MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

JOB PROGRESS REPORT

STATE: Montana **PROJECT TITLE:** Statewide Fisheries Investigations

PROJECT: F-78-R-1 **STUDY TITLE:** Survey and Inventory of Warmwater Streams

JOB NO: III-B **JOB TITLE:** Southeast Montana Warmwater Streams Investigations

PROJECT PERIOD: July 1, 1994 through June 30, 1995

ABSTRACT

Flathead chub, a federal T&E candidate, were abundant in 1994 Yellowstone River electrofishing collections. Yellowstone River adult sauger are present in very low levels but a very strong 1994 year class was present. Several years of angler tag returns from sauger indicated a first year tag return rate of 5.6%. Walleye egg collection at Tongue Reservoir in 1994 met with even less success than previous years. Future walleye egg efforts will be at Ft. Peck Reservoir. Fall fish sampling in the T&Y canal found relatively large numbers of fish, but channel catfish were the only game species found.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To collect up to 50 million walleye eggs each year with average survival to hatching of 60%. Walleye eggs were collected, but the goal was not met. More information is given in the RESULTS section.

2. Fund feasibility study for fish passage at Cartersville Diversion Dam. This study has been funded. A draft report is expected in late fall 1995.

3. To understand the significance to game fish of Yellowstone River non-game fish species. Progress toward the objective is reported in the RESULTS section.

4. To have needed Tongue River flows recognized in the operating plan for the rebuilt Tongue River Dam. Effort has been made toward having these flows recognized by the controlling agencies. The Northern Cheyenne tribe has also been notified of the Departments possible interest in leasing or purchasing tribal water for instream flows from the rebuilt Tongue River Dam.

5. To ensure that legally mandated instream flows are met. Department instream flows in portions of the Yellowstone River and tributaries were not met at some locations in late summer 1994. This was caused by weather related events, not by illegal water withdrawals.

6. To maintain existing water quality and bank-channel condition. Projects were reviewed under two state laws. These projects were approved as planned, or modified, depending on the kind and degree of effect on river banks, channels and specific fish habitat needs.

7. To monitor effect of angler harvest on selected Yellowstone River game fish. This objective was met. Progress is reported in the RESULTS section.

8. To monitor status of non-game species - especially sturgeon chub, blue sucker and sicklefin chub. This objective was met. Progress is reported in the RESULTS section.

METHODS

River fish populations were sampled with boat-mounted electrofishing gear. Fish were tagged with Floy "T" tags and "cinch-up" tags. Fish total lengths (fork length for sturgeon) were measured to the nearest millimeter and weights to the nearest gram for smaller fish or nearest 10 grams for larger fish. Sauger gut contents were removed by placing thumb pressure on the gut area of the fishes ventral side. This usually forced regurgitation of gut contents.

Walleye spawners were collected by electrofishing in the Tongue River upstream of the reservoir and with frame traps and sinking gill nets of 2 1/2" and 3" (bar) mesh gill nets in the Tongue River Reservoir. Green

females were injected with a synthetic Luteinizing-Releasing Hormone analogue (LHRHa) to encourage final ripening of eggs. Injection rate was 0.02 mg/kg body weight. Fish were retained until ripening or released at seven days after injection.

Fish in the Tongue and Yellowstone canal were sampled within a few days of shut down of the canal. Water in the remaining shallow pools was sampled with a gas powered back-pack electrofisher.

RESULTS
Yellowstone River Fish Population Work

Fish were sampled in 13 sections of the Yellowstone River in fall 1994. The data are grouped into four larger sections and shown in Tables 1 and 2. From 11-14 nongame fish species were collected in each of the four sections. A cisco collected near Seven Sisters Island is a new species for the Yellowstone River. This species is abundant in Fort Peck Reservoir. It probably originated there, traveled down the Missouri River and then moved up the Yellowstone River.

The flathead chub is presently being considered as a candidate species for threatened or endangered status. Relatively large numbers were found in three of the four Yellowstone River sections (Table 1). It is probably more abundant in the upstream section (Forsyth to Rosebud) than is suggested by the two fish sampled in fall 1994. Only one sturgeon chub was sampled in 1994.

Sauger, along with the less abundant walleye are key species in the Yellowstone River. Table 2 shows numbers and sizes of these and other game fish sampled in 1994. Work in 1993 documented a rather dramatic fall in electrofishing catch rate of sauger between the mid to late 1980's and early 1990's (Stewart 1994). This drop has continued (Table 3). Catch rates in 1994 average somewhat lower than in 1993 and the 1994 sample had large numbers of age 0+ sauger that were not present in 1993. If age 0+ fish were deleted from Table 3, catch rates would appear even lower.

