Montana Department of Fish, Wildlife and Parks
Fisheries Division

Job Progress Report

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

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ABSTRACT

The paddlefish harvest cap shared by North Dakota and Montana was 1,000 fish in 2007. The lower Yellowstone River flows were near 23,000 c.f.s. at the start of the paddlefish season on May 15, 2007 and peaked at 40,100 c.f.s. on June 10, 2007. The harvest of paddlefish was allowed on Tuesday, Wednesday, Friday and Saturday during 2007. Catch-and-release fishing only was allowed on Sunday, Monday and Thursday. Paddlefish were abundant at Intake at the start of the season and the harvest of paddlefish was closed at the Intake FAS in three harvest days. An estimated 998 paddlefish were harvested from this population in Montana in 2007. The remainder of the season was left open to catch-and-release fishing and 1,825 paddlefish were tagged with jaw tags. Statewide paddlefish tag sales were down 30.4 percent in 2007 from that of the previous year. Young male paddlefish dominated the harvest in 2007. The average size of male paddlefish was slightly greater than in 2006 and the average size of female paddlefish was slightly less than in 2006.

PROCEDURES

A partial creel census was conducted during the paddlefish season at Intake in 2007. As many anglers as possible were questioned concerning amount of time spent fishing and number of fish caught. The interview total for periods requiring retention of fish was 740. Anglers were counted each day of the season during the fifteen-hour fishing day. A 15-hour fishing day was used in calculations to estimate fishing pressure. Analysis of the data was accomplished by adapting formulas 5 through 32 from Spence (1970) to the census.

Angler caught and kept paddlefish were weighed to the nearest pound. Body length (front of eye to fork of caudal fin) was measured to the nearest inch. Sex was determined by examination of the gonads of harvested fish. For fish released, sex was assigned on the basis of length and shape. Angler released fish were not weighed. Most of the released paddlefish were jaw tagged. 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 2007 to obtain harvest numbers for the paddlefish population above Fort Peck Reservoir as well as the Yellowstone River/Lake Sakakawea population. The creel was design to gather information on the harvest of paddlefish by different river sections thereby giving an estimate of harvest at sites not covered by the Intake Creel (Riggs, 2005).

RESULTS

General Observations

The Montana-North Dakota Paddlefish Management Plan (Scarnecchia, et al. 1995) establishes the goals and objectives guiding the management of the Yellowstone River/Lake Sakakawea paddlefish population. An updated draft of this plan is currently being reviewed and finalized. 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 2007 paddlefish season began with Yellowstone River flows near 23,000 c.f.s. (Figure 1). By way of comparison, the long term, mean daily flow for the Yellowstone River at Sidney is 38,840 c.f.s. for the month of June (USGS, 2002). Flows peaked at 40,100 c.f.s. on June 10, 2007.

Over 400 paddlefish were harvested at Intake FAS the first two days of the 2007 season (Figure 1). The third day of the season was a catch-and-release day. On the fourth day of the season an additional 400 paddlefish were harvested at Intake and the harvest was closed. The remainder of the Yellowstone and Missouri (below Fort Peck Dam) Rivers were closed to paddlefish harvest the next day (May 19, 2007). An estimated 998 paddlefish were harvested from this population in Montana.

While the new regulations were adequate to close the paddlefish harvest before exceeding the 1,000 fish harvest cap they had no effect on slowing the pace of the harvest.

Statewide paddlefish tag sales were down 30.4 percent in 2007 from tag sales in 2006 (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 down in recent years but in 2006, non-residents purchased 13 percent of paddlefish tags sold which was the first increase in seven years. In 2007 the portion of non-resident sales increased to 16 percent.

The three catch-and-release days per week appeared to be popular with paddlefish anglers. During catch-and-release angling efforts Department personnel placed jaw tags on 1,825 paddlefish.

Paddlefish Size and Sex Ratio

A total of 867 paddlefish were checked by creel clerks, from the angler catch, at Intake in 2007 (Table 2).

