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Region 7

Montana Department of Fish, Wildlife and Parks
Fisheries Division

Job Progress Report

STATE: Montana PROJECT: Statewide Fisheries Investigations

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JOB NO: III-c JOB TITLE: Yellowstone River Paddlefish Investigations

PROJECT PERIOD: July 1, 1997 through June 30, 1998

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ABSTRACT

Near record May-June Yellowstone River flows in 1997 produced a relatively low paddlefish harvest and catch rate. Tag sales were down from 1996. The trend of a low female percentage in the harvest that began in 1993 continued in 1997. Average male size increased somewhat in 1997, but female size remained static. Data suggest the paddlefish population, or at least the segment that migrates to Intake, is smaller in recent years. Relative exploitation of the paddlefish population may have increased for the past three years, after a decrease in the early 1990's. Exploitation rates for the sexes seems to be similar in the past three years after many years of heavier female exploitation.

PROCEDURES

A partial creel census was conducted during the paddlefish season at Intake in 1997. 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 739 or 33.3% of the estimated angler days. Anglers were counted each day of the season during daylight hours. On days with no catch and release, eight counts were made. An additional three to five counts, during catch and release, were made on catch and release days. A 24 hour fishing day was used in calculations to estimate fishing pressure on days with no catch and release. An 18 hour day was used on catch and release days (6 hours per day of catch and release fishing). Analysis of the data was accomplished by adapting formulas 5 through 32 from Spence (1970) to the census.

Catch and release statistics were estimated by counting of fish caught and by three to five angler counts made during each 6-hour catch and release day.

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 millimeter. Sex was determined by examination of the gonad for fish kept by anglers. 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. An additional four paddlefish obtained by drifting gill nets in the Intake bypass channel were also jaw tagged. Monel metal bands (National Band and Tag Co.) were placed around the dentary bone.

RESULTS

General Observations

Yellowstone River flows during the 1997 paddlefish season were even higher than in 1996 and reached record or near record levels. By June, water levels forced anglers out of favored Intake fishing spots on the north side of the river because of the bank steepness. These anglers moved downstream 100-200 feet. Anglers on the north side were unable to wade during highest flows and fished on the bank above the water level.

Overall, paddlefishing was poor in both 1996 and 1997, despite river flow rates that would have once led to excellent fishing. This may indicate a somewhat smaller paddlefish population.

Paddlefish tag sales were down about 10% in 1997 from the record sales of 1996 (Table 1). Some anglers may not have fished in 1997 because 1996 was not a good fishing year and because fishing was even slower in 1997.

Interest in catch and release fishing in 1997 was down from earlier years, probably because of the relatively poor fishing.

Paddlefish Size and Sex Ratio

A total of 797 paddlefish were weighed, measured and sexed from the angler catch at Intake in 1997 (Table 2). This total included 74 fish caught at downstream points and was 74% of the estimated catch at Intake in 1997. The high water allowed large numbers of paddlefish to move upstream of Intake. A fishery developed in the vicinity of the Powder River mouth and more than a few paddlefish were caught there in 1997.

Females made up 38.7% the total weighed and measured for length (Table 2), continuing the trend of a fishery dominated by male paddlefish that began in 1993.

After two years of rather exceptionally short males in 1995 and 1996, average male length increased noticeably in 1997 (Table 3). This may indicate an increase in the average age of male paddlefish in 1997 after several years of decreasing male age at Intake. Data from paddlefish researcher, Dr. Dennis Scarnecchia, will be

available on 1997 paddlefish age.

Female paddlefish continue to show no trend in size (Table 3). Average female size has held steady since 1991 and is remaining at a level above what was found in the 1980's and 1970's.

Creel Census

Results from the 1997 creel census at Intake are shown in Table 4. Results from 1997 can be compared to previous years in Table 5. In 1997 at Intake, anglers fished an estimated 2217 days with an average of 2.91 hours per day to catch an estimated 1,075 fish. These figures, except for angler days are a small decrease from 1996.

The calculated harvest figure for Intake in 1997 is considered somewhat of an overestimate. Only 797 fish were weighed and measured and some of these fish were caught at downstream points outside of the Intake area. It seems unlikely that only 74% (797 of 1075)of the Intake catch came through the cleaning station, based on past years percentages and on the high angler interest in having fish cleaned for free.

Angler catch rate in 1997 was even lower(0.17 fish per hour)than in 1996, which was less than half the catch rate of 1995(Table 5). Until the past few years a fairly strong positive correlation between river flows during paddlefish season and catch rate was evident. This correlation has all but disappeared in the past three years. In the 1980's and early 1990's river flows such as occurred in 1996 and 1997 would have produced a much higher catch rate. This information must be viewed as indicating fewer paddlefish available for movement to Intake in recent years and probably as indicating a smaller paddlefish population. However, the large proportion of young males in the Intake catch(Scarnecchia, unpublished data)is a strong sign of a larger migratory population in the near future when females of the same age as current young males reach sexual maturity.

