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-10

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REPORT PERIOD: April 1, 2009 through March 30, 2010

ABSTRACT

The paddlefish harvest cap shared by North Dakota and Montana was 2,000 fish in 2009, 1,000 fish for each state. The lower Yellowstone River flows were near 13,400 cubic feet per second (CFS) at the start of the paddlefish season on May 15, 2009 and peaked at 43,300 CFS on June 4, 2009. The harvest of paddlefish was allowed on Tuesday, Wednesday, Friday and Saturday during 2009. Catch-and-release fishing only was allowed on Sunday, Monday and Thursday. Paddlefish were not abundant at Intake fishing access site (FAS) at the start of the season and the harvest of paddlefish was closed at the Intake FAS in 12 harvest days. An estimated 967 paddlefish were harvested from this population in Montana in 2009. Catch-and-release fishing remained open for 10 days after harvest was closed and 398 paddlefish were tagged with jaw tags. Statewide paddlefish tag sales were consistent with those in 2008. Young male paddlefish dominated the harvest in 2009. The average size of male and female paddlefish was slightly greater in 2009 than in 2008.

PROCEDURES

Montana Fish, Wildlife and Parks personnel were present at the Intake fishing access site (FAS) during the entire 2009 paddlefish season. Tuesdays, Wednesdays, Fridays, and Saturdays were designated harvest days. On these days harvested fish were weighed to the nearest pound and measured (front of eye to fork of caudal fin) to the nearest inch. Sex of harvested fish was determined by examination of the gonads. Sundays, Mondays and Thursdays were designated catch-and-release days. On these days fish were measured and sex was assigned based on length and shape. Angler released fish were not weighed. Most of the released paddlefish were jaw tagged. Numbered Monel metal bands (National Band and Tag Co., Size 16, ½ inch inside diameter) were placed around the dentary bone.

A statewide paddlefish telephone creel was conducted in 2009 to obtain harvest numbers for the Yellowstone River/Lake Sakakawea paddlefish population. Until 2008 an onsite creel census was also conducted. However, changes in the population age structure and reductions in the harvest cap created a more highly intense fishery that was not effectively measured by the design of the onsite creel (Riggs 2007, Riggs and Bollman 2008).

RESULTS

General Observations

The Montana-North Dakota Paddlefish Management Plan (Scarnecchia, et al. 2008) establishes the goals and objectives guiding the management of the Yellowstone River/Lake Sakakawea paddlefish population. A 3,000 fish per year harvest cap was established in 1996 to slow the harvest of this late maturing, long lived species. Montana and North Dakota were each allowed to harvest 1,500 paddlefish per year. Beginning in 2003, the harvest cap was reduced to 2,000 paddlefish (1,000 paddlefish per state). This reduction was necessary to bring harvest in line with recruitment and has its basis in the paddlefish stock index developed by Dr. Dennis Scarnecchia as outlined in objectives 1 and 2 of the management plan. In Montana, when the observed harvest approaches the harvest cap, the Fish, Wildlife and Parks Commission can close the paddlefish season early.

In 2005, the harvest of paddlefish was closed in ten days and in 2006, the harvest was closed in thirteen days. In both years, the harvest cap was exceeded because procedures for closing the season to harvest were not adequate. Regulation changes were made for the 2007 season to allow the harvest of paddlefish to be closed more quickly and to attempt to spread the harvest over a longer period of time.

The new regulations for 2007 were to allow harvest only fishing on Tuesday, Wednesday, Friday and Saturday and catch-and-release only fishing on Sunday,

Monday and Thursday. The fishing day for paddlefish was reduced to 15 hours (6 a.m. to 9 p.m.). The harvest of paddlefish at the Intake Fishing Access Site could be closed instantaneously when 800 paddlefish are harvested at Intake and elsewhere the harvest season could be closed with 24-hour notice.

The 2009 paddlefish season began on May 15 with Yellowstone River flows at 13,400 CFS (Figure 1). By way of comparison, the long term, mean daily flow for the Yellowstone River at Sidney is 38,000 CFS for the month of June (USGS, 2010). Flows peaked at 43,300 CFS on June 4, 2009.

During the first four harvest days of the 2009 paddlefish season 75 fish were harvested at Intake FAS (Figure 1). The second week of the season 292 paddlefish were harvested during the four harvest days. The third week of the season 433 paddlefish were harvested during the four harvest days. The harvest season closed at the end of the day June 3. The remainder of the Yellowstone and Missouri (below Fort Peck Dam) Rivers were closed to paddlefish harvest the next day. An estimated 967 paddlefish were harvested from this population in Montana in 12 harvest days during 2009.

