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Region 4

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: Montana PROJECT NO. F-78-R-3
PROJECT TITLE: Statewide Fisheries Investigations
JOB TITLE: Northcentral Montana Warm and Coolwater Ecosystems

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

ABSTRACT

Fifteen warm/coolwater fishery ecosystems were inventoried during the report period. Spottail shiner are numerous in Lake Frances and Tiber Reservoir while young-of-the-year yellow perch are low in Bynum Reservoir and Tiber Reservoir. Northern pike numbers are increasing in Lake Frances and may be limiting walleye recruitment. Walleye were tagged in three reservoirs with metal jaw tags and/or Cinch-up and T-tags to help determine tag loss. Exploitation of walleye during 1996 was less than two percent at Bynum Reservoir and Lake Frances while northern pike exploitation was 10 percent at Tiber Reservoir and 13 percent at Lake Frances. A hydroacoustics survey conducted at Tiber Reservoir estimated the total pelagic fish abundance at about 2.0 million fish. Year-class strength of walleye was determined for Tiber, Frances and Bynum Reservoir. Sampling by gill netting and seining indicated warmwater fisheries are doing well in the Lewistown area. Spottail shiners introduced in June 1996 successfully reproduced in Petrolia Reservoir and numbers of forage fish captured per haul were at record levels. Walleye gill net capture rate was also a record, due in part to low water levels. In East Fork Reservoir, yellow perch were also captured at record numbers during gill netting. Biomass and average length of white suckers in East Fork Reservoir have increased dramatically since northern pike were introduced. In both East Fork and Petrolia Reservoirs relative weights were within an acceptable target range for most size classes of game species. One small reservoir in the Choteau area, two small reservoirs in the Lewistown area, and four small reservoirs in the Great Falls area were sampled. The Portage Coulee section of the Missouri River between Morony Dam and the Marias River was electrofished.

OBJECTIVES

1. To identify and monitor the characteristics and trends of fish populations, angler harvest and preferences, and habitat conditions in northcentral Montana warm and coolwater ecosystems.

2. Use survey and inventory information to identify management problems and opportunities, then develop and implement management actions to maintain fish populations at levels consistent with habitat conditions or other limiting factors.

3. Review projects proposed by state, federal, and local agencies and private parties which have the potential to affect fisheries resources and aquatic habitats. Provide technical advice or decisions to reduce or mitigate resource damage.

4. Provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources and aquatic habitat.

5. Enhance public understanding and awareness of fishery and aquatic habitat resources and issues in northcentral Montana through oral and written communication.

6. Maintain and enhance public access to fishery resources in northcentral Montana.

PROCEDURES

Fish populations were sampled with a boat mounted electrofish shocker; standard 125 x 6 foot multifilament experimental gill nets (fished sinking or floating) with 25 foot sections of 0.75, 1.00, 1.25, 1.50, and 2.00 inch square mesh; 3 x 4 foot frame trap nets (0.25 inch square mesh); 4 x 6 foot frame trap nets (1.00 inch square mesh): and a 100 x 10 foot seine (0.25 inch square mesh). Captured fish were measured to the nearest tenth of an inch and weighed to the nearest hundredth of a pound. Stomach samples, and scale and fin ray/spine samples, were collected from some fish for food habits, and age and growth studies, respectively. Vertical plankton tows were made using a 30 cm conical net with a 15 cm radius (0.153 mm mesh). Walleye dorsal spines were mounted and sectioned according to methods described by Mackay et. al. (1990). A computer program designed by Liknes (1993) was used to generate age composition and estimate the number of walleye caught by age. An index of year-class strength of walleye was calculated using parameters developed by Goeman (1993). Age composition of a gill net catch was re-constructed according to Ketchen's stratified subsampling method described in Ricker (1975). Relative weight (Wr) of walleye, northern pike and yellow perch were determined using MDFWP computer programs which utilized data in Murphy et al. 1990, Willis 1989, and Willis et al. 1991. Floy T-tags were used on northern pike, while Floy T-tags, Cinch-up tags and metal jaw tags were used on walleye. Throughout the report, abbreviations for fish species appear in tables and figures and are explained

here rather than in each instance where they appear: WE=walleye; NP=northern pike; LMB=largemouth bass; Ling=burbot; SNS=shovelnose sturgeon; Rb=rainbow trout; LL=brown trout; BBh=black bullhead; YP=yellow perch; SS=spottail shiner; ES=emerald shiner; LND=longnose dace; LC=lake chub; FHC=flathead chub; FHM= fathead minnow; SB=brook stickleback; MSc=mottled sculpin; WSu=white sucker; LnSu=longnose sucker.

FINDINGS

CHOTEAU AREA WATERS

Bynum Reservoir

Seven trap nets were fished for two nights, on April 22 and 23, 1996. The traps caught a total of 394 walleye, 26 yellow perch and 2,887 white sucker. The lake was completely free of ice on April 17 and water temperatures ranged from 44-46°F. The lake was near full pool at the time of the survey. Lengths and weights of miscellaneous species are on file in the Choteau field office.

A total of 250 walleye over 14 inches in length were tagged with metal jaw tags to help monitor exploitation. These fish ranged in length from 14.1-24.4 inches and averaged 17.0 inches. Average weight was 1.81 pounds with a range of 0.87-5.22 pounds. Only 5 tags from fish tagged in 1996 were voluntarily returned by fishermen (Table 1). Anglers also returned 13 other tags, representing fish tagged in 1991, 1992 and 1995. First-year returns vary from 2.0 percent for 1996 to 18.4 percent for 1992 while cumulative rates for 1992 have reached over 25 percent.

Young-of-the-year yellow perch increased slightly over the previous year but overall forage fish numbers continue at low levels as shown in Figure 1 and Appendix I. Natural reproduction of walleye has been documented in three of the last four years (Figure 2).

The September gill net survey caught 94 walleye, 28 yellow perch and 361 white sucker in 10 gill nets (Table 2). In addition, 1,236 crayfish were captured in the nets. Population trends shown in Figure 3 indicate that walleye are stable while yellow perch increased slightly with overall numbers remaining low.

Forty stomachs of walleye taken in gill nets were examined in the field. Unidentifiable fish remains were most the common items followed by crayfish and yellow perch (Table 3). Spottail shiner and yellow perch probably make up the bulk of the unidentifiable

Table 1. Angler exploitation of walleye and northern pike in Region Four reservoirs as indicated by voluntary tag returns, 1992-1996.

Lake	Species	Year tagged	Number tagged	Number of Returns (%)					
				1992	1993	1994	1995	1996	Cumulative
Bynum Res.	WE	1992	255	47(18.4)	9(3.5)	6(2.4)	0(0.0)	2(0.8)	64(25.1)
		1993	225		8(3.6)	9(4.0)	6(2.7)	0(0.0)	23(10.2)
		1994	483			23(4.8)	13(2.7)	0(0.0)	36(7.5)
		1995	347				26(7.5)	10(2.9)	36(10.4)
		1996	250					5(2.0)	5(2.0)
Lake Frances	WE	1992	242	21(8.7)	12(4.9)	10(4.1)	5(2.1)	2(0.8)	50(20.7)
		1993	250		19(7.6)	7(2.8)	9(3.6)	2(0.8)	37(14.8)
		1994	242			12(4.9)	10(4.1)	3(1.2)	25(10.3)
		1995	289				17(5.9)	6(2.1)	23(8.0)
		1996	73					1(1.4)	1(1.4)
	NP	1992	66	7(10.6)	1(1.5)	0(0.0)	0(0.0)	0(0.0)	8(12.1)
		1993	76		3(3.9)	4(5.3)	0(0.0)	2(2.6)	9(11.8)
		1994	310			17(5.4)	9(2.9)	4(1.3)	30(9.7)
		1995	325				26(8.0)	13(4.0)	39(12.0)
		1996	46					6(13.0)	6(13.0)
Tiber Res.	WE	1992	266	15(5.6)	20(7.6)	11(4.1)	1(0.4)	1(0.4)	48(18.0)
		1993	398		35(8.8)	26(6.5)	16(4.0)	2(0.5)	79(19.8)
		1994	461			48(10.2)	14(3.0)	7(1.5)	69(15.0)
		1995	500				63(12.6)	18(3.6)	81(16.2)
		1996	499					40(8.0)	40(8.0)
	NP	1992	99	6(6.1)	5(5.0)	3(0.6)	2(2.0)	1(1.0)	17(17.2)
		1993	225		21(9.3)	11(4.8)	5(2.2)	2(0.9)	39(17.3)
		1994	153			25(17.6)	0(0.0)	1(0.7)	26(17.0)
		1995	182				14(7.7)	7(3.8)	21(11.5)
		1996	250					26(10.4)	26(10.4)

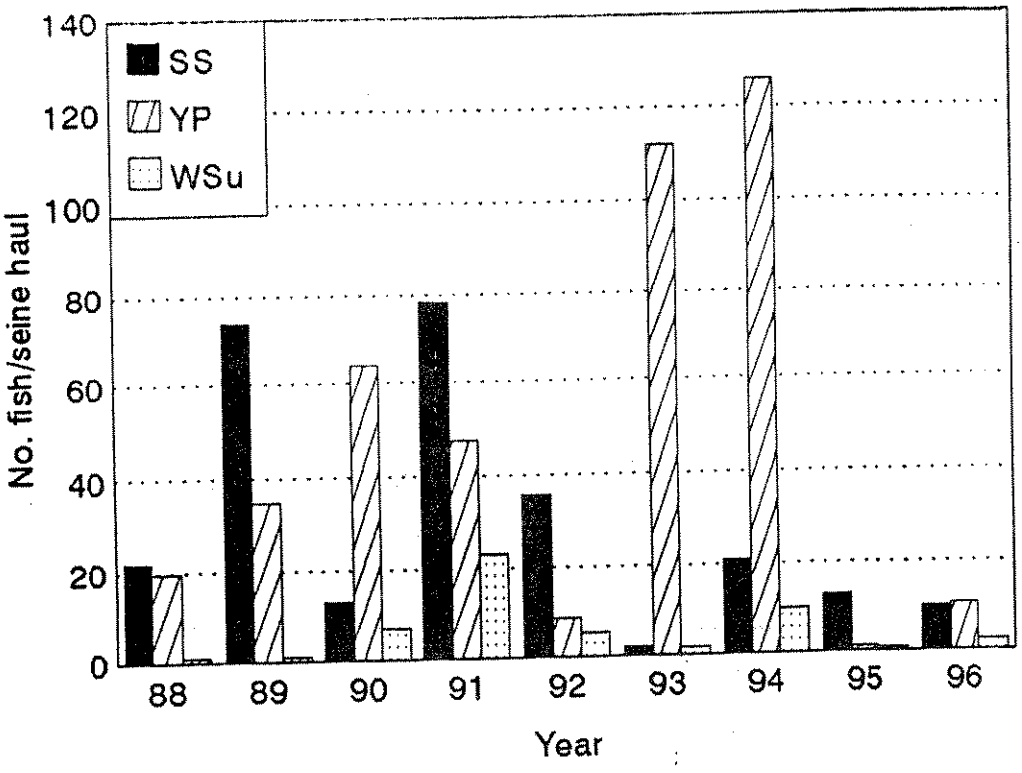

Figure 1. Forage fish trends in Bynum Reservoir, 1988-1996.

