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Region 7

Montana Department of Fish, Wildlife and Parks
Fisheries Division

Job Progress Report

STATE: Montana PROJECT: Statewide Fisheries Investigations

PROJECT NO. F-78-R-3 STUDY TITLE: Survey and Inventory of Warmwater Streams

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

PROJECT PERIOD: July 1, 1996 through June 30, 1997

REPORT PERIOD: April 1, 1996 through March 30, 1997

ABSTRACT

Creel census at Intake indicated a paddlefish harvest of close to 1200 fish and slightly less than the 1500 fish quota for the entire Yellowstone River in Montana. The trend of a lower female percentage in the harvest that began in 1993 continued in 1996. There is probably a large increase of young male paddlefish in the Yellowstone River run. Females from these age classes will enter the run in later years. Condition of male paddlefish has also increased. Despite higher Yellowstone River flows in 1996, catch rate was about half of that for 1995. The past conclusion of heavier exploitation of paddlefish tagged in the 1980's and lighter exploitation since 1993 is reinforced by 1996 data. Female paddlefish continue to be harvested at a higher rate than males. The paddlefish caviar program is continuing to generate significant income.

PROCEDURES

A partial creel census was conducted during the paddlefish season at Intake in 1996. As many anglers as possible were questioned concerning amount of time spent fishing and number of fish caught. The interview total for fishing effort during periods requiring retention of fish caught was 774, or 37.5% 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. Eleven counts of anglers were made on days with catch and release. A twenty-four hour fishing day was used to estimate fishing pressure. Analysis of the data was accomplished by adapting formulas 5 through 32 from Spence (1970) to the census. Calculations were made by computer.

Angler caught 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. Paddlefish were obtained for tagging by two methods. Most of the fish caught during catch and release were jaw tagged preceding release. Also floating drifted gill nets were used to obtain fish for tagging. These nets were 100-150 feet long and 10 feet deep, but tied up to six feet deep. Plastic, individually numbered tags were placed around the lower jaw bone. They were obtained from the National Band and Tag Co.

RESULTS

General Observations

Yellowstone River flows during the 1996 paddlefishing season were well above 1995 flows, but the angler catch rate of paddlefish was only about half of 1995. Catch and release paddlefishing remained popular, with higher angler catch during catch and release hours than during "catch and keep" periods.

Paddlefishing remains popular. Tag sales were the highest ever in 1996 (Table 1). The nonresident fraction of the total increased to 19% after having dropped for several years. Relatively good Intake fishing in 1995 may have increased interest in 1996.

Paddlefish Size and Sex Ratio

A total of 1,120 paddlefish were weighed, measured and sexed from the angler catch at Intake in 1996 (Table 2). This total included approximately 100 fish caught at downstream points and was 93% of the estimated catch at Intake in 1996. Females made up 42.1% of the total, continuing the trend of fewer female fish in the catch that began in 1993. Work by Scarnecchia(unpublished file report, 1997) suggests that in recent years there has been a large influx of young male paddlefish (ages 7-12) into the Yellowstone River run. Females of corresponding ages will not enter the run until about age 15. This may account for the recent decrease in the female percentage of the catch at Intake and probably portends a much larger run of female fish in a few years.

Table 3 shows average length and weight, by sex, for paddlefish at Intake. Over recent years both average length and weight has increased slowly for female paddlefish. Average age(Scarnecchia, unpublished file report, 1997) has fluctuated between 22.8 and 26.7 years over the 5 years from 1991 through 1995, without showing any trend. Average length of male paddlefish began to decrease in 1994, with a sharp decrease in 1995 and a smaller decrease in 1996. Average age of males (Scarnecchia, unpublished file report, 1997) decreased sharply from 1992 to 1993 (17.8 years to 15.8 years) and has continued downward to 14.7 in 1996. This length and age data, as well as the sex ratio in the angler catch, suggests a large influx of first-run male paddlefish. Weight of male paddlefish at Intake has decreased less than length (Table 3), indicating an increase in average condition of male paddlefish.

Creel Census

Results from the 1996 creel census at Intake are shown in Table 4. Results from 1996 can be compared to previous years in Table 5. In 1996 at Intake, anglers fished an estimated 2,062 days with an average of 3.07 hours per day to catch an estimated 1,199 fish. The 1996 catch rate was 0.19 fish per angler hour.

The 1996 season was under a quota of 1500 fish for the total Yellowstone River harvest. Based on past comparisons of Intake harvest as a percentage of the total Yellowstone River harvest (Stewart 1996). The total Yellowstone harvest probably approached, but probably did not significantly exceed the 1500 fish quota. With a season limit of one fish and present fishing pressure, it is unlikely that the quota will be exceeded by a large amount in any season, even if the season is left open when the quota is reached.