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 7,310 paddlefish tagged in the Yellowstone River(mostly near Intake)at least 1,736(23.7%)have been harvested by anglers(Table 6).

In 1997, 66 tags from angler harvested fish were recovered from paddlefish tagged in the Yellowstone River. Of these, nine were caught in North Dakota, one from the mouth of the Powder River and the remainder from Intake or within a few miles downstream. Also, of the 66 returned tags, 17 were tagged in 1997. An additional 21 tags recovered at Intake were tagged in North Dakota, and four Intake caught fish were tagged in the Missouri River in Montana. In 1997 tag returns at Intake were exceptionally high for fish tagged in 1995. Of the above 66 tags, 26(39%)were tagged in 1995.

Table 7 summarizes tag return rates for multi-year periods. Tag returns in 1997 reinforce the past conclusion of lighter exploitation in the 1960's and 1970's, heavier in the 1980's and lighter in the early 1990's. This can also be seen from average annual exploitation rates in Tables 8 and 9.

Tables 7 and 8 indicate heavier exploitation beginning in about 1995. To date exploitation for fish tagged in 1993-94 averages 2.3%-3.5% per year. However, for fish tagged in 1995 and 1996 the corresponding figures are 8.1 and 8.9 percent. Also, for fish tagged in 1997, the first year return of tags was 23.7%, the highest ever measured. The apparent increase in recent years in exploitation rate may be at least partially caused by what is believed to be a decrease in the size of the population migrating to Intake.

Table 10 compares tag return rate by sex for fish tagged in the years 1977 through 1997. The heavier harvest rate for females in the earlier years is coming to and end. For the years 1995 through 1997 return rates for the sexes are similar.

Paddlefish Caviar

The Glendive Chamber, as of 12-12-97, had not completed sale of 1997 caviar. Very close to 1800 lbs of caviar was produced from approximately 300 female paddlefish in 1997.

LITERATURE CITED

Spence, L. 1970. Georgetown Lake winter creel census. Job prog. Rept, F-12-R-16, Job I-b MT Dept. Fish and Game 29pp.

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Key Words:

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

Table 1. Number of anglers purchasing paddlefish tags.

Year	Total	Resident	Nonresident	% Nonresident
1997	6077	4855	1222	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			

1 Tags were free in 1981.
2 Resident and nonresident tag sales were calculated separately beginning in 1986.
3 Previous to 1992 tags were required only for Yellowstone River paddlefish snagging. Beginning in 1992 tags were required statewide.
4 Data for 1988 through 1996 is updated from previous reports to show complete sales.

Table 2. Summary of paddlefish measurements obtained from the angler catch at Intake, Yellowstone River, 1963-1997.

Year	No. of fish Measured	Average Total Length (Inches)	Eye-fork Length (mm)	Average Weight (Pounds)	Percentage of Females
1963	46	43.4		29.6	0
1964	920	48.8		21.0	2.8
1965	453	50.6		21.3	2.9
1966	28	49.2		21.2	0
1967	123	50.9		21.8	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[1]		49.1[a]	80.2
1981	2528		1086	46.7	75.1
1982	2004		1078	45.1	71.2
1983	1400		1086	50.2	82.6

Table 2 (Cont.) Year	No. Of fish Measured	Eye-fork Length (mm)	Average Weight (Pounds)	Percentage Of Females
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

1 Based on 62 measurements.
2 Based on 131 measurements.

Table 3. Summary of paddlefish average length and weight, by sex, obtained from the angler catch at Intake, Yellowstone River, 1963-1997.

	Males			Females		
Year	Sample Size	Length (E-F,mm)	Weight (pounds)	Sample Size	Length (E-F,mm)	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

Table 3. continued

Year	Sample Size	Length (E-F,mm)	Weight (pounds)	Sample Size	Length (E-F,mm)	Weight (Pounds)
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

Table 4. Estimate of anglers, hours fished and harvest for the 1997 paddlefish season at Intake.

Time Period	No. Of Angler Days	Hrs./ Angler Day	Angler Hours	# Of Fish Caught	Fish Caught/ Angler Hr.	Fish Caught Per Angler Day.
			Periods Requiring Angler Retention of Fish			
Wednesdays and Sundays	585	2.65	1550	254	0.16	0.43
Other Days	1632	3.00	4899	821	0.17	0.50
Total or Mean	2217	2.91	6449	1075	0.17	0.48
			Periods Requiring Fish Release			
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Table 5. Comparison of paddlefish fishing pressure, harvest and success rate data at Intake from 1972 to 1997.

