**Montana Department of Fish, Wildlife and Parks**
**Fisheries Division**

**Job Progress Report**

**STATE: Montana** **PROJECT: Statewide Fisheries Management**

**JOB TITLE: Yellowstone River Paddlefish Investigations-3740**

**FEDERAL GRANT: F-113-R-16**

**PROJECT PERIOD: July 1, 2014 through June 30, 2015**

**REPORT PERIOD: April 1, 2015 through March 30, 2016**

ABSTRACT:

Each spring Paddlefish migrate upstream out of the headwaters of Lake Sakakawea with rising river discharge to reach river spawning grounds. River discharge (flow) below 20,000 cubic feet per second (CFS) in the Lower Yellowstone resulted in few Paddlefish in the Lower Yellowstone and none caught at Intake Fishing Access Site (FAS) at the beginning of Paddlefish season (May 15th). Most early season snagging success occurred at the state line. The majority of the harvest occurred after Memorial Day weekend as ascending river flows (from 20,000 to 40,000 CFS) made Paddlefish more numerous at Intake FAS. The harvest season was closed on the 12th harvest day. Catch-and-release fishing for Paddlefish was allowed for 10 additional days at Intake FAS, ending June 13, 2015. Fish, Wildlife & Parks (FWP) staff tagged 991 Paddlefish with jaw tags in 2015 during catch-and-release fishing. In the second half of May FWP staff surgically implanted 40 adult Paddlefish with radio telemetry transmitters in the 10 mile reach downstream of Intake FAS as part of a native fish passage study.

INTRODUCTION:

Paddlefish *Polyodon spathula* are a highly sought after sport-fish in the Yellowstone and Missouri rivers. They also garner commercial interest for their eggs that support the caviar trade (Carlson and Bonislawsky 1981). They are native to Montana and are an integral part of the aquatic community in the Lower Yellowstone River (Holton and Johnson 2003). Paddlefish have highly developed gill rakers that facilitate filter feeding of zooplankton in large river systems and reservoirs (Meyer 1960, Rosen and Hales 1981). Paddlefish are sexually dimorphic. Males become sexually mature earlier and at a smaller size than females (Scarnecchia et al 1996; Scarnecchia and Stewart 1997). Paddlefish of the Yellowstone/Sakakawea stock reside in the slow and quiet waters of Lake Sakakawea as juveniles. After the onset of sexual maturity, approximately age 10 for males and age 14 for females, they make spawning runs out of the reservoir up the Missouri River to its confluence with the Yellowstone River. Many Paddlefish spend the spawning season in the immediate vicinity of this confluence area while others continue to migrate up the Missouri River below Ft. Peck Dam or up the Yellowstone River. They spawn on the clean gravel bars during the high flow period in May and June (Rehwinkel 1978; Carlson and Bonislawsky 1981). Some fish from this stock function as river residents remaining in the rivers above Lake Sakakawea all year e.g. in the dredge cuts below Ft. Peck Reservoir (Frazier 1985).

The harvest of Paddlefish at Intake, MT has been documented for over a century and with a better understanding of the fishery some important management decisions have been made in the last two decades (Scarnecchia et al. 2008). The Montana-North Dakota Paddlefish Management Plan (Scarnecchia et al. 2008) establishes the goals and objectives guiding the management of the Yellowstone/Sakakawea Paddlefish population. Currently a 2,000 Paddlefish harvest cap is shared by North Dakota and Montana (1,000 fish each). Since 1989, the Glendive Chamber of Commerce, a non-profit organization, has been allowed to offer onsite fish cleaning services in exchange for roe from female Paddlefish. Proceeds from caviar fund community improvement grants, as well as Paddlefish research, monitoring and management (Scarnecchia et al. 2008). This arrangement and tight management of the fishery has prevented over-commercialization and subsequent exploitation that plague fisheries of other roe bearing species worldwide (Speer et al. 2000).

In Montana, the harvest of Paddlefish at Intake Fishing Access Site (FAS) is closed instantaneously when Fish, Wildlife & Parks (FWP) staff estimates that harvest is approaching the 1000 fish cap. Paddlefish harvest closes elsewhere 24 hours after the closure at Intake. After the instantaneous harvest closure at Intake FAS catch-and-release fishing is permitted at Intake FAS for an additional 10 consecutive days. Regulation changes in 2007 created the current season structure with harvest (mandatory) on Tuesday, Wednesday, Friday and Saturday and catch-and-release (mandatory and at Intake FAS only) on Sunday, Monday and Thursday. Legal fishing hours are from 6 a.m. to 9 p.m. mountain time.

Objectives for the 2015 season were as follows: 1) keep harvest under the 1000 fish harvest cap, while spreading harvest over more days to increase angler satisfaction and maintain opportunity 2) provide additional Paddlefish angling opportunity with catch-and-release days, and use this opportunity to increase number of tagged fish in the river, 3) characterize size

distribution, condition of fish, and sex ratio of the population 4) document movements of radio tagged Paddlefish with emphasis on passage at Intake FAS

METHODS:

Data from harvested fish and catch-and-release fish were collected by FWP staff at Intake FAS throughout the Paddlefish season. Data from both harvested fish and catch-and-release fish were used to make inferences about size distribution, condition, sex ratio, and population size. Harvested Paddlefish were weighed to the nearest pound and measured to the nearest inch (front of eye to fork of the caudal fin). Sex of harvested fish was assigned by FWP staff and confirmed when filleted by caviar staff. Most, but not all, of the Paddlefish caught during designated catch-and-release fishing days were tagged and measured. Fish sex was assigned based on length, abdominal shape and presence of tubercles on rostrum and head. Catch-and-release fish were not weighed. Paddlefish were jaw tagged with Monel metal bands (National Band and Tag Co., Size 16, ½ inch inside diameter) that were placed around the dentary bone. Paddlefish tagging data is used to model population (Scarnecchia et al. 2008).

