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-15

PROJECT PERIOD: July 1, 2013 through June 30, 2014

REPORT PERIOD: April 1, 2013 through March 30, 2014

ABSTRACT:

Each spring paddlefish migrate upstream out of the headwaters of Lake Sakakawea with rising river discharge to reach river spawning grounds. An early to mid-May pulse in flow of nearly 30,000 cubic feet per second (CFS) in the Lower Yellowstone prompted paddlefish to move to Intake Fishing Access Site (FAS) by the beginning of paddlefish season (May 15th). Snagging success was high during the first four harvest days of the season, leading to a decision to close the harvest season after the fifth harvest day. The harvest season was closed on Friday, May 23 after only five harvest fishing days and four catch-and-release fishing days. After the close of the harvest fishing season, catch-and-release fishing for paddlefish was allowed for 10 additional days and ended June 2, 2014. Fish, Wildlife & Parks (FWP) staff tagged 1,031 paddlefish with jaw tags in 2014 during catch-and-release fishing.

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 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) on Sunday, Monday and Thursday. Legal fishing hours are from 6 a.m. to 9 p.m. mountain time.

Objectives for the 2014 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 tag sales 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.

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 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 estimates and infer exploitation (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 2003 to 2013. The 2014 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 manage for a sustainable paddlefish population (Scarnecchia et. al 2008).

RESULTS / DISCUSSION:

Discharge measured at the United States Geologic Survey (USGS) gauge station at Sidney, Montana rose to 30,300 cubic feet per second (CFS) several days prior to the start of paddlefish season, and was 24,200 CFS at the start of the paddlefish season on May 15, 2014. The peak discharge during paddlefish season was 35,200 CFS on May 23, 2014. The early to mid-May pulse of water in the Lower Yellowstone made fish available from the beginning of the season (Figure 1). Harvested paddlefish came mostly from Intake FAS throughout the season, with small contributions from other sites downstream (Figure 1; Skaar and Selby 2014, Appendix A). Harvest success was high from the beginning of the season. Observed harvest was 112, 105, 186, and 159 individuals respectively for the first four harvest days of the season (Figure 1). A decision to close the harvest season after the fifth harvest day (May 23, 2014) was made in anticipation of continued high harvest rates and an influx of snaggers over the Memorial

Day weekend. On the fifth harvest day, the observed harvest was140 paddlefish, bringing the total observed harvest for the entire season to 702 individuals. The Yellowstone/Sakakawea telephone creel estimated total harvest at 788 paddlefish for 2014 (Skaar and Selby 2014, Appendix A).

The 2014 paddlefish season was the eigth 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 six of the last eight years. An estimated 2,063 anglers participated in the 2014 paddlefish season on the Lower Missouri and Yellowstone Rivers, generating 3,940 angler days (Skaar and Selby 2014, 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 84% of fish harvested were cleaned by the Glendive Chamber of Commerce (Skaar and Selby 2014, 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. The survey found 89% of current paddlefish anglers surveyed are satisfied with the current season structure. Anglers surveyed would support mandatory reporting of harvest if it provided more efficient population management. Anglers surveyed liked having the option to catch and release but 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). Favorable flow and resulting paddlefish availability at Intake FAS in 2013 and 2014 increased catch and release participation from what was observed in 2012. The 2014 phone creel documented the increased participation in catch and release fishing. An estimated 28.0% of anglers participated in catch and release fishing in 2014 and landed 4,431 paddlefish at a rate of 1.42 paddlefish caught per angler day (Skaar and Selby 2014, 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 2014, FWP staff tagged 1,031 paddlefish, exceeding the long-term average of 415 tagged paddlefish (Figure 5). Additionally, the average number of tagged paddlefish has risen from 171$\pm$51 (avg$\pm$SE) prior to catch-and-release opportunity to 537$\pm$127 (avg$\pm$SE) post catch-and-release (Figure 5).

The sex ration of harvested paddlefish during 2014 was comprised of 70 percent female and 29 percent male (Figure 6). The relative weight (Wr) of females was greater than that of males (Figure 7). Yellowstone/Sakakawea stock are available in good numbers with trophy potential. 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 7). Fish collected at Intake FAS demonstrated condition factor at or just slightly below other populations.

