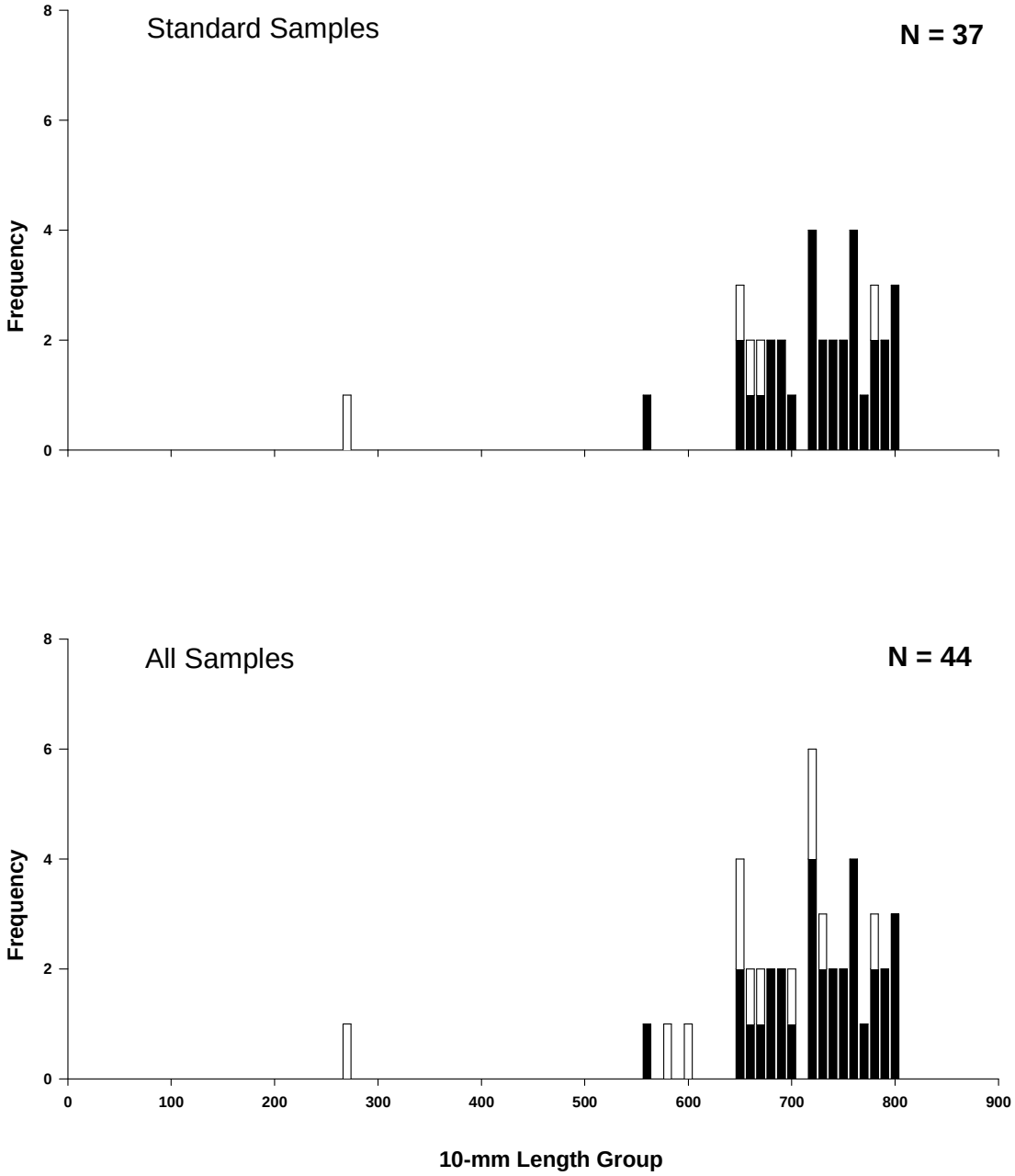


Figure 26. Length frequency of blue sucker during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2014. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2014.

Sauger

Sampling regimens during the 2014 field season throughout Segment 2 resulted in the capture of one hundred and fifty-two sauger. Sauger observations continue to be common in all gears, with rank in order of abundance were; trammel net (N=102), otter trawl (N=33), mini-fyke net (N=16) and one additional sauger sampled on trotline.

Similar to past years, sauger were more frequently seen during sturgeon season, with 61% of them being witnessed during that time. Like blue suckers, sauger abundances during sturgeon season can be linked to upstream movements by adults indicating spring-time spawning migrations, particularly into the Milk River.

Catch per unit of effort for trammel net sampling across both seasons within Segment 2 has shown only slight fluctuation throughout past years (Figure 28). Combined-season CPUE in 2014 was calculated to be 0.20 fish/100m, which is similar to the average across all years. Within seasons, CPUE for sturgeon season was recorded at 0.27 fish/100m, while catch rates were tabulated at 0.12 fish/100m.

Conversely, otter trawl CPUE for sauger in Segment 2 (Figure 29) showed a sizeable increase during sturgeon season, setting a new record at 0.12 fish/100m. The catch rate observed during sturgeon season, combined with an average catch rate during fish community season (0.02 fish/100m) also created a record high CPUE witnessed for combined-seasons, which was set at 0.07 fish/100m.

Sauger occurrence in mini-fyke nets was once again a common occurrence during Segment 2 sampling in 2014. The associated CPUE (Figure 27) was calculated at 0.15 fish/net night, which remains quite similar to previous years. To illustrate, the highest recorded mini-fyke net CPUE regarding sauger was set in 2013 at 0.17 fish/net night, while the lowest recorded CPUE occurred in 0.06 fish/net night.

The average TL for sauger within Segment 2 in 2014 was 344 mm, ranging in size from 250 mm to 560 mm, which remains comparable with previous years. A complete summary of length frequencies can be found in Figure 30.

Further information regarding the specific macro habitat and associated capture information can be viewed in Table 15.

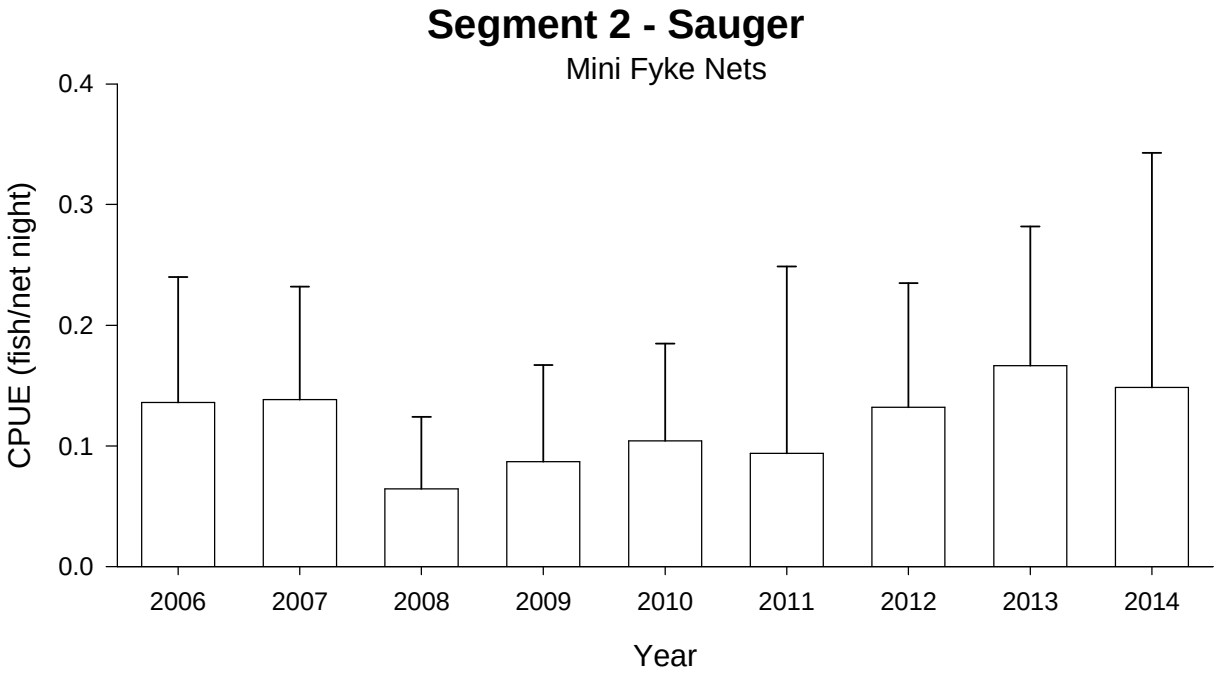


Figure 27. Mean annual catch per unit effort (+/- 2 SE) of sauger using mini-fyke nets in Segment 2 of the Missouri River from 2006-2014.