Statewide paddlefish tag sales in 2009 were relatively unchanged from 2008 levels. Tag sales in 2008 and 2009 were up approximately 9.3 percent from 2007 (Table 1). The number of Yellowstone/Lower Missouri River tags sold in 2007 was 56.3 percent lower than in 2006. This was probably due to how quickly the harvest season closed at Intake in 2007. The non-resident portion of tag sales has been trending up in recent years. In 2009 non-resident tag sales remained consistent with 2008 sales at 18 percent of the total tags sold.

The catch-and-release days continued to be popular with paddlefish anglers in 2009. Fewer fish were tagged in 2009 than in previous years, as there was not an early pulse of high water to concentrate fish at Intake FAS. During catch-and-release angling efforts FWP personnel placed jaw tags on 324 paddlefish (Table 5).

Paddlefish Size and Sex Ratio

A total of 800 paddlefish were checked by creel clerks, from the angler catch, at Intake in 2009 (Table 2).

Young male paddlefish have recruited to the adult population and dominated the 2009 harvest. Analysis of the dentary bones collected from harvested paddlefish revealed that over 75% of the male paddlefish were from the 1995 year class. Females made up 32.5% of the total fish measured by FWP personnel in 2009 (Table 2). This was an increase from 2008, and was the highest female harvest since 2004. The average size of both male and female paddlefish in 2009 was slightly greater than those observed in 2008 (Table 3).

Creel Census

The Intake creel survey was eliminated in 2008 (Table 4). This creel survey design worked well in the past when the harvest was spread out over a longer period of time. When the harvest was compressed into a few days and anglers catch a fish in a few minutes rather than a few hours this survey design undercounted anglers participating in the fishery, resulting in a low harvest estimate (Riggs and Bollman 2008). The post-season telephone creel survey does not rely on angler counts to estimate harvest and is a better tool at this time for estimating harvest.

The harvest of paddlefish in 2009 did not exceed the 1,000 fish quota for the Yellowstone River/Lake Sakakawea paddlefish population in Montana. The telephone creel survey estimated 967 paddlefish were harvested in 2009. The regulations that were put in affect during the 2007 season were sufficient to allow fish mangers to close the harvest of paddlefish in a timely manner to prevent over harvest.

Tagging, Tag Return and Exploitation Rate

Return rates of individually numbered plastic and monel metal bands placed around the dentary bone were used to infer exploitation rate. Since 1964 13,842 paddlefish have been tagged in the Yellowstone River (mostly near Intake). Of these tagged fish 2,872 (20.7%) have been reported as harvested by anglers (Table 5).

Table 5 shows the percentage of tag returns from harvested paddlefish tagged in the Yellowstone River in Montana. From 1996 to 2002, with a 1,500 fish harvest cap in place, the percentage of tags returned ranged from 23.8 to 44.6 percent. This level of exploitation is similar to years prior to 1996 when there was no harvest cap in place. Starting in 2003, the harvest cap was reduced to 1,000 fish and thus far the tag return rate has not exceeded 20.0 percent.

Caution must be used when assessing tag return rates within a given season due to the nature of the tagging process. Tagging is done on catch-and-release days, rather than prior to the season. As a result, the number of tagged paddlefish in the population fluctuates as fish are harvested and tagged. Since the proportion of tagged fish in the population changes throughout the season, tag return rates do not accurately describe exploitation rates.

Another problem associated with tag return data is how tag return rates are currently being calculated, particularly for fish tagged and harvested in the same year. When the tag return data is summarized the number of fish tagged and harvested in the same season is divided by the total number of fish tagged in the season. For example, in table 5, the 2009 data shows that 398 paddlefish were tagged and 53 tagged fish were harvested, a 13.3% tag return rate. However, the majority of fish tagged each year are tagged after harvest of paddlefish has been closed. In 2009, only 206 fish had been tagged before harvest was closed. To more accurately calculate tag return rate only the

number of tagged fish available to anglers during legal harvest periods should be used. Based on the number of tagged fish available prior to harvest closure in 2009 the tag return rate was 25.7%. Consideration should be given to eliminating fish tagged and harvested during the same season from future tag return rate monitoring. Separating the analysis for in-season tag return rates and between-season tag return rates would likely result in greater precision in inferring exploitation rates both in season and through time.