The 1995 year class continued to be the cohort providing the largest percentage of harvested paddlefish in 2014 (aging data, Scarnecchia et. al 2006, Scarnecchia 2010 A). Males from the 1995 year-class had skewed the sex ratio of harvested paddlefish toward male for much of the past decade (Figure 8). 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 have become 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 8). 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 continue to show 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 identification of successful reproduction has not consistently resulted in recruitment of sexually mature fish to the adult population.

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Mathew Rugg

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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

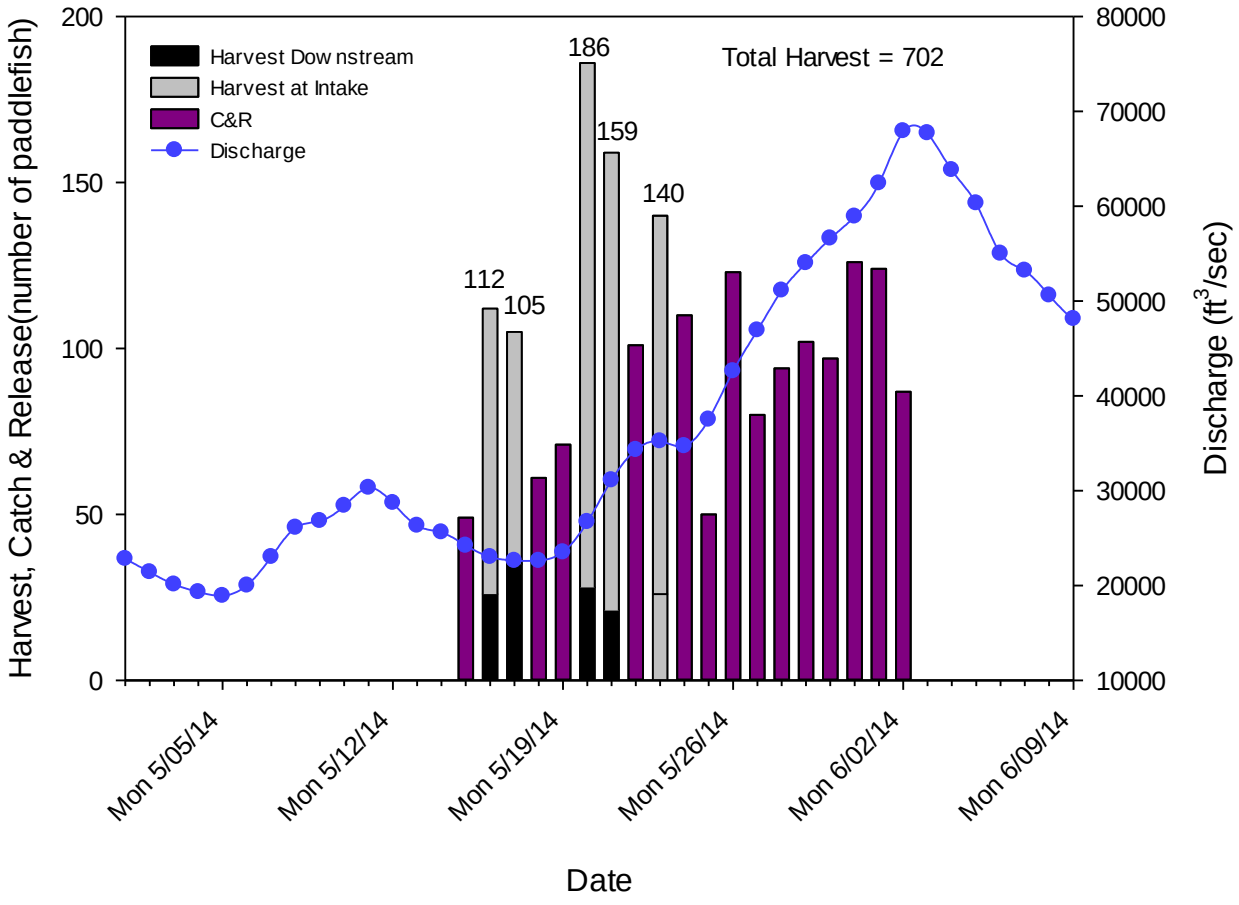

Figure 1. Observed paddlefish harvest in number of fish and Yellowstone River discharge recorded at the USGS gauging station at Sidney, MT by day over the 2014 paddlefish season

