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-17

PROJECT PERIOD: July 1, 2016 through June 30, 2017

REPORT PERIOD: April 1, 2017 through March 30, 2018

ABSTRACT:

Each spring Paddlefish migrate upstream out of the headwaters of Lake Sakakawea with rising river discharge to reach river spawning grounds. In contrast to the 2016 season, the Yellowstone River was at above average discharge throughout the entirety of the 2017 Paddlefish season. In response to the above average snow pack in the Big Horn mountains and an already mostly full Yellowtail Reservoir the Bureau of Reclamation released >10,000 cubic feet per second (CFS) from April 13th to June 13th. This contributed to a measured Yellowstone River discharge (USGS station #06329500 Sidney, MT) above 20,000 CFS by April 22 about the same date on which migrating Paddlefish were observed breaking the surface at Intake Fishing Access Site (FAS). Flows only continued to rise and by the Paddlefish opener on May 15th exceeded 40,000 CFS. The result was a fast and furious harvest season that ended on the 4th harvest day with an in-season closure on May 20th. Catch and release fishing continued for an additional 10 days at Intake FAS and closed the Tuesday after Memorial Day Weekend (May 30th). Fish, Wildlife & Parks (FWP) staff tagged 691 Paddlefish with jaw tags in 2017 during catch-and-release fishing. During the month of May, FWP staff surgically implanted 13 adult Paddlefish with radio telemetry transmitters in the 10-mile-long reach downstream of Intake FAS as part of an ongoing native fish passage study that began in 2015. Telemetered Paddlefish had left the Yellowstone River by mid-July, while reports documented with photographs indicated some Paddlefish were still in the Ft Smith area of the Bighorn River in early August. The Bighorn River is part of the historical range of the Paddlefish as evidenced by anecdotal pictures and reports from anglers prior to the construction of the mainstem dams that changed its character from a turbid prairie river to a blue-ribbon trout stream. Use of the Bighorn River by migrating Paddlefish since the construction of Yellowtail Dam had not previously been documented, and the presence of Paddlefish in the Bighorn River as late as August is not easily explained.

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 (Purkett 1961, Rehwinkel 1978; Carlson and Bonislawsky 1981). The Yellowstone/Sakakawea stock is sustained primarily through natural recruitment although hatchery stocking has occurred periodically with the specific purpose of introducing known age fish into the stock for validation of aging methods. It has also been observed that some Paddlefish immigrate from the Fort Peck stock that resides in Fort Peck Lake and the Missouri River upstream of Fort Peck Dam. Similarly, it has been observed that Paddlefish emigrate and are permanently lost from the Yellowstone Sakakawea population by passing over Garrison Dam into the Garrison reach of the Missouri River below the Dam (e.g. as observed most recently in 2011 during historic Missouri River flows).

The harvest of Paddlefish at Intake, MT has been documented for over a century and as understanding of the fishery has improved some important management decisions have been made particularly 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). In 2017, the Montana legislature passed a bill that extended the statute allowing production of caviar from the roe of harvested Paddlefish at Intake Fishing Access Site (FAS) until 2028. Since 1990, 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 under a memorandum of understanding with Fish, Wildlife & Parks (FWP) because of this legislation. Proceeds from the sale of caviar fund community improvement grants, as well as Paddlefish research, monitoring and management (Scarnecchia et al. 2008). This arrangement and regulated 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 FAS is closed instantaneously when FWP staff estimates that harvest is approaching the 1,000-fish harvest 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 only at Intake FAS) on Sunday, Monday and Thursday. Legal fishing hours are from 6 a.m. to 9 p.m. mountain time.

Objectives for the 2017 season were as follows: 1) keep harvest under the 1,000 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:

The 2017 Paddlefish season was the second season requiring mandatory report of harvested Paddlefish by either phone or in person at the Intake cleaning station. In 2017 the MRRE phone hotline for Paddlefish got its own phone number to facilitate differentiation of phone calls between Fisheries and Wildlife for billing purposes. The data collected by this hotline was used in combination with the Intake cleaning station harvest count to decide when to implement the instantaneous harvest closure. A post season 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 since 2003. The 2017 phone creel included 8 questions about angler harvest, angler effort, use of Glendive Chamber of Commerce fish cleaning services, and participation in catch-and-release fishing. The phone creel was used to provide the final estimate of harvest.

University of Idaho and FWP staff ran a biological check station to collect data from harvested Paddlefish brought by anglers to Intake FAS to be cleaned by the Glendive Chamber of Commerce Caviar Contractors. Harvested fish were weighed to the nearest pound, measured to the nearest inch (front of eye to fork of the caudal fin), and inspected for tags (jaw, radio, coded wire, etc.). Gender of harvested fish was recorded by FWP staff and confirmed when filleted by caviar staff. A portion of the Paddlefish caught during designated catch-and-release fishing by anglers were measured and tagged by FWP creel clerks. Fish sex was estimated based on length, abdominal shape and presence of tubercles on rostrum and head. Monel metal bands (National Band and Tag Co., Size 16, ½ inch inside diameter) have been used to tag Paddlefish around the dentary bone since 1997. Recent runs of the bands have been corroding badly, so that the numbers are not discernible after just a few years. This lack of longevity for tags being put on a species of fish that could be at large after tagging for half a century poses a problem. In 2016 FWP staff began using an aluminum version of the metal jaw tags. North Dakota Game and Fish Department (NDGF) staff jaw tags roughly 300 Paddlefish annually below the confluence prior to both the North Dakota and Montana Paddlefish seasons. The NDGF tagging effort functions as the mark event and the harvested fish from both states function as the recapture events used to model population (Scarnecchia et al. 2008). Both states collected jaw sections from harvested Paddlefish to be aged by the University of Idaho. This age data was used to model population (Scarnecchia et al. 2014).

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. 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).

During the month of August NDGF staff conducted transects in the upper end of Lake Sakakawea counting young-of-the-year Paddlefish with methods as described by Fredericks and Scarnecchia (1997). While conducting these visual transects from a boat it is also common for NDGF staff to observe sub-adult Paddlefish. This effort provides an indication of the relative strength of reproduction from the current year as well as recruitment of the previous few year classes to sub-adulthood.

Additionally, since the 2015 season FWP and the Bureau of Reclamation (BOR) have conducted a telemetry study using radio tagged native species (Pallid Sturgeon, Shovelnose Sturgeon, Blue Sucker, Sauger, and Paddlefish) to evaluate passage at Intake Diversion Dam under current conditions. Only a description of the movements of telemetered Paddlefish will be summarized in this report. Paddlefish were surgically equipped with Lotek MCFT2-3L radio transmitters adapting methods described by Ross and Kleiner (1982). Incisions were made on fishes left just offset from the abdominal midline, and closed with wax coated braided silk sutures (Photo 1). Relocations of telemetered fish were made weekly by boat and continuously with a network of ground receivers.

RESULTS / DISCUSSION:

Yellowstone River discharge had reached 40,000 cubic feet per second (CFS) by May 15, 2017 (USGS station #06329500 Sidney, MT) making Paddlefish available at Intake FAS for the season opener. Discharge during Paddlefish season peaked two days later at 45,200 CFS, stayed above 30,000 CFS for the rest of the season and eventually peaked for the year on June 10th (Figure 1). Harvest was intense with only three full days of harvest with an in-season closure at Intake FAS at 8am and river-wide at 2pm on the fourth harvest day. Catch-and-release fishing for Paddlefish was allowed for 10 additional days at Intake FAS, ending the Tuesday after Memorial Day Weekend. The Yellowstone/Sakakawea telephone creel estimated total harvest at 972 Paddlefish for 2017 (Skaar and Selby 2017, Appendix A).

