

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

JOB PROGRESS REPORT

STATE: Montana PROJECT TITLE: Statewide Fisheries Investigation

PROJECT: F-78-R-4 STUDY TITLE: Survey and Inventory of Warmwater Streams

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

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

ABSTRACT

Large numbers of goldeye, shovelnose sturgeon, channel catfish and other species used the Intake high water bypass channel. Blue sucker, shovelnose sturgeon and bigmouth buffalo were not sampled upstream of the Cartersville Diversion Dam. This structure may limit the upstream abundance of these and other Yellowstone River fish species. Sauger are remaining at abundance levels far below that observed in the Yellowstone River in the mid to late 1980's. Sauger YOY are also much less abundant. Sauger exploitation rate, as indicated by tag, return seems to be within acceptable levels.

METHODS

River fish populations were sampled with the following types of gear: drifted, experimental, 6 x 125 gill nets; trammel nets of 1 1/2"x8"x150 feet and 2"x12"x150 feet; 8'x50' or 100'x1/4" beach seine with bag; 5'x25'x1/4" beach seine; boat-mounted Coffelt electrofishing gear. Fish total lengths (fork length for sturgeon) were measured to the nearest millimeter and weights to the nearest gram for small fish or nearest 10 grams for larger fish.

RESULTS

Yellowstone River Fish Passage/Entrainment Study

In 1996, MFW&P Regions 5 and 7 began a cooperative study with the Bureau of Reclamation to investigate the loss of fish into irrigation canals and determine if diversion dams limit upstream fish populations by prevention of upstream passage. To date, Bureau of Reclamation field efforts have centered on measuring fish entry into the Intake canal, the largest point withdrawal on the Yellowstone River. FW&P work included measurement of fish use of the Intake high water channel. This channel flows at Yellowstone River discharge beginning at approximately 25,000 cfs and bypasses the diversion dam, giving fish a low gradient route for upstream movement.

Most of the FWP effort in the above study has been made I measurement of fish community differences upstream and downstream of Cartersville Diversion Dam. This structure had previously been indicated as a controlling factor for sauger density at upstream points (Stewart 1990). Efforts in this work were increased beginning July 1, 1997 through federal project III F (state project 3744) headed by Bill Gardner. Data from both projects will be combined to determine fish community differences upstream and downstream of the diversion dam.

A summary of work done in 1997 in the Intake high water bypass channel is shown in Table 1. Four different sampling techniques were used, but the drifted trammel nets were most efficient at sampling larger fish. Large numbers of goldeye, shovelnose sturgeon and channel catfish were present in this seasonal water channel (Table 1). If this route of upstream movement is more important than movement directly over the diversion dam is not known.

Tables 2 through 6 summarize species, numbers and sizes of fish sampled at points upstream and downstream of the Cartersville Diversion Dam. No shovelnose sturgeon, blue sucker or bigmouth buffalo were found upstream of the diversion dam. Upstream sampling areas in Tables 2 through 6 are labeled Rancher Ditch Diversion to Myers, downstream of Yellowstone Irrigation Diversion Dam and upstream of Cartersville Diversion Dam. Shovelnose sturgeon were very common at downstream points in drifted trammel

nets. Blue sucker and bigmouth buffalo were less common at downstream sampling areas. No absolute presence-absence differences upstream and downstream were noted for small sized species in seine hauls. The seine haul and trammel net data will be more useful when combined with dated from project 3744.

SAUGER STATUS

Abundance and general status of sauger in the Yellowstone River has been tracked for a number of years through electrofishing samples. A total of 11 days (1139 minutes) was spent in fall electrofishing sampling on the Yellowstone River in 1997. Eight of those days were at sampling sections downstream of Cartersville Diversion Dam where long term information on sauger catch rates are compared (Table 7). In 1997 a total of 49 sauger were captured for an average of 6.1 sauger per day. Sauger catch rates are remaining well below the levels of the mid to late 1980's. The reasons for this long-term decrease are presently not known.

Possibly related to the above decrease are catch rates of sauger young-of-the-year (YOY) (Table 8). These fish are recognizable by size in the fall and are mostly less than 200mm total length in that season. Only one sauger YOY was sampled in 1997 and catches of YOY have been low since the mid to late 1980's with the exception of 1994. In work done in the late 1970's and early 1980's in the Yellowstone River, Penkal (1992) found that sauger spawned in the Yellowstone River drifted downstream immediately after hatching and moved back up into the river in summer and fall. Personal communication with Fred Ryckman (North Dakota Game and Fish - Williston) indicates that sauger YOY are present in Upper Lake Sakakawea in years when they are absent in the Yellowstone River. Why these fish fail to return to the river in some years and if they later return to the river at an older age need to be investigated. Yellowstone River sauger populations may be dependent on this upstream movement.