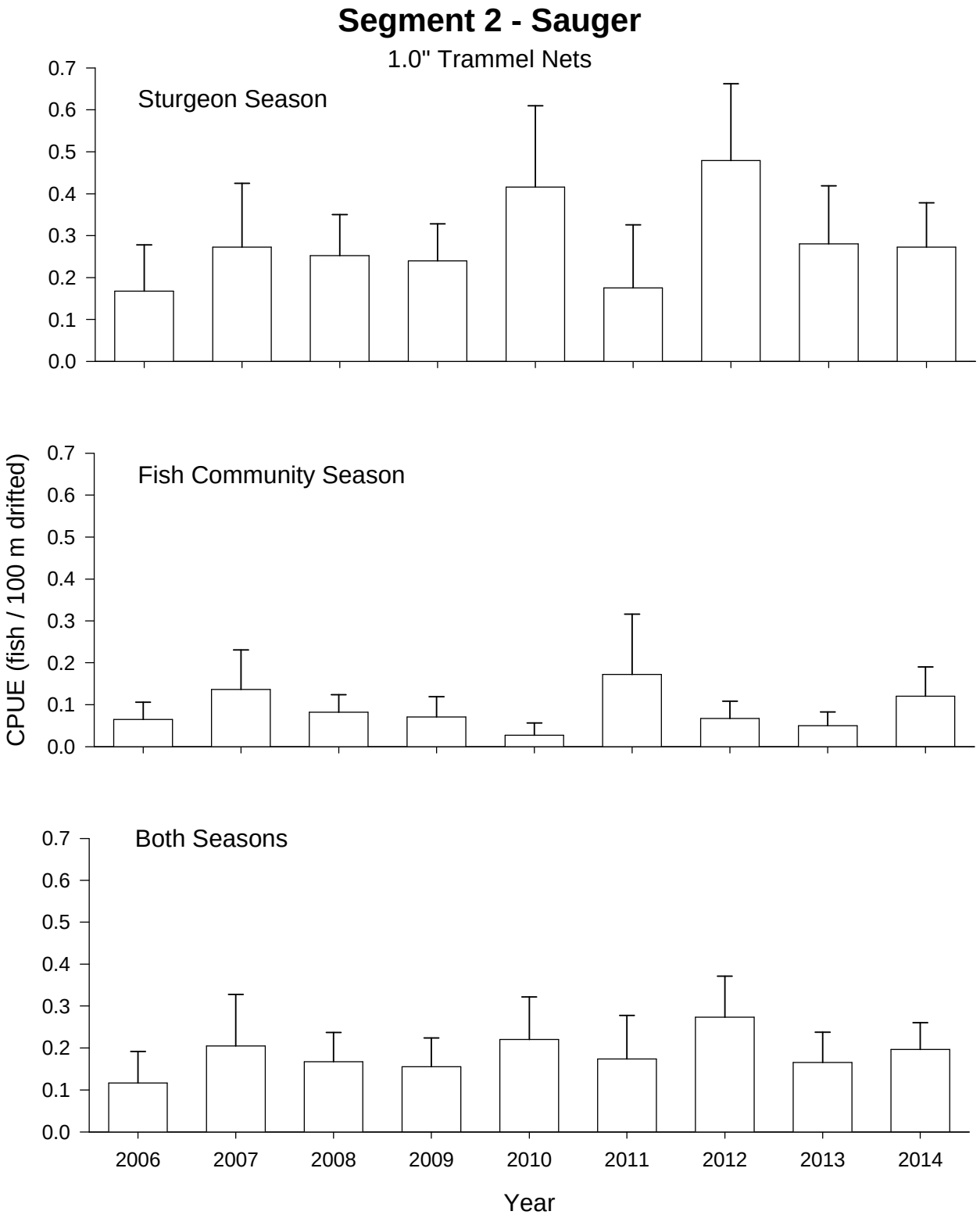


Figure 28. Mean annual catch per unit effort (+/- 2 SE) of sauger using 1.0” trammel nets in Segment 2 of the Missouri River from 2006-2014.

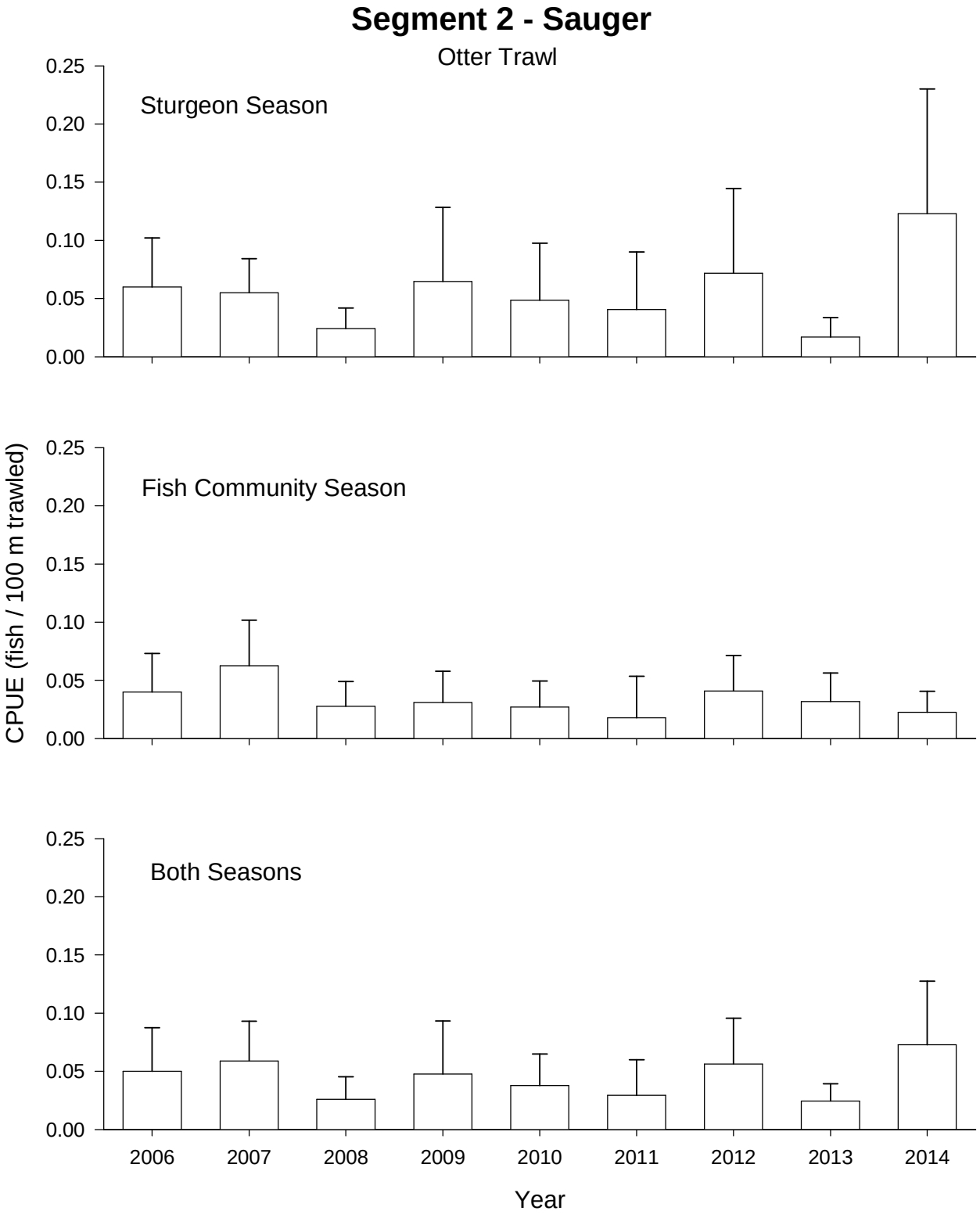


Figure 17. Mean annual catch per unit effort (+/- 2 SE) of sauger using otter trawls in Segment 2 of the Missouri River from 2006-2014.