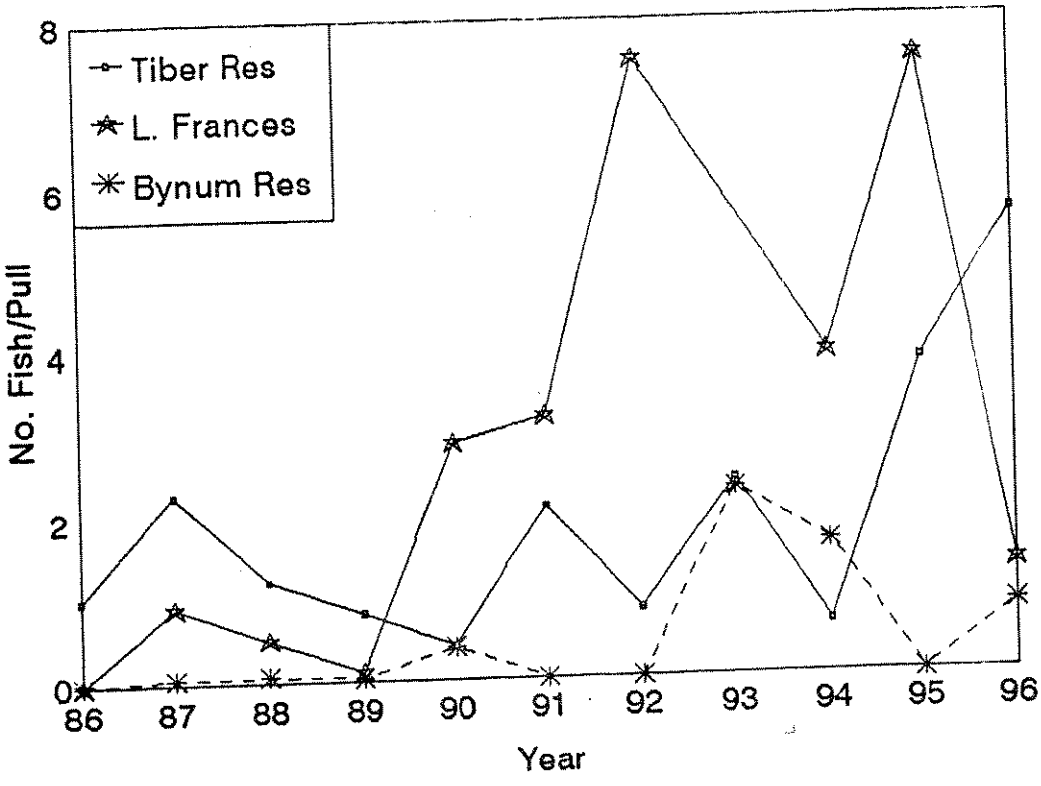

Figure 2. Reproduction of walleye in three reservoirs (1986-96).

Table 2. Overnight gill netting results in warm and coolwater reservoirs in the western portion of Region Four, 1996.

Water (date sampled)	Surface acres[1]/	No. of nets[2]/	Mean hrs. per net	Species	No. of fish	Length range(avg)	Weight range(avg)
Bynum Res. (9/12-13/96)	2,800	10S	15.8	WE	12	8.1-12.5(9.7)	0.16- 0.76(0.34)
					11	13.0-15.8(13.9)	0.71- 1.48(0.97)
					68	16.0-19.6(17.4)	1.40- 2.82(1.99)
					3	20.0-22.3(20.9)	2.86- 3.25(3.01)
				YP	11	5.3- 7.3(5.9)	0.06- 0.28(0.13)
					2	10.7-10.7(10.7)	0.73- 0.82(0.76)
					15	11.0-12.8(11.8)	0.80- 1.39(1.06)
				WSu	129	5.9-12.7(11.2)	0.08- 1.14(0.74)
					232	13.9-19.0(16.5)	1.13- 3.00(2.14)
Lake Frances (9/10-11/96)	4,600	20S	18.0	WE	26	7.2-12.1(10.2)	0.10- 0.65(0.35)
					9	13.5-15.9(14.7)	0.72- 1.29(1.07)
					44	16.1-19.9(18.2)	1.42- 3.26(2.19)
					6	20.2-28.7(23.3)	2.93- 9.10(5.06)
				NP	54	8.9-15.8(13.0)	0.16- 0.82(0.47)
					39	16.1-19.7(18.1)	0.83- 2.41(1.31)
					29	20.0-28.5(22.7)	1.62- 5.70(2.67)
				YP	86	5.6- 8.9(7.8)	0.09- 0.44(0.27)
					71	9.0-10.9(9.8)	0.35- 0.78(0.54)
					11	11.0-12.0(11.5)	0.67- 1.07(0.91)
				WSu	2	17.5-17.9(17.7)	2.36- 3.00(2.68)
Tiber Res. (9/4-6/96)	15,900	27S	18.5	WE	29	6.8-12.9(10.2)	0.10- 0.68(0.35)
					26	13.0-15.8(14.3)	0.60- 1.53(0.91)
					10	16.0-19.1(17.5)	1.10- 2.22(1.66)
					4	20.3-28.8(23.0)	2.54- 8.70(4.22)
				NP	2	8.1-14.7(11.4)	0.14- 0.83(0.49)
					12	16.5-19.5(18.4)	0.90- 1.65(1.42)
					34	20.1-26.3(21.9)	1.14- 4.30(2.27)
				YP	60	4.6- 8.6(6.8)	0.05- 0.34(0.16)
					10	9.6-10.4(10.1)	0.42- 0.58(0.51)
					2	11.2-11.6(11.4)	0.68- 0.84(0.76)
				Rb	7	12.0-13.6(12.7)	0.70- 1.10(0.91)
					10	17.5-20-7(18.9)	1.96- 3.20(2.44)
				WSu	44	14.7-19.9(16.3)	1.48- 3.24(2.04)
				LnSu	9	6.9-15.1(11.7)	0.12- 1.38(0.77)
				Carp	1	(4.2)	(0.05)
				FHC	3	21.5-27.3(25.1)	5.36-12.50(8.93)
					1	(7.0)	(0.12)

[1]/ Approximate surface acres at time of survey.
[2]/ S = sinking experimental gill nets.

Table 3. Stomach contents of walleye and northern pike from Bynum, Frances and Tiber Reservoirs (fall gill nets, 1996).

	Walleye			Northern Pike	
	Bynum	Frances	Tiber	Frances	Tiber
No. of stomachs	40	45	50	40	33
% occurrence by item:					
Empty	15	29	26	10	27
Fish remains	45	33	50	30	36
Y. perch	35	2	16	8	6
S. shiner	3	4	8	0	0
Crayfish	5	27	8	53	45
N. pike	N/A	4	0	3	0
Walleye	0	2	0	3	3
Vegetation	8	4	4	8	3
Tapeworms	18	4	22	0	0
Insects	0	2	6	0	3
Fish hook/rocks	0	0	0	3	3

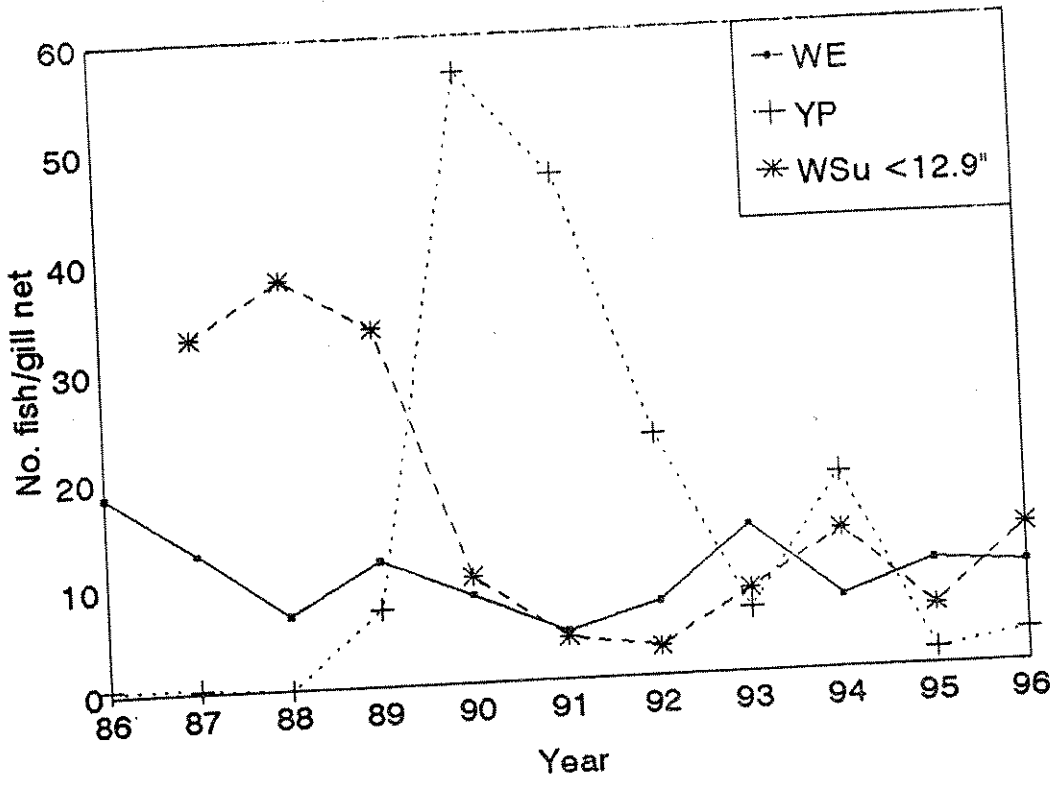

Figure 3. Trends of the fish populations in Bynum Res. (fall gill nets 1986-96).

fish. Walleye stomach analysis from previous years shows similar use patterns.