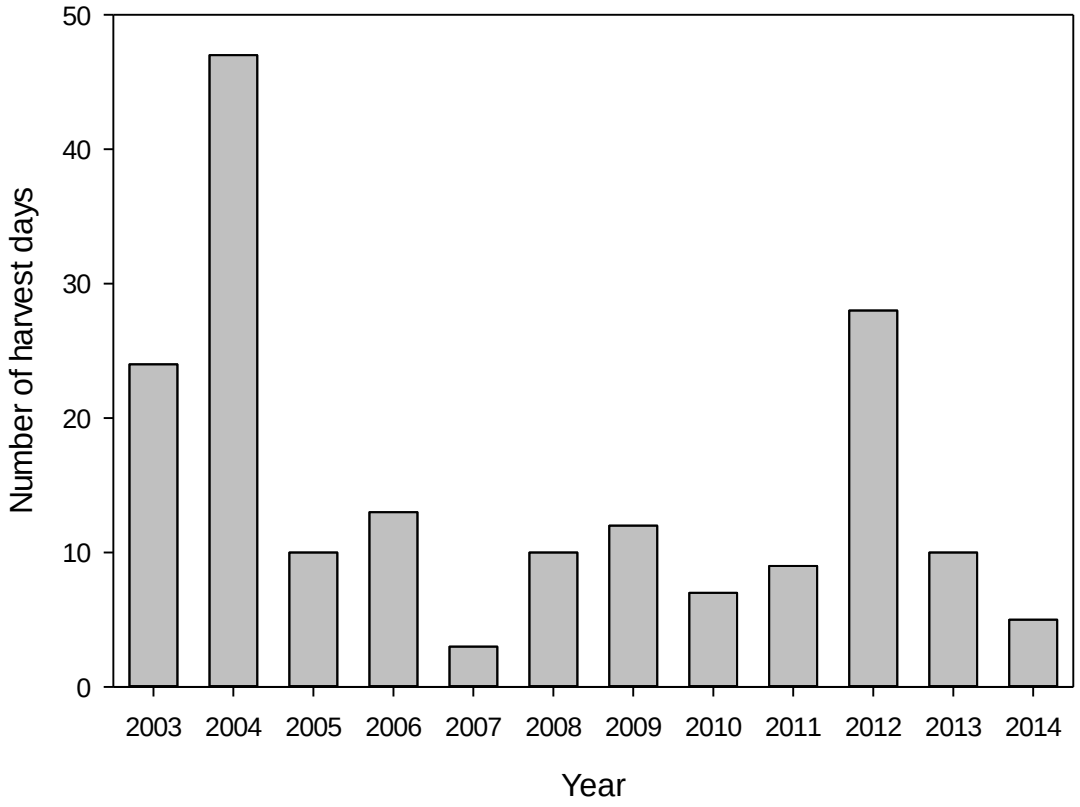

Figure 2. Number of harvest days per season with standard error bars for the Lower Missouri River and Yellowstone River.