A statewide Paddlefish telephone creel has been conducted since 2003 to obtain harvest estimates for the Yellowstone/Sakakawea Paddlefish population. The content of the annual phone creel has varied over the years as regulations and management concerns have changed. Estimation of total harvest is the one component of the phone creel that has remained consistent from since 2003. The 2015 phone creel included seven questions about angler harvest, angler effort, participation in catch-and-release fishing and use of Glendive Chamber of Commerce fish cleaning services. The phone creel was used to provide the final estimate of harvest.

Paddlefish length and weight data were used to determine relative weight ($W_r$), an index of condition (Murphy and Willis 1996). Length frequency histograms were calculated to describe the length distribution of harvested Paddlefish (Murphy and Willis 1996, Brouder et al. 2009). These indices provide a metric for analysis of the size and condition of the Yellowstone/Sakakawea population relative to other Paddlefish across the species range.

Sex identification of harvested Paddlefish was used to infer future trends in sex of Paddlefish harvest. Inferences are made using the combination of knowledge of dominant year classes and differing age at maturity. Consideration of sex ratio, population modeling, and knowledge of strong year classes (as identified by dentary bone aging, Scarnecchia et. al 2006) are used to ensure harvest from this Paddlefish population is sustainable (Scarnecchia et. al 2008).

RESULTS / DISCUSSION:

Discharge measured at the United States Geologic Survey (USGS) gauge station at Sidney, Montana was below 20,000 cubic feet per second (CFS) at the start of the Paddlefish season on May 15, 2015. The peak discharge during Paddlefish season was 56,300 CFS on June 7, 2015. Early season harvest occurred primarily at the state line (Figure 1). The majority of the harvest occurred after Memorial Day weekend as ascending river flows (from 20,000 to 40,000 CFS) made Paddlefish more numerous at Intake FAS. The harvest season was closed on the 12$^{th}$ harvest day. Catch-and-release fishing for Paddlefish was allowed for 10 additional days at

Intake FAS, ending June 13, 2015. The Yellowstone/Sakakawea telephone creel estimated total harvest at 995 Paddlefish for 2015 (Skaar and Selby 2015, Appendix A).

The 2015 Paddlefish season was the ninth season under regulations designed to keep harvest under 1000 fish, spread out harvest and increase catch-and-release fishing opportunity. Harvest has been kept under the harvest cap seven of the last nine years. An estimated 2,397 anglers participated in the 2015 Paddlefish season on the Lower Missouri and Yellowstone Rivers, generating 11,959 angler days (Skaar and Selby 2015, Appendix A). Phone creel results indicate that staying under the harvest cap and increasing catch-and-release opportunity has been generally successful but regulations have not increased the average number of harvest days per season (Figure 2). An estimated 81.9% of fish harvested were cleaned by the Glendive Chamber of Commerce (Skaar and Selby 2015, Appendix A).

A special phone creel survey was completed in 2012 of which the numerical results as well as angler comments can be found in the 2012 report (Bollman 2012). The survey found 89% of Paddlefish anglers surveyed are satisfied with the current season structure. The survey results also indicate anglers would support mandatory reporting of harvest if it provided more efficient population management. Anglers surveyed liked having the option to catch-and-release and would not be in favor of a lottery style draw for Paddlefish tags.

Tag sales for the Lower Yellowstone Paddlefish fishery were higher in the periods prior to the last bundle of regulation changes in 2007 than from 2007 to 2012 (Figure 3). Monitoring tag sales for this Paddlefish population in Montana demonstrates license sales have responded to management of the Intake fishery and reinforces a continued need to strive for ways to increase angler satisfaction while taking biologically necessary measures to maintain a healthy Yellowstone/Sakakawea Paddlefish stock.

The change to harvest days and catch-and-release days in 2007 sought to maintain opportunity without increasing harvest. Phone creel results demonstrate anglers have responded to the increased catch-and-release fishing opportunity that has been available three days a week since 2007 (Figure 4). Since catch-and-release fishing is allowed only at Intake FAS participation in catch-and-release appears to be more strongly influenced by fish availability at Intake than participation in harvest fishing for a given year. In good water years (e.g. 2013, 2014, and 2015) phone creel results demonstrate higher participation in catch-and-release than observed in a poor water year (e.g. 2012). River discharge made fish available at Intake FAS for the majority of the fishing season and the 2015 phone creel documented the resulting participation in catch-and-release fishing. An estimated 19.3% of anglers participated in catch-and-release fishing in 2015 and landed a cumulative total of 3,990 Paddlefish at a rate of 7.5 Paddlefish caught per angler (Skaar and Selby 2015, Appendix A). Catch-and-release fishing has provided an opportunity for FWP staff to tag angler caught Paddlefish at Intake FAS three days a week during the harvest season and 10 days immediately after the season closure since 2007. During catch-and-release fishing at Intake FAS in 2015, FWP staff tagged 991 Paddlefish, exceeding the long-term average number of Paddlefish tagged per year of 565 (Figure 5). Additionally, the average number of tagged Paddlefish has risen from 171$\pm$51 (avg$\pm$SE) prior to catch-and-release opportunity to 559$\pm$116 (avg$\pm$SE) post catch-and-release (Figure 6).