Lake Frances

Extremely windy weather hampered spring netting investigations on this reservoir. From April 22-24, 1996, four to seven trap nets captured 44 walleye, 55 northern pike, 3 yellow perch, 5 ling, and 35 white sucker. An additional 34 walleye were captured and tagged using 36 short-term gill net sets. Walleye greater that 14 inches averaged 18.1 inches and 2.02 pounds (length range 14.1-25.9; weight range 0.94-5.01). Northern pike over 16 inches averaged 20.1 inches and 1.89 pounds (length range 15.8-25.6; weight range 0.95-3.52). Water temperatures ranged from 42-44°F and lake levels were near maximum capacity during the survey. Information pertaining to the miscellaneous species taken are on file in the Choteau field office.

Due to weather problems encountered, only 73 walleye and 46 northern pike were tagged to assist in determining exploitation. Anglers returned tags from 14 walleye and 25 northern pike representing fish tagged from 1992 to 1996 (Table 1). Anglers returned one walleye tag from 1996 for 1.4 percent return while 13 percent (6 tags) of the northern pike tagged in 1996 were returned. Cumulative returns for walleye tagged in other years ranges from 8 to over 20 percent while northern pike vary from approximately 10 to 12 percent.

Forage fish were sampled along shoreline areas in August. Young-of-the-year yellow perch were most abundant followed by spottail shiner (Appendix I). Perch numbers have more than doubled since 1995 while spottail shiner have nearly tripled (Figure 4). Examination of Figure 2 shows that Lake Frances has had excellent walleye reproduction for several years beginning in 1990. Young walleye were sampled at 1.3 fish per seine haul in 1996, lower than previous years but still considered good. Although good numbers of young-of-the-year walleye are taken in forage surveys, the number that actually recruit to the fishery as adults is lower than desired.

The September gill net survey captured 168 yellow perch, 122 northern pike, 85 walleye and 2 white sucker (Table 2). Gill nets also collected 503 crayfish. Compared to recent years, perch numbers are slowly increasing but considerably lower than what was found in the late 1980's and early 1990's (Figure 5). Northern pike are at their highest level since 1979. Walleye showed a slight increase in 1996 over the previous year but population levels have been lower than desired since 1991.

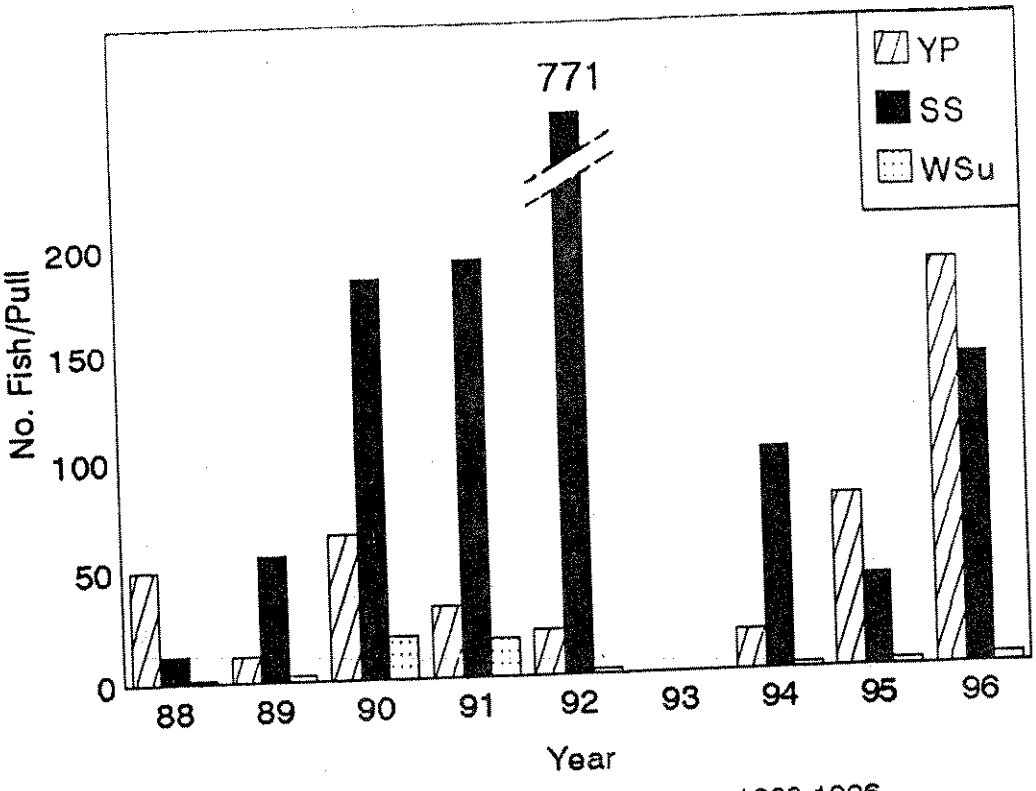

Figure 4. Forage fish trends in Lake Frances, 1988-1996.

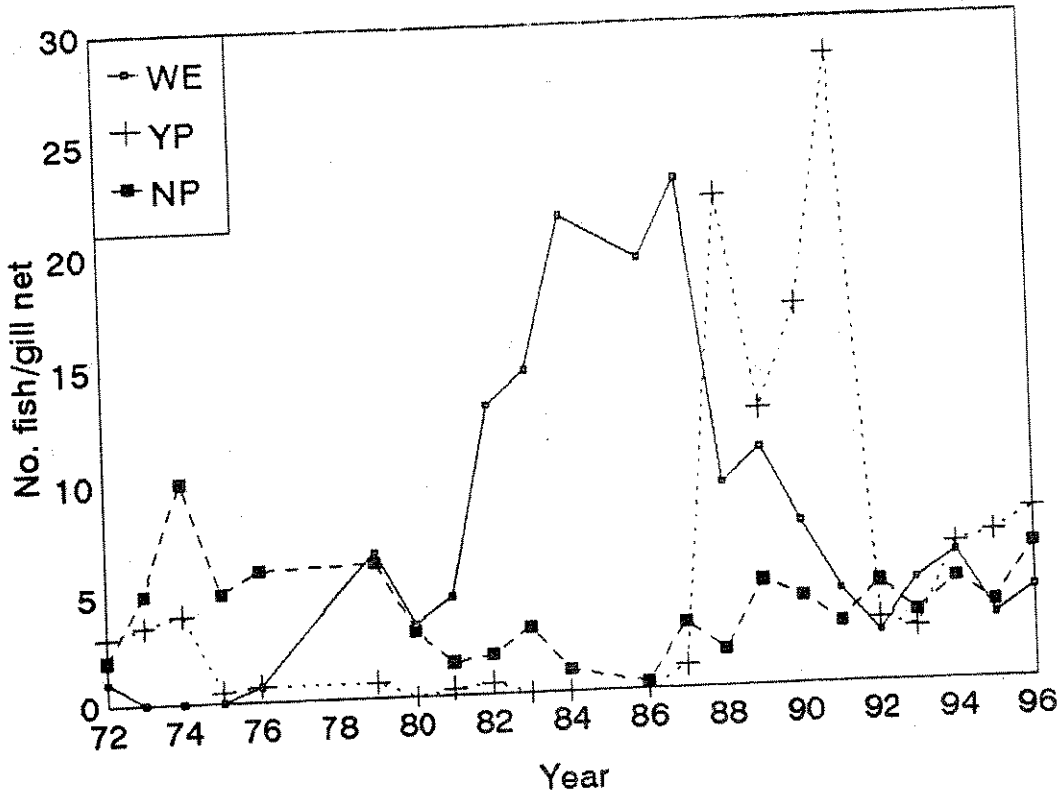

Figure 5. Trends of the fish populations in Lake Frances (fall gill nets, 1979-1996).

A total of 45 walleye and 40 northern pike stomachs were examined for content in the field. Approximately 30 percent of the walleye and 10 percent of the pike stomachs were empty (Table 3). Unidentified fish remains were most common in walleye stomachs followed by crayfish. In northern pike stomachs, crayfish were most common followed by fish remains. Walleye and northern pike also preyed on young of their own as well as each other.

Pishkun Reservoir

Shoreline seining in August collected the following forage species in decreasing order of abundance: yellow perch, white sucker and spottail shiner (Appendix I). Young-of-the-year northern pike and crayfish were also taken. Gill netting results for Pishkun Reservoir appear in the annual coldwater lakes report (Tews, et al, 1997).

Tiber Reservoir

Surveys were conducted from April 10-13, 1996, at the upper end of the reservoir (Devon area) and in the Marias River above the reservoir. Trap nets were fished in the reservoir and the river was electrofished. Trap nets and electrofishing surveys were also conducted in the Willow Creek Arm (WCA) from April 14-17, 1996. Spawning runs were monitored and fish were obtained for tagging purposes. Water temperatures ranged from 40-52°F in the Marias/Devon area and from 40-51° in the WCA. Water levels increased slightly during the surveys, from 2986.4 to 2986.8 feet m.s.l. Inflows were quite high, ranging from 1850 to 3500 cfs.

Twenty-three trap net nights in the Devon area captured 317 walleye, 55 northern pike, 1 rainbow trout, 28 burbot, 6 yellow perch, 16 white sucker, 5 longnose sucker, and 6 carp. A total of 11.1 hours of electrofishing in the Marias River over a three-day period captured 213 walleye and 1 northern pike. Other species taken while shocking include rainbow trout, burbot, white sucker, longnose sucker, carp, flathead chub and mottled sculpin.

In the WCA, 100 walleye, 210 northern pike, 6 yellow perch, 21 burbot, 257 white sucker, 11 longnose sucker, 11 carp and 1 mountain whitefish were captured in 29 trap net nights. Electrofishing of the upper portion of the WCA produced 142 walleye and 9 northern pike in 2.8 hours. Other species taken while shocking include rainbow trout, yellow perch, white sucker, longnose sucker, emerald shiner and spottail shiner.