Harvest has been kept under the harvest cap eight of the last ten years. An estimated 2,031 anglers participated in the 2017 Paddlefish season on the Lower Missouri and Yellowstone Rivers, generating 4,468 angler days (Skaar and Selby 2017, Appendix A). Phone creel results indicate that staying under the harvest cap and increasing catch-and-release opportunity has been successful, but regulations have not increased the average number of harvest days per season (Figure 2). An estimated 86.8% of fish harvested were cleaned by the Glendive Chamber of Commerce (Skaar and Selby 2017, 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. Anglers surveyed liked having the option to catch-and-release and would not be in favor of a lottery style draw for Paddlefish tags. The survey results also indicate anglers would support mandatory reporting of harvest if it provided more efficient population management. Mandatory reporting became a requirement for harvested Paddlefish in 2016. In the 2016 phone survey several questions were used to gauge the use and importance of gaffs for Paddlefish harvest. The intent was to determine if eliminating gaffs (i.e. eliminating the risk of incidental gaffing of Pallid Sturgeon) could be done without infringing on the opportunity of Paddlefish anglers. Thousands of Paddlefish are landed during catch and release fishing annually without the use of gaffs (Skaar and Selby 2017, Appendix A). The 2016 phone survey indicated that 60% of Paddlefish anglers use a gaff while harvest fishing and believe their harvest ability would be reduced if gaffs were eliminated. While catch and release fishing suggests gaffs are not necessary to land Paddlefish the 2016 phone creel results strongly demonstrate that use of a gaff is important to harvest anglers. Since the risk of incidental gaffing is quite low, the benefit of eliminating the use of gaffs is outweighed by the cost to angler opportunity.

Tag sales for the Lower Yellowstone Paddlefish fishery suggest more participation prior to the last bundle of regulation changes in 2007 than from 2007 to 2012 (Figure 3). In 2006 anglers could purchase both a yellow and white tag giving them the opportunity to harvest two fish in Montana. Beginning in 2007, anglers had to choose one area, this eliminated everyone that preferred the Fort Peck fishery but were previously in the habit of buying the yellow tag purely as second opportunity. 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). Catch-and-release fishing appears to be strongly influenced by fish availability at Intake. 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). An estimated 35.8% of anglers participated in catch-and-release fishing in 2017 and landed a cumulative total of 4,744 Paddlefish at a rate of 2.5 Paddlefish caught per angler and fished a total of 1,891 catch-and-release angler days (Skaar and Selby 2017, Appendix A). The percentage of anglers participating in catch-and-release fishing was higher than observed in 2016. The number of angler days generated in 2017 was about the same as in 2016. 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 2008. During catch-and-release fishing at Intake FAS in 2017, FWP staff tagged 691 Paddlefish, which is close to the 20-year average number of Paddlefish tagged per year of 614 (Figure 5). Additionally, the average number of tagged Paddlefish has risen from 171$\pm$51 (avg$\pm$SE) prior to catch-and-release opportunity to 562$\pm$106 (avg$\pm$SE) post catch-and-release (Figure 6).

The sex ratio of harvested Paddlefish during 2017 was 72 percent female and 28 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 (Figure 8). The relative weight (Wr) of females was greater than that of males (Figure 9). 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 9). 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 2017. Male Paddlefish from the 1995 year-class had skewed the sex ratio of harvested Paddlefish toward male for much of the past decade (Figure 7). These male fish from the 1995-year class began showing up in 2003, at age eight, and were the dominant year class in male harvest by 2005 (Scarnecchia 2017). 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. However, in recent years the harvest of Paddlefish has been skewed toward females (Figure 7).

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 20 years (Figure 10). These closed population estimates with the mark-recapture data collected on spawning individuals for a given year estimate a subset of the entire population. In any given year there are off-year spawners and sexually immature fish residing within Lake Sakakawea that are not estimated. 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 during these years but these surveys showed an unprecedented presence of sub-adult fish assumed to be the 2011-year class (Fred Ryckman, personal communication). During the 2017 season several small male Paddlefish were harvested that were thought to possibly be leading edge fish from the 2011-year class. Age analysis confirmed this and has provided evidence that the 2011-year class of Paddlefish will be recruiting to adulthood beginning with males over the next couple years and then females thereafter. It is still too early to determine how substantial the size of this year class will be.

During the month of May in 2015, 40 adult Paddlefish were surgically implanted with radio telemetry transmitters in the 10-mile reach downstream of Intake FAS as part of a native fish passage study. The movements of telemetered Paddlefish in 2015 demonstrate passage over or around Intake Diversion Dam (Figure 11). Five Paddlefish migrated upstream of Glendive. Four continued upstream to the Powder River area, with one male Paddlefish migrating as far as Rosebud, MT. During the month of May in 2016, 58 adult Paddlefish were surgically implanted with radio telemetry transmitters in the 10-mile reach downstream of Intake FAS as part of a native fish passage study. In 2016, 0 of 53 Paddlefish that encountered Intake Diversion Dam passed over or around as flows were likely inadequate to make passage available (Figure 12). During the month of May in 2017, 13 adult Paddlefish were surgically implanted with radio telemetry transmitters in the 10-mile reach downstream of Intake FAS as part of a native fish passage study. Newly tagged and previously tagged (2015, 2016) Paddlefish were relocated during 2017 telemetry and ground station tracking. Forty-nine telemetered Paddlefish encountered Intake Diversion Dam in 2017 with just 12 passing (24%) upstream, mostly through the side channel (9 Paddlefish) but also over the dam (3 Paddlefish).

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Key Words: Catch-and-release, Harvest, Paddlefish sex ratio, Paddlefish caviar, Phone creel survey, Paddlefish tagging

Photo 1. Example of Paddlefish surgery, abominal insertion on fishes left of Lotek MCFT2-3L radio transmitter on frequency 148.480, closure with silk sutures.