The sex ratio of harvested Paddlefish during 2015 was 68 percent female and 32 percent male (Figure 7). As expected when harvest is associated with a spawning run harvested fish are mature and some individuals are of trophy size. The relative weight (Wr) of females was greater than that of males (Figure 8). A regression of relative weight against length gave a similar

indication of the size distribution of the Yellowstone/Sakakawea stock compared to other populations across the range (Figure 8). Fish collected at Intake FAS demonstrated condition factor at or just slightly below other populations.

The 1995 year class continued to be the best represented single cohort in the Paddlefish harvest in 2015 (D. L. Scarnecchia, 2016 memorandum to Mike Backes, Montana Fish, Wildlife & Parks, on Paddlefish stock status and recommendations). Male Paddlefish from the 1995 year-class had skewed the sex ratio of harvested Paddlefish toward male for much of the past decade (Figure 9). These male fish from the 1995 year class began showing up in dominant numbers in 2005, at age ten upon reaching sexual maturity (Rehwinkel 1978; Carlson and Bonislawsky 1981). The sex ratio began to shift back to one to one in 2013 as the 1995 year class females became sexually mature and represented in spawning runs (Rehwinkel 1978; Carlson and Bonislawsky 1981). However, 70 percent of the harvested Paddlefish during the 2014 Paddlefish snagging season were females, of which 76 percent were from the 1995 year class (Scarnecchia 2015). Population estimates for the Yellowstone/Sakakawea stock developed by Dr. Dennis Scarnecchia of the University of Idaho using tagging information from Montana and North Dakota have been consistent over the last 10 years with an average population estimate of 34,000 Paddlefish (Figure 9). The female component of the 1995 year class will continue to provide more recruitment to the adult population than the current harvest level, but once the 1995 year class is fully recruited regulations may need to be changed if another strong year class is not identified. A strong class of young-of-the-year (YOY) fish were documented during reservoir transects in 2011. Sakakawea transects in 2012 and 2013 suggested that little reproduction occurred in these years but these surveys showed an unprecedented presence of sub-adult fish assumed to be the 2011 year class (Fred Ryckman, personal communication). While the 2011 cohort is the most recent year class that offers some promise of future contribution to the population, history has demonstrated that documenting high levels of reproduction for a year class Paddlefish as young-of-the-year does not guarantee recruitment to adulthood.

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Prepared by: _____
Caleb Bollman

Date Prepared: December 9, 2016

Waters Referred to: Yellowstone River Sec. 1 21-1350-02

**Key Words:**

| | |
|---|---|
| Catch-and-release | Paddlefish caviar |
| Harvest | Phone creel survey |
| Paddlefish sex ratio | Paddlefish tagging |