Year	Angler Days	Fish Caught	Fish Kept	Fish/ Angler Day	Fish/ Angler Hour	Total Weight Harvested (Pounds)
1972	2118	2935	1805	1.39	0.40	61,370
1973	2449	4670	2675	1.91	0.46	88,543
1974	3363	4359	2182	1.30	0.39	70,680
1975	2784	2950	1473	1.06	0.28	77,038
1977	3524	2764	1410	0.78	0.34	67,962
1978	6130	4814	2887	0.78	0.49	124,141
1979	2904	2202	1727	0.76	0.27	87,041
1981	3982	5318	5318	1.34	0.81	248,251
1982	3535	4713	4713	1.33	0.45	212,556
1983	3142	3193	3193	0.92	0.38	160,289
1984	3978	3860	3860	0.98	0.35	169,840
1985	1745	550	550	0.34	0.09	25,960
1986	2521	1791	1791	0.73	0.15	78,267
1987	2386	2612	2612	1.13	0.28	129,816
1988	2320	2923	2923	1.25	0.34	127,151
1989	2208	2242	2242	1.00	0.19	105,374
1990	2877	2046	2046	0.65	0.15	93,298
1991	3332	4203	4203	1.19	0.30	189,135
1992	2396	762	762	0.34	0.09	37,109
1993	2818	1635	1635	0.56	0.13	60,331
1994	1037	278	278	0.27	0.08	13,177

Table 5. (Continued)

Year	Angler Days	Fish Caught	Fish Kept	Fish/ Angler Day	Fish/ Angler Hour	Total Weight Harvested (Pounds)
1995	2098[a]	2008	1657[a]	0.81[a]	0.39[a]	64,789[a]
1996	2062[a]	1328	1199[a]	0.58[a]	0.19[a]	48,080[a]
1997	2217[a]	1149	1075[a]	0.48[a]	0.17[a]	41,065[a]

"a" Does not include fishing during catch and release periods.

Table 6. Summary of paddlefish tagging at Intake and downstream points and tag returns 1964-1997.

Year	Number Tagged	#Returned in 1997	Total # Returned	Percentage Returned
1964-1970	1703	0	278	16.3
1971-1980	3242	0	805	24.8
1984	551	1	243	44.1
1985	2	0	2	100.0
1986	153	1	45	29.4
1988	156	3	61	39.1
1989	10	0	3	30.0
1990	153	1	40	26.1
1991	20	2	6	30.0
1992	221	3	57	25.8
1993	268	6	30	11.2
1994	180	2	24	13.3
1995	442	26	101	22.9
1996	139	4	24	17.3
1997	70	17	17	24.3
Totals	7310	66	1736	23.7

"a" Most fish tagged at Intake or within a few miles downstream of Intake. A few tagged a points farther downstream from the Yellowstone River in Montana.

Table 7. Tag return rate averages for multi-year periods.

Period Tagged	Number Tagged	#Returned Through 1997	Percentage Returned
1964-1970	1703	278	16.3
1971-1980	3242	805	24.8
1981-1990	1025	394	38.4
1991-1995	1131	218	19.3
1996-1997	209	41	19.6

Table 8. Annual angler exploitation rates in percent and (number of fish caught each year) for Yellowstone - Sakakawea paddlefish as indicated by returns of angler caught fish.

	Year tagged and (number of fish tagged)			
Year	1993 (268)	1994 (180)	1995 (442)	1996 (139)
1993	5.2 (14)			
1994	0.0 (0)	6.1 (11)		
1995	2.8 (7)	1.2 (2)	15.4 (68)	
1996	1.2 (3)	5.4 (9)	1.8 (7)	14.3 (20)
1997	2.5 (6)	1.3 (2)	7.1 (26)	3.4 (4)
Mean Annual Percentage	2.3	3.5	8.1	8.9

"a" Percentage = $\frac{\text{Number caught that year x 100}}{\text{\# tagged - \# caught in previous yrs}}$

Table 9. Average annual angler exploitation rates of paddlefish for five years following tagging.

Year tagged	Number fish tagged	Average exploitation rate (%)
1984	581	6.35
1986	153	4.18
1988	156	6.25
1990	153	4.33
1992	221	4.80

Table 10. Comparison of male and female tag return rates.

Year Tagged	Number Tagged		Number Returned		Percentage Returned	
	Female	Male	Female	Male	Female	Male
1977	123	223	44	43	35.8	19.3
1978	158	451	53	76	33.5	16.9
1984	313	238	152	75	48.6	31.5
1986	88	65	27	16	30.7	24.7
1988	98	59	43	18	43.9	30.5
1990	77	77	18	8	23.4	10.4
1992	108	110	25	29	23.1	26.4
1993	63	204	10	20	15.9	9.8
1994	109	74	17	5	15.6	6.8
1995	185	257	41	60	22.1	23.3
1996	47	92	6	18	12.8	19.6
1997	26	44	6	11	23.1	25.0