MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

JOB PROGRESS REPORT

STATE: Montana PROJECT: Statewide Fisheries Investigations

PROJECT NO: F-46-R-7 STUDY TITLE: Survey and Inventory of Warmwater Streams

JOB NO: III-B JOB TITLE: Southeast Montana Warmwater Streams Investigation

PROJECT PERIOD: July 1, 1993 through June 30, 1994

REPORT PERIOD: April 1, 1993 through March 31, 1994

ABSTRACT

Blue suckers and sturgeon chub were common in Yellowstone River electrofishing samples. Electrofishing catch rates for sauger in the Yellowstone River are much lower than in the 1980's, but size structure upstream of Intake is unchanged. Sauger are now much smaller than in the 1980's downstream of Intake. Data is presented on angler tag return rates of sauger and smallmouth bass from the Yellowstone River. Over two million walleye eggs were collected for cultural purposes from the Tongue River Reservoir and river upstream of the Reservoir.

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 fully met. More information is given in the RESULTS section.

2. To determine the effect of Yellowstone River low-head diversion dams on game fish distribution and abundance; provide for additional angler days for warm water species at upstream locations. A contract with Dr. Dennis Scarnecchia of the University of Idaho has been prepared. Under this contract feasibility and possible methods of constructing fish passage will be determined. Work under this contract has been delayed, but implementation of the contract is expected soon.

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

4. To obtain a minimum flow on the Tongue River downstream of the T&Y diversion of 525 cfs for the period April 1 through May 10. These flows have been incorporated into project documents for the rebuilding and future operation of the Tongue River

Reservoir dam.

5. To ensure that legally mandated instream flows are met. These flows were met during the report period.

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 and channels.

METHODS

River fish populations were samples with boat-mounted electrofishing gear. Fish were tagged with Flag "T" tags and "cinch-up" tags. Fish total lengths (fork length for sturgeon) were measured to the nearest millimeter and weights to the nearest 10 grams. 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 by frame trap nets and sinking 2 1/2" and 3" (bar) mesh gill nets in 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.

RESULTS

Yellowstone River Fish Population Work

Fish were sampled in four sections of the Yellowstone River in fall 1993 (Tables 1 and 2). Relatively low numbers of game fish were collected in the Miles City and Forsyth sections. From 11 to 13 non-game fish species were collected in the four sections.

Of particular interest are blue suckers and sturgeon chubs. Large blue suckers were found in all four sections, but no small blue suckers were observed. The smallest weighed in excess of 1300 grams (Table 2). Sturgeon chubs were found in all but the Miles City section. Both sturgeon chub and blue sucker are candidates for federal threatened or endangered status, but appear quite common in the lower Yellowstone River.

Sauger are a key species in the Yellowstone river. Along with the less abundant walleye they are probably the species preferred by anglers. Few population estimates have been made for Yellowstone River sauger, but I converted available electrofishing data into the catch rate indicator of sauger caught per day of electrofishing (Table 3). A day of electrofishing probably averages approximately four hours of actual operation of the electrofishing gear.

Sauger electrofishing catch rates have dropped rather dramatically from the mid 1980's (Table 3). This drop is not evident only for the Fallon Bridge section that was first sampled in 1992. For the other three sections 1993 catch rates are only 4% to 14% of catch rates in the mid-1980's. This rather dramatic decrease is unexplained. Many factors, other than sauger density, affect electrofishing catch rates, but the catch rate decrease is so large that a significant decrease in abundance seems likely.

The decrease in electrofishing catch rate has been accompanied by a change in size structure only for the section just downstream of Intake Diversion Dam (Table 4). For the Miles City and Forsyth sections the relative abundance of various size sauger is similar in 1985, 1987 and 1993. In all three years fish in the 350-399mm class were most abundant (Table 4). For the Intake section size structure has shifted rather dramatically from 1985 to 1993. Small sauger (250-299mm) dominated in 1993, while large sauger (450-499mm) dominated in 1985.

Young of the year (age 0+) sauger have not been observed in the Yellowstone River since 1991. These fish are mostly in the size group 150-199mm in fall. Large numbers of these sauger have not been sampled in any year, but electrofishing efficiency on fish of this size is much lower than for larger sauger.