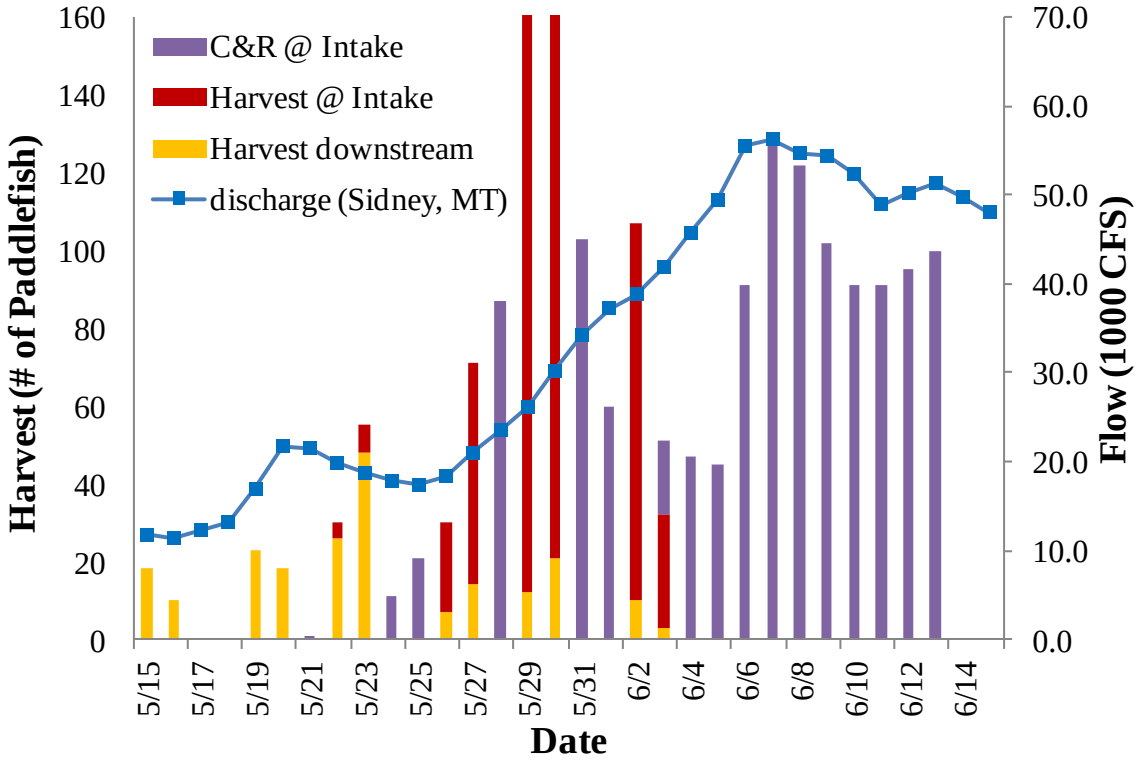


Figure 1. Observed Paddlefish harvest in number of fish and Yellowstone River discharge recorded at the USGS gauging station at Sidney, MT by day over the 2015 Paddlefish season

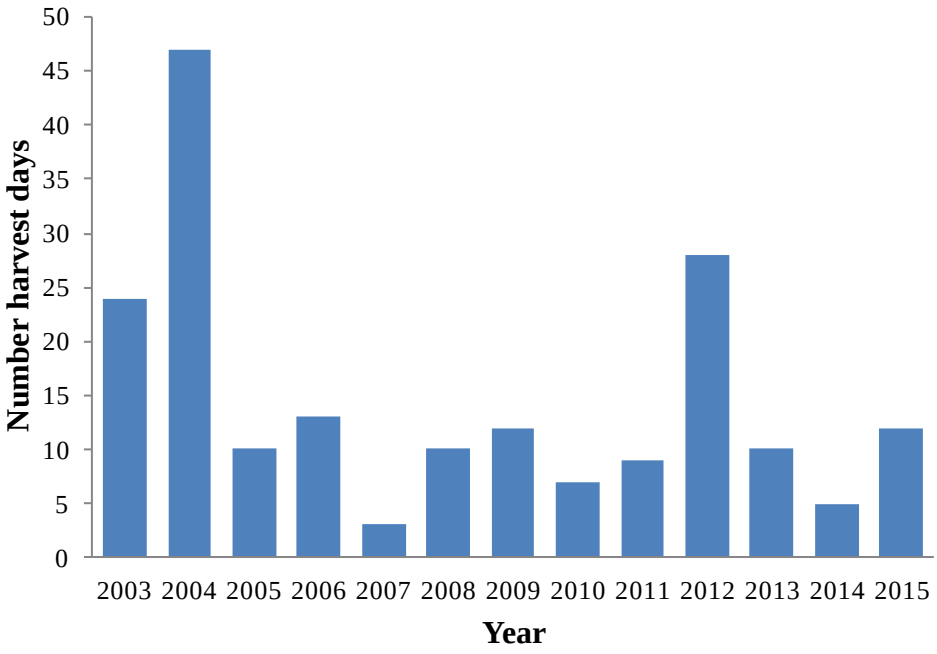


Figure 2. Number of harvest days per season for the Lower Missouri and Yellowstone Rivers.