Dr. Dennis Scarnecchia (2009) of the University of Idaho has applied tag return data to a harvest model to determine the status of the Yellowstone River/Lake Sakakawea paddlefish population. He has determined that recruitment of paddlefish to the fishery has exceeded harvest the past five years. However, the surplus of fish is made up almost entirely of paddlefish from the strong 1995 year class. The lack of recruitment of males from year classes after 1995 is a major concern. Without the contribution of post-1995 fish, the 1995 year class will be relied upon to support the fishery. As the year class continues to age males will be diminished and replaced by later maturing females. If females begin to make up the majority of the paddlefish harvest the reproductive potential of the population could be negatively impacted.

Changes to paddlefish regulations are likely to occur in coming years. Reductions in the total number of harvested fish are a necessary precaution to protect the paddlefish population until significant recruitment from post-1995 year classes are documented. Significant changes to the paddlefish fishery will likely occur after the 2010 season.

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Key Words:

- Angler success rate
- Fishing pressure
- Creel Census
- Paddlefish tagging
- Paddlefish caviar
- Paddlefish exploitation rate
- Paddlefish sex ratio

Figure 1. Paddlefish harvested per day at Intake, MT and mean daily flow at Sidney, MT in 2009

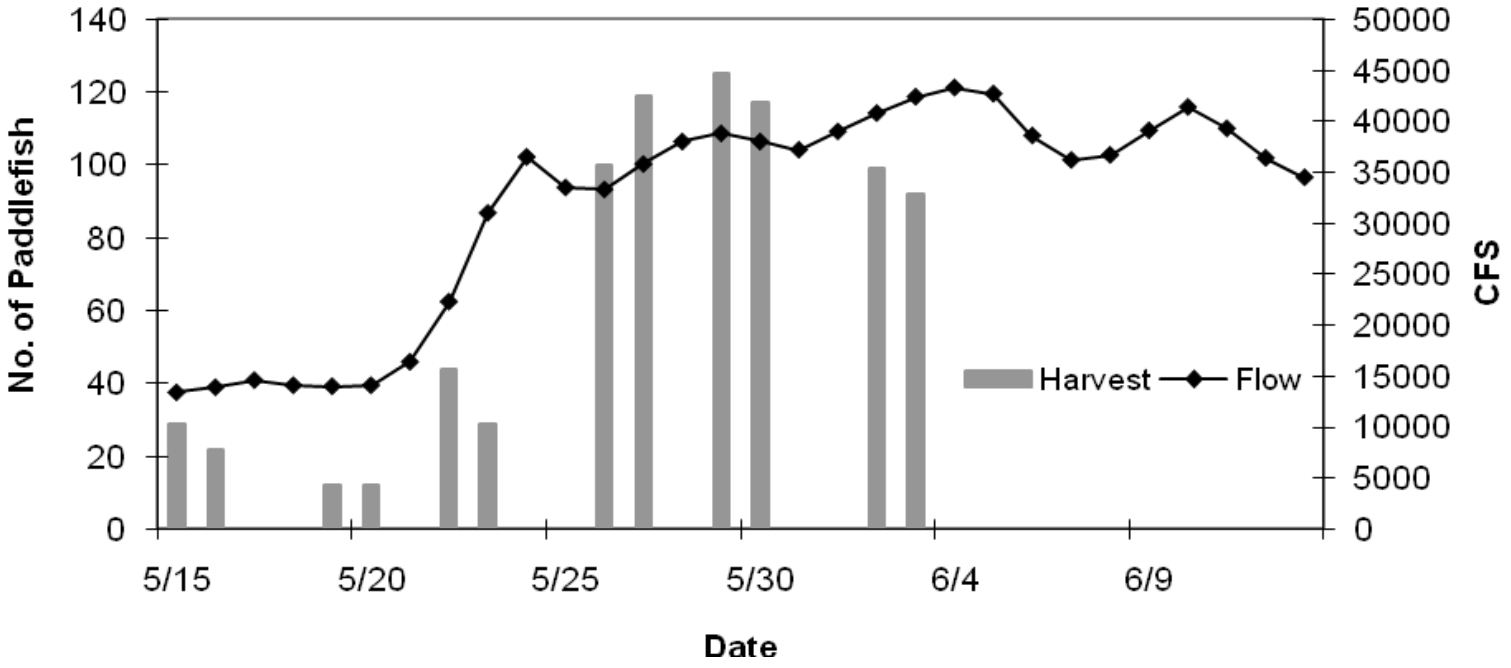

Table 1. Number of anglers purchasing Montana paddlefish tags.