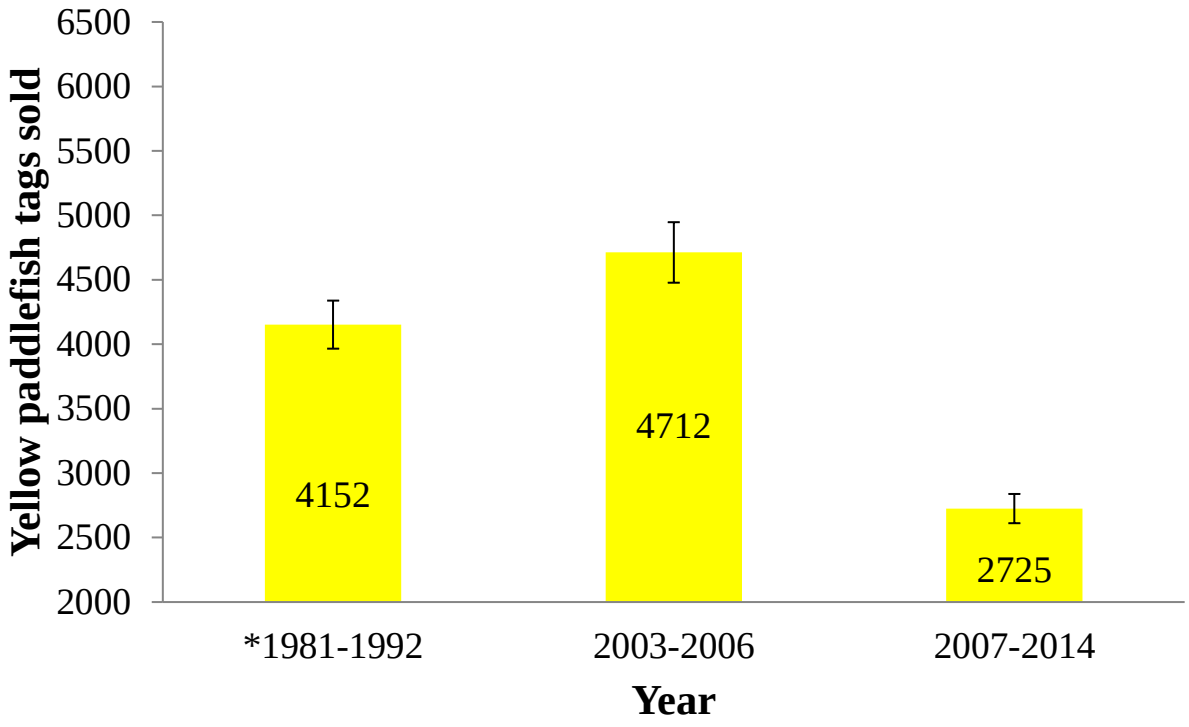

Figure 3. Mean paddlefish tags sold with standard error bars for the Lower Missouri River and Yellowstone River in Montana by period.
*From 1981 to 1992 tags were only required on Lower Yellowstone, and an angler could get two tags per year. The Missouri River allowed 1 daily and two in posession year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