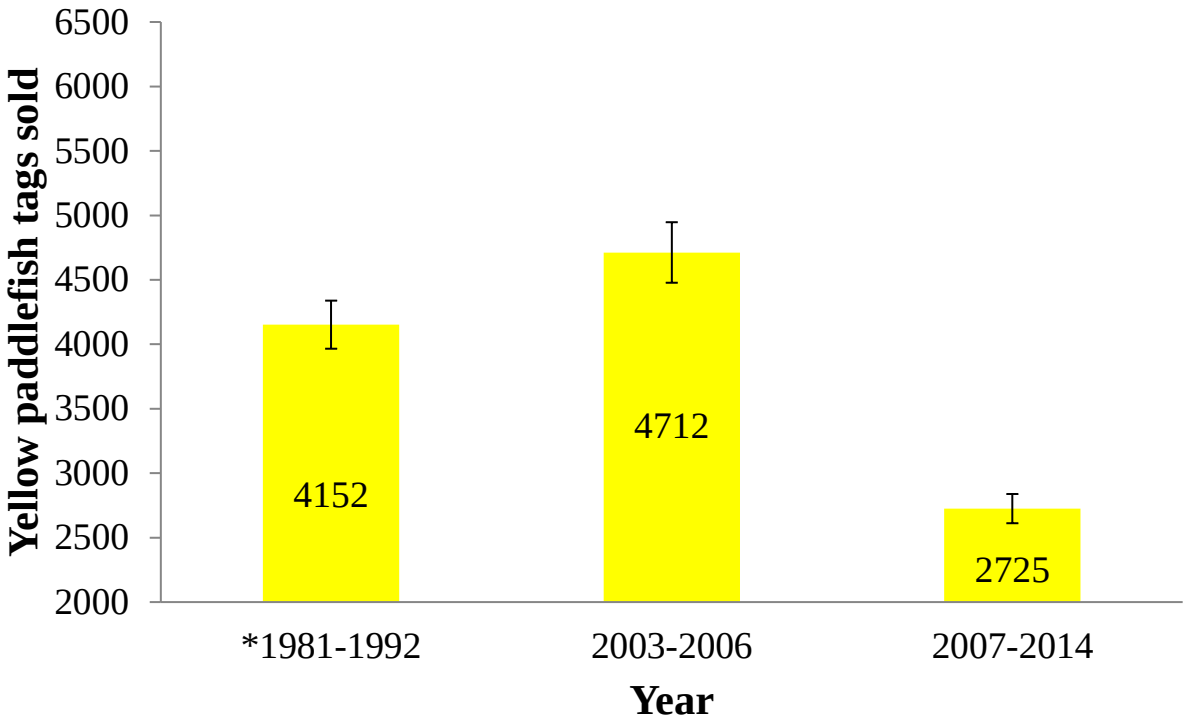


Figure 3. Mean Paddlefish tags sold with standard error bars for the Lower Missouri River and Yellowstone River in Montana by period.
*From 1981 to 1992 tags were only required on Lower Yellowstone, and an angler could get two tags per year. The Missouri River allowed 1 daily and two in posession year round.

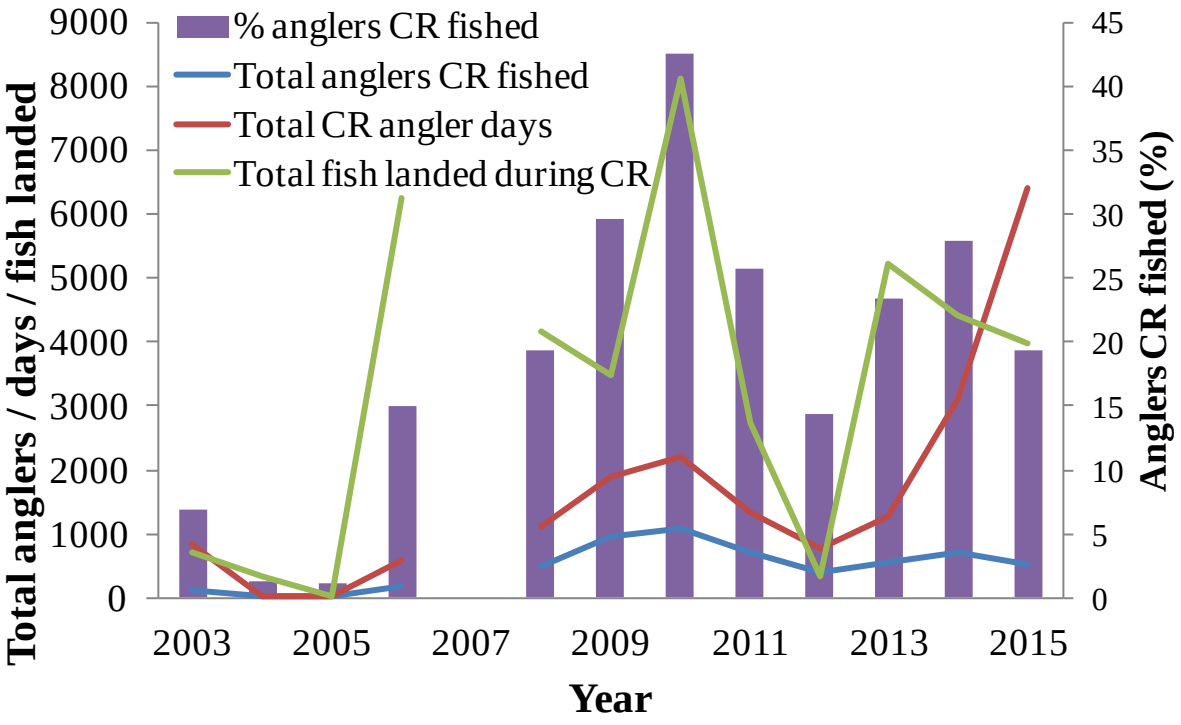


Figure 4. Phone creel catch-and-release (CR) data by year including anglers fished, angler days, total fish landed and percent anglers participating in catch-and-release for Paddlefish of the Lower Missouri River and Yellowstone River in Montana from 2003 to 2015.