For the first time since 1991 sauger young-of-the-year (YOY) were sampled in 1994. Although no sauger YOY were sampled upstream of Bonfield, YOY made up over half of the 117 sauger collected in the downstream two sections (Table 2). This large fraction of YOY has not been observed in the past in the Yellowstone River. It probably has resulted from a combination of two factors: very low adult levels and a strong 1994 year class.

Although no good explanation can be advanced for the late 1980's - early 1990's drop in adult sauger abundance, absence of sauger YOY in 1992 and 1993 and a very strong 1994 year class, these observations correspond very well in time to water levels in Lake Sakakawea in North Dakota. Adult sauger numbers in the Yellowstone River dropped as the water level of Lake Sakakawea fell in the late 1980's and early 1990's. Sauger YOY in the Yellowstone River were absent in the springs of lowest lake level

(1992 and 1993). A large year class of sauger was then formed in 1994, the first year with a much higher lake level in spring. Sauger in the Yellowstone system drift downstream after hatching, probably reaching upper Lake Sakakawea, and then move back upstream in late summer and fall (Penkal 1992). The large 1994 sauger year class should portend a future increase in adult sauger numbers.

Length frequencies of sauger shown in Table 4 are dramatically different from 1993. However, most of the changes from 1993 are accounted for by YOY. In fall most of the YOY are 150-200 mm total length. A few are longer than 200 mm.

Yellowstone River Angler Tag Return Rate

Angler tag return rates for sauger/walleye and smallmouth bass are shown in Table 5. Rates are calculated only for the first year following tagging to minimize errors from natural mortality. The calculated rates are low because of an unknown, but probably significant percentage of tags that anglers fail to return.

Overall return rates suggest angler exploitation is probably within acceptable ranges, even if actual exploitation rates are twice as high as suggested by tag return rates. The overall annual return rate for sauger/walleye is 5.6% (Table 5). Return rates for fish tagged near Miles City and Forsyth are higher than for fish tagged near Fallon.

Return rates for smallmouth bass are based on relatively few fish tagged in only two years. Many of the sauger returns are from a location many miles from the tagging location. One sauger tagged in 1993 near Fallon was caught at Intake the following year, a distance of approximately 50 river miles.

Sauger Gut Contents

Relatively few adult sauger were sampled in 1994 and fish food items were found in only three of those. The sauger with fish food items were all relatively large, between 454 and 511 mm total length. One sauger contained an unidentified fish that was too far digested to measure length. The second sauger contained an unidentifiable fish of approximately 200 mm length. The third sauger contained two plains/silvery minnows approximately 110 mm long and one goldeye 150 mm long.

Walleye Egg Collection

Tongue River Reservoir and the lower part of the Tongue River immediately upstream of the reservoir have been used for walleye egg collection since 1992. This location has not produced the desired number of eggs. Large walleye are abundant in the reservoir but do not concentrate at any location during the spawning period. As a result the number of adult spawners and number of eggs collected has been low.

Egg collection totals in 1994 were even low than the two previous years. Less than two million eggs were collected from approximately 20 females. Size by sex of walleye spawners is shown in Table 6. Average size of females has increased each year. In 1994 the average female walleye was over 3000 grams.

Regional efforts in walleye eggs will move to Fort Peck Reservoir in 1995. Although there is presently a Department effort in walleye eggs at this location, I expect our additional efforts will produce more walleye eggs than at Tongue River Reservoir.

T & Y Canal - Fish Entry

Screening of irrigation diversions on the Tongue River has been suggested as a potential project under the enhancement portion of the Tongue River Dam repair project. To evaluate the potential benefits from screening this diversion. We sampled fish in the canal two or three days after the headgate was closed. Approximately 500 feet of canal was sampled at four locations from near the headgate to a location near Miles City.

Results are shown in Table 7. Channel catfish were the only game species found in the canal. All of these were small (maximum length of 255 mm), but numbers were relatively high. Channel catfish numbers were exceeded only by white suckers. Species composition in the canal included most of the species present in the canal upstream of the headgate.

LITERATURE CITED

Penkal, R.F. 1992. Assessment and requirements of sauger and walleye populations in the lower Yellowstone River and its tributaries. Montana Dept. of Fish, Wildlife and Parks. Miles City. 149 pp.

Stewart, P.A. 1994. Southeast Montana warmwater streams investigations. Job Prog. Rept. F-46-R-7, Job III-B. MT Dept. Fish, Wildl & Parks. 10 pp.