Females made up 20.3% of the total fish weighed and measured for length in 2007 (Table 2). This is a big decrease from 2006, and was the lowest female harvest since 1970. Many young male paddlefish have recruited to the adult population and were dominate in the 2007 harvest.

The average size of male paddlefish in 2007 was slightly greater than that observed in 2006 (Table 3). The average size of female paddlefish was slightly less than that seen in 2006.

Creel Census

The harvest estimate from the 2007 telephone paddlefish creel survey is compared with the Intake creel harvest estimate and the Intake observed harvest in Table 4. The telephone creel harvest estimate for the Intake Fishing Access Site was 767 paddlefish. This is 11.5% less than the observed harvest of 867 paddlefish. It does not seem likely that 137 paddlefish were caught above the Intake Diversion Dam as was estimated by the telephone creel. It is thought that the way the telephone creel survey question regarding fishing location is presented to angler's causes some confusion either with the angler or the surveyor. Most of the paddlefish estimated caught above Intake were likely caught at the Intake Fishing Access Site. If this were the case, then the observed harvest and the Intake harvest estimated from the telephone creel would be very similar.

The Intake creel survey underestimated the paddlefish harvest in 2006 and 2007 (Table 4). This creel survey design has worked well in the past when the harvest was spread out over a longer period of time. When the harvest is compressed into a few days and anglers catch a fish in a few minutes rather than a few hours this survey design

undercounts anglers participating in the harvest. The result is a low harvest estimate. The post-season telephone creel survey that does not rely on angler counts to estimate harvest is the better tool at this time for estimating harvest.

The harvest of paddlefish in 2007 did not exceed the 1,000 fish target for this population in Montana. The regulation that were 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 are used to infer exploitation rate. Of 12,174 paddlefish tagged in the Yellowstone River (mostly near Intake), at least 2,337 (19.2%) have been harvested by anglers (Table 5).

In 2007, 73 tags from angler-harvested fish were recovered from paddlefish tagged in the Yellowstone River. Of these, 25 were caught in North Dakota, and the remainder from Intake or within a few miles downstream. Also, of the 73 returned tags, 13 were tagged in 2007. An additional 17 tags recovered at Intake were from paddlefish tagged in North Dakota.

Table 6 summarizes tag return rates for multi-year periods. Tag returns through 2007 reinforce the past conclusion of lighter exploitation in the 1960's and 1970's, heavier in the 1980's and lighter in the 1990's through 2007.

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 2002 when there was no harvest cap in place. Starting in 2003, the harvest cap was reduced to 1,000 fish and thus far the percentage of returned tags has not exceeded 20.0 percent.

The annual exploitation rate for paddlefish tagged since the 1,000 fish harvest cap has been in place (2003 - 2007) has ranged from 1.3 to 5.4 percent (Table 7).

Table 8 shows angler exploitation of paddlefish for five years after tagging. Exploitation of paddlefish tagged in 1995, 1996 and 1997 shows a dramatic increase over what was seen in the early 1990’s. The average exploitation of paddlefish tagged in 1998, 1999 and 2000 was again lower. Only seven paddlefish were tagged in 2001. In 2003, two of these fish were harvested which is the highest one-year return rate (33.3%) ever seen. The five-year average exploitation rate for paddlefish tagged in 2002 is 5.91 percent.

Table 9 compares tag return rates by sex for fish tagged in the years 1977 through 2007. The heavier harvest rate for females in the earlier years is not as apparent from 1992 to the present. Since the early nineties, with the exception of 1994, 2000 and 2001 tag return rates for the sexes have been similar or heavier toward males. The tag return rate by sex for paddlefish tagged in 2000 and 2001 indicates a heavier harvest of female paddlefish, but few fish overall were tagged in those years

Young male paddlefish have recruited to the population as confirmed by ageing and recruitment studies conducted by Dr. Dennis Scarnecchia (2002) of the University of Idaho. Later maturing young female paddlefish should begin recruiting several years into the future.

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Fishing pressure	Paddlefish exploitation rate
Creel Census	Paddlefish sex ratio
Paddlefish tagging	

Figure 1. Paddlefish harvested per day at Intake, MT and mean daily flow (1000 cfs) at Sidney, MT in 2007.