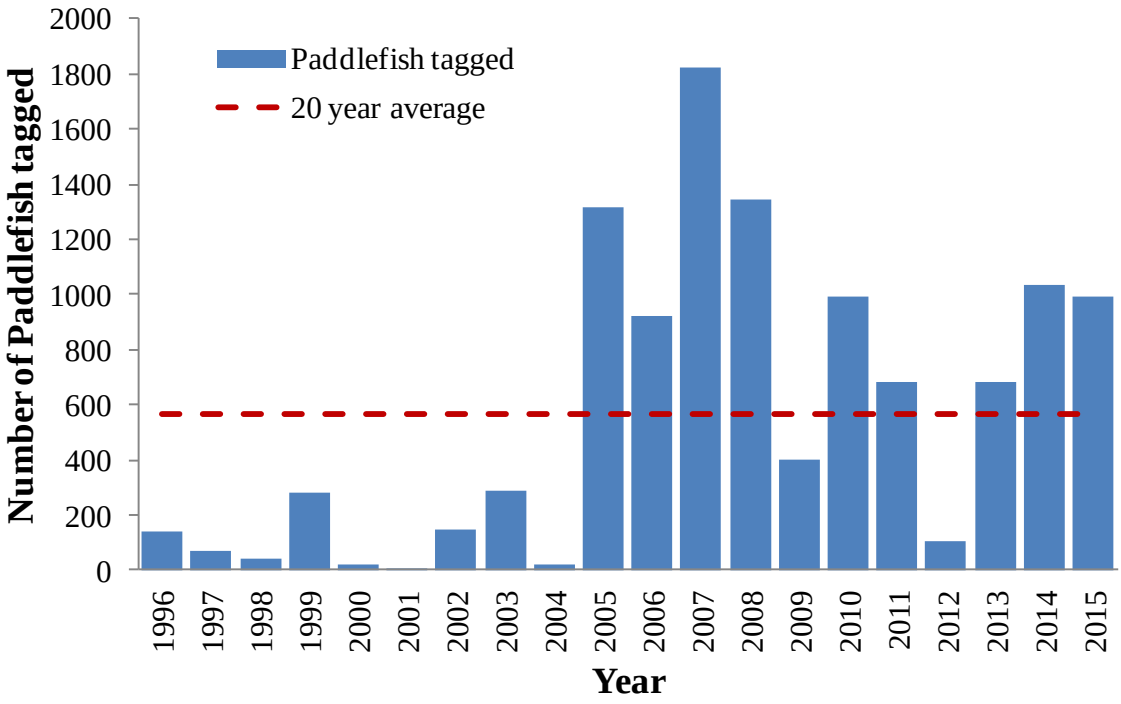


Figure 5. Number of Paddlefish tagged by year from 1996 to 2015, catch-and-release opportunity has been available since 1995, 3 days of catch-and-release only fishing has been available since 2007.

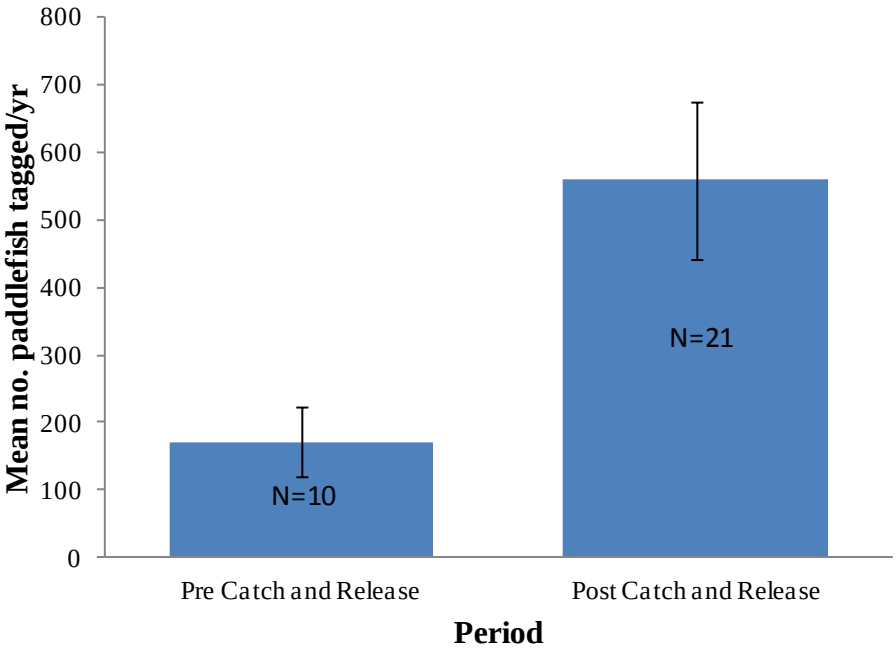


Figure 6. Number of Paddlefish tagged by period pre catch-and-release fishing (1984-1994) and post catch-and-release fishing (1995-2015), catch-and-release opportunity has been available since 1995, 3 days of catch-and-release only fishing has been available since 2007.