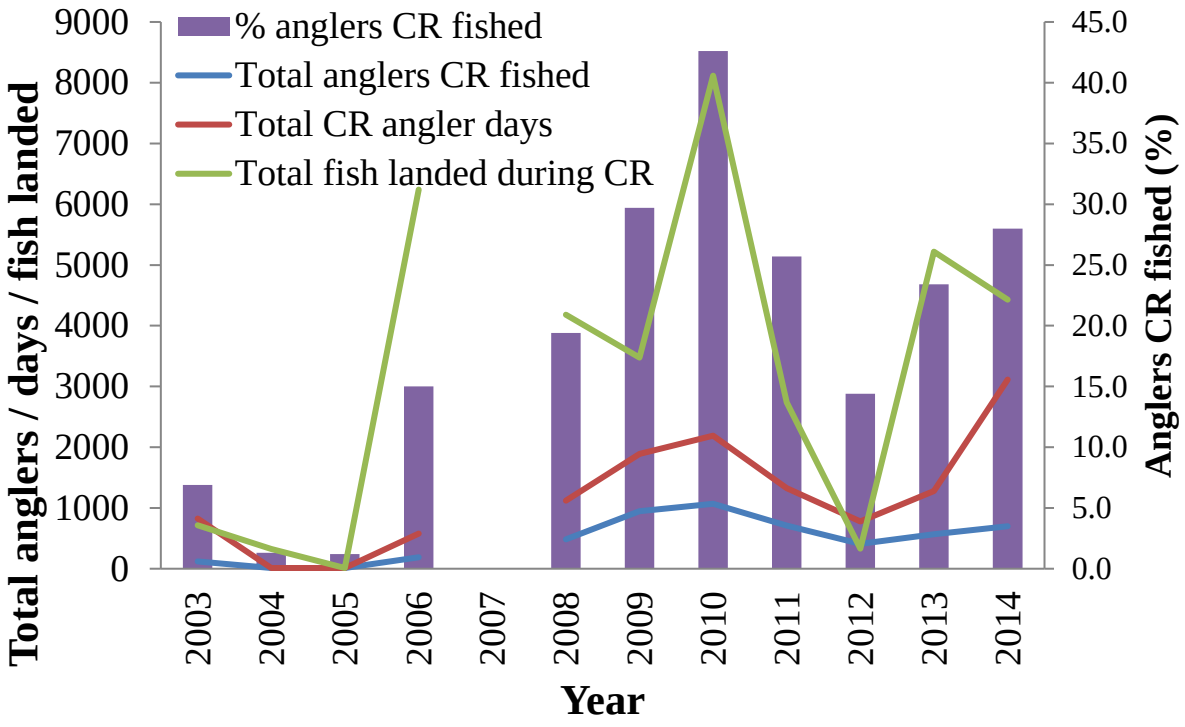

Figure 4. Phone creel catch and release data by year including anglers fished, angler days, total fish landed and percent anglers participating in catch and release for paddlefish of the Lower Missouri River and Yellowstone River in Montana from 2003 to 2014.

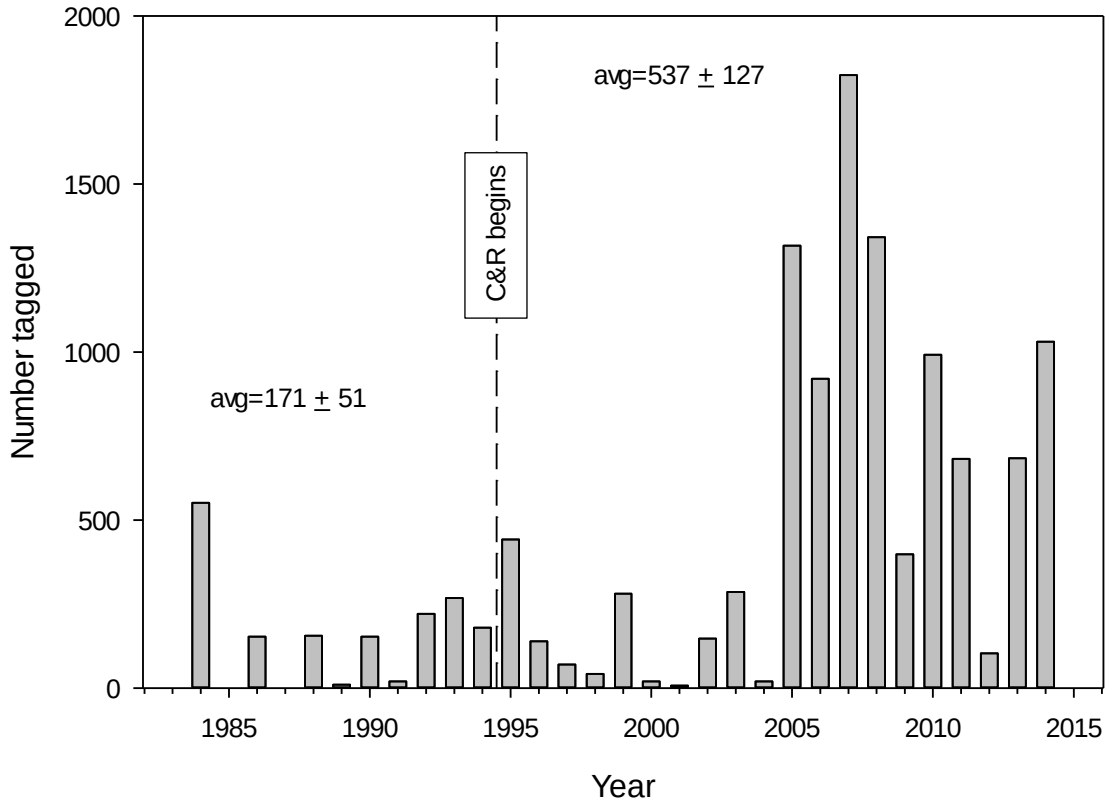

Figure 5. Number of paddlefish tagged by year from 1984 to 2014, catch and release opportunity has been available since 1995, 3 days of catch and release only fishing has been available since 2007.