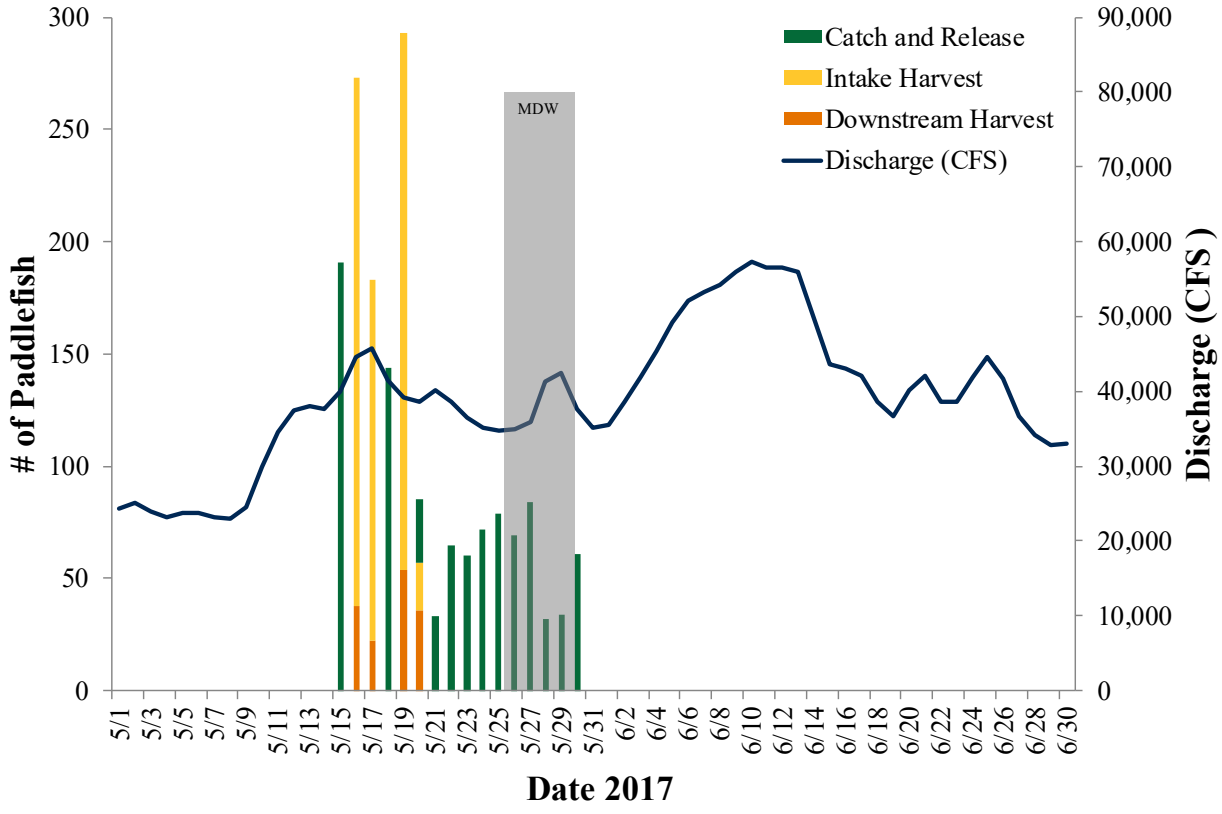

Figure 1. Observed Paddlefish harvest at Intake, downstream of Intake, and catch and release at Intake and Yellowstone River discharge (flow measured in cubic feet per second) recorded at the USGS gauging station at Sidney, MT during the 2017 Paddlefish season

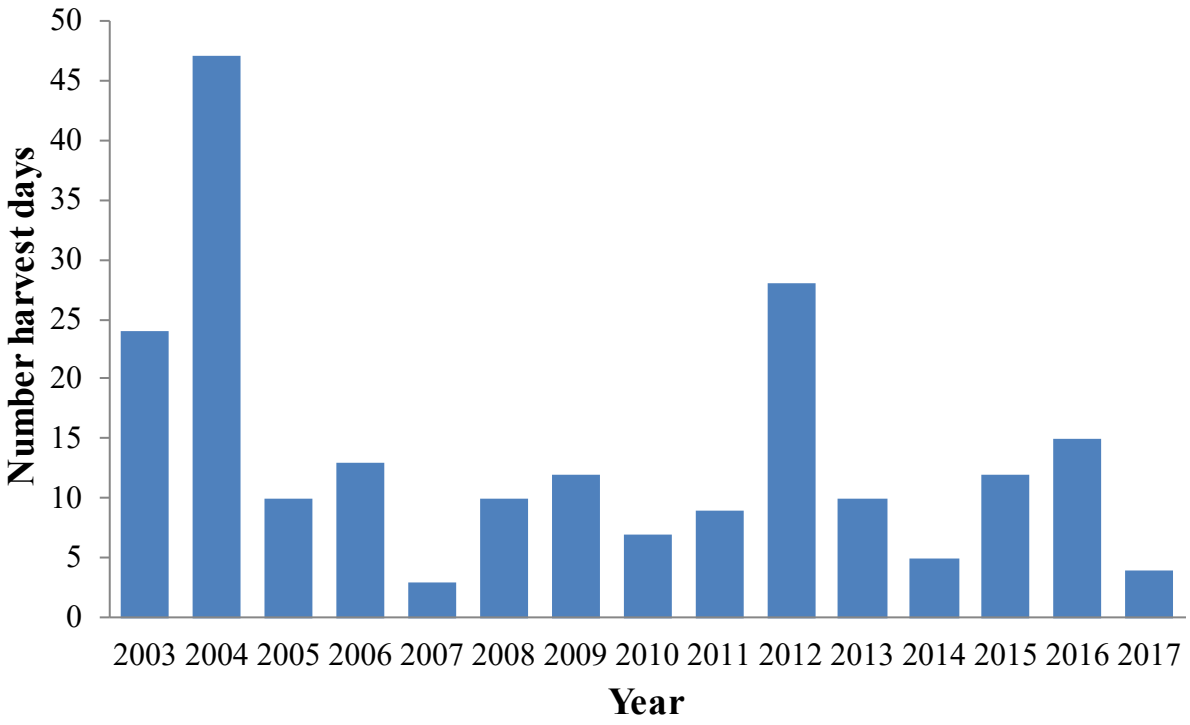

Figure 2. Number of harvest days per season for the Lower Missouri and Yellowstone Rivers.