Yellowstone River Angler Tag Return Rate

Angler tag return rates for sauger/walleye and smallmouth bass are

shown in Table 4. Rates are calculated only for the first year following tagging to minimize errors from natural mortality. The calculated rates are low because an unknown, but probably significant percentage of tags are not returned. No particular trend, since 1985, is evident in sauger tag return rates. This rate has averaged 6.1% for fish tagged in the years 1985 through 1992. The highest annual figure is 15.4% for smallmouth bass tagged in 1992 near Miles City.

Sauger Gut Contents

Of 173 sauger handled in fall 1993, recognizable fish food items were found in only one fish. This fish had two flathead chubs of approximately 5 inches in length in its gut.

Walleye Egg Collection

Size of walleye spawners collected from the Tongue River Reservoir and Tongue River immediately upstream of the reservoir is shown in Table 6. Although fewer fish were collected in 1993 than in 1992, both sexes averaged larger in both length and weight in 1993 (Table 6). Most males were collected in the Tongue River. Almost all of the females in 1993 came from the Reservoir.

Spawners were collected over the period April 6 through April 18 in 1993. Spawning had begun previous to 4-6-93 as spent females were collected on that date. In 1993 a total of 2.45 million eggs were collected. Of these 45.2% survived to the eyed stage. Eggs were collected from approximately 30 females.

LHRHa appeared to be very effective in promoting final ripening of gravid female walleye. Of 23 females injected, 22 (95.7%) ripened within one week. Only 3 of 12 untreated fish (25%) ripened in the same time period.

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 rage, size structure, abundance
walleye-egg collection

Prepared by: Phillip A. Stewart

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Table 1. Game fish species sampled from four sections of the Yellowstone River in fall 1993.

Species	N	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mean Weight (gm)
	Intake to Cottonwood Creek				
Channel Catfish	14	204-745	463	60-5000	1606
Sauger	103	228-522	319	80-1160	271
Walleye	1	--	377	--	500
Rainbow Trout	1	--	482	--	1080
Shovelnose Sturgeon (fork length)	6	268-481	381	60- 380	197
	Cherry Creek to Fallon Bridge				
Channel Catfish	39	138-753	423	15-5500	960
Sauger	53	259-574	378	120-1690	492
Saugeye	1	--	427	--	670
Walleye	1	--	474	--	1060
Brown Trout	1	--	405	--	650
Shovelnose Sturgeon (fork length)	6	648-905	733	1070-3200	1842
	Miles City vic.-Ft. Keogh R.R. Bridge-Roche Jaune FAS				
Channel Catfish	15	200-772	495	70-5750	1735
Sauger	7	315-405	356	250- 510	357
Walleye	4	242-510	418	170-1380	800
Smallmouth Bass	4	228-275	246	150- 280	215
Burbot	1	--	350	--	190
	Forsyth vic.-Cartersville Dam to Little Porcupine Creek				
Channel Catfish	58	280-754	458	180-5250	1193
Sauger	10	292-472	386	180- 850	489
Walleye	11	280-590	406	180-1350	711
Smallmouth Bass	32	187-389	272	100-1120	393
Largemouth Bass	1	--	103	--	10
Black Crappie	1	--	240	--	230
Burbot	1	--	360	--	240
Brown Trout	1	--	367	--	610
Shovelnose Sturgeon (fork length)	2	671-680	671	1260-1330	1295

Table 2. Non-game fish species sampled from four sections of the Yellowstone River in fall 1993.