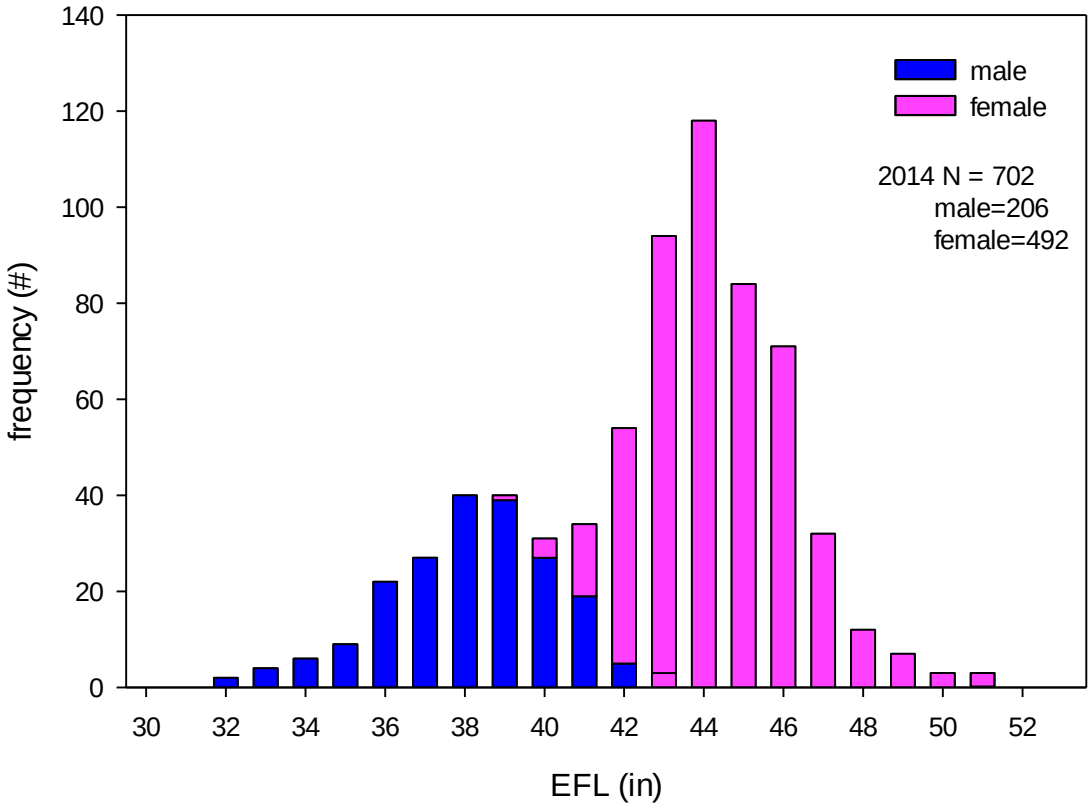

Figure 6. Length frequency histogram of Lower Missouri River and Yellowstone River paddlefish harvested in Montana during 2014.