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 2014. 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.

		Macrohabitat[a]							
Gear	**N**	**CHXO**	**CONF**	**ISB**	**OSB**	**SCCL**	**SCCS**	**SCN**	**TRML**
					Sturgeon Season				
1.0” Trammel Net	61	31	2	26	39	0	0	0	2
		35	2	30	28	3	0	0	1
Otter Trawl	26	15	69	8	8	0	0	0	0
		37	3	33	26	2	0	0	0
					Fish Community Season				
1.0” Trammel Net	22	41	0	41	18	0	0	0	0
		42	2	30	26	0	0	0	0
Mini-Fyke Net	16	13	25	0	0	0	0	44	19
		26	2	41	13	5	3	8	2
Otter Trawl	6	17	0	50	33	0	0	0	0
		36	2	31	31	0	0	0	0
					Both Seasons				
Trot Line	1	0	100	0	0	0	0	0	0
		33	7	32	27	0	0	0	0

Segment 2 - Sauger

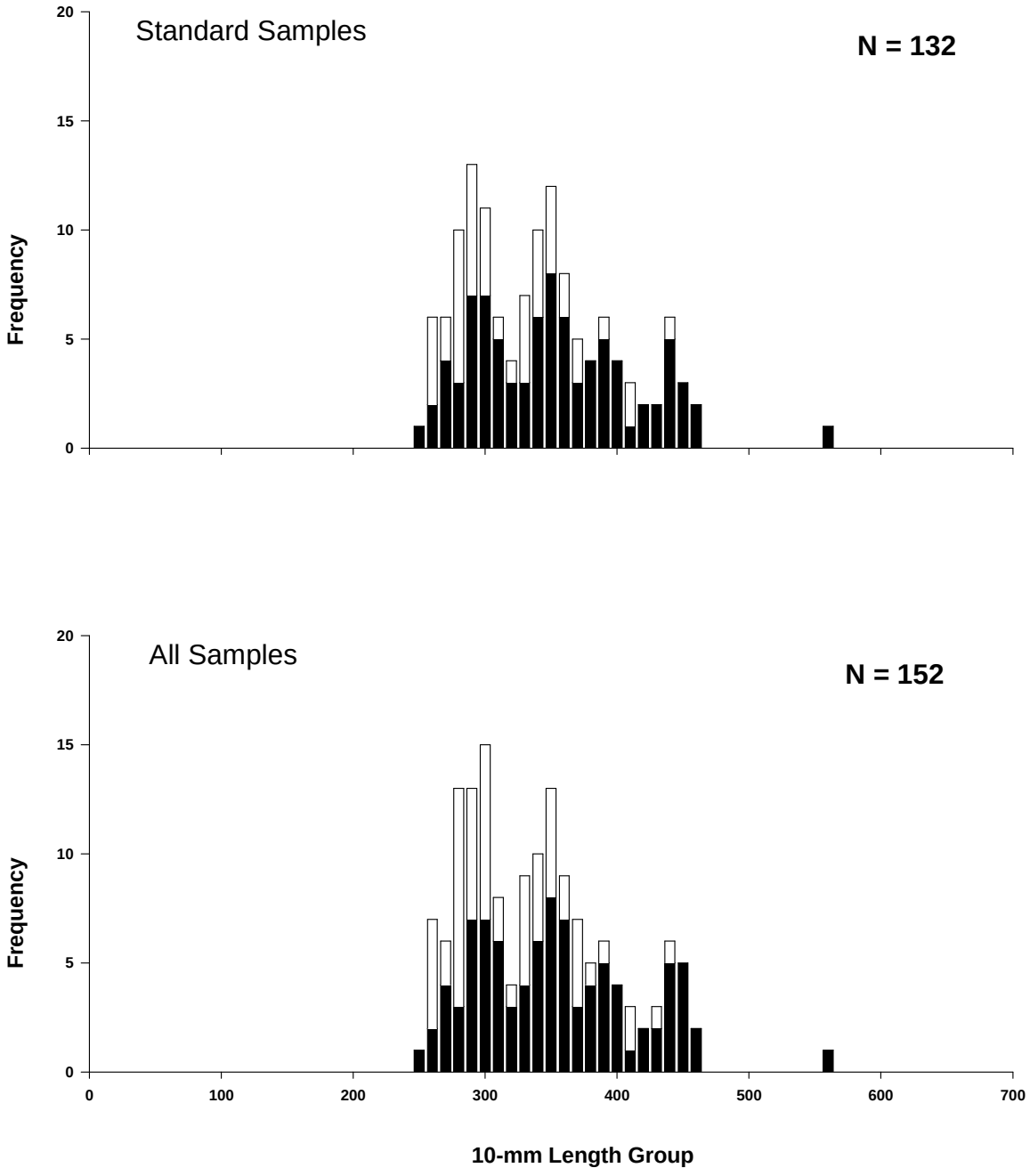


Figure 18. Length frequency of sauger during the sturgeon season (black bars) and the fish community season (white bars) in Segment 2 of the Missouri River during 2014. Standard samples include standard gears, random bends, and random subsamples. All samples include all sampling conducted during 2014.

Missouri River Fish Community

The 2014 sampling regimen occurring in Segment 2 accounted for the total capture of 6,491 fish consisting of thirty-nine species, which consequentially was the exact total of different species observed in 2013. Many years, raw fish numbers have been simply be driven by young of the year fish sampled in mini-fyke nets, particularly YOY *Catostomus* spp. During years when those species were abundant in YOY form, thousands could be sampled in just one mini-fyke. Although numerous young of the year of many different species were present in Segment 2 in 2014, overly inflated catch rates were not witnessed on a widespread basis. In turn, the most abundant species sampled in 2014 was shovelnose sturgeon (N=2,052). Shovelnose sturgeon remain a staple representative of the fish community in Segment 2 year after year.

The second most abundant species observed in 2014 were *Catostomus* spp., particularly white suckers *C. commersoni*. Among the two species, white suckers total counts were tallied at 1,616, while 285 additional longnose suckers *C. catostomus* were observed. These two species continue to be well represented by the presence of young of the year found while sampling with mini-fyke nets. Also well represented by fyke net catches were emerald shiners *Notropis atherinoides* (N=678), the third most abundant species observed. Fathead minnows *Pimephales promelas*, once again, found their way into mini-fyke nets to represent the fourth most common species observed, totaling 300 individuals.

Channel catfish *Ictalurus punctatus* were represented by the capture of 290 individuals, which, by far, eclipsed the previous record high set in 2013 of one hundred and forty-seven. Channel cats during the 2014 field season averaged 299 mm in total length, which was very comparable to previous years, and ranged from 24 mm to 680 mm. In years past, trotlines represent both the majority of captures, as well as the largest individuals; however, in 2014 an influx of y-o-y channel catfish resulted in mini-fyke nets capturing the largest proportion of individuals (31%), followed by otter trawl (25%), and lastly trammel nets and trotlines both capturing 22%. While trotline capture rates were down from previous years, that particular gear still represented the largest average length of channel catfish (401 mm).

Smallmouth *Ictiobus bubalus* (N=284) and bigmouth buffalo *I. cyprinellus* (N=31) were both observed in 2014 across Segment 2. Catches of both species were represented by y-o-y fish present in mini-fyke nets, as well as adult size classes, most often handled in trammel nets.

River carpsuckers *Carpiodes carpio* (N=243) were observed in both y-o-y form (41%), as well as adult form. River carpsucker young of the year remain a common site while sampling with mini-fyke nets.

A total of 153 flathead chubs *Platygobio gracilis* were sampled in Segment 2 in 2014. What continues to be notable about this population of fish is the increase of average length since the high-water year of 2011. The total length average in 2010 was observed at 118 mm, in 2012 it was recorded at 201 mm, in 2013 it was a similar 199 mm, but again, in 2014, the average length increased to 232 mm. The accretion of average length has caused observation in both trammel net and trotline to increase in the last few years.