Table 9 gives angler tag return rate of sauger during the first year following tagging. In 1997 only one of 48 sauger tagged in 1996 was returned in 1997, a 2% return rate overall (Table 9). Since 1985, 5.0% of tags have been returned. Even if the actual catch rate is 2-3 times higher than the tag return rate, catch rates are probably not excessive

LITERATURE CITED

- Penkal, R.F. 1992. Assessment and Requirements of Sauger and Walleye Populations in the Lower Yellowstone River and its Tributaries. Mt. Dept. Fish, Wildlife and Parks. 149 pp.
- Stewart, P.A. 1990. Southeast Montana Warm Water Streams Investigations. Job Progress Report F-46-R-3. Job III-B. Mt. Dept. Fish, Wildlife and Parks. 10 pp.

Key Words:

Fish passage - diversion dams
Sauger - abundance, exploitation rate

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Table 1. Results of four fish sampling techniques in the Intake high water channel from 6/3/97 to 7/2/97.

Species	N	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mea Weight (gm)
<u>Drifted experimental gill net 125 feet - 4 drifts - total 42 minutes</u>					
Shovelnose sturgeon	11	463-818	612	350-2400	1007
Goldeye	5	235-327	301	190-260	240
<u>Drifted 1 1/2"x8"x150' Trammel Net - 18 drifts - total 169 minutes</u>					
Sauger	3	375-386	382	370-510	433
Shovelnose sturgeon	44	268-881	530	50-4070	707
Channel catfish	27	297-495	363	260-1140	451
Shorthead redhorse	2	322-379	351	350-610	480
White sucker	1	-----	345	-----	400
Blue sucker	8	616-789	724	2010-3820	3026
River carpsucker	1	-----	405	-----	890
Smallmouth buffalo	2	645-775	710	5010-7720	6365
Freshwater drum	1	-----	257	-----	200
Goldeye	339	294-362	320	210-410	279
Carp	13	261-685	462	260-4270	1616
<u>Drifted 5"x8"x150 Gill Net - 13 drifts - total 206 minutes</u>					
Paddlefish	5	1013-1212	1099	-----	-----
Bigmouth buffalo	1	-----	820	-----	7720
* An additional 3 paddlefish observed only					
<u>Electrofishing - total 273 minutes</u>					
Sauger	4	299-480	365	190-930	440
Channel catfish	2	405-500	453	550-1060	805
Shorthead redhorse	3	74-264	169	10-150	105
White sucker	1	-----	280	-----	200
River carpsucker	1	-----	404	-----	970
Flathead chub	6	79-174	128	3-70	22
Goldeye	383	120-367	316	5-440	281
Paddlefish - 15 observed only in lower part of channel					

Table 2. Results of fish sampling on the Yellowstone River in April and May 1997 with 2"x12"x150' drifted trammel nets.

Species	N	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mean Weight (gm)
<u>Between Rancher Ditch Diversion and Myers Bridge - 6 drifts, 35 minutes</u>					
Longnose sucker	18	308-425	361	330-750	540
Shorthead redhorse	1	-----	473	-----	1320
<u>Immediately upstream of Cartersville Diversion - 6 drifts, 51 minutes</u>					
Longnose sucker	9	290-400	348	220-820	536
Shorthead redhorse	4	373-478	423	520-1220	835
Goldeye	25	302-367	326	240-430	312
<u>Immediately downstream of Cartersville Diversion, 6 drifts, 51 minutes</u>					
Shovelnose sturgeon	7	657-905	819	1380-4400	3150
Burbot	1	-----	580	-----	1000
Longnose sucker	10	313-386	340	350-700	475
Shorthead redhorse	9	345-473	387	450-1100	660
Goldeye	5	315-345	328	280-370	310
<u>Near town of Rosebud, 6 drifts, 36 minutes</u>					
Shovelnose sturgeon	1	-----	755	-----	1970
Channel catfish	3	304-364	331	210-410	290
Goldeye	3	302-317	308	260-260	260
<u>Near Miles City, 2 drifts, 9 minutes</u>					
No fish collected					
<u>Downstream of mouth of Powder River, 8 drifts, 58 minutes</u>					
Shovelnose sturgeon	62	612-1100	798	860-5900	2648
Sauger	25	377-515	424	370-1180	558
Channel catfish	38	290-407	348	190-620	358
Blue sucker	2	705-706	706	2760-2850	2805
River carpsucker	2	450-475	463	1210-1390	1300
Flathead chub	1	-----	214	-----	80
Carp	2	475-503	489	1400-1530	1465
Goldeye	6	232-326	289	240-300	262

Table 3. Results of fish sampling on the Yellowstone River from late August through October 1997 with 2"x12"x150' drifted trammel nets.