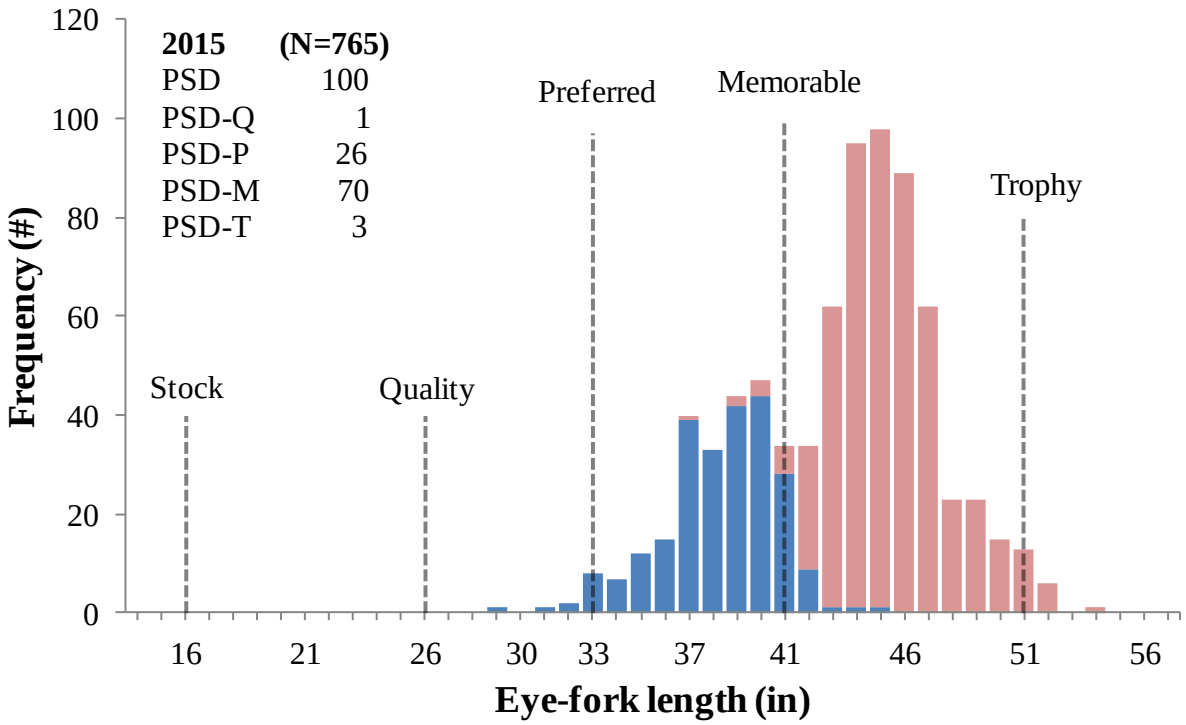


Figure 7. Length frequency histogram with proportion size distribution of Lower Missouri River and Yellowstone River Paddlefish harvested in Montana during 2015.

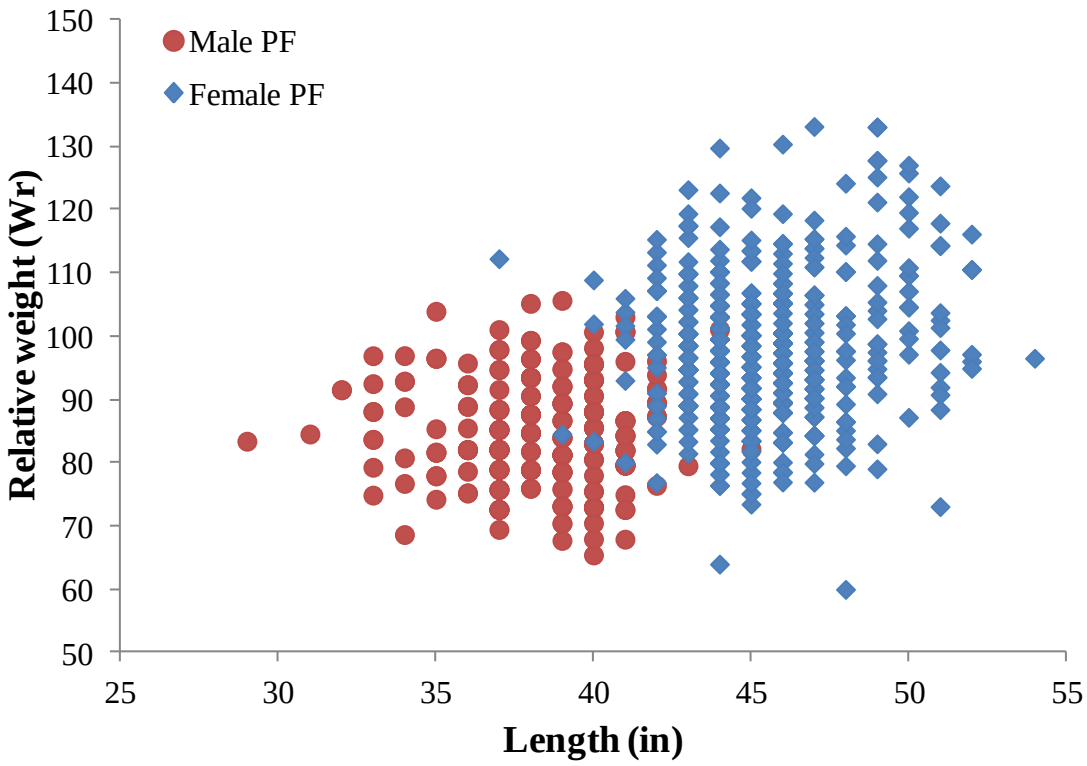


Figure 8. Relative weight by eye-fork-length (in) of Lower Missouri River and Yellowstone River Paddlefish harvested in Montana during 2015 season.