A total of 499 walleye (over 14 inches) and 250 northern pike (over 16 inches) were tagged in the reservoir and/or river. In the Devon/Marias area, walleye averaged 16.5 inches (range 14.0-28.9)

and 1.58 pounds (range 0.75-10.30). Northern pike averaged 21.9 inches (range 16.3-36.7) and 2.96 pounds (range 0.93-16.40). In the WCA, walleye averaged 17.0 inches (range 14.0-27.5) and 1.72 pounds (range 0.79-9.00). Northern pike in the WCA averaged 21.6 inches (range 17.6-37.9) and 2.70 pounds (range 1.44-19.60). Lengths and weights of the miscellaneous species taken in both areas are on file in the Choteau field office.

Throughout this report period, anglers voluntarily returned 62 walleye tags and 34 northern pike tags (Table 1). For fish tagged in the spring of 1996, exploitation of walleye was 7.2 percent and 10.4 for northern pike. Cumulative returns for walleye range from about 15 percent in 1994 to 20 percent in 1993 while northern pike vary from 10 percent in 1995 to 17 percent in 1992, 1993 and 1994.

Based on the location reported by anglers, walleye tagged in 1996 in the Marias River and Devon areas were mostly caught in the Bootlegger Trail area. Walleye tagged in the WCA were mainly taken in the WCA. Northern pike tagged in 1996 in the WCA were also mainly taken in the WCA by anglers. Few northern pike tagged in the Devon area were caught and no conclusions can be drawn from this limited data.

During the report period, anglers caught three rainbow trout which were tagged in the Marias River in 1994 and 1995. One was caught near the Dam, one was taken in the Bootlegger area and one was taken in Cut Bank Creek.

Trends in spottail shiner populations were monitored during mid-June using small mesh trap nets in the WCA. Three trap nets fished for two nights caught an estimated 16,000 adult spottail. Approximately 2,000 adult spottail shiner were transferred to Petrolia Reservoir on June 18, 1996.

A total of 66 shoreline seine hauls were made throughout the reservoir from August 26-29, 1996. The reservoir level was approximately 2986 feet M.S.L. and water temperatures varied from 67-68°F. Thirteen species were collected and results are presented in Appendix I. Spottail shiner were most abundant in all seine hauls. Figure 6 presents trends in forage fish numbers since 1988. Spottail shiner have been the predominant forage fish throughout this time period and have been stable for the past three years. Yellow perch numbers decreased in 1996 following an increase in 1994 and 1995. Emerald shiner are present in very low numbers. Walleye reproduction continues to be very good, with the highest number of young-of-the-year fish taken in 1996 (Figure 2). As in past years, greater numbers were taken near the upper end of the reservoir.

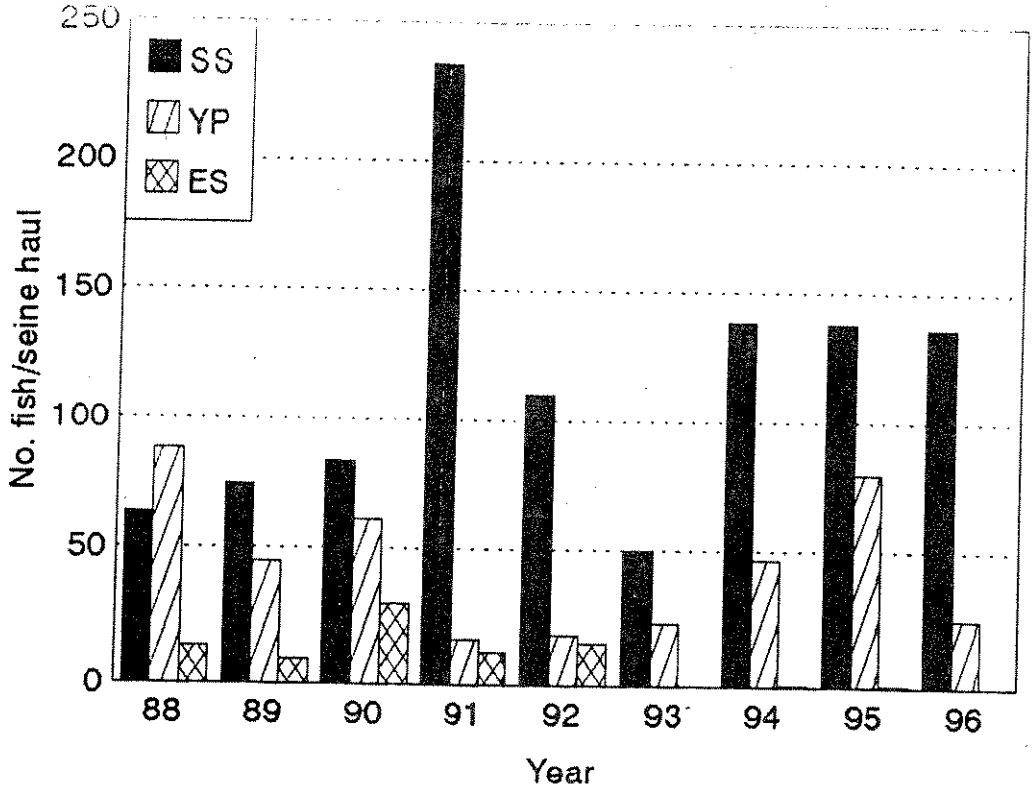

Figure 6. Forage fish trends in Tiber Reservoir, 1988-1996.

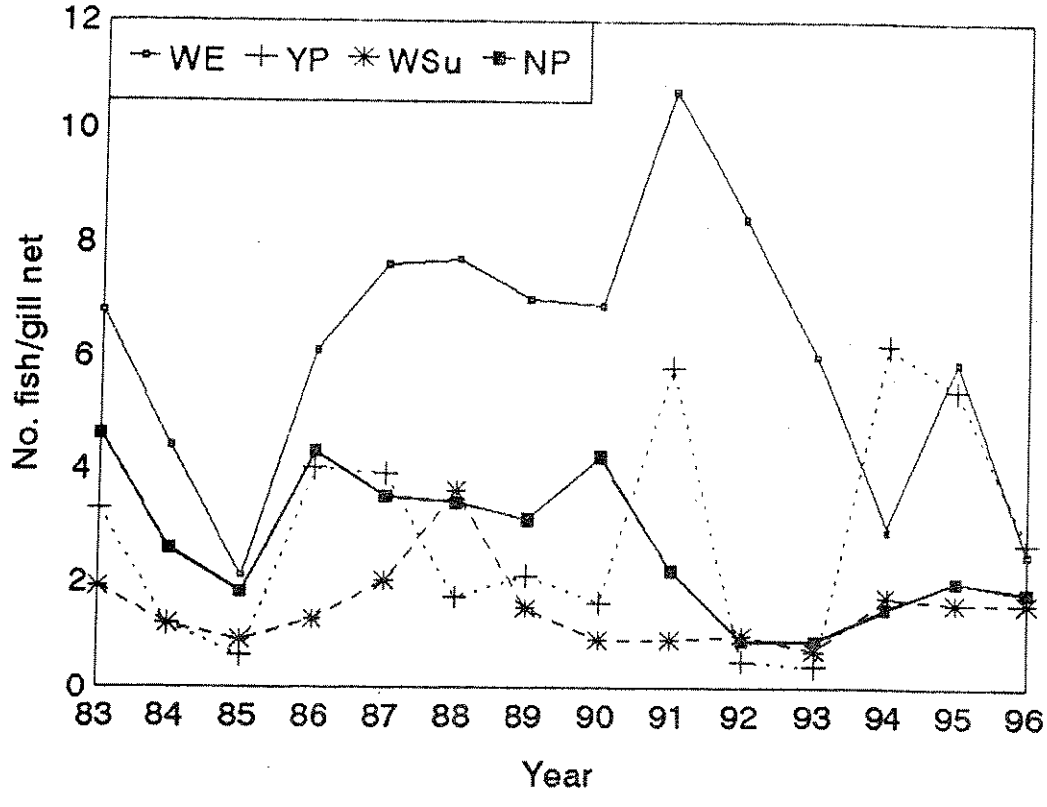

Figure 7. Trends in the fish populations in Tiber Res. (fall gill nets 1983-96).

A total of 27 sinking gill nets were fished overnight in the WCA, Dam, Bootlegger Trail and Devon areas of the reservoir from September 4-6, 1996. Eight species of fish were taken with yellow perch most abundant followed by walleye and northern pike (Table 2). Nearly 80 percent of the walleye captured were less than 16 inches in length. Figure 7 presents trends in the fish population of Tiber since 1983. Walleye numbers have essentially been on a downward trend since 1992 with an increase noted in 1995. Yellow perch also declined in 1996 from numbers observed in 1994 and 1995. No crayfish were found in the gill nets.

Fifty walleye and 33 northern pike stomachs from fish collected in gill nets were examined for food content. Slightly more than one-fourth of the stomachs of both species were empty (Table 3). Unidentified fish remains occurred in 50 percent of the walleye and 36 percent of the northern pike stomachs. Fish remains are probably yellow perch and spottail shiner. Crayfish occurred in 45 percent of the pike stomachs even though no crayfish were taken in the gill nets.

Considerable time has been spent investigating the introduction of additional forage fish into Tiber Reservoir. An assessment of the biological effects of introducing cisco (lake herring) was initiated in 1991 and completed in 1993 (Bennett and Bennett). After gathering additional data on Tiber, analyzing cisco/walleye interactions in Fort Peck Reservoir, and consulting with other states and provinces, an environmental assessment was prepared for a proposed introduction of cisco into Tiber Reservoir (Leathe and Hill, 1996). Finally, a decision to introduce cisco was made by the Department of Fish, Wildlife & Parks in August of 1996. Attempts to collect adult cisco using a Merwin trap in Fort Peck Reservoir in late November 1996 were unsuccessful due to poor catches and the onset of severe winter weather. An alternative source for the introduction was to obtain eggs from the province of Saskatchewan. Personnel from the Fisheries Branch of Saskatchewan Environment and Resource Management collected approximately five million cisco eggs on November 15-16, 1996. The eggs were kept in their hatchery until the "eye-up" stage and then transferred to a temporary hatchery facility in the powerhouse of Fort Peck dam in early February. The eggs hatched in late April and the fry were stocked throughout the deeper areas of Tiber Reservoir on April 25, 28, and May 1.

Temperature profiles and plankton tows were taken mid-month from May through September. Maximum surface temperatures was 72°F in July and 70°F in August. Temperatures at 80 feet reached 60°F in July and 63°F in August. Identification and densities of plankton will be done at a later date.

Participation in the Marias Management Committee continued as discussions were held with the Bureau of Reclamation to manage water elevations for the benefit of the fishery.