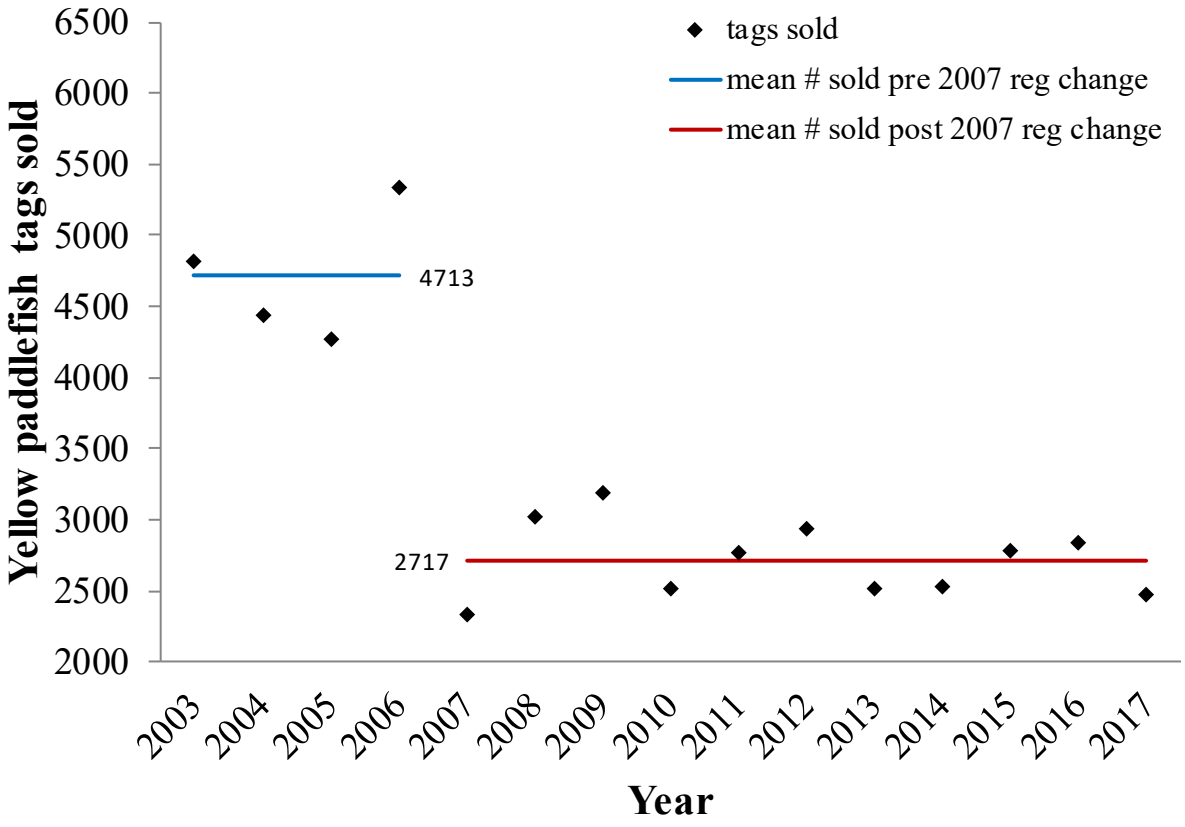

Figure 3. Number of Paddlefish tags sold for the Lower Missouri River and Yellowstone River in Montana by year with mean tag sales from 2003 to 2006 indicated by the blue line and mean tag sales from 2007 to 2017 indicated by the red line.

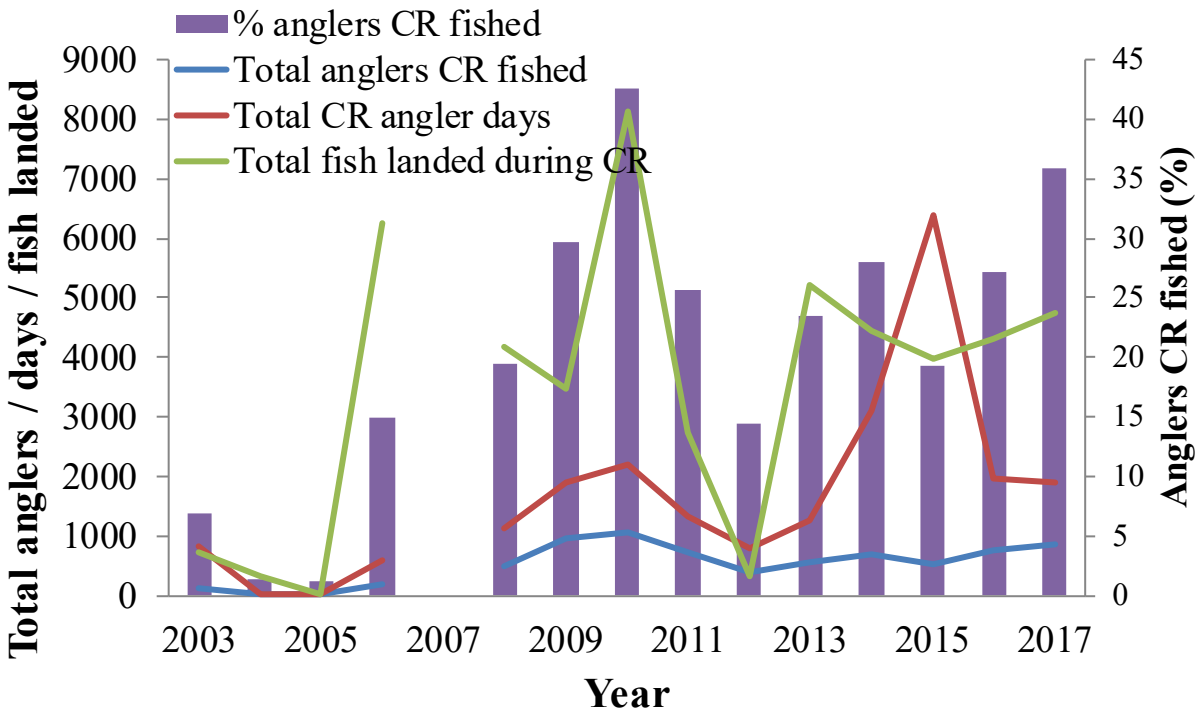

Figure 4. Phone creel catch-and-release (CR) data by year including anglers fished, angler days, total fish landed and percent anglers participating in catch-and-release for Paddlefish of the Lower Missouri River and Yellowstone River in Montana from 2003 to 2017.

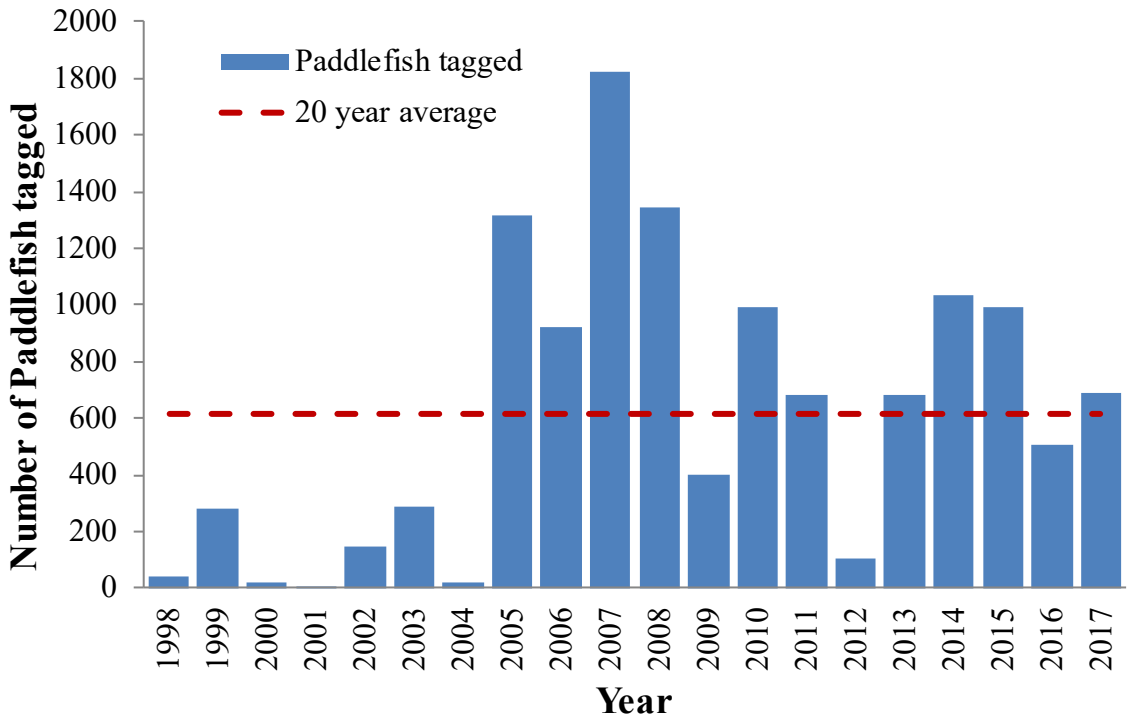

Figure 5. Number of Paddlefish tagged by year from 1997 to 2017, catch-and-release opportunity has been available since 1995, 3 days/week during the harvest season and an additional 10 days post harvest closure of catch-and-release only fishing has been available since 2007.