Other species present within Segment 2 in 2014 were goldeye *Hiodon alosoides* (N=193), shorthead redhorse *Moxostoma macrolepidotum* (N=87), commom carp *Cyprinus carpio* (N=58), walleye *Sander vitreus* (N=24), y-o-y rainbow trout *Oncorhynchus mykiss* (N=14) and longnose dace *Rhinichthys cataractae* (N=13). Other species observed in Segment 2 in 2014, but were of low abundance were; Northern Pike *Esox lucius*, stonecat *Noturus flavus*, shortnose gar *Lepisosteus platostomus*, creek chub *Semotilus atromaculatus*, spottail shiner *Notropis hudsonius*, white crappie *Pomoxis annularis*, yellow perch *Perca flavescens*, freshwater drum *Aplodinotus grunniens*, cisco *Coregonus artedi*, burbot *Lota lota*, lake trout *Salvelinus namaycusch*, lake whitefish *Coregonus clupeaformis*, brook stickleback *Culaea inconstans*, paddlefish *Polyodon spathula* and northern redbelly dace *Chrosomus eos*.

Discussion

The 2014 sampling year marked the ninth field season for the Pallid Sturgeon Population Assessment Program (Program) crew in Segment 2 of the Missouri River**.** Field crews were excited to see if the high-water year of 2011 was still positively affecting the fish and associated habitat within Segment 2, particularly pallid sturgeon. Although "status quo" flows are slowly returning the river to pre-2011 form, positive correlations still exist in Segment 2.

Pallid sturgeon captures (N=123) in 2014 reached the second highest total observed in Segment 2 since the Programs inception in 2006, only falling behind the captures witnessed in 2012 (N=166). The inflated capture totals can be partly attributed to a four day non-random, targeted effort taking place from September 22-25 at bend 15. This sampling effort alone, taking place in a newly discovered "hotspot", resulted in the handling of 40 hatchery-reared juvenile pallid sturgeon of many different sizes and age classes.

These never before seen "hotspots" in Segment 2, combined with the presence of older, larger size classes of fish indicates that Segment 2 is still witnessing positive habitat effects following the river-altering high-water year of 2011. Hatchery-reared pallid sturgeon captured in Segment 2 in 2014 averaged 423 mm in fork length and 334 g in weight. Both of these totals are record highs for Segment 2; indicating that these hatchery released juveniles are continuing to recruit towards adulthood, as well as larger individuals increasing their usage of upper part of the Missouri River below Fort Peck Dam. To illustrate, pallid sturgeon greater than 700 mm were not observed in Segment 2 until 2012, when two were collected. During the sampling events of 2013, an additional two pallid sturgeon over 700 mm were captured, then in 2014, four pallid sturgeon over 700 mm were witnessed in sampling gears, including the largest juvenile ever collected by Population Assessment crews in Montana; an individual from the 1997 year class measuring 1170 mm and weighing 5950 g. This fish was deemed to be sexually mature according to testosterone and estradiol levels (M. Webb, personal communication). Although larger juveniles have not been uncommon the last few years, they are usually sampled in the downstream, more naturalized portion of the Missouri River in Segment 3.

The past two field seasons, an observation occurred never before seen in Segment 2; more juvenile pallid sturgeon were captured during sturgeon season than fish community season.

This pattern was not observed again in 2014, with only 21 pallid sturgeon being sampled during sturgeon season and the other 102 being caught during fish community season. Even removing the forty individuals sampled during the targeted event, 62 juvenile pallid sturgeon were captured during other sampling events taking place during fish community season.

Trammel net catch per unit effort (CPUE) in Segment 2 across both seasons was recorded at 0.037 fish/100m, which was the third highest CPUE since the programs implementation in 2006. The CPUE for both seasons recorded in 2014 fell only to the record high observed in 2012 (0.046 fish/100m) and neared the CPUE calculated in 2013 (0.040 fish/100m). Among seasons, trammel net CPUE was reported at 0.025 fish/100m and 0.040 fish/100m for sturgeon season and fish community season, respectively. The catch per unit of effort noted during the fish community season in 2014 was also a new all-time high for Segment Two.

The combined otter trawl CPUE for both seasons in Segment 2 for 2014 was documented at 0.021 fish/100m, which places it in the realm of the long-term average. Among seasons, CPUEs of 0.015 and 0.027 fish/100m were noted during the sturgeon and fish community seasons, respectively. When attempting to detect catch rate differences, it should be noted that increases and decreases in CPUE are based on very minimal changes; furthermore catch rates seem to be even slightly more erratic during fish community season.

With a below average trotline CPUE (0.146 fish/20 hooks) during sturgeon season and an above average CPUE (0.583 fish/20 hooks) during fish community season, a modest CPUE of 0.365 fish/20 hooks was observed across both seasons. For comparison, this combined-season CPUE fell behind the record observed in 2012 (0.573 fish/20 hooks) and the second best calculated in 2013 (0.479 fish/20 hooks).

Although trotlines normally yield the highest proportion of catch, the aforementioned targeted effort during the 2014 field season helped trammel nets become the largest contributor to total catch (58.5%). Trotlines were yet again a valuable sampling gear, yielding 28.5% of the catch, followed by otter trawl (11.4%) and lastly, angling, resulting in 1.6% of the total catch of pallid sturgeon in Segment 2 for the 2014 sampling year.

Although catch rates continue to illustrate minor differences from season to season, as well as year to year, they often fall within the associated error ranges. These minor changes and error-range overlap, combined with seemingly stochastic patterns, makes catch rate trend observations nearly impossible. It is likely, that given the size and habitat difference of any particular segment, catch rate trends cannot be quantified over an entire reach. Although more

fine-scale catch rates have not been calculated, they may lend to more consistent and comparable data. For example, one particular bend may lead to high CPUE for any particular gear within that bend, followed by numerous bends, often within close proximity, that yield “zero” catch rates.

The relative condition (Kn) for the sub-stock category (200-329 mm) of hatchery-reared pallid sturgeon during the 2014 field season in Segment 2 exhibited an sharp increase, however, when looking at the data, the Kn was based off of a very small sample size (N=2) and it appears a recorded weight for one of these fish may be an error (L=273, W=175). Meanwhile, the relative condition for both the stock and quality class of pallid sturgeon appears to be on a small but steady increase since 2012. The Kn for preferred and memorable/trophy classes of pallid sturgeon continues to be based on small sample size, and has only surfaced in the last few field seasons. The best example condition factor may be observed in the stock and quality classes of fish, since these two age classes regularly account for the largest sample size. The observed increases in Kn during the 2011 field season were somewhat predictable, given the large habitat changes that involved turbid water and inundate floodplain. However, when flow conditions returned to more stabilized, normal stages during the 2012 field season, relative conditions, in turn, dipped to more historic levels. What was less predictable was that Kn during the 2013 field season, and again in 2014, would show slight increases, surpassing those relative conditions observed in 2011. It is presumed, that given current dam-related flows, much of Segment 2 is a productive system in terms of invertebrates and temperatures may be a more limiting factor in growth than food availability.

A total of 13 different year classes of pallid sturgeon were captured in Segment 2 in 2014, which was widest variety of individual year classes ever captured by Population Assessment crews for this segment. Year classes in rank of abundance were; 2009 (N=35), 2008 (N=28), 2010 (N=18), 2006 (N=15), 2007 (N=7), 2005 (N=5), three fish coming from the 1997, 2001 and 2012 year classes, respectively, two pallid sturgeon each from the 2004 and 2013 year classes, respectively, and one each from the 2003 and 2014 year classes, respectively. Although stocking practices contribute to a logical increase in the number of year classes captured, the effect of older year classes increasingly utilizing Segment 2 cannot be overlooked.

Shovelnose sturgeon continue to be highly abundant across Segment 2 of the Missouri River, particularly in the upper reaches. Sampling in 2014 resulted in the collection of 2,014 shovelnose sturgeon, which by far bested the previous high observed in 2012 (N=1,264) and was also the most abundant species captured over all. Although record high trammel net CPUE was

recorded for community (1.49 fish/100m) and combined seasons (at 1.16 fish/100m), it is important to note that catch rates continue to vary by minimal amounts.

The average length and weight observed in 2014 falls in line with those calculated in previous years, especially since the smaller size classes remain nearly absent in Segment 2. It is clear that the habitat within Segment 2 of the Missouri River is not conducive to shovelnose sturgeon rearing. This continual presence of a large population of adult shovelnose sturgeon could become important with the increased usage older age class pallid sturgeon, especially in regards to diet competition.