Species	N	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mean Weight (gm)
<u>Between Rancher Ditch Diversion and Myers Bridge - 12 drifts, 74 minutes</u>					
Channel catfish	12	343-645	452	320-3280	1043
Shorthead redhorse	28	395-525	450	630-1280	955
Longnose sucker	3	434-483	458	900-1360	1087
White sucker	4	376-506	442	640-1420	965
Smallmouth buffalo	1	-----	695	-----	4500
Carp	2	530-535	533	1850-2250	2050
Goldeye	5	303-326	313	180-290	235
<u>Downstream of Yellowstone Irrigation Diversion Dam - 10 drifts, 65 minutes</u>					
Channel catfish	8	352-585	456	340-2240	1009
Shorthead redhorse	50	389-508	442	630-1350	930
Longnose sucker	5	401-455	425	760-1180	926
White sucker	5	402-442	415	820-1090	894
River carpsucker	1	-----	372	-----	580
Smallmouth buffalo	2	625-685	655	3610-5500	4555
Goldeye	3	303-310	310	250-310	277
Carp	1	-----	587	-----	2520
<u>Upstream of Cartersville Diversion Dam - 6 drifts, 38 minutes</u>					
Channel catfish	2	380-575	478	460-1920	1190
Shorthead redhorse	15	385-492	445	660-1230	904
White sucker	1	-----	415	-----	800
River carpsucker	2	379-400	390	710-720	715
<u>Downstream of Cartersville Diversion Dam - 5 drifts, 29 minutes</u>					
Shovelnose sturgeon	26	750-902	830	1750-4100	2810
Channel catfish	2	302-341	322	240-310	275
Shorthead redhorse	1	-----	449	-----	900
Longnose sucker	3	415-470	442	810-1180	990
Goldeye	2	297-305	301	250-250	250
<u>Rosebud to Sweeney Creek - 10 drifts, 53 minutes</u>					
Shovelnose sturgeon	14	600-900	771	1500-3960	2593
Blue sucker	6	620-780	706	2070-4050	3155
Channel catfish	2	338-390	364	290-500	395
Longnose sucker	2	451-451	451	970-1090	1030
Goldeye	3	317-340	331	270-320	297
<u>Near Miles City - 12 drifts, 51 minutes</u>					
Shovelnose sturgeon	12	612-1035	750	950-6360	2172
Blue sucker	5	640-802	716	2050-5000	3470
Shorthead redhorse	7	413-477	450	760-1150	1013
Longnose sucker	2	428-451	440	880-1050	965
White sucker	1	-----	430	-----	1000
Goldeye	1	-----	314	-----	270

Table 4. Results of seining with a 5'x25' x1/4" seine in the Yellowstone River from late August through October 1997.

<u>Species</u>	<u># Seined</u>	<u>Species</u>	<u># Seined</u>
<u>Rancher Ditch Diversion to Myers Bridge</u>		<u>Downstream of YID Dam</u>	
<u>6 seine hauls</u>		<u>5 seine hauls</u>	
Yellow Perch	1	Longnose sucker	10
Shorthead redhorse	11	Mountain sucker	1
Longnose sucker	4	Emerald shiner	3
White sucker	46	Flathead chub	9
River carpsucker	1		
Unknown sucker	3	<u>Upstream of Cartersville Diversion Dam</u>	
Flathead chub	62	<u>2 hauls</u>	
Plains/Silvery minnow	77	Flathead chub	5
Fathead minnow	15	Longnose dace	2
Emerald shiner	10		
Longnose dace	1	<u>Downstream of Cartersville Diversion Dam</u>	
Unknown minnow	1	<u>3 hauls</u>	
Carp	1	Flathead chub	2
<u>Rosebud to Sweeney Creek</u>		<u>Near Miles City</u>	
<u>6 hauls</u>		<u>4 hauls</u>	
Shorthead redhorse	27	Smallmouth bass	3
Longnose sucker	3	Green sunfish	2
River carpsucker	10	Shorthead redhorse	4
Flathead chub	103	Longnose sucker	2
Emerald shiner	52	River carpsucker	10
Plains/silvery minnow	131	Flathead chub	117
Sand shiner	1	Emerald shiner	6
Longnose dace	1	Sand shiner	5
		Plains/silvery minnow	2
		Fathead minnow	2
		Unknown minnow	23

Table 5. Results of seining with a 8'x50' or 100' x1/4" seine in the Yellowstone River from late August through October 1997.