	N[a]	N[b]	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mean Weight (gm)
Intake to Cottonwood Creek						
Blue Sucker	5	6	661-728	695	1980-3120	2574
S.H. Redhorse	7	53	167-312	236	50- 350	176
White Sucker	1	--	--	293	--	280
Longnose Sucker	2	3	190-338	264	70- 410	240
River Carpsucker	7	118	188-463	354	70-1210	571
Carp	3	15	330-575	458	470-2400	1357
Bigmouth Buffalo	--	4	--	--	--	--
Smallmouth Buffalo	4	9	356-530	459	1200-2020	1710
Goldeye	19	197	195-350	285	60- 420	219
Freshwater Drum	2	--	314-392	353	340- 730	535
Flathead Chub	--	132	--	--	--	--
Emerald Shiner	--	5	--	--	--	--
Sturgeon Chub	1	3	--	97	--	10
Cherry Creek to Fallon Bridge						
Blue Sucker	5	--	638-782	699	1780-4100	2630
S.H. Redhorse	20	241	168-428	306	50- 770	335
Longnose Sucker	11	--	116-396	275	15- 730	258
River Carpsucker	21	63	300-538	384	350-2330	806
Carp	20	46	205-637	411	120-2880	1016
Bigmouth Buffalo	3	4	673-695	683	5000-6250	5750
Smallmouth Buffalo	6	--	433-656	558	1060-3840	2397
Goldeye	20	418	196-330	277	110- 370	214
Freshwater Drum	5	--	298-352	323	300- 420	360
Flathead Chub	55	--	--	--	--	--
Sturgeon Chub	3	--	84- 89	86	--	--
Long Nose Dace	1	--	--	52	--	--
Miles City vic.-Ft. Keogh R.R. Bridge to Roche Jaune FA						
Blue Sucker	1	--	--	568	--	1370
S.H. Redhorse	58	228	159-448	271	40- 820	236
White Sucker	7	8	204-362	316	100- 570	417
Longnose Sucker	17	35	271-442	370	180-1000	611
River Carpsucker	20	103	187-401	315	90- 770	446
Carp	20	71	231-590	450	290-2700	1327
Bigmouth Buffalo	2	7	622-658	640	3640-5000	4320
Smallmouth Buffalo	11	15	527-710	624	2530-6000	4182
Goldeye	22	406	228-346	299	180- 460	253
Freshwater Drum	5	--	263-400	333	240- 790	462
Flathead Chub	2	47	180-187	184	--	--
Forsyth vic-Cartersville Dam to Little Porcupine Creek						
Blue Sucker	7	9	648-813	725	2150-5500	3421
S.H. Redhorse	20	615	197-497	329	80-1230	464
White Sucker	40	75	183-415	339	60- 920	503
Long Nose Sucker	18	25	192-428	342	80- 900	512
River Carpsucker	20	296	314-411	364	390-1010	640
Carp	20	158	206-493	419	130-1530	985
Big Mouth Buffalo	6	--	514-755	654	2080-2390	2235
Small Mouth Buffalo	17	18	510-674	589	1940-5500	3445
Goldeye	20	598	282-336	305	190- 300	240
Fresh Water Drum	9	--	309-505	399	380-1380	791
Flathead Chub	1	276	--	--	--	--
Emerald Shiner	--	81	--	--	--	--
Sturgeon Chub	--	1	--	--	--	--

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

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	
1993	6	103	17.2
1985	3	358	119.3
		Below Fallon Bridge	
1993	5	54	10.8
1992	8	51	6.4
		Near Miles City	
1993	8	8	1.0
1992	12	33	2.8
1990	17	135	8.1
1985	5	135	27.0
		Below Cartersville Diversion (Near Forsyth)	
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 for sauger in the Yellowstone River during September and October 1993, 1987 and 1985

Length Class (mm)	Miles City & Forsyth No.	%	Fallon No.	%	Intake No.	%
1993						
<200	0		0		0	
200-249	0		0		7	6.8
250-299	2	11.8	6	11.5	40	38.8
300-349	3	17.6	17	32.7	32	31.1
350-399	7	41.2	13	25.0	10	9.7
400-499	4	23.5	6	11.5	9	8.7
450-499	1	5.9	4	7.7	4	3.9
>500	0		6	11.5	1	1.0
Total	17		52		103	
1987						
<200						
200-249						
250-299	4	1.6				
300-349	47	18.9				
350-399	78	31.3				
400-449	65	26.1				
450-499	27	10.8				
>500	28	11.2				
Total	249					
1985						
<200	3	2.3			5	1.4
200-249	0	0.0			7	2.0
250-299	17	12.9			18	5.1
300-349	33	25.0			47	13.4
350-399	48	36.4			72	20.6
400-449	23	17.4			53	15.1
450-499	3	2.3			128	36.6
>500	5	3.8			20	5.7
Total	132				350	

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
All Years		992	61	6.1
		SMALLMOUTH BASS		
1992	Below Forsyth	103	2	1.9
1992	Miles City	39	6	15.4

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
			FEMALES		
1992	118	564	2271	350-770	500-5250
1993	32	615	2600	506-756	1300-4400