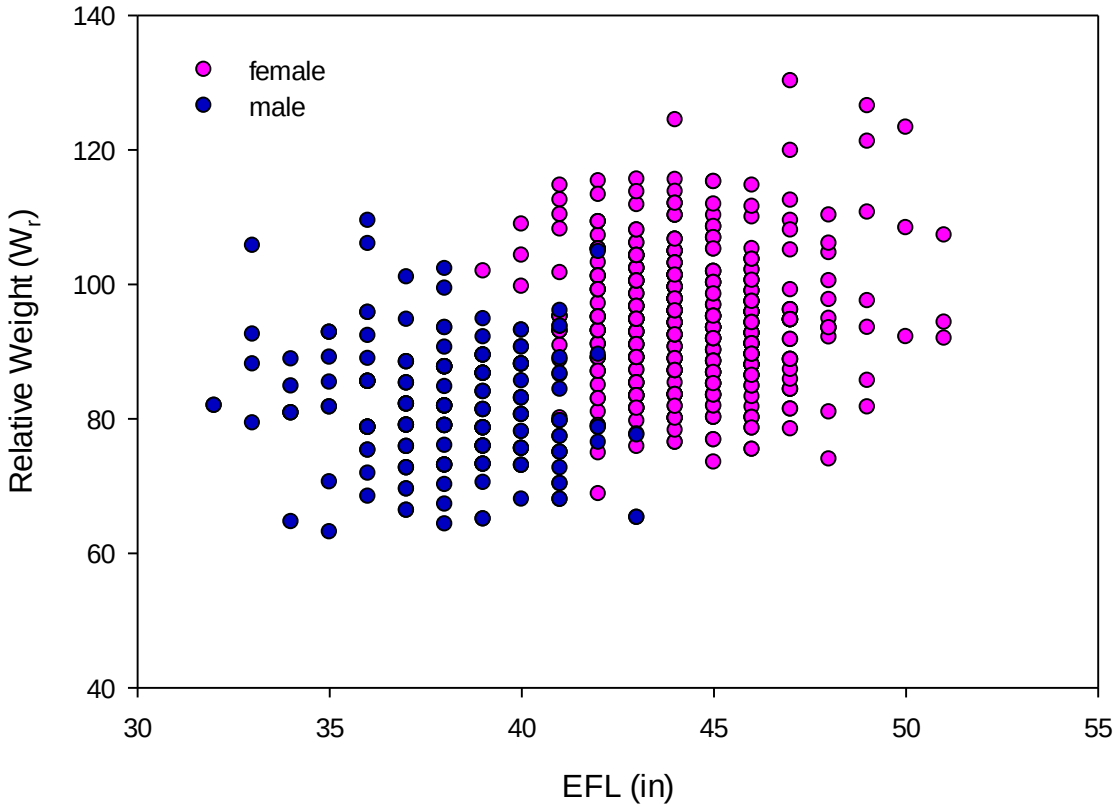

Figure 7. Relative weight by eye-fork-length (in) of Lower Missouri River and Yellowstone River paddlefish harvested in Montana during 2014 season.