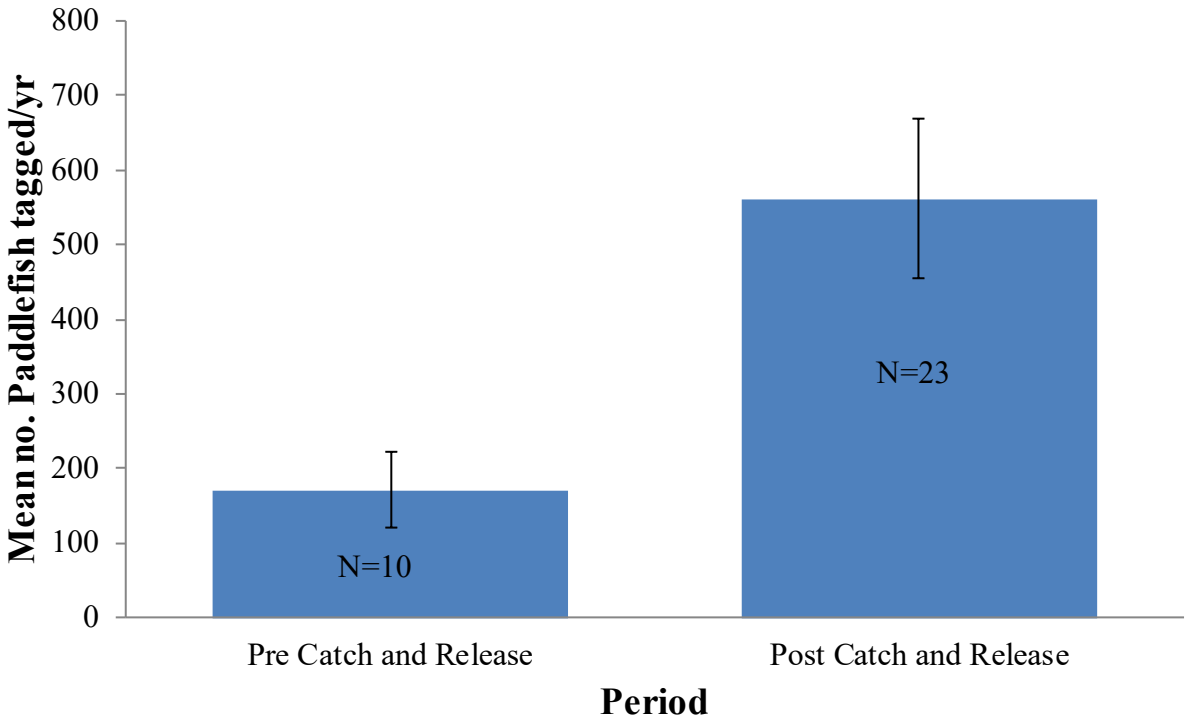

Figure 6. Number of Paddlefish tagged by period pre catch-and-release fishing (1984-1994) and post catch-and-release fishing (1995-2017), catch-and-release opportunity has been available since 1995, 3 days/week during the harvest season and an additional 10 days post harvest closure of catch-and-release only fishing has been available since 2007.

Figure 1. Ratio of male to female paddlefish and corresponding harvests from Montana data, 2000 - 2017.

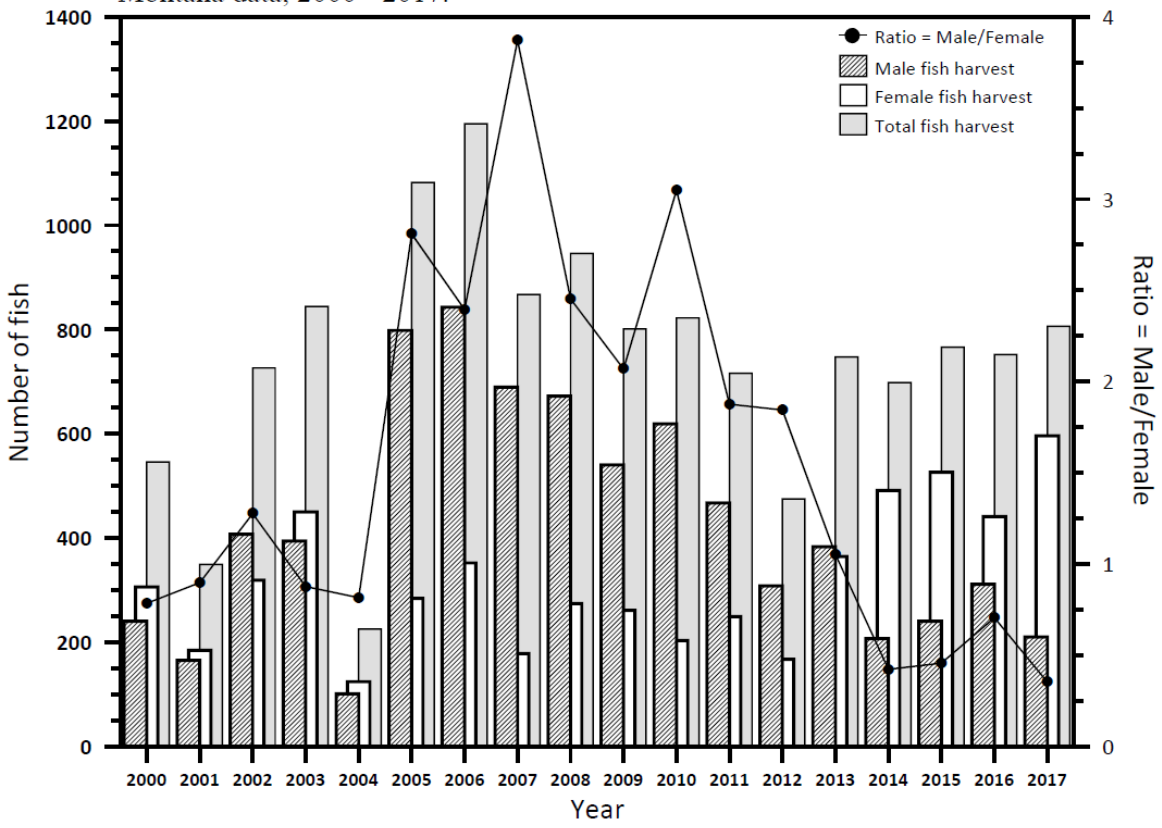

Figure 7. Ratio of male to female Paddlefish and corresponding harvests from Montana data, 2000-2017 (from Scarnecchia 2017)