Angler success rate in 1996 was about half the success rate of 1995, despite higher river flows in 1996. 1996 flows allowed significant numbers of fish to move to points upstream of Intake in 1996. This was not true in 1995 and may at least partly account for the lower 1996 success rate. Angler days were nearly the same both years (Table 5). Evidence continues that catch rates and paddlefish density at Intake in recent years are lower as discussed in Stewart 1996.

Tagging, Tag Return and Exploitation Rate

Return rates of individually numbered plastic bands placed around the dentary bone are used to infer angler exploitation rate. Of 7,240 paddlefish tagged in the Yellowstone River (mostly near Intake) at least 1,670 (23.1%) have been harvested by anglers (Table 6).

In 1996, 56 tags were recovered from paddlefish tagged in the Yellowstone River. Of these, six were caught in North Dakota, two from the Yellowstone River outside the Intake area and the remainder at Intake or within a few miles downstream. An additional 20 fish tagged in North Dakota were caught by anglers in the Intake area.

Table 7 summarizes tag return rates for multi-year periods. Tag returns in 1996 reinforce the past conclusion of lighter exploration in the 1960's and 1970's, heavier in the 1980's and, hopefully, lighter exploitation in the 1990's with more restrictive regulations beginning in 1994.

Tables 8 and 9 indicate average annual exploitation rates for paddlefish tagged in various years. Rates are calculated only for the first five years following tagging to minimize the compounding error from unreported tag returns and natural mortality. Returns in 1996 appear to continue suggesting somewhat decreased exploitation rates beginning in about 1993. Two or three years of additional data should more clearly indicate this trend, if present.

Table 10 compares tag return rate by sex for fish tagged in the years 1977 through 1995. Sex differentials continued to expand in 1996 with returns of female paddlefish in the years 1978, 1984, 1986, 1988, and 1990, but without 1996 returns of male paddlefish for those years. Harvest rates of female paddlefish are probably more significant than those for males.

Paddlefish Caviar

The Glendive Chamber of Commerce and Agriculture continued their collection of paddlefish at Intake for the seventh consecutive year. They encourage the donation of roe by offering free fish cleaning in return for roe donation. In 1996 they cleaned 1,145 fish of which 432 (37.7%) were females. They sold 3,090 lbs of caviar for $231,881 or at an average of $75.04 per pound.

Literature Cited

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Paddlefish tagging

Table 1. Number of anglers purchasing paddlefish tags.

Year	Total	Resident	Nonresident	% Nonresident
1996	6747	5460	1287	19
1995	6544	5495	1049	16
1994	4065	3237	828	20
1993	5577	4194	1383	25
1992[3]	4779	3503	1276	27
1991	4438	3021	1417	32
1990	3960	2826	1134	29
1989	4255	3081	1174	28
1988[4]	3526	2620	906	26
1987	2877	2182	695	24
1986	3696[2]	2661	1035	28
1985	3593			
1984	5063			
1983	4636			
1982	4834			
1981[1]	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 1995 is updated from previous reports to show complete sales.

Table 2. Summary of paddlefish measurements obtained from the angler catch at Intake, Yellowstone River, 1963-1996.

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[2]	80.2
1981	2528		1086	46.7	75.1
1982	2004		1078	45.1	71.2
1983	1400		1086	50.2	82.6

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

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, 1963-1996.

	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

Table 4. **Estimate of anglers, hours fished and harvest for the 1996 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	593	2.68	1588	305	0.19	0.51
Other Days	1469	3.23	4746	894	0.19	0.61
Total or Mean	2062	3.07	6334	1199	0.19	0.58
			Periods Requiring Fish Release			
	235	2.51	590	129	.22	.55

Table 5. Comparison of paddlefish fishing pressure, harvest and success rate data at Intake from 1972 to 1995.

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
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]

"a" represents that it does not include fishing during catch and release periods.

Table 6. Summary of paddlefish tagging at Intake and tag returns 1964-1996.

Year	Number Tagged	#Returned in 1996	Total # Returned	Percentage Returned
1964-1970	1703	0	278	163
1971-1980	3242	1	805	24.8
1984	551	5	242	43.9
1985	2	0	2	100.0
1986	153	1	44	28.8
1988	156	2	58	37.2
1989	10[a]	0	3	40.0
1990	153[a]	2	39	25.5
1991	20	0	4	20.0
1992	221[a]	6	54	24.4
1993	268[a]	3	24	9.0
1994	180[a]	9	22	12.2
1995	442[b]	7	75	17.0
1996	139[c]	20	20	14.4
Totals:	**7240**	**56**	**1670**	**23.1**

"a" Some fish tagged at downstream points as far as Crittenden Island. Most tagged in the first 5 miles immediately downstream of Intake Diversion Dam.

"b" Includes 19 fish tagged between Sidney and the Fairview Bridge.

"c" Includes 20 fish tagged between Diamond Willow and the Confluence.