	Total Tag sales				Yellowstone/Lower Missouri River Tag Sales				Upper Missouri River Tag Sales			
Year	Total	Resident	Nonresident	% Nonresident	Total	Resident	Nonresident	% Nonresident	Total	Resident	Nonresident	% Nonresident
2009	5308	4370	938	18	3189	2430	759	24	2118	1939	179	8
2008	5301	4344	957	18	3017	2239	778	26	2284	2105	179	8
2007	4810	4061	749	16	2329	1809	520	22	2481	2252	229	9
2006	6910	6022	888	13	5329	4496	833	16	2605	2391	214	8
2005	6596	5833	763	12	4267	3691	576	13	2329	2142	187	8
2004	6920	6032	888	13	4442	3759	683	15	2478	2273	205	8
2003	7366	6363	1003	14	4812	4020	792	16	2554	2343	211	8
2002	5901	5002	899	15								
2001	4524	3770	754	17								
2000	6056	4859	1197	20								
1999	6785	5522	1263	19								
1998	6051	5004	1047	17								
1997	6169	4930	1239	20								
1996	6787	5495	1292	19								
1995	6544	5495	1049	16								
1994	4065	3237	828	20								
1993	5577	4194	1383	25								
1992	4779	3503	1276	27								
1991	4438	3021	1417	32								
1990	3960	2826	1134	29								
1989	4255	3081	1174	28								
1988	3526	2620	906	26								
1987	2877	2182	695	24								
1986	3696	2661	1035	28								
1985	3593											
1984	5063											
1983	4636											
1982	4834											
1981	4166											

Notes: Tags were free in 1981.
Resident and nonresident tag sales were calculated separately beginning in 1986.
Previous to 1992 tags were required only for the Yellowstone River paddlefish snagging.
Beginning in 1992 tags were required statewide.
Paddlefish tags were added to the automated licensing system in 2003 allowing for all area and upper Missouri tags to be separated.
Prior to 2007, the Yellowstone/Lower Missouri River tag could also be used on the Upper Missouri River.

Table 2. Summary of Paddlefish measurements obtained from the angler catch at Intake, Yellowstone River, 1963-2008.

Year	No. of fish Measured	Average Total Length (Inches)	Average Eye-fork Length (mm)	Average Weight (Pounds)	Percentage of Females
1963	46	43.4		29.6	0.0
1964	920	48.8		21.0	2.8
1965	453	50.6		21.3	2.9
1966	28	49.2		21.2	0.0
1967	123	50.9		21.8	0.0
1968	149	52.6		25.0	4.3
1969	499	51.9		23.4	3.7
1970	700	52.0		25.6	11.4
1971	1136	53.1		30.8	45.4
1972	1678	55.5		34.0	48.2
1973	1696	53.9		33.1	44.1
1974	1910	55.1		35.6	51.2
1975	1158	57.3		42.3	67.8
1976	940	57.6		47.4	67.8
1977	1003	58.2		48.2	64.0
1978	809	55.6		43.0	68.0
1979	637	60.1		50.4	67.5
1980		58.3*		49.1**	80.2
1981	2528		1086	46.7	75.1
1982	2004		1078	45.1	71.2
1983	1400		1086	50.2	82.6
1984	2691		1080	44.0	69.1
1985	628		1087	47.2	78.7
1986	1462		1064	43.7	63.3
1987	1412		1091	49.7	77.2
1988	1780		1058	43.5	61.0
1989	1583		1084	47.0	70.0
1990	1493		1073	45.6	65.4
1991	2558		1055	45.0	57.2
1992	670		1087	48.7	67.3
1993	1659		1005	36.9	35.1
1994	309		1070	47.4	62.8
1995	1448		1003	39.1	43.6
1996	1120		1002	40.1	42.1

Table 2. – Continued

Year	No. of fish Measured	Average Total Length (Inches)	Average Eye-fork Length (mm)	Average Weight (Pounds)	Percentage of Females
1997	797		1007	38.2	38.7
1998	580		1046	41.0	47.9
1999	1345		1049	43.0	54.0
2000	541	Average	1053	44.4	55.3
2001	344	Eye-fork	1064	43.0	52.9
2002	713	Length (inches)	1025	38.5	44.6
2003	831	39.1	993	38.1	52.8
2004	221	40.0	1016	41.2	54.3
2005	1051	36.9	937	29.8	26.8
2006	1194	37.6	955	31.8	29.3
2007	867	37.1	942	28.9	20.3
2008	946	38.7	983	34.1	29.0
2009	800	39.6	1006	36.7	32.5

* Based on 62 measurements.