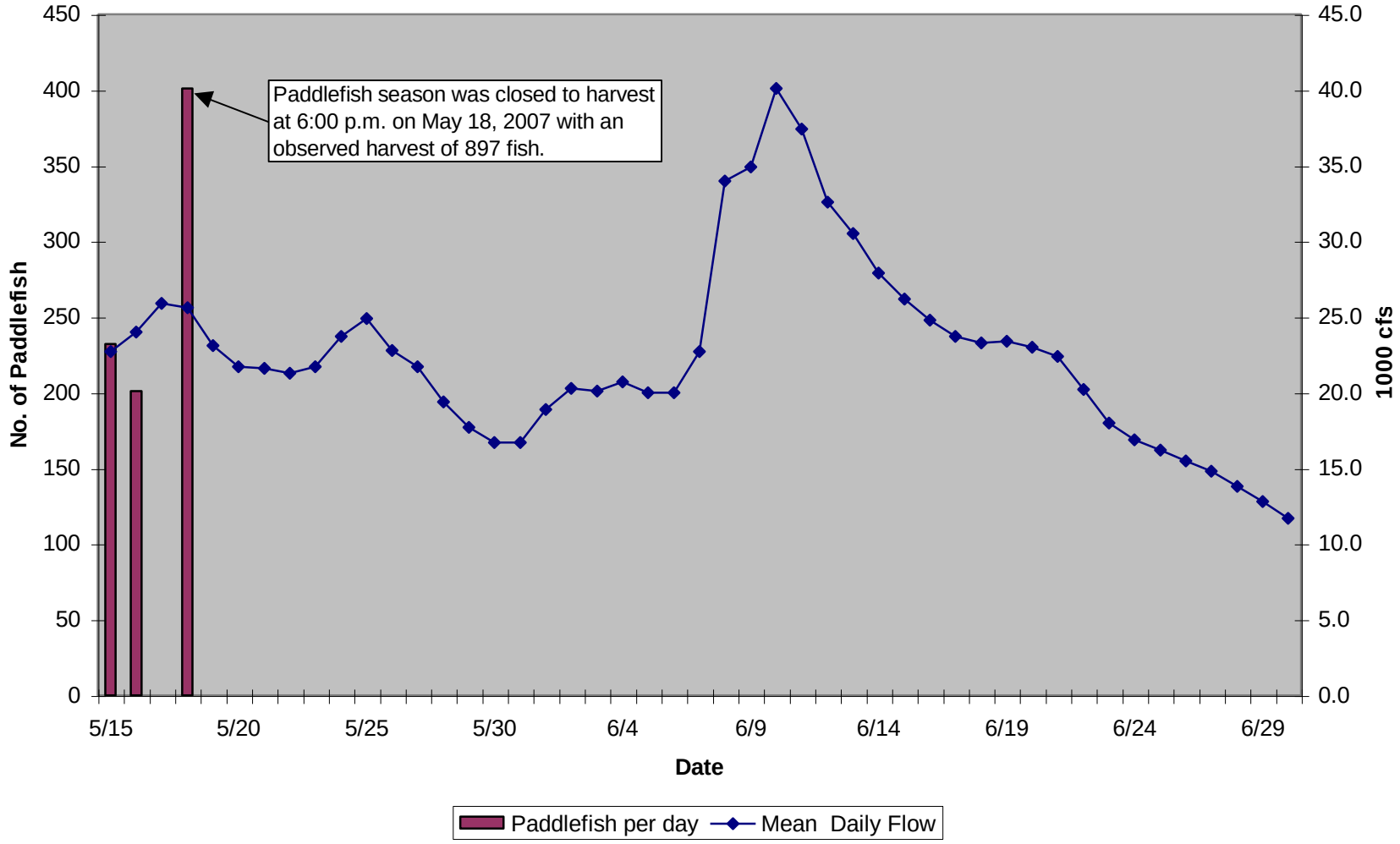

Table 1. Number of anglers purchasing Montana paddlefish tags.