Waters Referred to:

Yellowstone River Sec. 01	7-21-1350
Yellowstone River Sec. 02	7-21-1400
Tongue River Sec. 03	7-21-1250
Tongue River Reservoir	7-21-9000

Key Words:
non-game fish- abundance
sauger - exploitation rate, size structure, abundance
walleye - egg collection

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Table 1. Non-game fish species sampled from four sections of the Yellowstone River in fall 1994.

Species	N[a]	N[b]	Length Range (mm)	Weight Range (gm)
Intake to Seven Sisters				
Cisco	1		181	50
Freshwater drum	7		173-425	217-1070
Sturgeon chub	2		76-86	-
Flathead chub	7	50	96-193	10-15
Bigmouth buffalo	2		619-655	3980-4000
River carpsucker	9		353-555	300-2670
Goldeye	40	58	120-392	20-480
Longnose sucker	3		225-376	120-550
Carp	2		282-460	310-1390
Plains/Silvery minnow	64	22	107-137	10-20
Longnose dace		1	-	-
Shorthead redhorse	19		61-430	160-870
Bonfield to Glendive				
Blue sucker	6	-	670-692	2510-3900
Shorthead redhorse	58	-	67-597	10-1130
River carpsucker	18	-	45-473	160-1450
Goldeye	75	112	81-350	5-420
Flathead chub	32	10	80-297	5-80
Longnose dace	4	-	63-105	-
Stonecat	1		116	20
Freshwater drum	4		302-321	330-410
White sucker	1		378	620
Longnose sucker	15		98-430	20-680
Carp	3		392-590	750-2820
Smallmouth buffalo	1		575	2450
Plains/Silvery minnow	14		97-140	5-30
Sturgeon chub	1		-	-
Hathaway to Kinsey Bridge				
Goldeye	44	70	132-350	20-350
Shorthead redhorse	53	30	79-508	60-1290
Longnose sucker	13	-	121-442	60-860
White sucker	3	-	292-380	280-680
Carp	9	-	392-610	750-2690
Flathead chub	13	2	106-150	209-35
Freshwater drum	5	-	304-403	360-1060
Mountain sucker	1	-	107	-
River carpsucker	9	-	92-399	10-790
Smallmouth buffalo	2	-	487-536	1800-1980
Blue sucker	3	-	692-785	3450-4500

Table 1 continued. Non-game fish species sampled from four sections of the Yellowstone River in fall 1994.

Species	N[a]	N[b]	Length Range (mm)	Weight Range (gm)
Forsyth to Rosebud				
Goldeye	45	23	140-347	20-320
Shorthead redhorse	73	137	58-490	40-1310
White sucker	19	-	60-426	5-880
Longnose sucker	16	-	120-462	10-1050
Blue sucker	2	-	695-752	2670-3050
Mountain sucker	3	-	129-150	20-30
River carpsucker	26	14	102-400	10-750
Smallmouth buffalo	2	-	478-643	1510-4750
Carp	8	-	342-525	510-1900
Longnose dace	1	-	95	10
Flathead chub	2	-	142-145	20

[a] number weighed and measured
[b] number counted only

Table 2. Game fish sampled from four reaches of the Yellowstone River in fall 1994.

Species	N	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mean Weight (gm)
Intake to Seven Sisters					
Channel catfish	1	-	260	-	120
Sauger (adult)	30	245-511	341	100-1170	310
Sauger (YOY)	47	130-213	174	10-60	35
Walleye	1	-	304	-	290
Brown trout	1	-	473	-	950
Burbot	1	-	620	-	1160
Shovelnose sturgeon	3	560-650	613	670-1130	890
Bonfield to Glendive					
Channel catfish	34	173-620	373	35-3400	598
Sauger (adult)	28	245-462	380	105-960	489
Sauger (YOY)	12	200-231	216	60-100	77
Burbot	4	230-670	439	50-1400	572
Shovelnose sturgeon	1	-	850	-	3240
Hathaway to Kinsey Bridge					
Channel catfish	15	200-657	450	60-3210	1026
Sauger	6	302-424	371	230-600	427
Walleye	2	263-540	401	150-1470	810
Burbot	6	157-216	193	20-40	35
Shovelnose sturgeon	1	-	805	-	2520
Smallmouth bass	14	100-321	143	15-630	74
Forsyth to Rosebud					
Channel catfish	41	186-750	351	50-2350	402
Sauger	8	338-512	395	320-1130	516
Burbot	1	-	615	-	440
Smallmouth bass	31	100-323	180	10-650	160
Brown trout	1	-	505	-	1250
Northern pike	3	496-640	570	860-1940	1317

Table 3. Electrofishing catch rate (fish per day) for Yellowstone River sauger in the autumn.