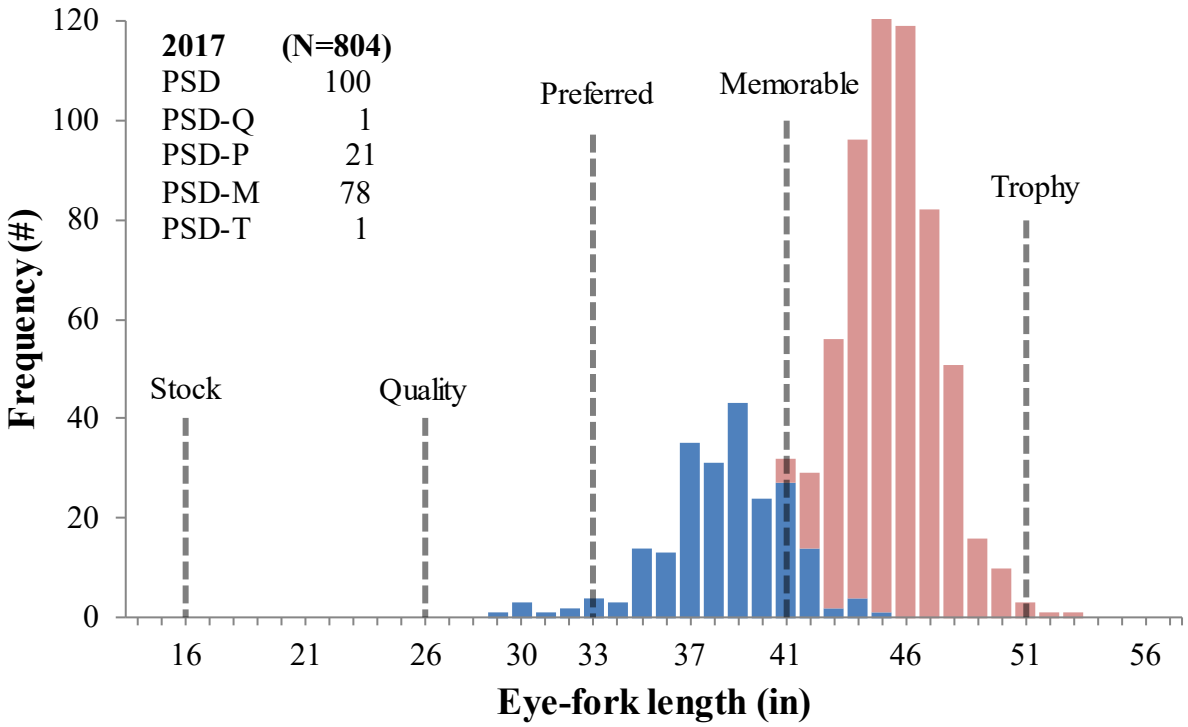

Figure 8. Length frequency histogram with proportion size distribution of Lower Missouri River and Yellowstone River Paddlefish harvested in Montana during 2017, blue bars represent male Paddlefish and pink bars represent female Paddlefish.

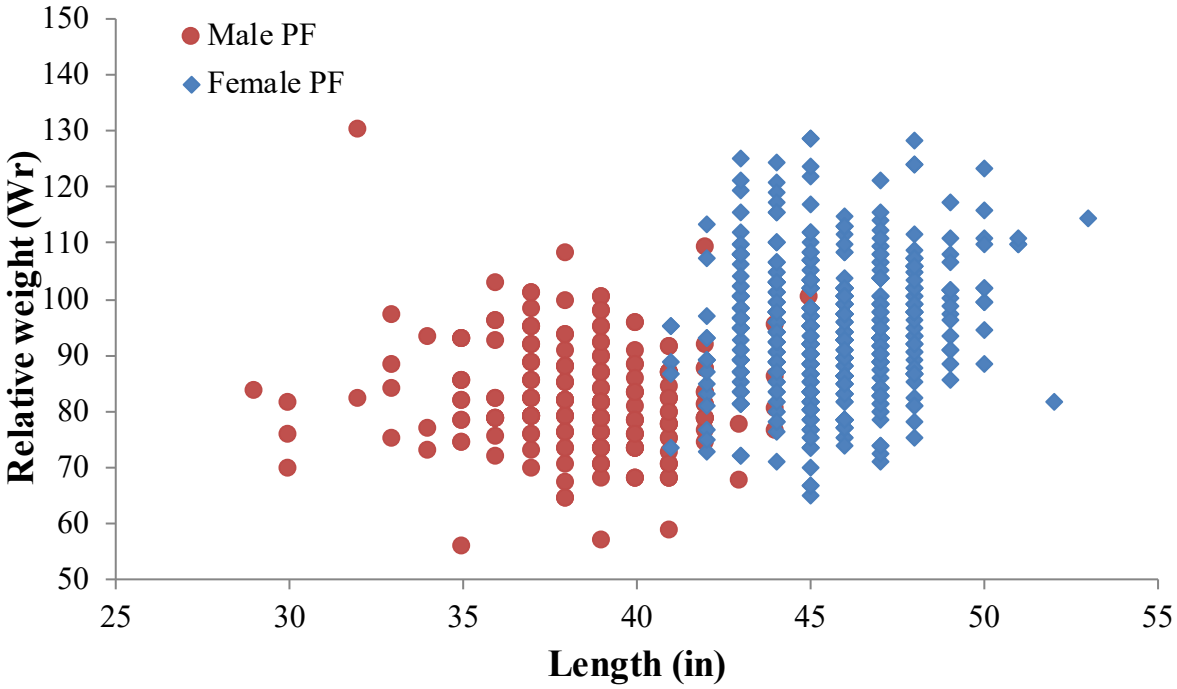

Figure 9. Relative weight by eye-fork-length (in) of Lower Missouri River and Yellowstone River Paddlefish harvested in Montana during 2017 season.