Evaluating trends, annually or long-term, for other target species is an even more convoluted subject. Some trends have become clearer as times go on; for example, most of the native target species become more prevalent in Segment 2 during the sturgeon season in relation to upstream spawning movements. However, the related catch rates to these species are sometimes driven by brief but exceptional events that can occasionally be the result of one sampling event in one bend. Other times, as was the case in 2014, species such as sturgeon and sickelfin chubs, hardly show up at all in our sampling gears.

Water and flow conditions can add to further complexities when trying to compare annual catch rates of native species. Although plenty of positive benefits can be attributed to the high-water year of 2011, such as condition and reproduction of some species, sampling during that year was difficult and many of the interactions could not be observed until the following field season. It then becomes difficult to quantify the degree and longevity of the affects of these never before seen flows and habitat changes. In addition, the Milk River is an important influence on the conditions affecting virtually the entire segment. Although the Milk adds vital suspended sediments and associated warmer water, many years it often varies in both degree of flow, as well as longevity of that flow. When all of these intricacies are combined with different biological behaviors by many different species, trends within one particular segment become very difficult.

Acknowledgments

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Appendices

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

Scientific name	Common name	Letter Code
	CLASS CEPHALASPIDOMORPHI-LAMPREYS	
	ORDER PETROMYZONTIFORMES	
	Petromyzontidae – lampreys	
Ichthyomyzon castaneus	Chestnut lamprey	CNLP
Ichthyomyzon fossor	Northern brook lamprey	NBLP
Ichthyomyzon unicuspis	Silver lamprey	SVLP
Ichthyomyzon gagei	Southern brook lamprey	SBLR
Petromyzontidae	Unidentified lamprey	ULY
Petromyzontidae larvae	Unidentified larval lamprey	LVLP
	CLASS OSTEICHTHYES – BONY FISHES	
	ORDER ACIPENSERIFORMES	
	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	**Shoal chub**	**SKCB***
Macrhybopsis gelida	**Sturgeon chub**	**SGCB***
Macrhybopsis meeki	**Sicklefin chub**	**SFCB***
Macrhybopsis storeriana	Silver chub	SVCB
M. aestivalis X M. gelida	Shoal-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.

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.

Gear	Code	Type	Season	Years	CPUE units
Gill Net – 4 meshes, small mesh set upstream	GN14	Standard	Sturgeon	2003 - Present	Fish / net night
Gill Net – 4 meshes, large mesh set upstream	GN41	Standard	Sturgeon	2003 - Present	Fish / net night
Gill Net – 8 meshes, small mesh set upstream	GN18	Standard	Sturgeon	2003 - Present	Fish / net night
Gill Net – 8 meshes, large mesh set upstream	GN81	Standard	Sturgeon	2003 - Present	Fish / net night
Trammel Net – 1.0”inner mesh	TN	Standard	Sturgeon	2003 - Present	Fish / 100 m drift
		Standard	Fish Comm.	2003 - 2009	Fish / 100 m drift
Otter Trawl – 16 ft head rope	OT16	Standard	Both Seasons	2003 - Present	Fish / 100 m trawled
Mini-Fyke Net	MF	Standard	Fish Comm.	2003 - Present	Fish / net night
Beam Trawl	BT	Standard	Both Seasons	2003 - 2004	Fish / 100 m trawled
Hoop Net – 4 ft.	HN	Standard	Both Seasons	2003 - 2004	Fish / net night
Trammel Net – 2.5” inner mesh	TN25	Standard	Sturgeon	2005 – 2006	Fish / 100 m drift
Bag Seine – quarter arc method pulled upstream	BSQU	Standard	Fish Comm.	2003 – 2005	Fish / 100 m^2
Bag Seine – quarter arc method pulled downstream	BSQD	Standard	Fish Comm.	2003 - 2005	Fish / 100 m^2
Bag Seine – half arc method pulled upstream	BSHU	Standard	Fish Comm.	2003 - 2005	Fish / 100 m^2
Bag Seine – half arc method pulled downstream	BSHD	Standard	Fish Comm.	2003 - 2005	Fish / 100 m^2
Bag seine – rectangular method pulled upstream	BSRU	Standard	Fish Comm.	2003 - 2005	Fish / 100 m^2
Bag seine – rectangular method pulled downstream	BSRD	Standard	Fish Comm.	2003 - 2005	Fish / 100 m^2
Otter trawl – 16 ft SKT 4mm x 4mm HB2 MOR	OT01	Evaluation	Fish Comm.	2006	Fish / 100 m trawled
Push Trawl – 8 ft 4mm x 4mm	POT02	Evaluation	Fish Comm.	2007	Fish / m trawled
Trot Line	TL	Evaluation	Both Season	2009	Fish / hook night
		Standard	Both Seasons	2010 - Present	Fish / hook night

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 and adult pallid sturgeon stocking summary for Segment 2 of the Missouri River (RPMA 4).

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		
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	
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	
2010	Fallon	721	2009	4/15/2010	Yearling	PIT Tag	Scute Removed
2010	Fallon	268	2009	8/3/2010	Yearling	PIT Tag	Scute Removed
2010	Fallon	1000	2010	10/7/2010	Fingerling	Elastomer	
2010	Forsyth	1402	2009	4/15/2010	Yearling	PIT Tag	Scute Removed
2010	Forsyth	268	2009	8/3/2010	Yearling	PIT Tag	Scute Removed
2010	Intake	1890	2009	4/15/2010	Yearling	PIT Tag	Scute Removed
2010	Intake	816	2009	6/4/2010	Yearling	Elastomer	
2010	Intake	541	2009	8/3/2010	Yearling	PIT Tag	Scute Removed
2010	Intake	1000	2010	10/7/2010	Fingerling	Elastomer	
2010	Sidney	331	2009	4/15/2010	Yearling	PIT Tag	Scute Removed
2010	Wolf Point	1309	2009	4/15/2010	Yearling	PIT Tag	Elastomer, Scute
2010	Wolf Point	858	2009	6/4/2010	Yearling	Elastomer	
2010	Wolf Point	425	2009	8/3/2010	Yearling	PIT Tag	Scute Removed
2010	Wolf Point	1000	2010	10/7/2010	Fingerling	Elastomer	
2010	Culbertson	65	2004	9/21/2010	6 Yr Old	PIT Tag	
2010	Culbertson	1337	2009	4/15/2010	Yearling	PIT Tag	Elastomer, Scute
2010	Culbertson	384	2009	6/4/2009	Yearling	PIT Tag	Scute Removed
2010	Culbertson	1000	2010	10/7/2010	Fingerling	Elastomer	
2010	School Trust	1766	2009	4/15/2010	Yearling	PIT Tag	Elastomer, Scute
2011	Culbertson	795	2010	5/5/2011	Yearling	PIT Tag	Scute Removed
2011	Wolf Point	797	2010	5/5/2011	Yearling	PIT Tag	Scute Removed
2011	Fallon	531	2010	5/5/2011	Yearling	PIT Tag	Scute Removed
2011	Forsyth	545	2010	5/5/2011	Yearling	PIT Tag	Scute Removed
2011	Intake	510	2010	5/5/2011	Yearling	PIT Tag	Scute Removed

Year	Stocking Site	Number Stocked	Year Class	Stock Date	Age at Stocking[a]	Primary Mark	Secondary Mark
2011	Culbertson	262	2010	8/22/2011	Yearling	PIT Tag	Scute Removed
2011	Fallon	131	2010	8/22/2011	Yearling	PIT Tag	Scute Removed
2011	Forsyth	174	2010	8/22/2011	Yearling	PIT Tag	Scute Removed
2011	Intake	132	2010	8/22/2011	Yearling	PIT Tag	Scute Removed
2011	Wolf Point	262	2010	8/22/2011	Yearling	PIT Tag	Scute Removed
2013	Wolf Point	187	2012	4/22/2013	Yearling	PIT Tag	Scute Removed
2013	Culbertson	187	2012	4/22/2013	Yearling	PIT Tag	Scute Removed
2013	Intake	118	2012	4/22/2013	Yearling	PIT Tag	Scute Removed
2013	Fallon	185	2012	4/22/2013	Yearling	PIT Tag	Scute Removed
2014	Culbertson	212	2013	4/15/2014	Yearling	PIT Tag	Scute Removed
2014	Kinsey Bridge	214	2013	4/15/2014	Yearling	PIT Tag	Scute Removed
2014	Powder River Depot	210	2013	4/15/2014	Yearling	PIT Tag	Scute Removed
2014	Wolf Point	211	2013	4/15/2014	Yearling	PIT Tag	Scute Removed

Appendix F

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 2012. Species captured are listed alphabetically and their codes are presented in Appendix A. Asterisks with bold type indicate targeted native Missouri River species and habitat abbreviations are presented in Appendix B. Standard Error was not calculated when N < 2.