	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
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, 1963-2007.

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		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
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

* 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, 1963-2007.

	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
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

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					
			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

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 1964-2007.

Year	Number Tagged	Number Returned In 2007	Total Number Returned	Percentage Returned
1964-1970	1703	0	279	16.4
1971-1980	3242	1	812	25.0
1984	551	0	249	45.2
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	1	60	22.4
1994	180	0	60	33.3
1995	442	1	178	40.3
1996	139	1	62	44.6
1997	70	0	30	42.9
1998	42	0	10	23.8
1999	281	1	90	32.0
2000	20	1	5	25.0
2001	7	0	3	42.9
2002	145	2	45	31.0
2003	282	7	54	19.1
2004	20	1	4	20.0
2005	1321	35	101	7.6
2006	921	9	23	2.5
2007	1825	13	13	0.7
Totals	12174	73	2337	19.2

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

Table 6. Tag return rate averages for multi-year periods.

Period Tagged	Number Tagged	Number Returned During Period	Percentage Returned
1964-1970	1703	279	16.4
1971-1980	3242	811	25.0
1981-1990	1025	418	40.8
1991-2000	1683	573	34.0
2001-2007	4521	243	5.4

Table 7. Annual angler exploitation rates in percent for Yellowstone - Sakakawea paddlefish as indicated by returns of angler caught fish.

	Year tagged and (number of fish tagged).											
	2001 (7)		2002 (145)		2003(282)		2004(20)		2005(1321)		2006(921)	
	Tag Returns		Tag Returns		Tag Returns		Tag Returns		Tag Returns		Tag Returns	
Year	%*	#	%*	#	%*	#	%*	#	%*	#	%*	#
2001	14.3	1										
2002	0	0	13.1	19								
2003	33.3	2	4.0	5	5.0	14						
2004	0	0	5.0	6	1.1	3	10.0	2				
2005	0	0	1.7	2	1.5	4	0	0	2.9	38		
2006	0	0	9.7	11	10.0	26	5.6	1	2.2	28	1.5	14
2007	0	0	2.0	2	3.0	7	5.9	1	2.8	35	1.0	9
Mean Annual Percentage	6.8		5.9		4.1		5.4		2.6		1.3	

* Percentage = $\frac{\text{Current Year tag returns x 100}}{\text{\# tagged - \# of previous years tag returns}}$

Table 8. Average annual angler exploitation rates of paddlefish for five years following tagging.

Year tagged	Number fish tagged	Average exploitation rate (%)
1984	551	6.35
1986	153	4.18
1988	156	6.25
1990	153	4.33
1992	221	4.80
1994	180	4.27
1995	442	6.82
1996	139	8.33
1997	70	7.40
1998	42	4.35
1999	281	5.38
2000	20	3.33
2001	7	7.93
2002	145	5.91

Table 9. Comparison of male and female tag return rates.

Year	Number Tagged		Number Returned		Percentage Returned	
Tagged	Female	Male	Female	Male	Female	Male
1977	123	223	44	43	35.8	19.3
1978	158	451	54	76	34.2	16.9
1984	313	238	158	75	50.5	31.5
1986	88	65	29	16	33.0	24.7
1988	98	59	49	18	50.0	30.5
1990	77	77	26	9	33.8	11.7
1992	108	110	38	39	35.2	35.5
1993	63	204	14	42	22.2	20.6
1994	109	74	42	15	38.5	20.3
1995	185	257	76	96	41.1	37.4
1996	47	92	21	39	44.7	42.4
1997	26	44	9	19	34.6	43.2
1998	12	36	1	10	8.3	27.8
1999	127	154	44	44	34.6	28.6
2000	11	9	3	1	27.3	11.1
2001	4	3	2	1	50.0	33.3
2002	66	79	23	20	34.8	25.3
2003	160	119	30	17	18.8	14.3
2004	10	10	2	3	20.0	30.0
2005	426	895	12	54	2.8	6.0
2006	245	676	3	11	1.2	1.6
2007	332	1490	4	9	1.2	0.6