Creel Census

For the fourth consecutive year, weekend creel censuses were conducted at Tiber Reservoir and Lake Frances from Memorial Day through Labor Day. The data are presented in a separate document (Hill, 1997).

Tag Loss

Walleye have been tagged with a variety of tags over the past twenty years to monitor movements and angler exploitation. Tag loss has been quite high at times, based on fin clips or scars observed in the vicinity of tag insertion. A previous report (Hill and Wipperman, 1982), presented information for fish tagged in Tiber Reservoir from 1977 through 1980. Dart tags and T-tags were placed on walleye at the base of the spiny dorsal fin near the posterior end. Northern pike were tagged with T-tags at the base of the dorsal fin near the anterior end. Results of the 1982 report indicated walleye lost dart tags at a rate of 45 to 85 percent during the first year following tagging, accumulating to 90 percent loss after two to three years and 100 percent loss by four years. Walleye lost T-tags at a rate of 29 to 52 percent in the first year following tagging, increasing to 60 to 100 percent loss after two years and 100 percent loss by three years. For northern pike during the same time period, loss of T-tags was generally less that 5 percent.

More recently, walleye have been tagged with either T-tags, Cinch-up tags and metal jaw tags. If tagged with one tag only, fish were also fin clipped to help determine tag loss. Fin clips were not necessary when a combination of two of the tags mentioned above were used on the same fish. T-tags were placed at the base of the soft dorsal fin near the anterior end. Cinch-up tags were inserted between the spiny and soft dorsal fins. Metal jaw tags were placed at the anterior portion of the mandible.

Information on tag loss presented in a previous report (Hill, et al, 1996), is in error and the data are corrected here.

In 1993 at Bynum Reservoir, 100 walleye were marked with T-tags and a right pelvic fin clip while 125 walleye were marked with Cinch-up tags and a left pelvic fin clip. Based on limited recaptures of marked fish taken in 1994 spring trap nets, first-year loss of 1993 T-tags was 50 percent (2 of 4 recaptured fish losing tags). First-year loss of Cinch-up tags was also 50 percent (3 of 6 recaptured

fish losing tags).

In 1994, 316 walleye were tagged at Bynum Reservoir with T-tags and 167 were marked with Cinch-up tags. As before, they were additionally marked with right and left pelvic fin clips, respectively. During 1995 spring trap netting operations, recaptures were grouped together because the marking scheme was the same used in both 1993 and 1994. A loss of 90 percent was determined for T-tags (26 of 29 recaptured fish losing tags). Loss for Cinch-up tags was 53 percent (8 of 15 recaptured fish losing tags). In 1996 spring trap netting, loss of T-tags from 1993-94 had accumulated to 93 percent while Cinch-up tags increased to 69 percent loss.

At Tiber Reservoir in 1995, 500 walleye were double-tagged with T-tags and Cinch-up tags. Fish caught by anglers during the first year (ending March 31, 1996) show a loss of 5 percent for T-tags (3 of 63 recaptured fish losing tags) and 14 percent loss of Cinch-up tags (9 of 63 recaptured fish losing tags). For angler-caught fish during the second year (ending March 31, 1997), no additional tag loss was noticed for T-tags but the loss of Cinch-up tags had increased to 47 percent (8 of 17 recaptured fish losing tags).

Electrofishing and trap nets fished in Tiber in the spring of 1996 gave additional first-year information on tag loss for the 1995 tagging year. A total of 23 recaptures were of fish tagged in 1995. T-tag loss was 13 percent (3 of 23 losing tags) and Cinch-up tag loss was 35 percent (8 of 23 losing tags).

In 1996 at Tiber Reservoir, 499 walleye were double-tagged with metal jaw tags and Cinch-up tags. Angler-caught fish during the first year (ending March 31, 1997) suggest a loss of jaw tags of 2.4 percent (1 of 41 losing tags) and 12.2 percent loss for Cinch-up tags (5 of 41 losing tags).

Age and Growth

Ageing of walleye using dorsal spines has been on-going since 1991 at Bynum Reservoir, Lake Frances and Tiber Reservoir. Representative samples taken from fall gill nets facilitate calculation of an index for year-class strength. Small sample size in some years limits the validity of the calculations, but additional data from future collections will add to the index accuracy.

The index is based on values averaging near 100. Data presented in Table 4 suggest strong year classes occurred in 1985 and 1990 for Bynum Reservoir. Walleye were first stocked in Bynum in 1985 and have been stocked annually through 1992. At Lake Frances, strong

year classes occurred in 1985, 1986, 1988, 1989 and 1990. Strong year classes for Tiber Reservoir developed in 1985, 1986, 1989 and 1990. Walleye have not been stocked in either Lake Frances or Tiber Reservoir since populations became established in the 1970's.

Age composition for walleye recaptured in fall gill nets from the three reservoirs is presented in Appendixes III-V. The average percent contribution for each age class is highest as three-year old, ranging from 21 percent at Lake Frances to 33 percent at Tiber Reservoir.

Table 4. Year-class strength of walleye from three Region Four reservoirs (using 1991-96 fall netting data).

	Year-class strength index		
Year class	Bynum Res.	Lake Frances	Tiber Res.
1983	-	107	-
1984	-	10	93
1985	120	137	157
1986	35	138	157
1987	63	78	114
1988	38	127	99
1989	64	134	153
1990	256	132	121
1991	94	72	95
1992	18	20	62

Hydro acoustics - Tiber Reservoir

On 27 August 1996, we completed a hydro acoustics survey of pelagic (open water) fish densities in Tiber Reservoir. The purpose of the survey was to collect baseline population data and establish survey methods for a long term cisco monitoring program. The acoustic survey was designed following suggestions by Gunderson (1993). A total of 18 transects were surveyed. Transects were spaced one mile apart and ran north and south following sectional lines on a USGS topographic map. Transect locations and GPS coordinates are shown in Figure 8 and Table 5, respectively. The survey was completed between 0000 and 0500 hrs during intermittent rain and windy conditions.

A BioSonics Model 105 Echosounder (420kHz) was used to transmit and receive signals from a dual-beam system (boat-mounted 6° and 15°

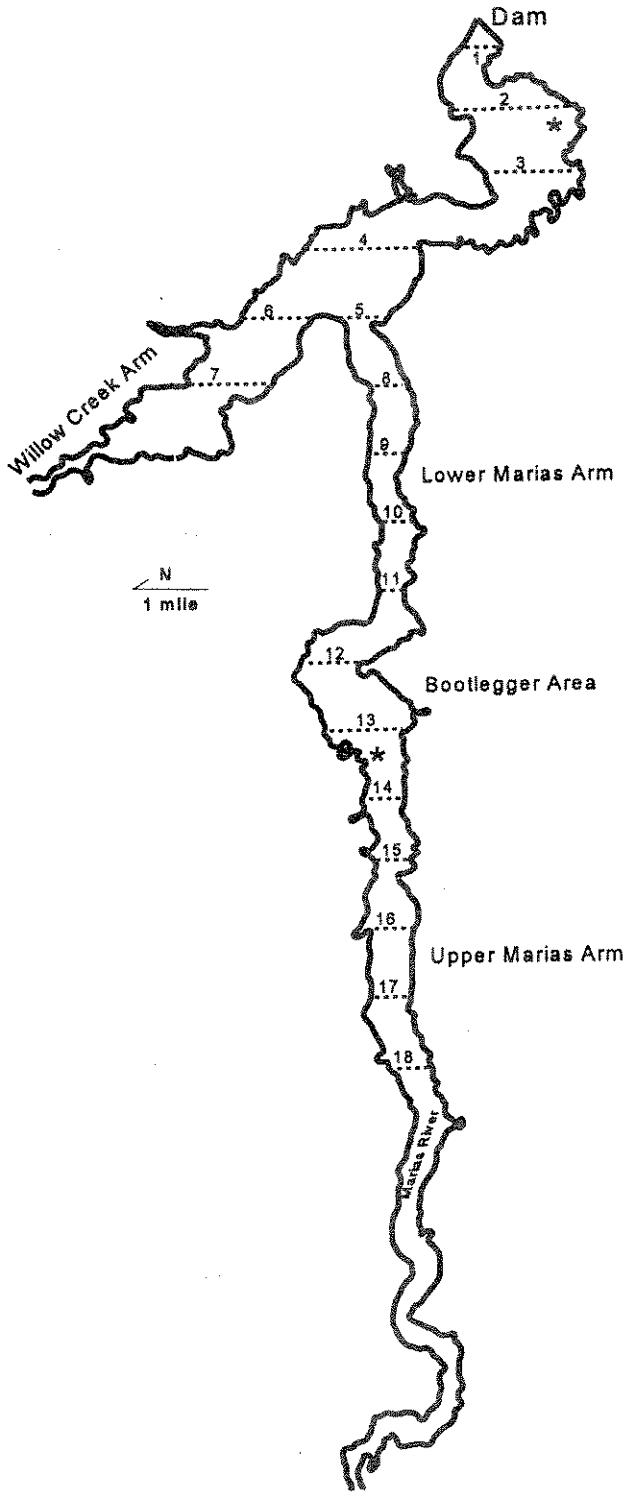

Figure 8. Hydroacoustic transects and vertical gill net location. Netting location are indicated with * symbol.

Table 5. Transect locations, estimated transect length, fish densities, and the percentage of tracked targets estimated to be greater than 10 inches total length.

Transect	Begin Location (GPS)	Transect Length (m)	fish / acre	fish / 1000 m^3	% of fish > 10"
1	48°19.19 N 111°06.70 W	805	121	0.68	5.8
2	48°21.50 N 111°10.16 W	2,961	116	0.40	0.2
3	48°18.48 N 111°08.03 W	2,511	95	0.21	0.0
4	48°18.94 N 111°08.77 W	1,352	329	0.92	3.9
5	48°20.05 N 111°10.18 W	1,465	72	0.82	6.4
6	48°20.77 N 111°12.49 W	1,561	190	3.32	0.0
7	48°22.61 N 111°12.76 W	2,510	188	8.47	0.0
8	48°20.99 N 111°12.65 W	1,110	104	1.15	16.7
9	48°20.27 N 111°13.94 W	901	159	0.48	5.6
10	48°20.68 N 111°15.33 W	805	156	2.37	18.5
11	48°20.61 N 111°16.17 W	547	433	6.00	11.7
12	48°20.98 N 111°17.55 W	1,561	165	0.97	0.0
13	48°20.51 N 111°18.84 W	2,011	20	0.20	0.0
14	48°20.49 N 111°20.40 W	853	60	0.87	0.0
15	48°20.50 N 111°21.68 W	901	57	1.27	6.7
16	48°20.48 N 111°22.94 W	1014	87	2.32	0.0
17	48°20.73 N 111°24.05 W	853	30	1.30	0.0
18	48°20.43 N 111°25.36 W	853	157	5.43	0.0
	means	**1,365**	**141**	**2.06**	**4.2**

circular transducer). Data were collected in digital format on tape and processed with a BioSonics Model 281 Echo Signal Processor. Fish densities were calculated using BioSonics ESPTS software.