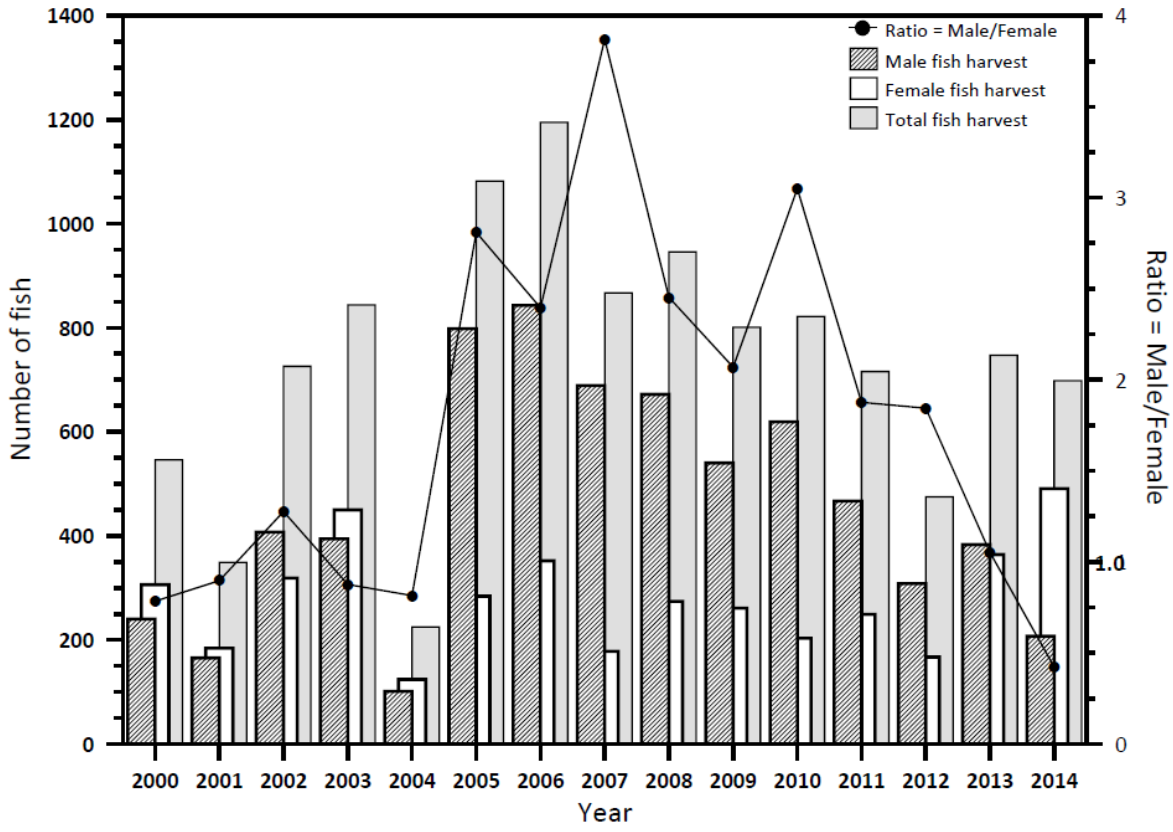

Figure 8. Ratio of male to female paddlefish and corresponding harvests from Montana data, 200-2014 (from Scarnecchia 2015)

APPENDIX A

Yellowstone/Missouri River (Yellow Tag) Paddlefish Phone Survey – 2014

Compiled by Don Skaar and Corrine Selby, February 16, 2015

Number of tags sold:	**2,535**
Number tag holders sampled:	**887**
Number respondents:	**463**
Response rate:	463/887 = **52.1%**
Percent fished	377/463 = **81.4%**
Percent fished on Yellowstone	372/377 = **98.6%**
Percent fished on Missouri	5/377 = **1.3%**
Total Anglers Fished	(.814)(2,535) = **2,063 anglers**

Harvest Fishing

Fish harvested:	(2,535)(144/463) = **788 paddlefish**
Average days fished to harvest:	269/149 = **1.81 days**
Average days fished to no harvest:	455/224 **= 2.03 days**
Average hrs/day harvest fishing:	
-Yellowstone River	**1.93hr/day**
-Missouri River	**1.86 hr/day**
Total Angler Days (harvest fishing):	(1.91)(2,063) = **3,940 days**
Catch rate (harvested fish):	144/719 = **0.20 pf/day**
Percent cleaned at chamber:	117/139 = **84.2%**

Catch and Release Fishing

Percent anglers c/r fishing:	104/372= **28.0%**
Total anglers c/r fishing	(.279)(.987)(2,535) = **699 anglers**
Average days c/r fishing	463/117 = **4.45 days**

Total days c/r fishing	(4.45)(699) = **3,113 days**
Average number of fish landed	659/104 = **6.33 pf/angler**
Total fish landed	(6.33)(699) = **4,431 paddlefish**
Catch rate c/r fishing	4431/3113 = **1.42 pf/day**
Percent Missouri River anglers purchasing a tribal permit	**20.0%** (n=5)

General Location of Harvest

Intake	106
Sidney bridge	11
MDU Bridge	6
Richland Park	4
1/4 mile N of MDU bridge	1
2 miles north of Sidney bridge	1
5 mi N of Intake-Big Rock	1
7 miles upstream of Sidney bridge	1
a few miles N of MDU Bridge	1
between Intake and savage	1
Between Sidney/Fairview	1
Crane	1
Elk Island	1
FAS near Crane	1
MDU power plant	1
North of Richland Park	1
Seven Sister FAS	1
slough side of Intake	1
south of Sidney Brdige	1
state line	1
Sidney Bridge area	1