** Based 0n 131 measurements.

Table 3. Summary of paddlefish average length and weight, by sex, obtained from the angler catch at Intake, Yellowstone River, 1963-2008.

	Males			Females		
Year	Sample Size	Mean Length (E-F, mm)	Mean Weight (pounds)	Sample Size	Mean Length (E-F, mm)	Mean Weight (Pounds)
1963	46		29.6			
1964	28		21.2			
1967	123		21.8			
1968				6		42.3
1970	620		26.3			
1971	620		25.7	516		52.6
1972	869		23.5	809		53.4
1974	932		24.4	978		55.4
1976	303		25.9	637		60.2
1978	259		30.0	550		66.0
1979	207		25.0	430		61.6
1981	630	954	27.8	1898	1130	53.0
1982	577	937	24.4	1427	1138	53.8
1983	244	932	25.8	1156	1117	55.3
1984	832	954	24.0	1859	1136	52.9
1985	134	914	24.2	494	1134	53.4
1986	537	932	24.7	925	1142	54.7
1987	322	916	25.6	1090	1143	56.8
1988	695	929	25.5	1085	1141	55.0
1989	475	931	24.8	1108	1150	56.9
1990	516	922	23.8	977	1153	57.1
1991	1080	916	24.9	1462	1159	60.3
1992	214	917	24.7	451	1170	60.2
1993	1076	925	25.2	583	1152	58.6
1994	115	914	25.9	194	1163	60.1
1995	815	889	23.5	631	1151	59.2
1996	649	882	24.0	471	1168	62.3
1997	488	912	24.8	309	1158	59.5
1998	300	933	24.0	278	1173	59.5

Table 3. – Continued

	Males			Females		
Year	Sample Size	Mean Length (E-F, mm)	Mean Weight (pounds)	Sample Size	Mean Length (E-F, mm)	Mean Weight (Pounds)
1999	619	926	24.9	726	1154	58.5
2000	242	919	25.2	299	1161	60.0
2001	162	960	27.2	182	1156	57.0
2002	395	932	24.2	318	1146	56.4
2003	392	866	20.6	439	1107	53.8
2004	100	879	22.0	120	1133	57.3
2005	768	873	21.1	281	1122	54.1
2006	844	882	21.8	350	1130	56.0
2007	691	897	22.3	176	1128	55.2
2008	672	922	24.9	274	1138	56.7
2009	540	932	25.6	260	1157	59.7

Table 4. A comparison of paddlefish harvest estimates and the percentage of harvest not occurring at Intake.

Year	Intake Creel Harvest Estimate	Intake Observed Harvest	Telephone Survey Harvest Estimates						Percent Cleaned by Chamber
			Intake	Below Intake	Above Intake	Below Ft Peck	Total	Percent Non-Intake	
2003	1060	831	848	167	103	91	1209	29.9	
2004	205	221	218	24	12	65	319	31.7	
2005	1323	1051	1586	30	0	0	1616	1.9	
2006	904	1194	648	196	265	0	1109	41.6	
2007	553	867	767	94	137	0	998	23.1	
2008	NA	946					1102		82.76
2009	NA	800					967		88.43

Note: There are some number of paddlefish harvested on the Ft. Peck Indian Reservation every year that do not show up in any of the harvest estimates.

Note: The 2004 telephone harvest estimates have been corrected and are slightly different from that reported in the 2003/2004 report.

Table 5. Summary of paddlefish tagging and tag returns 1964-2008.

Year	Number Tagged	Number Returned In 2009	Total Number Returned	Percentage Returned
1964 -1970	1703	0	279	16.4
1971 -1980	3242	0	812	25.0
1984	551	0	250	45.4
1985	2	0	2	100.0
1986	153	0	47	30.7
1988	156	0	67	42.9
1989	10	0	4	40.0
1990	153	0	49	32.0
1991	20	0	8	40.0
1992	221	0	82	37.1
1993	268	0	61	22.8
1994	180	0	61	33.9
1995	442	0	179	40.5
1996	139	0	62	44.6
1997	70	0	30	42.9
1998	42	0	11	26.2
1999	281	1	93	33.1
2000	20	0	5	25.0
2001	7	0	3	42.9
2002	145	4	52	35.9
2003	282	11	72	25.5
2004	20	0	4	20.0
2005	1321	70	228	17.3
2006	921	81	131	14.2
2007	1825	143	173	9.5
2008	1344	16	54	4.0
2009	398	53	53	13.3
Totals	13842	379	2872	20.7

Note: Most fish tagged at Intake or within a few miles downstream of Intake.