Fish densities in Tiber Reservoir ranged from 0.21 to 8.47 fish per 1000 m^3. In general, fish densities were relatively low near the dam (transects 1-3), increased in the Willow Creek arm (transects 6 and 7), and continued to be variable with some low and high densities recorded in the lower Marias area (Figure 8 and 9). Densities in the Bootlegger and upper Marias arm were also variable. Transects with the greatest number of fish per unit water volume were 7, 11, and 18 (Figure 9). The mean density for all 18 transects was 2.06 (s.d. = 2.3) fish per 1000 m^3. Areal densities (fish per acre) are shown in Table 5.

Total pelagic fish abundance in Tiber Reservoir was estimated at about 2.0 million fish. The population estimate includes all species of fish. Species partitioning was not possible because of the paucity of fish collected in vertical gill nets. In two nights of netting, only one sucker was collected. Interestingly, the hydro acoustic data supported results from the vertical gill nets. Echograms from the acoustic equipment showed that fish densities were greater near shore than off shore and that most of the fish were associated with bottom structure. Conversely, cisco are generally suspended in pelagic regions of lentic water and should be more susceptible to acoustic or vertical gill net sampling.

Target strength estimates indicated that about 95% of the fish tracked by the acoustic equipment were less than 10 inches (Table 5). Small targets (fish< 10") were concentrated in the Willow Creek arm. Small fish also appeared to select water depths less than 21 m. The preference for shallow water by small fish was most apparent in Transects 1-4 (Figure 10; upper left hand corner). Larger fish (fish > 10") were most abundant in the Bootlegger Area and were found in deeper water (Figure 10; see Lower Marias Arm and Bootlegger graphs).

Other Waters - Choteau Area

Three trap nets were fished overnight in Arod Lake (Eyraud Lake) on May 16, 1996. Fish captured include 18 northern pike, 23 yellow perch, 4 white sucker and 1 carp. Seventeen northern pike were transferred to a Lewistown area water.

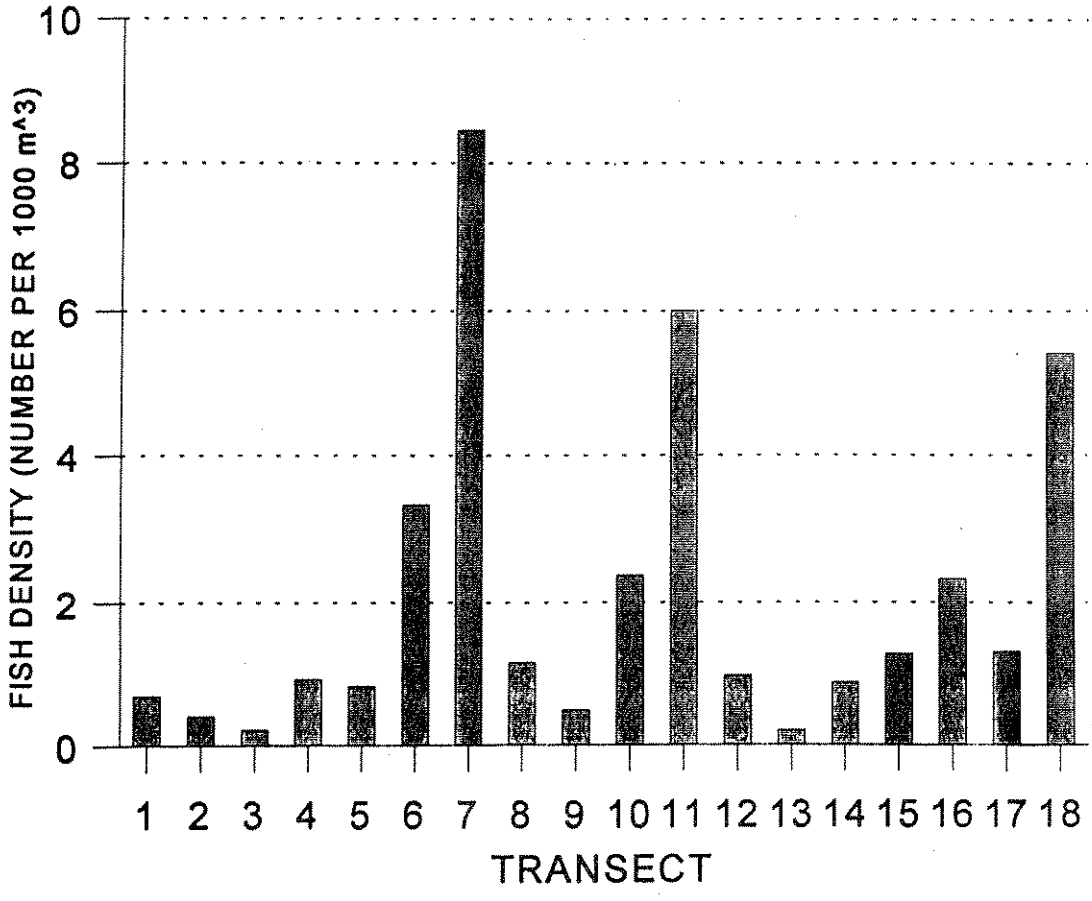

Figure 9. Fish densities in Tiber Reservoir.

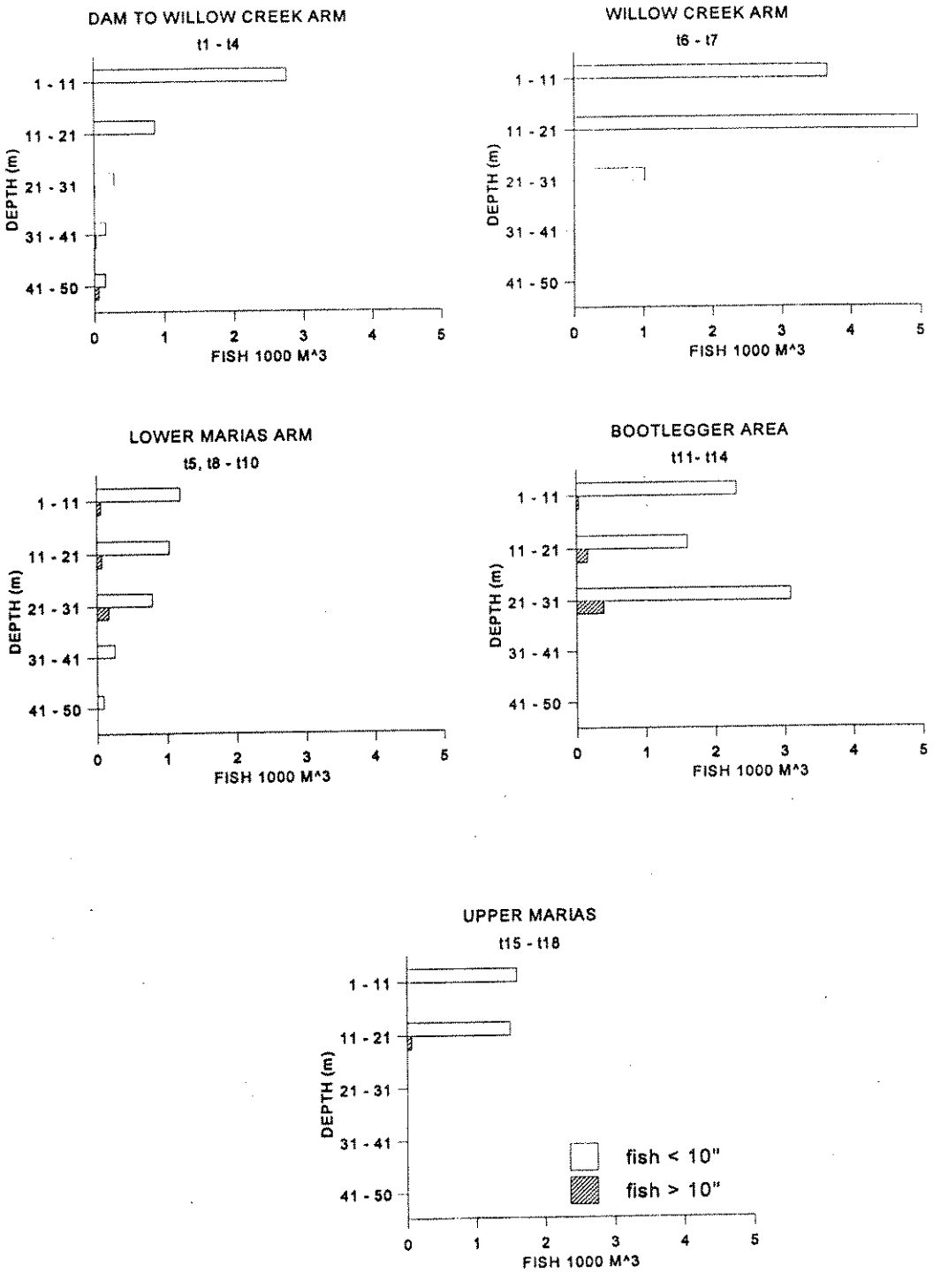

Figure 10. Fish densities by depth, size, and location in Tiber Reservoir.

Petrolia Reservoir

Shoreline seining results indicated the 2000 spottail shiners transferred from Tiber Reservoir on June 17, 1996, reproduced in Petrolia Reservoir. There was an average catch of 6.9 spottail shiners per haul (Table 6, Figure 12). Due to their small size (1.3 inch average), many young-of-the-year (YOY) spottail shiners swam through the seine and were not captured. During shoreline seining yellow perch were captured at higher rates than in 1995 (Figure 12). Young of the year carp and walleye numbers were the highest observed since seining began in 1994.