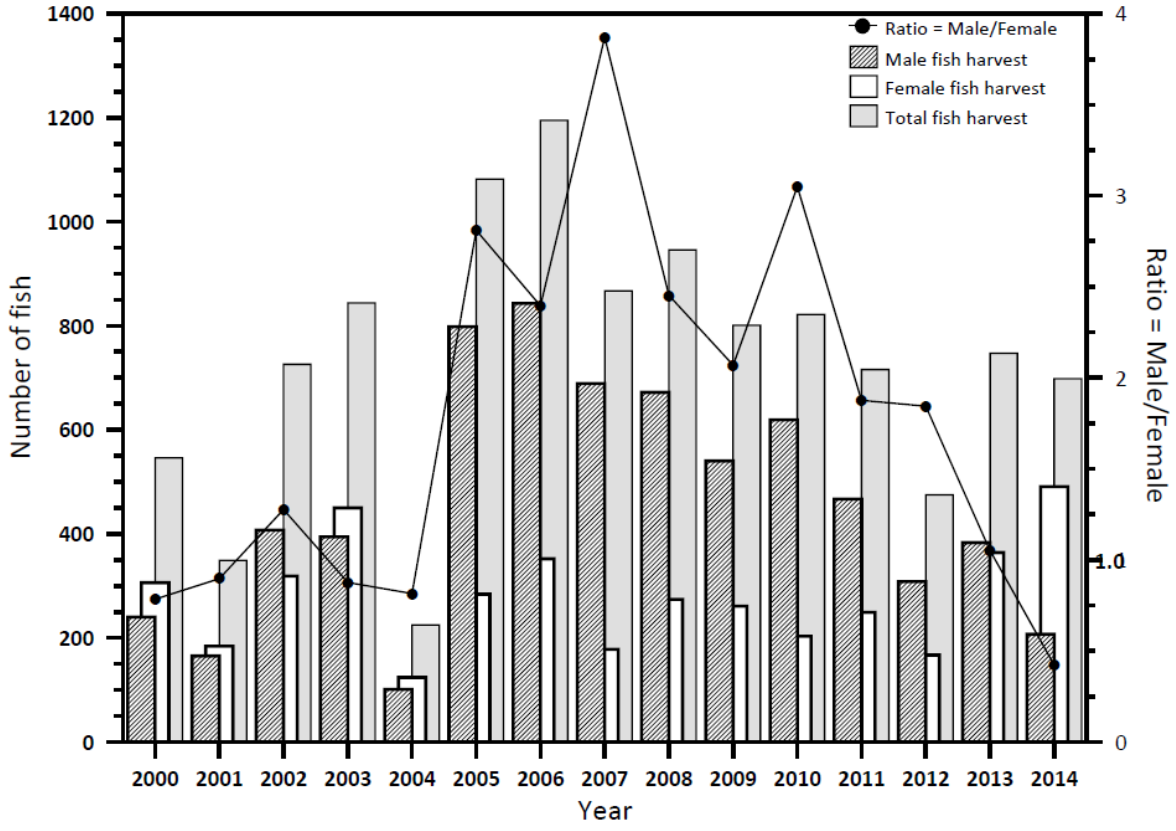


Figure 9. Ratio of male to female Paddlefish and corresponding harvests from Montana data, 200-2014 (from Scarnecchia 2015)

**APPENDIX A**

# Yellowstone/Missouri River (Yellow Tag) Paddlefish Phone Survey – 2015

Compiled by Don Skaar and Corrine Selby, February 12, 2015

| | |
|---|---|
| Number of tags sold: | **2,778** |
| Number tag holders sampled: | **976** |
| Number respondents: | **547** |
| Response rate: | 547/976 = **56.0%** |
| Percent fished | 472/547 = **86.2%** |
| Percent fished on Yellowstone | 466/472 = **98.7%** |
| Percent fished on Missouri | 6/472 = **1.3%** |
| Total Anglers Fished | (.862)(2,778) = **2,397 anglers** |

**Harvest Fishing**

| | |
|---|---|
| Fish harvested: | (2,397)(196/472) = **995 paddlefish** |
| Average days fished to harvest: | 508/196 = **2.59 days** |
| Average days fished to no harvest: | 587/970 **= 0.61 days** |
| Average hrs/day harvest fishing: | |
| -Yellowstone River | **3.72 hr/day** |
| -Missouri River | **2.50 hr/day** |
| Total Angler Days (harvest fishing): | (2.31)(2,397) = **5,561 days** |
| Catch rate (harvested fish): | 196/1095 = **0.18 pf/day** |
| Percent cleaned at chamber: | 154/188 = **81.9%** |

**Catch and Release Fishing**

| | |
|---|---|
| Percent anglers c/r fishing: | 90/466 = **19.3%** |
| Total anglers c/r fishing | (.193)(.987)(2,778) = **530 anglers** |
| Average days c/r fishing | 1,087/90 = **12.1 days** |
| Total days c/r fishing | (12.1)(530) = **6,398 days** |
| Average number of fish landed | 678/90 = **7.53 pf/angler** |
| Total fish landed | (7.53)(530) = **3,990 paddlefish** |
| Catch rate c/r fishing | 3990/7.53 = **0.62 pf/day** |
| Percent Missouri River anglers purchasing a tribal permit | **33.3%** (n=6) |

**General Location of Harvest**

| | |
|---|---|
| Intake | 121 |
| Sidney Bridge | 16 |
| Richland Park | 11 |
| MDU Bridge | 11 |
| State line | 9 |
| Savage | 4 |
| Seven Sisters | 4 |
| 10 miles downstream of intake | 1 |
| 2 miles downstream of intake | 1 |
| Between Intake and Elk Island | 1 |
| between Intake and Sidney | 1 |
| between Savage and Sidney | 2 |
| Border of MT/ND | 1 |
| By Fairview | 1 |
| Close to the ND border-private land | 1 |
| Diamond Willow fishing access | 1 |
| Elk Island | 1 |
| Just north of intake | 1 |
| Just north of Sidney | 1 |
| Miles City | 1 |
| Near Sidney Bridge | 1 |
| Richardson Park | 1 |
| Right outside Fairview, near state line | 1 |
| Sidney | 1 |