Appendix F1. 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	CONF CHNB	ISB CHNB	OSB CHNB	SCCL CHNB	TRML CHNB
BKSB	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
BMBF	5	0.013	0.01	0.066	0	0	0	0.695
		0.013	0.02	0.133	0	0	0	0.38
BUSK	**34**	**0.072**	**0.108**	**0.341**	**0.029**	**0.036**	**0**	**0.442**
		0.068	**0.186**	**0.452**	**0.041**	**0.045**	**0**	**0.885**
CARP	16	0.039	0.038	0.066	0.011	0.016	0	1.515
		0.035	0.035	0.133	0.022	0.022	0	3.03
CKCB	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
CNCF	56	0.14	0.099	0.557	0.066	0.083	0	4.17
		0.074	0.073	0.501	0.058	0.064	0	2.279
CSCO	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
ERSN	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
FHCB	71	0.147	0.165	0	0.13	0.153	0.503	0
		0.049	0.083	0	0.102	0.074	1.007	0
FHMW	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO CHNB	CONF CHNB	ISB CHNB	OSB CHNB	SCCL CHNB	TRML CHNB
FWDM	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
GDEY	78	0.174	0.169	0.732	0.139	0.154	0.503	0
		0.065	0.098	0.931	0.115	0.097	1.007	0
LKTT	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
LNDC	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
LNSK	24	0.062	0.01	0.489	0.05	0.08	0	0.442
		0.043	0.014	0.75	0.069	0.092	0	0.885
NFSH	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
NRBD	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
NTPK	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
PDFH	1	0.002	0	0	0	0.006	0	0
		0.003	0	0	0	0.012	0	0
PDSG	16	0.037	0.026	0	0.017	0.079	0	0
		0.021	0.023	0	0.025	0.06	0	0
RBTT	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO CHNB	CONF CHNB	ISB CHNB	OSB CHNB	SCCL CHNB	TRML CHNB
RVCS	107	0.324	0.154	5.394	0.1	0.128	0.495	2.78
		0.299	0.107	9.132	0.062	0.084	0.318	1.52
SFCB	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**
SGCB	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**
SGER	**83**	**0.197**	**0.154**	**0.064**	**0.214**	**0.248**	**0**	**0.253**
		0.064	**0.084**	**0.127**	**0.126**	**0.141**	**0**	**0.505**
SHRH	46	0.128	0.077	0.064	0.096	0.156	0	2.338
		0.067	0.046	0.127	0.151	0.103	0	0.635
SMBF	36	0.087	0.017	1.444	0.016	0.063	0	1.263
		0.082	0.019	2.109	0.033	0.112	0	2.525
SNGR	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
SNSG	**590**	**1.235**	**0.964**	**0.127**	**1.547**	**1.365**	**1.501**	**0.253**
		0.321	**0.353**	**0.254**	**0.755**	**0.605**	**1.695**	**0.505**
SNSN	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
STCT	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
STSN	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO CHNB	CONF CHNB	ISB CHNB	OSB CHNB	SCCL CHNB	TRML CHNB
UCA	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
WLYE	10	0.028	0.022	0	0.017	0.044	0	0.253
		0.021	0.022	0	0.033	0.055	0	0.505
WSMW	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**
WTCP	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0
WTSK	16	0.04	0.02	0.064	0.078	0.022	0	0
		0.023	0.02	0.127	0.062	0.034	0	0
YWPH	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0

Appendix F2. Otter trawl: overall season and segment summary. Lists CPUE (fish/100 m) and 2 standard errors on second line.

species	Total Catch	Overall CPUE	CHXO CHNB	CONF CHNB	ISB CHNB	OSB CHNB	SCCL CHNB
BKSB	0	0	0	0	0	0	0
		0	0	0	0	0	0
BMBF	0	0	0	0	0	0	0
		0	0	0	0	0	0
BUSK	**3**	**0.008**	**0.005**	**0**	**0.019**	**0**	**0**
		0.01	**0.011**	**0**	**0.028**	**0**	**0**
CARP	7	0.015	0.005	0.228	0.021	0	0
		0.013	0.011	0.303	0.025	0	0
CKCB	0	0	0	0	0	0	0
		0	0	0	0	0	0
CNCF	67	0.133	0.11	0.275	0.197	0.066	0.463
		0.063	0.051	0.389	0.176	0.052	0.926
CSCO	1	0.003	0	0	0.009	0	0
		0.006	0	0	0.019	0	0
ERSN	65	0.122	0.341	0	0.006	0.007	0
		0.199	0.574	0	0.012	0.013	0
FHCB	27	0.053	0.033	0	0.068	0.067	0
		0.029	0.037	0	0.068	0.048	0
FHMW	0	0	0	0	0	0	0
		0	0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO	CONF	ISB	OSB	SCCL
			CHNB	CHNB	CHNB	CHNB	CHNB
FWDM	2	0.005	0	0	0.01	0.006	0
		0.007	0	0	0.02	0.012	0
GDEY	4	0.007	0.011	0	0.006	0.006	0
		0.007	0.015	0	0.012	0.013	0
LKTT	0	0	0	0	0	0	0
		0	0	0	0	0	0
LNDC	0	0	0	0	0	0	0
		0	0	0	0	0	0
LNSK	15	0.034	0	0	0.072	0.037	0
		0.027	0	0	0.069	0.051	0
NFSH	0	0	0	0	0	0	0
		0	0	0	0	0	0
NRBD	0	0	0	0	0	0	0
		0	0	0	0	0	0
NTPK	0	0	0	0	0	0	0
		0	0	0	0	0	0
PDFH	0	0	0	0	0	0	0
		0	0	0	0	0	0
PDSG	**11**	**0.021**	**0.022**	**0**	**0.031**	**0.013**	**0**
		0.016	**0.026**	**0**	**0.036**	**0.019**	**0**
RBTT	2	0.004	0.005	0	0.006	0	0
		0.005	0.011	0	0.012	0	0

species	Total Catch	Overall CPUE	CHXO	CONF	ISB	OSB	SCCL
			CHNB	CHNB	CHNB	CHNB	CHNB
RVCS	20	0.041	0.033	0.165	0.038	0.045	0
		0.023	0.037	0.204	0.034	0.048	0
SFCB	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**
SGCB	**12**	**0.023**	**0.016**	**0**	**0.035**	**0.019**	**0**
		0.02	**0.024**	**0**	**0.049**	**0.028**	**0**
SGER	**32**	**0.073**	**0.027**	**1.523**	**0.036**	**0.029**	**0**
		0.055	**0.028**	**1.386**	**0.042**	**0.028**	**0**
SHRH	12	0.024	0.011	0.066	0.045	0.013	0
		0.015	0.015	0.133	0.037	0.018	0
SMBF	3	0.006	0	0	0.019	0	0
		0.007	0	0	0.021	0	0
SNGR	0	0	0	0	0	0	0
		0	0	0	0	0	0
SNSG	**96**	**0.183**	**0.174**	**0.199**	**0.26**	**0.116**	**0**
		0.068	**0.072**	**0.399**	**0.176**	**0.089**	**0**
SNSN	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**
STCT	3	0.008	0	0	0.025	0	0
		0.01	0	0	0.031	0	0
STSN	0	0	0	0	0	0	0
		0	0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO	CONF	ISB	OSB	SCCL
			CHNB	CHNB	CHNB	CHNB	CHNB
UCA	0	0	0	0	0	0	0
		0	0	0	0	0	0
WLYE	7	0.019	0	0.374	0.019	0.007	0
		0.019	0	0.552	0.028	0.013	0
WSMW	**3**	**0.006**	**0**	**0**	**0.012**	**0.007**	**0**
		0.007	**0**	**0**	**0.016**	**0.013**	**0**
WTCP	0	0	0	0	0	0	0
		0	0	0	0	0	0
WTSK	8	0.017	0	0.076	0.046	0	0
		0.018	0	0.153	0.053	0	0
YWPH	0	0	0	0	0	0	0
		0	0	0	0	0	0