Three gill nets set on September 10 captured 104 walleye ranging from 5.7 - 23.7 inches (Table 7). The average catch of nearly 35 walleye per net was much higher than ever recorded at Petrolia (Figure 13). Average relative weight (Wr) for walleye was 95.0. Average Wr was within a suggested target range of 95 - 105 (Murphy et al. 1990) except for low values for walleye less than 12 inches long (Table 7). Eleven northern pike, 14 yellow perch, 9 white suckers and 82 carp were also captured. Relative weights averaged 108.3 for northern pike and 95.2 for yellow perch (Table 7). Average yellow perch TL was slightly less than seen in 1995 (Hill et al. 1996) Capture rates for all species were the highest seen for at least five years (Figure 13). Small carp were captured at the highest rate ever (Lewistown data files). The high numbers of fish caught was due in part to extreme drawdown of Petrolia Reservoir during 1996 dam repairs. The maximum depth seen during September gill netting was 16 feet.

East Fork Reservoir

Shoreline seining surveys captured 124 YOY yellow perch per haul. This is far more than were captured in 1995 and a similar capture rate to that seen in 1994 (Table 6, Figure 14). White suckers were captured at record numbers and northern pike reproduction was documented.

Gill netting captured two northern pike per net, which was less than found in 1995 (Figure 15). Northern pike average TL increased nearly 4 inches compared to 1995 netting (Hill et al. 1996). Average northern pike Wr was high at 109.6 (Table 7). Capture rate of yellow perch in gill nets was the highest recorded for East Fork Reservoir (Figure 15). Yellow perch total length averaged 7.8 inches (Table 7) and has increased annually since 1994 (Hill et al. 1996) after a decline (Hill et al. 1995). Yellow perch had a low average Wr at 92.2.

Table 6. Number of forage fish captured per pull during 1996 beach seining of Lewistown area reservoirs.

Water	Date	Water temp(°F)	# of hauls	Species(average TL (inches)) YP[1]	WE	NP	FHM	LND	WSU	SSH[1]	Carp
Petrolia	8/5/96	70	9	16.9 (2.6)	2.1 (3.9)	0.3 (9.9)	0.8 (1.1)	1.0 (2.0)	-	6.9 (1.3)	
East Fork	8/6/96	64	4	124.2 (2.1)	-	0.5 (8.0)	-	-	10.5 (2.1)	-	

[1] Young of the year, an additional 44 older YP were captured in East Fork, 4 YP in Petrolia and 3 adult SSH in Petrolia
NP=northern pike; YP=yellow perch; WSU=white sucker; LND=longnose dace; SSH=spottail shiner; WE = walleye; FHM = fathead minnow

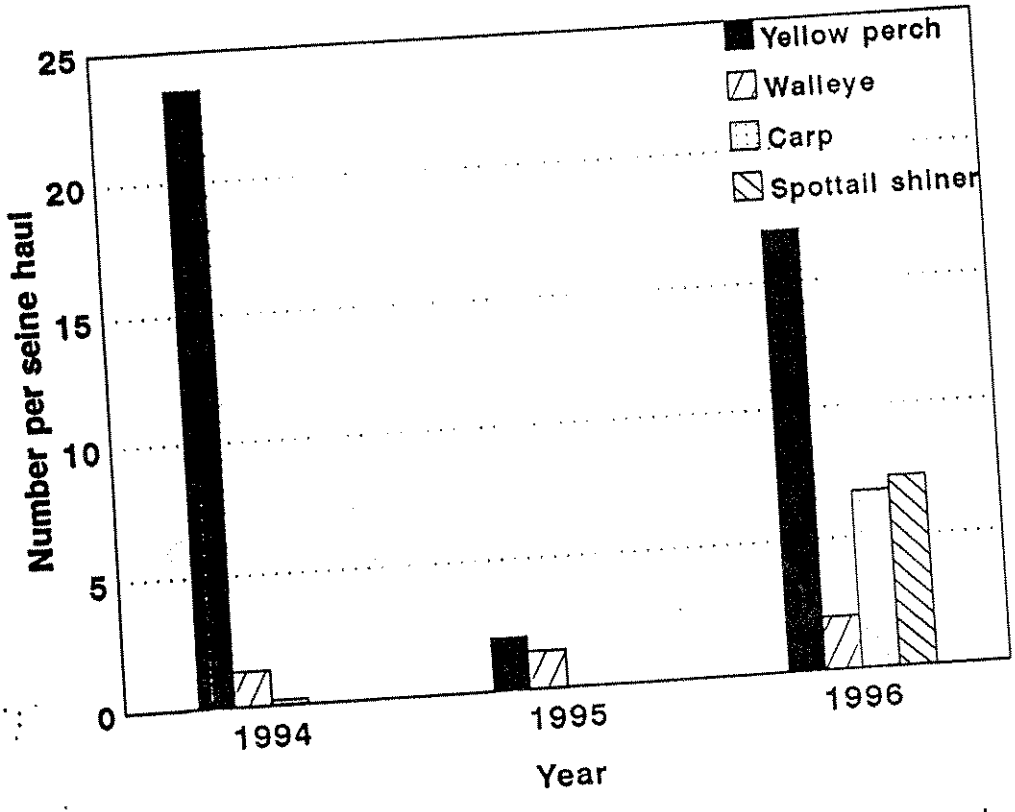

Figure 12. Forage fish trends from shoreline seining hauls in Petrolia Reservoir 1994 - 1996.

Table 7. Overnight gill netting results in large lakes and reservoirs in north central Montana during 1996.

Water name (Date surveyed)	# of[1] nets	Mean hours fished/net	Species[2]	Total # of fish	Length (in) Range	Length (in) (Mean)	Weight (lbs) Range	Weight (lbs) (Mean)	Condition Factor Range	Condition Factor (Mean)	Relative weight Range	Relative weight (Mean)
East FK Spring (9/16/96)	1F,2S	18.2	NP	6	18.9-36.2	(27.1)	1.34-9.79	(5.43)	19.8-29.1	(24.9)	89.0-128.2	(109.6)
			YP	48	5.4-10.4	(7.8)	0.06-0.50	(0.24)	37.0-62.4	(46.0)	74.2-125.6	(92.2)
			LL	1	-	(14.8)	-	(1.87)	-	(57.7)	-	
			WSu	70	11.2-15.1	(13.5)	0.50-1.46	(0.99)	30.7-69.4	(40.2)	-	
			LnSu	1	-	(9.9)	-	(0.31)	-	(32.0)	-	
Petrolia (9/10/96)	1F,2S	27.0	WE	2	5.7- 5.9	(5.8)	0.04-0.05	(0.04)	21.6-24.3	(23.0)	69.2- 77.6	(73.4)
			WE	50	9.0-11.7	(11.0)	0.22-0.57	(0.43)	25.6-39.1	(32.3)	72.6-112.5	(92.1)
			WE	26	12.8-14.5	(13.5)	0.72-1.03	(0.88)	31.9-39.7	(35.5)	87.7-108.6	(97.5)
			WE	24	15.1-18.4	(16.6)	1.23-2.42	(1.74)	34.8-41.8	(37.8)	91.8-111.4	(100.0)
			WE	2	23.0-23.7	(23.4)	4.43-5.60	(5.01)	36.4-42.1	(39.2)	90.8-104.3	(97.6)
			WE(all)	104	9.0-23.7	(13.0)	0.04-5.60	(0.93)	21.6-42.1	(34.3)	69.2-112.5	(95.0)
			NP	11	12.3-14.4	(13.4)	0.38-0.73	(0.57)	18.4-27.8	(23.7)	83.9-127.4	(108.3)
			YP	14	6.5-13.0	(9.1)	0.13-1.16	(0.42)	44.3-53.9	(49.2)	84.7-103.8	(95.2)
			WSu	9	12.6-18.0	(15.9)	0.85-2.18	(1.64)	35.2-42.8	(39.8)	-	
			Carp	76	4.1- 5.9	(4.8)	0.04-0.14	(0.07)	45.2-84.1	(57.1)	-	
			Carp	6	9.9-28.0	(20.3)	0.44-9.3	(4.66)	42.4-52.5	(46.6)	-	

[1] F= Floater and S= Sinker [2] NP=northern pike; YP=yellow perch; WSU=white sucker; LnSu=longnose sucker; WE=walleye; LL=brown trout