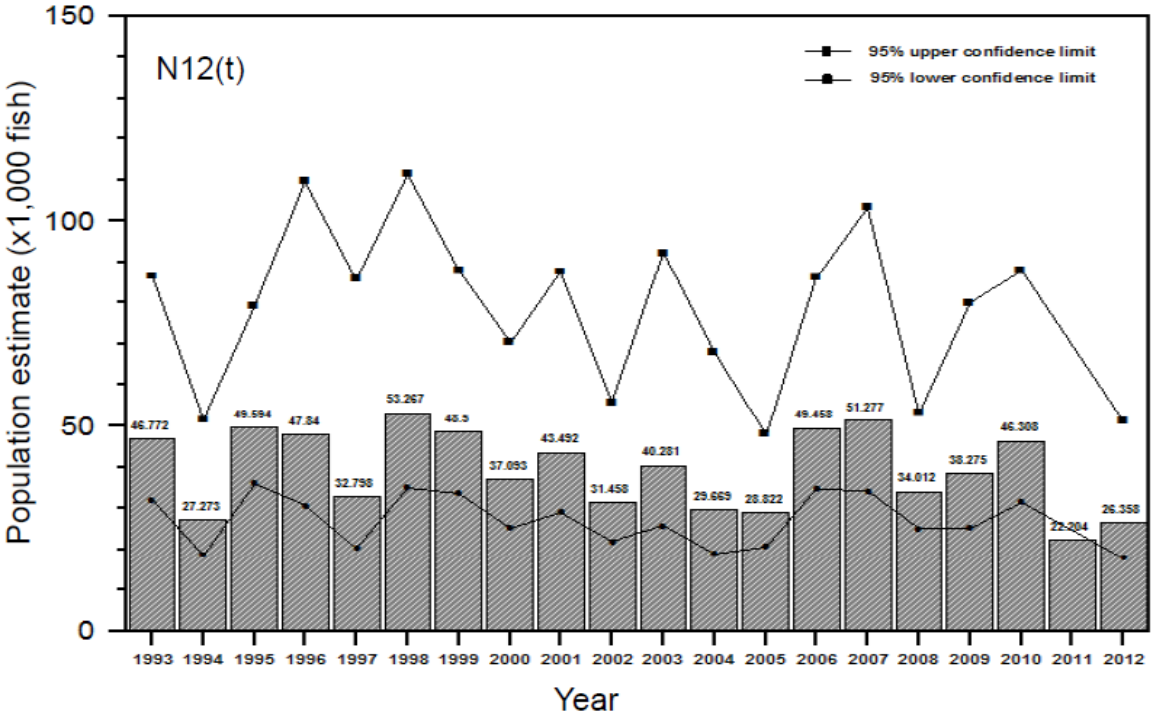

Figure 10. Petersen-Lincoln estimates of paddlefish population size with 95% confidence intervals, using scheme M1(*t*) with R12(*t*) and C12(*t*), where M1(*t*) = Count of: (1) ND-tagged paddlefish in Spring of year *t*, and (2) ND-tagged paddlefish from previous years (*t*-1, *t*-2, …) which were recaptured and released in Spring of year *t*, and the number of ND-tagged fish randomly recaptured from both ND and Montana (MT) water (R12(*t*)), and the number of paddlefish in combined ND and MT harvest in year *t* (i.e., C12(*t*)). (from Scarnecchia 2013)

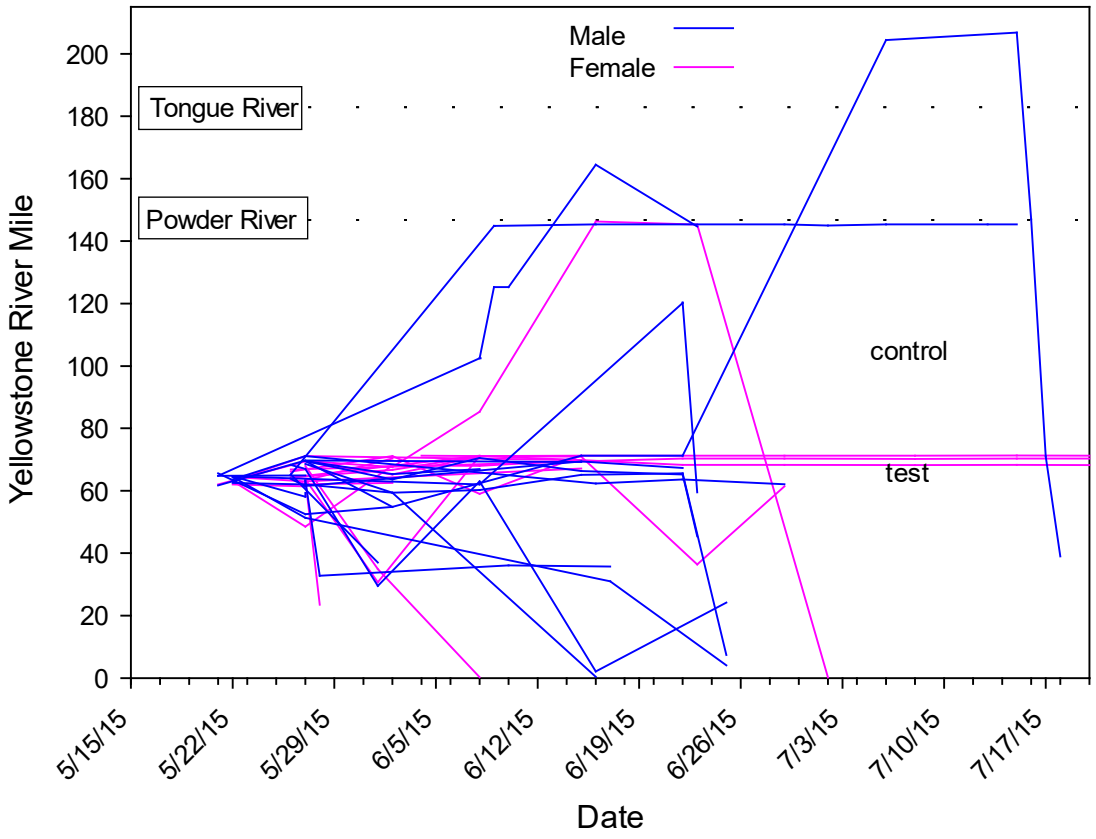

Figure 11. Movements of 40 telemetered Paddlefish in the Yellowstone River by sex during 2015. Yellowstone river mile on the y-axis and date on the x-axis with reference markers for test reach (Intake), control reach (Glendive), Powder River, and Tongue River (by Mat Rugg from Native Species Telemetry presentation to Upper Basin Pallid Sturgeon Workgroup 2015)

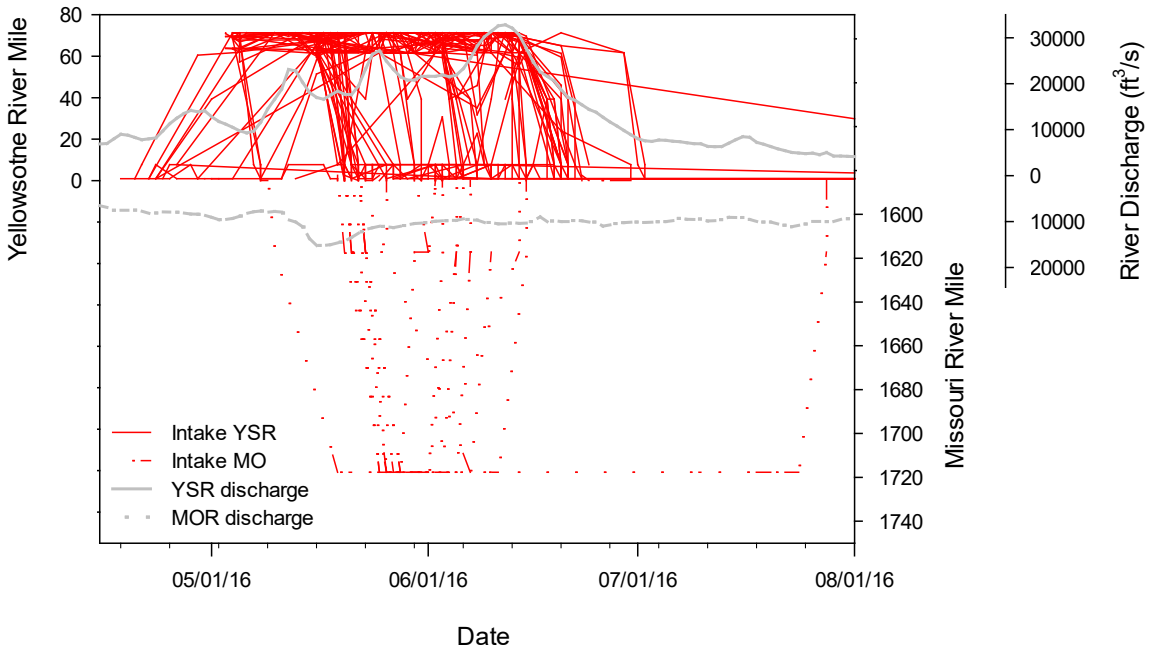

Figure 12. Movements of 58 telemetered Paddlefish in the Yellowstone and Missouri Rivers during 2016. Yellowstone river mile on the primary y-axis, Missouri river mile on the secondary y-axis, river discharge (CFS) on tertiary y-axis, and date on the x-axis with reference marker for test reach (Intake) shown in gray (by Mat Rugg from Native Species Telemetry presentation to Upper Basin Pallid Sturgeon Workgroup 2016)