Appendix F3. 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	CONF	ISB	OSB	SCCL	SCCS	SCN	TRML
			BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS
BKSB	1	0.01	0.04	0	0	0	0	0	0	0
		0.021	0.08	0	0	0	0	0	0	0
BMBF	26	0.271	0.08	7.5	0.128	0.25	0	0	0.125	0
		0.32	0.111	15	0.15	0.261	0	0	0.25	0
BUSK	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
CARP	28	0.292	0.44	0.5	0.282	0.417	0	0	0	0
		0.268	0.654	1	0.47	0.672	0	0	0	0
CKCB	3	0.031	0	1	0	0	0	0	0.125	0
		0.046	0	2	0	0	0	0	0.25	0
CNCF	88	0.917	0.12	33.5	0.231	0.333	0	0.333	0.125	1.5
		1.376	0.176	65	0.214	0.376	0	0.667	0.25	3
CSCO	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
ERSN	612	6.375	16.6	1	2.051	1.333	3.4	0	10.25	0
		6.567	24.609	2	1.616	1.504	4.454	0	12.698	0
FHCB	5	0.052	0	2	0	0.083	0	0	0	0
		0.086	0	4	0	0.167	0	0	0	0
FHMW	299	3.115	5.08	1.5	2.769	3.75	1.2	0	1.25	0
		1.77	5.497	3	2.159	4.384	1.166	0	1.5	0

species	Total Catch	Overall CPUE	CHXO	CONF	ISB	OSB	SCCL	SCCS	SCN	TRML
			BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS
FWDM	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
GDEY	4	0.042	0.04	0	0	0	0	0	0.375	0
		0.051	0.08	0	0	0	0	0	0.526	0
LKTT	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
LNDC	13	0.135	0.12	0	0.154	0.083	0	0	0.375	0
		0.105	0.133	0	0.188	0.167	0	0	0.75	0
LNSK	200	2.083	0.96	2.5	0.231	12.833	1.2	0	0.25	0
		3.144	1.525	5	0.226	24.943	1.939	0	0.5	0
NFSH	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
NRBD	1	0.01	0	0	0	0.083	0	0	0	0
		0.021	0	0	0	0.167	0	0	0	0
NTPK	3	0.031	0	0	0.026	0.083	0	0	0.125	0
		0.036	0	0	0.051	0.167	0	0	0.25	0
PDFH	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
PDSG	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
RBTT	12	0.125	0.12	0	0.205	0.083	0	0	0	0
		0.08	0.133	0	0.167	0.167	0	0	0	0

species	Total Catch	Overall CPUE	CHXO	CONF	ISB	OSB	SCCL	SCCS	SCN	TRML
			BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS
RVCS	98	1.021	0.44	0.5	0.59	3.75	2.6	0	0.625	0
		0.687	0.731	1	0.414	4.723	3.555	0	0.75	0
SFCB	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SGCB	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SGER	**16**	**0.167**	**0.08**	**2**	**0**	**0**	**0**	**0**	**0.875**	**1.5**
		0.124	**0.111**	**4**	**0**	**0**	**0**	**0**	**0.59**	**3**
SHRH	2	0.021	0	0	0.026	0	0	0	0.125	0
		0.029	0	0	0.051	0	0	0	0.25	0
SMBF	239	2.49	3.2	7	0.872	0.5	0	0	11.5	6.5
		1.434	2.882	14	0.771	0.389	0	0	12.253	13
SNGR	4	0.042	0	0.5	0	0	0	0	0.25	0.5
		0.051	0	1	0	0	0	0	0.5	1
SNSG	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SNSN	**222**	**2.313**	**1.44**	**1.5**	**3.436**	**3.583**	**0.8**	**0**	**0.25**	**0**
		1.365	**1.405**	**3**	**2.866**	**4.726**	**1.166**	**0**	**0.327**	**0**
STCT	1	0.01	0	0.5	0	0	0	0	0	0
		0.021	0	1	0	0	0	0	0	0
STSN	3	0.031	0	1	0	0	0	0	0.125	0
		0.036	0	0	0	0	0	0	0.25	0

species	Total Catch	Overall CPUE	CHXO BARS	CONF BARS	ISB BARS	OSB BARS	SCCL BARS	SCCS BARS	SCN BARS	TRML BARS
UCA	1	0.01	0	0	0.026	0	0	0	0	0
		0.021	0	0	0.051	0	0	0	0	0
WLYE	1	0.01	0	0	0	0.083	0	0	0	0
		0.021	0	0	0	0.167	0	0	0	0
WSMW	**22**	**0.229**	**0.48**	**1**	**0.103**	**0.167**	**0**	**0**	**0.25**	**0**
		0.155	**0.518**	**2**	**0.123**	**0.225**	**0**	**0**	**0.327**	**0**
WTCP	3	0.031	0.04	0	0	0	0	0	0.25	0
		0.036	0.08	0	0	0	0	0	0.327	0
WTSK	1578	16.438	2.44	15.5	30	13.167	0.6	0	19.375	0
		22.333	3.227	31	54.502	16.669	1.2	0	27.446	0
YWPH	2	0.021	0	0	0.051	0	0	0	0	0
		0.029	0	0	0.072	0	0	0	0	0

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

			CHXO	CONF	ISB	OSB
species	Total Catch	Overall CPUE	CHNB	CHNB	CHNB	CHNB
BKSB	0	0	0	0	0	0
		0	0	0	0	0
BMBF	0	0	0	0	0	0
		0	0	0	0	0
BUSK	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**
CARP	4	0.042	0.063	0	0.065	0
		0.059	0.125	0	0.129	0
CKCB	0	0	0	0	0	0
		0	0	0	0	0
CNCF	64	0.667	0.5	2.571	0.677	0.346
		0.244	0.284	1.625	0.458	0.247
CSCO	0	0	0	0	0	0
		0	0	0	0	0
ERSN	0	0	0	0	0	0
		0	0	0	0	0
FHCB	14	0.146	0.156	0	0.194	0.115
		0.089	0.158	0	0.195	0.128
FHMW	0	0	0	0	0	0
		0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO	CONF	ISB	OSB
			CHNB	CHNB	CHNB	CHNB
FWDM	0	0	0	0	0	0
		0	0	0	0	0
GDEY	60	0.625	0.625	1.286	0.742	0.308
		0.171	0.266	0.719	0.347	0.242
LKTT	1	0.01	0	0.143	0	0
		0.021	0	0.286	0	0
LNDC	0	0	0	0	0	0
		0	0	0	0	0
LNSK	38	0.396	0.094	1	0	1.077
		0.38	0.138	2	0	1.265
NFSH	0	0	0	0	0	0
		0	0	0	0	0
NRBD	0	0	0	0	0	0
		0	0	0	0	0
NTPK	2	0.021	0.063	0	0	0
		0.029	0.087	0	0	0
PDFH	0	0	0	0	0	0
		0	0	0	0	0
PDSG	**35**	**0.365**	**0.563**	**0**	**0.387**	**0.192**
		0.16	**0.38**	**0**	**0.257**	**0.158**
RBTT	0	0	0	0	0	0
		0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO CHNB	CONF CHNB	ISB CHNB	OSB CHNB
RVCS	0	0	0	0	0	0
		0	0	0	0	0
SFCB	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**
SGCB	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**
SGER	**1**	**0.01**	**0**	**0.143**	**0**	**0**
		0.021	**0**	**0.286**	**0**	**0**
SHRH	15	0.156	0.219	0.143	0.194	0.038
		0.09	0.195	0.286	0.172	0.077
SMBF	3	0.031	0	0.143	0	0.077
		0.046	0	0.286	0	0.154
SNGR	0	0	0	0	0	0
		0	0	0	0	0
SNSG	**216**	**2.25**	**2.406**	**0.286**	**3.032**	**1.654**
		0.547	**0.983**	**0.369**	**1.111**	**0.776**
SNSN	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**
STCT	1	0.01	0	0	0.032	0
		0.021	0	0	0.065	0
STSN	0	0	0	0	0	0
		0	0	0	0	0

species	Total Catch	Overall CPUE	CHXO CHNB	CONF CHNB	ISB CHNB	OSB CHNB
UCA	0	0	0	0	0	0
		0	0	0	0	0
WLYE	2	0.021	0	0	0	0.077
		0.042	0	0	0	0.154
WSMW	**0**	**0**	**0**	**0**	**0**	**0**
		0	**0**	**0**	**0**	**0**
WTCP	0	0	0	0	0	0
		0	0	0	0	0
WTSK	8	0.083	0.125	0.143	0	0.115
		0.057	0.119	0.286	0	0.128
YWPH	0	0	0	0	0	0
		0	0	0	0	0

Appendix G. Hatchery names, locations and abbreviations.