<u>Species</u>	<u># Seined</u>	<u>Species</u>	<u># Seined</u>
<u>Rancher Ditch Diversion to Myers Bridge</u>		<u>Downstream of YID Dam</u>	
<u>4 hauls</u>		<u>1 haul</u>	
Shorthead redhorse	3	Longnose dace	1
Mountain sucker	5	Flathead chub	17
Flathead chub	11		
Plains/silvery minnow	1	<u>Upstream of Cartersville Diversion Dam</u>	
Emerald shiner	15	<u>3 hauls</u>	
Longnose dace	11	Yellow perch	1
		Shorthead redhorse	17
<u>Rosebud to Sweeney Creek - 4 hauls</u>		Longnose sucker	4
Smallmouth bass	1	White sucker	36
Shorthead redhorse	14	Mountain sucker	1
Longnose sucker	2	River carpsucker	5
White sucker	26	Goldeye (adult)	1
Flathead chub	285	Flathead chub	28
Emerald shiner	49	Emerald shiner	37
Plains/silvery minnow	99	Plains/silvery minnow	39
Sand shiner	21	Sand shiner	1
Longnose dace	17	Fathead minnow	20
Fathead minnow	253	Carp	1
Carp	1	Unknown minnow	46
<u>Near Miles City - 4 hauls</u>			
Shorthead redhorse	40		
Longnose sucker	1		
River carpsucker	43		
Goldeye	7		
Flathead chub	823		
Emerald shiner	94		
Longnose dace	5		
Sand shiner	2		
Plains/silvery minnow	332		
Fathead minnow	9		

Table 6. Results of Yellowstone River electrofishing in five river sections in September and October 1997.

Species	N	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mean Weight (gm)
<u>Between Armells Creek and Cartersville Dam - 270 minutes</u>					
Sauger	7	326-462	388	280-840	486
Channel catfish	8	406-692	546	580-3630	1672
Smallmouth bass	3	333-410	362	650-1150	833
Freshwater drum	2	345-358	352	630-650	640
Shorthead redhorse	378	119-503	339	10-1320	510
Longnose sucker	82	90-484	260	10-1380	286
White sucker	30	180-475	359	60-950	563
Mountain sucker	5	125-195	163	25-90	60
Smallmouth buffalo	6	413-740	612	960-6900	3858
River carpsucker	33	345-429	387	430-1080	741
Goldeye	111	244-371	319	150-450	289
Flathead chub	30	43-225	106	2-140	18
Longnose dace	5	35-115	69	2-5	4
Emerald shiner	3	62-86	73	3-5	4
Fathead minnow	1	-----	50	-----	3
Plains/silvery minnow	12	79-135	92	4-20	8
Carp	40	397-580	491	570-2520	1545
Mountain whitefish	2	118-132	125	15-20	18
<u>Cartersville Diversion Dam to Little Porcupine Creek - 179 minutes</u>					
Sauger	4	333-541	425	260-1280	728
Channel catfish	1	-----	481	-----	1030
Shovelnose sturgeon	1	-----	708	-----	1610
Freshwater drum	1	-----	48	-----	1680
Brown trout	1	-----	620	-----	2780
Shorthead redhorse	91	112-476	334	10-1220	489
Longnose sucker	28	66-440	330	3-930	484
White sucker	19	155-412	337	30-810	503
Blue sucker	1	-----	728	-----	3580
Mountain sucker	2	143-165	154	40-60	50
River carpsucker	39	150-460	381	50-1200	739
Smallmouth buffalo	6	383-631	521	900-4500	2415
Goldeye	45	277-355	317	180-370	281
Flathead chub	3	140-166	151	40-40	40
Plains/silvery minnow	5	95-136	112	10-20	14
Carp	27	373-635	479	250-3450	1487
Mountain whitefish	1	-----	227	-----	110