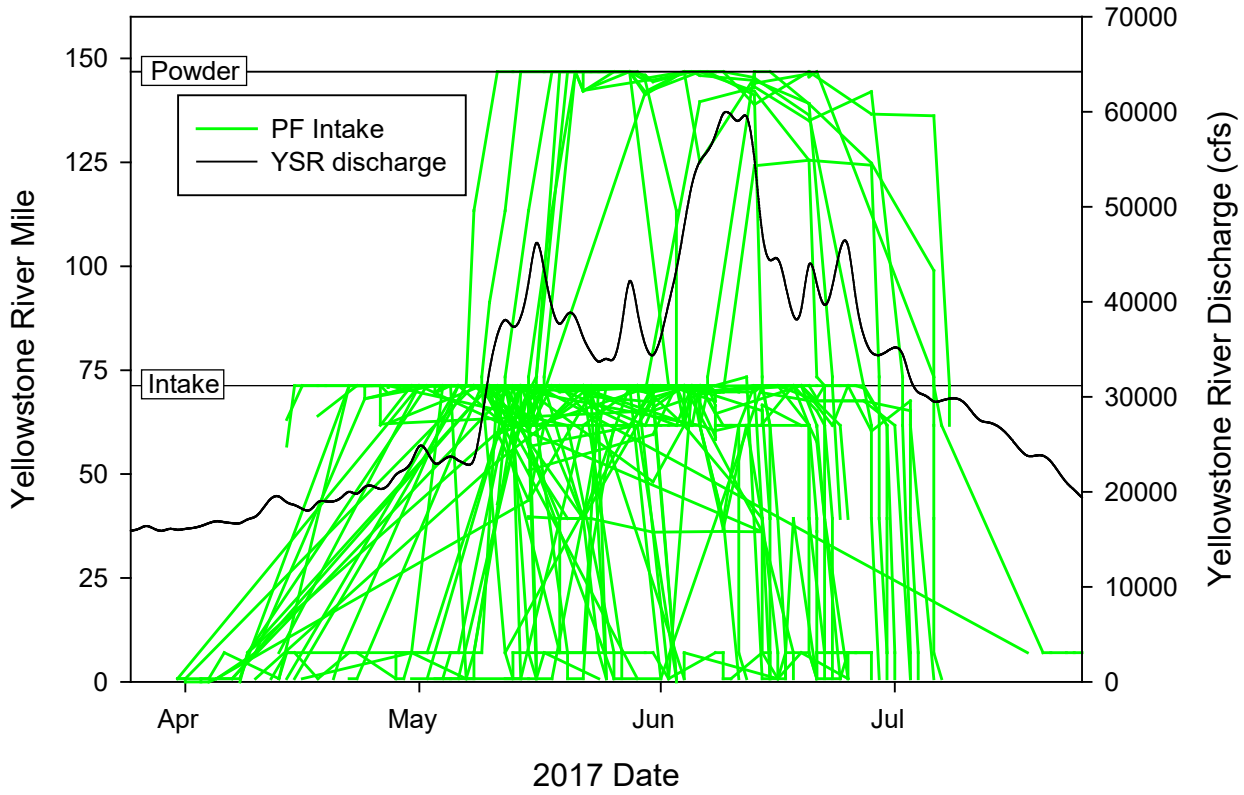

Figure 13. Movements of 49 telemetered Paddlefish in the Yellowstone and Missouri Rivers during 2017. Yellowstone river mile on the primary y-axis, Yellowstone River discharge (CFS) on the secondary y-axis, and date on the x-axis with reference marker for control reach and test reach (Intake) shown in gray (by Mat Rugg from Native Species Telemetry presentation to Upper Basin Pallid Sturgeon Workgroup 2017)

APPENDIX A

Yellowstone/Missouri River (Yellow Tag) Paddlefish Phone Survey – 2017

Compiled by Don Skaar and Corrine Selby, March 3, 2018

Number of tags sold:	**2,473**
Number tag holders sampled:	**866**
Number respondents:	**476**
Response rate:	476/866 = **55.0%**
Percent respondents fished	391/476 = **82.1%**
Percent fished on Yellowstone	383/391 = **97.95%**
Percent fished on Missouri	7/391 = **1.8%**
Total Anglers Fished	(.821)(2,473) = **2,031 anglers**

Harvest Fishing

Fish harvested:	(2,031)(187/391) = **972 paddlefish**
Average days fished to harvest:	250/188 = **1.33 days**
Average days fished to no harvest:	246/208 **= 1.18 days**
Average hrs/day harvest fishing:	
-Yellowstone River	**2.24 hr/day**
-Missouri River	**1.58 hr/day**
Total Angler Days (harvest fishing):	(1.33)(2,031) = **2,577 days**
Catch rate (harvested fish):	188/496 = **0.38 pf/day**
Percent cleaned at chamber:	158/182 = **86.8%**

Catch and Release Fishing

Percent anglers c/r fishing:	137/383 = **35.8%**
Total anglers c/r fishing	(.358)(.9795)(2,473) = **866 anglers**

Average days c/r fishing	299/137 = **2.18 days**
Total days c/r fishing	(2.18)(866) = **1,891 days**
Average number of fish landed	750/137 = **5.47 pf/angler**
Total fish landed	(5.47)(866) = **4,744 paddlefish**
Catch rate c/r fishing	4744/1,891 = **2.51 pf/day**
Interest in purchasing a C & R only license	**41.3%**

General Location of Harvest

Intake	145
Intake FAS	2
richland park	8
1/2 mi downstream of intake	1
3 mi dowstream from Intake	1
Joe's Island	1
Savage	2
mdu bridge	3
Near Savage	1
Sidney bridge	17
3 mi downstream of mdu bridge	1
elk island	2
seven sisters	1

APPENDIX B

Just got back from being gone 4 days and found this email from Doug Haacke. Not sure what to think? We ran 14,000 cfs for over a month in the Bighorn and water temperatures were way up due to so much surface withdrawal during the spill. Not sure why paddlefish would be hanging around up here now. Flows have been dropping the past couple of weeks and are down to about 4300 cfs. My guess is that the paddlefish ran up with the high flows and flows are just getting low enough for anglers to see them. Wonder if we had any pallids running with them?
Ken

From: Doug Haacke [mailto:dhaacke@gmail.com]
Sent: Monday, August 07, 2017 7:17 PM
To: Frazer, Ken <kfrazer@mt.gov>; Ruggles, Michael <mikeruggles@mt.gov>
Subject: Re: Paddlefish

Confirmed the paddlefish sitings. One was seen at the drum hole about two miles down from Afterbay. There inner in the pic was caught by handy in a riffle.

You see how water temps jumped when BOR switched from the river outlets? Wonder if that something to do with it.

-D

From: Doug Haacke <dhaacke@gmail.com>
Sent: Monday, August 7, 2017 1:32:10 PM
To: Ken Frazer; Mike Ruggles
Subject: Paddlefish

I'm getting a verification, but Rebecca at Eagle's next says they've seen 10 paddlefish today so far. Appreciate any thoughts you might have! Wow!