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

Appendix H. Alphabetic list of Missouri River fishes with total catch per unit effort by gear type for the sturgeon season and the fish community season during 2012 for Segment 2 of the Missouri River.

	Sturgeon Season		Fish Community Season			Both seasons
species	1.0" Trammel Net	Otter Trawl	1.0" Trammel Net	Mini-Fyke Net	Otter Trawl	Trot Lines
BKSB	0.000	0.000	0.000	0.010	0.000	0.000
BMBF	0.026	0.000	0.000	0.271	0.000	0.000
BUSK	**0.127**	**0.004**	**0.017**	**0.000**	**0.012**	**0.000**
CARP	0.044	0.004	0.034	0.292	0.026	0.042
CKCB	0.000	0.000	0.000	0.031	0.000	0.000
CNCF	0.174	0.069	0.105	0.917	0.198	0.667
CSCO	0.000	0.006	0.000	0.000	0.000	0.000
ERSN	0.000	0.004	0.000	6.375	0.240	0.000
FHCB	0.143	0.077	0.152	0.052	0.028	0.146
FHMW	0.000	0.000	0.000	3.115	0.000	0.000
FWDM	0.000	0.000	0.000	0.000	0.010	0.000
GDEY	0.177	0.011	0.172	0.042	0.004	0.625
LKTT	0.000	0.000	0.000	0.000	0.000	0.010
LNDC	0.000	0.000	0.000	0.135	0.000	0.000
LNSK	0.099	0.016	0.025	2.083	0.052	0.396
NFSH	0.000	0.000	0.000	0.000	0.000	0.000
NRBD	0.000	0.000	0.000	0.010	0.000	0.000
NTPK	0.000	0.000	0.000	0.031	0.000	0.021
PDFH	0.003	0.000	0.000	0.000	0.000	0.000
PDSG	**0.025**	**0.015**	**0.050**	**0.000**	**0.027**	**0.365**

	Sturgeon Season		Fish Community Season			Both seasons
species	1.0″ Trammel Net	Otter Trawl	1.0″ Trammel Net	Mini-Fyke Net	Otter Trawl	Trot Lines
RBTT	0.000	0.008	0.000	0.125	0.000	0.000
RVCS	0.240	0.061	0.408	1.021	0.022	0.000
SGCB	**0.000**	**0.004**	**0.000**	**0.000**	**0.041**	**0.000**
SGER	**0.272**	**0.123**	**0.121**	**0.167**	**0.023**	**0.010**
SHRH	0.159	0.011	0.098	0.021	0.036	0.156
SMBF	0.163	0.004	0.012	2.490	0.007	0.031
SNGR	0.000	0.000	0.000	0.042	0.000	0.000
SNSG	**0.841**	**0.222**	**1.629**	**0.000**	**0.144**	**2.250**
SNSN	**0.000**	**0.000**	**0.000**	**2.313**	**0.000**	**0.000**
STCT	0.000	0.004	0.000	0.010	0.012	0.010
STSN	0.000	0.000	0.000	0.031	0.000	0.000
UCA	0.000	0.000	0.000	0.010	0.000	0.000
WLYE	0.043	0.021	0.014	0.010	0.016	0.021
WSMW	**0.000**	**0.004**	**0.000**	**0.229**	**0.007**	**0.000**
WTCP	0.000	0.000	0.000	0.031	0.000	0.000
WTSK	0.027	0.018	0.053	16.438	0.015	0.083
YWPH	0.000	0.000	0.000	0.021	0.000	0.000

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 2003 - 2012.

Bend Number	Bend River Mile	Coordinates		2006	2007	2008	2009	2010	2011	2012	2013	2014
		Lattidude	Longitude									
1	1761	48.05581	106.32055	ST, FC					ST, FC, HW	ST, FC	ST	ST, FC
2	1760	48.04356	106.30328									ST, FC
3	1759	48.04416	106.28819		ST, FC				HW			
4	1757.5	48.03696	106.25307						HW			
5	1756	48.03379	106.24998					ST, FC	FC			ST
6	1754.5	48.02680	106.19850			ST, FC		ST, FC	FC, HW			ST, FC
7	1753	48.02938	106.16258		ST, FC	ST, FC			ST, FC	FC	ST	ST, FC
8	1751	48.03120	106.13605			ST, FC	ST, FC		ST, FC, HW	ST, FC	ST, FC	
9	1749.5	48.02872	106.12263	ST, FC					ST, FC, HW	ST	FC	
10	1747	48.00566	106.10929					ST, FC	ST, FC, HW	ST, FC	ST, FC	
11	1745	48.02677	106.08480				ST, FC	ST, FC	ST, FC			
12	1744	48.03534	106.08521	ST, FC	ST, FC	ST, FC	ST, FC		FC			
13	1741.5	48.00999	106.04510				ST, FC	ST, FC				ST, FC
14	1740	48.00255	106.02716		ST, FC							ST, FC
15	1738	48.03068	106.01973								ST	ST, FC
16	1736.5	48.03137	106.00100		ST, FC		ST, FC			FC	ST, FC	
17	1735	48.02545	105.98821			ST, FC				ST, FC		
18	1733	48.01287	105.95323	ST, FC						ST		ST
19	1732	48.01149	105.93182	ST, FC	ST, FC					ST, FC	FC	ST, FC
20	1730.5	48.01514	105.89578								ST, FC	
21	1728.5	48.03616	105.89557			ST, FC					ST	
22	1727.5	48.03228	105.88458						FC		ST, FC	

Bend Number	Bend River Mile	Coordinates		2006	2007	2008	2009	2010	2011	2012	2013	2014
		Lattidude	Longitude									
23	1726.5	48.01900	105.87228	ST, FC	ST, FC		ST, FC	ST, FC			FC	
24	1725.5	48.00855	105.85176			ST, FC					ST, FC	
25	1723.5	48.01666	105.82971			ST, FC		ST, FC		FC		
26	1722	48.02402	105.79479		ST, FC				FC, HW	ST, FC	FC	FC
27	1720	48.04621	105.77785				ST, FC	ST, FC	HW	FC	FC	ST, FC
28	1719	48.04468	105.76749	ST, FC	ST, FC				HW	ST		ST, FC
29	1717.5	48.02643	105.74791					ST, FC	FC, HW	ST, FC	FC	ST, FC
30	1716	48.03228	105.71736				ST, FC		FC, HW	FC	ST	
31	1714	48.05327	105.69457				ST, FC	ST, FC	HW	FC	ST, FC	
32	1712	48.05313	105.66531		ST, FC	ST, FC				ST, FC	ST, FC	
33	1710.5	48.04739	105.66245	ST, FC		ST, FC				ST, FC	ST, FC	ST
34	1710	48.05159	105.64158	ST, FC			ST, FC			FC		ST, FC
35	1709	48.06960	105.64798	ST, FC					HW	ST, FC	FC	
36	1707.5	48.07648	105.64107			ST, FC				ST, FC	FC	
37	1706.5	48.07407	105.62061	ST, FC	ST, FC		ST, FC	ST, FC	HW	FC	ST, FC	
38	1705.5	48.07725	105.60690					ST, FC		ST, FC	ST, FC	FC
39	1704.5	48.08012	105.58631	ST, FC	ST, FC	ST, FC			ST, FC		ST, FC	ST, FC
40	1703	48.07828	105.56033				ST, FC		ST, FC, HW		ST, FC	