Table 6. Continued

Species	N	Length Range (mm)	Mean Length (mm)	Weight Range (gm)	Mean Weight (gm)
<u>Near Miles City - 210 minutes</u>					
Sauger	5	311-456	401	230-930	560
Channel catfish	3	534-683	603	1470-3520	2330
Smallmouth bass	1	-----	310	-----	540
Burbot	1	-----	422	-----	370
Freshwater drum	2	310-338	324	350-500	425
Shorthead redhorse	65	153-453	336	50-960	475
Longnose sucker	21	172-545	326	60-1030	438
White sucker	8	245-377	329	180-620	403
Blue sucker	1	-----	812	-----	3970
River carpsucker	20	228-451	368	160-1300	681
Smallmouth buffalo	3	493-600	550	1520-3500	2480
Goldeye	28	200-355	313	60-360	258
Flathead chub	14	89-207	133	10-60	25
Carp	24	253-619	510	230-3570	2020
<u>Near Fallon - 240 minutes</u>					
Sauger	12	283-499	410	160-900	574
Channel catfish	5	110-570	207	10-1630	334
Freshwater drum	2	308-330	319	370-540	445
Shorthead redhorse	37	140-439	262	30-900	266
Longnose sucker	2	303-339	321	290-410	350
White sucker	2	305-346	326	300-440	370
River carpsucker	7	398-467	341	650-1650	1156
Goldeye	98	275-354	316	170-440	277
Flathead chub	22	83-206	139	5-80	28
Plains/silvery minnow	14	87-123	102	5-20	10
Emerald shiner	1	-----	58	-----	-----
Carp	10	467-703	580	1270-5000	2703
<u>Downstream of Intake - 240 minutes</u>					
Sauger	21	189-505	304	50-930	238
Saugeye	1	-----	373	-----	410
Walleye	1	-----	365	-----	450
Channel catfish	2	400-486	443	490-1010	750
Shovelnose sturgeon	4	462-875	608	350-2980	1185
Northern pike	1	-----	750	-----	2580
Freshwater drum	6	236-305	260	150-380	227
Chinook salmon	1	-----	677	-----	3260
Shorthead redhorse	15	127-316	254	30-320	193
Longnose sucker	1	-----	245	-----	170
River carpsucker	38	257-538	432	260-2240	1263
Smallmouth buffalo	3	492-642	550	1650-3740	2447
Bigmouth buffalo	1	-----	775	-----	8000
Goldeye	51	103-345	280	5-430	224
Flathead chub	45	61-206	141	3-80	30
Longnose dace	3	63-75	71	3-5	4
Carp	9	450-645	508	1050-3620	1751

Table 7. Electrofishing catch rate (fish per day) for Yellowstone River sauger in the autumn.

Year	Number of days	Number of sauger	Sauger per day
<u>Intake to Seven Sisters</u>			
1997	2	20 ²¹	10.0
1996	2	6	3.0
1995	6	80	13.3
1994	7	77	11.0
1993	6	103	17.2
1985	3	58	119.3
<u>Bonfield to Glendive</u>			
1997	2	12 ¹²	6.0
1996	2	4	2.0
1995	8	109	13.6
1994	8	40	5.0
1993	5	54	10.8
1992	8	51	6.4
<u>Hathaway to Kinsey Bridge</u>			
1997	2	5 ⁵	2.5
1996	3	22	7.3
1995	4	20	5.0
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
<u>Forsyth to Rosebud</u>			
1997	2	12 ⁴	6.0
1996	4	16	4.0
1995	4	56	14.0
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 8. Historical relative abundance of sauger young-of-the-year sampled by electrofishing in the Yellowstone River during autumn.

Year	# of days	<u>Upstream of Intake</u>		<u>Downstream of Intake</u>		
		# of sauger	# per day	# of days	# of sauger	# per day
1997	9	0	0.00	2	1	0.50
1996	9	0	0.00	2	0	0.00
1995	16	2	0.13	6	19	3.17
1994	17	12	0.17	7	47	6.17
1993	19	0	0.00	6	1	0.17
1992	26	0	0.00	0		
1990	18	10	0.56	0		
1988	8	20	2.50	0		
1987	15	0	0.00	0		
1985	20	3	0.15	3	8	2.67

Table 9. Yellowstone River sauger/walleye harvest rate in the first year following tagging.

Year tagged	Location tagged	Number tagged	First Year	Harvest Rate
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
1994	Below Forsyth	8	0	0.0
1994	Miles City	8	0	0.0
1994	Near Fallon	28	3	10.7
1994	Below Intake	31	0	0.0
1995	Forsyth to Hathaway	56	0	0.0
1995	Miles City to Bonfield	31	1	3.2
1995	Terry to Glendive	73	2	2.7
1995	Intake to Elk Island	40	2	5.0
1996	Forsyth to Rosebud	16	0	0.0
1996	Hathaway to Kinsey Bridge	22	1	4.5
1996	Bonfield to Glendive	4	0	0.0
1996	Intake to Seven Sisters	6	0	0.0
All years		1442	72	5.0