Year	Number of Days	Number of Sauger	Sauger per day
		Intake to Seven Sisters	
1994	7	77	11.0
1993	6	103	17.2
1985	3	358	119.3
		Bonfield to Glendive	
1994	8	40	5.0
1993	5	54	10.8
1992	8	51	6.4
		Hathaway to Kinsey Bridge	
1994	5	6	1.2
1993	8	8	1.0
1992	12	33	2.8
1990	17	135	8.1
1985	5	135	27.0
		Forsyth to Rosebud	
1994	4	8	2.0
1993	6	10	1.7
1992	6	23	3.8
1990	1	25	25.0
1988	8	233	29.1
1987	15	273	18.2

Table 4. Length frequency of sauger in the Yellowstone River in September and October, 1994.

Length Class (mm)	RIVER SECTION: Bonfield to Seven Sisters No.	Bonfield to Seven Sisters Percent	Forsyth to Kinsey Bridge No.	Forsyth to Kinsey Bridge Percent
<200	42	35.9		
200-249	18	15.4		
250-299	4	3.4		
300-349	23	19.7	3	21.4
350-399	16	13.7	7	50.0
400-449	8	6.8	2	14.3
450-499	5	4.3	1	7.1
>500	1	0.9	1	7.1

Table 5. Yellowstone River sauger/walleye and smallmouth bass angler harvest rate in the first year following tagging.

Year Tagged	Location	Number Tagged	# Returned First Year	Annual Percentage Harvest Rate
		Sauger/Walleye		
1985	Miles City	143	17	11.9
1987	Below Forsyth	276	17	6.2
1988	Below Forsyth	196	2	1.0
1989	Above Forsyth	30	1	3.3
1990	Below Forsyth	37	2	5.4
1990	Miles City	161	12	7.5
1991	Above Forsyth	30	3	10.0
1992	Below Forsyth	22	3	13.6
1992	Miles City	46	4	8.7
1992	Fallon Bridge	51	0	0.0
1993	Below Forsyth	21	1	4.8
1993	Miles City	10	0	0.0
1993	Near Fallon	54	1	1.9
1993	Below Intake	42	0	0.0
All years		1119	63	5.6
		Smallmouth Bass		
1992	Below Forsyth	103	2	1.9
1992	Miles City	39	6	15.4
1993	Miles City	3	0	0.0
1993	Below Forsyth	24	0	0.0
All years		169	8	4.7

Table 6. Size of walleye spawners collected from Tongue Reservoir and Tongue River upstream of the reservoir in spring.

Year	N	Mean Length (mm)	Mean Weight (gm)	Length Range (mm)	Weight Range (gm)
			MALES		
1992	98	447	982	337-605	400-2450
1993	34	532	1400	385-704	470-3200
1994	25	532	1364	456-705	800-3400
			FEMALES		
1992	118	564	2271	350-770	500-5250
1993	32	615	2600	506-756	1300-4400
1994	25	635	3273	510-775	1300-5500

Table 7. Fish sampled at four locations in the Tongue and Yellowstone Canal on November 7, 1994.

Species	N[a]	N[b]	Length Range (mm)	Mean Length (mm)
		0.25 Miles Below Headgate		
Channel catfish	20	33	71-255	91
Stonecat	6	12	85-170	125
Rock bass	4		50-64	56
Shorthead redhorse	4	6	83-122	96
White sucker	4	20	98-195	127
Longnose sucker	6		66-132	107
Mountain sucker	3		72-113	88
Carp	3		145-162	153
Flathead chub	11	25	51-68	59
Longnose dace	8	29	42-81	58
		Bill Jones Farm		
Green sunfish	2	2	72-85	79
Shorthead redhorse	1		-	62
Longnose sucker	1		-	35
White sucker	10	23	55-174	96
Carp	2		160-188	174
Black bullhead	1		-	122
Fathead minnow	3	2	35-60	47
Flathead chub	1	5	-	85
Longnose dace	1	7	-	35

Plains/silvery minnow	2	10	40-45	43
Oschner Farm				
Channel catfish	2	15	95-95	95
Shorthead redhorse	1		-	65
White sucker	10	23	65-225	109
Longnose sucker	1		-	176
Mountain sucker	1		-	80
Carp	1		-	140
Flathead chub	6	11	50-95	76
Fathead minnow	1		-	70
Longnose dace	5	13	50-65	57
Baker I-94 Interchange				
White sucker	3		50-210	121
Longnose dace	1		-	62

[a] Number weighed and measured
[b] Number counted only