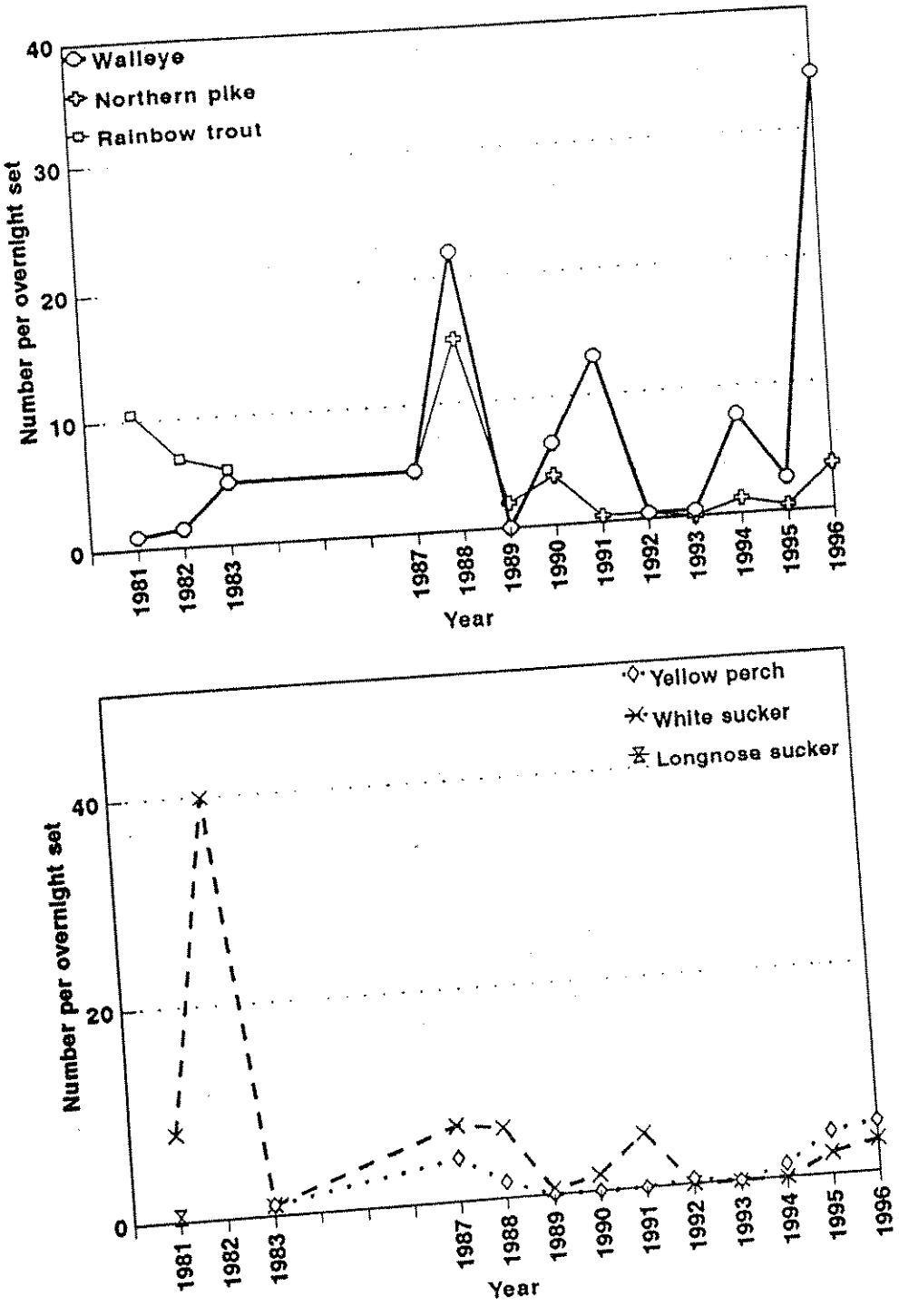

Figure 13. Trends in fish populations from Petrolia Reservoir from fall gill nets (1981 - 1996).

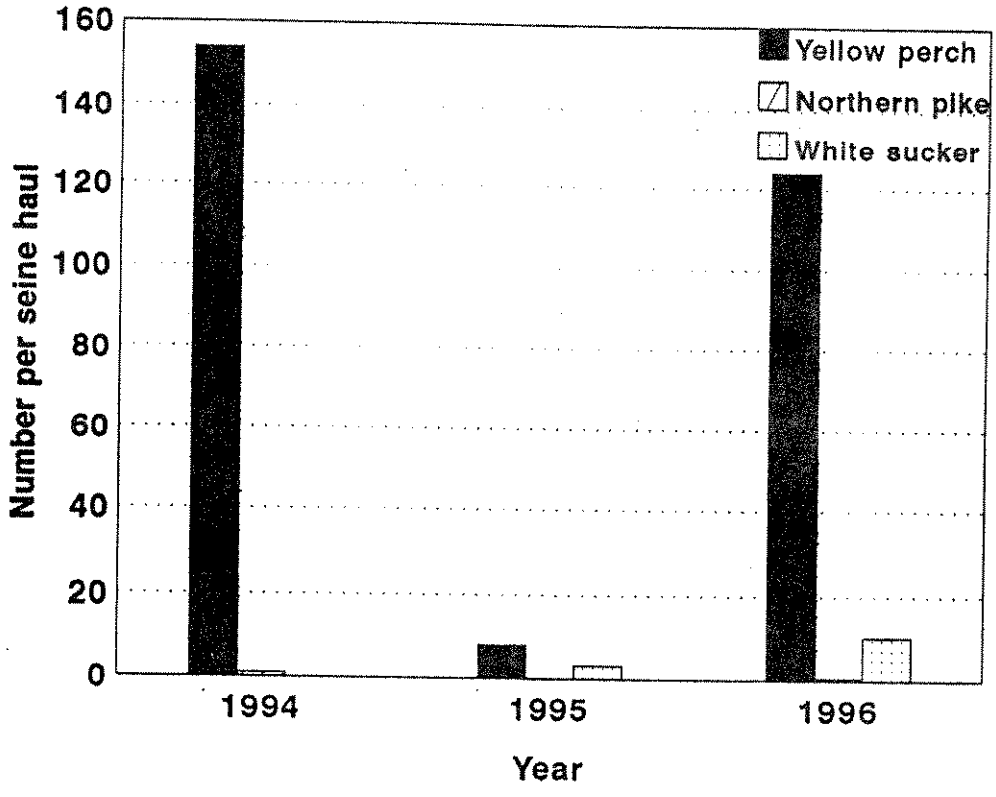

Figure 14. Forage fish trends from shoreline seining hauls in East Fork Reservoir 1994 - 1996.

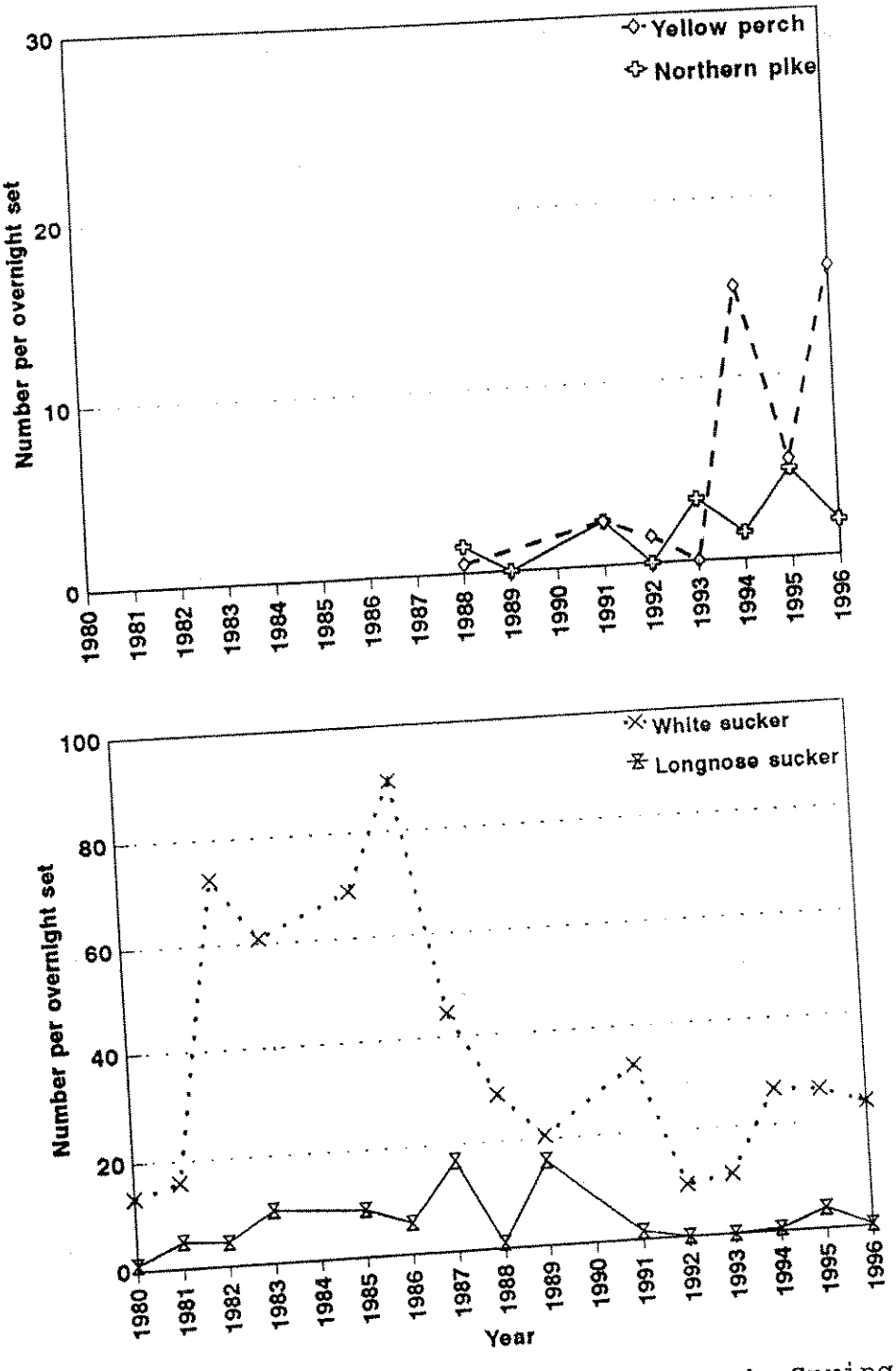

Figure 15. Warmwater fish trends in East Fork Spring Creek Reservoir from fall gill netting 1980 - 1996.

White sucker numbers in gill nets declined slightly from 1995, however average total length continued to increase (Figure 16). Average white sucker biomass per gill net has increased dramatically since northern pike were introduced (Figure 16). White sucker weights were first taken in 1988 and averaged 8 pounds of suckers per net. In 1996 average biomass was 23.1 pounds per net, a 290 percent increase from 1988. If 1988 weights are extrapolated for use with 1987 data, a doubling in average biomass per net is seen since northern pike were introduced (Figure 16). These abundant white suckers are responsible for the increasing YOY white sucker forage (Figure 14), but as adults, are unavailable as forage for most northern pike in the reservoir.

Other Lewistown Reservoirs

Jakes Reservoir has had a stunted perch problem for several years (Hill et al. 1995). To rectify this problem, 17 two to four pound northern pike were transferred from Arod Lakes to Jakes reservoir on May 16, 1996. Trapping of Jakes reservoir in June found perch up to 1.9 pounds (Table 8). Many perch were probably not captured due to their small size. These perch were transferred to Benes' pond to provide forage for the northern pike fishery. Despite stocking 2000 bass annually from 1993-1995, a gill net set in C-1 Reservoir on May 30, 1996 captured no fish.

GREAT FALLS AREA WATERS

Small Great Falls Area Reservoirs

Four warmwater reservoirs were surveyed and gill netted in 1996 (Table 9). No fish were netted in Harwood Lake where water levels were down approximately nine feet leaving only nine feet maximum depth. Kolar Pond # 8 was stocked with 2,000 largemouth bass fingerlings in 1993, 1994 and 1995. No bass were captured by angling in two hours, two 25 foot seine hauls and a four hour gill net set. One bass approximately 8-9 inches long was observed from a boat while taking depth readings.

Pelican Point Ponds # 1 and 2 are old gravel excavation pits located within the Pelican Point Fishing Access site on the Missouri River. When last sampled in 1985, both ponds had populations of yellow perch. Gill net sets in 1996 captured walleye, largemouth bass, pumpkinseed and yellow perch in Pond # 1, while northern pike and yellow perch were netted in Pond # 2 (Table 9).

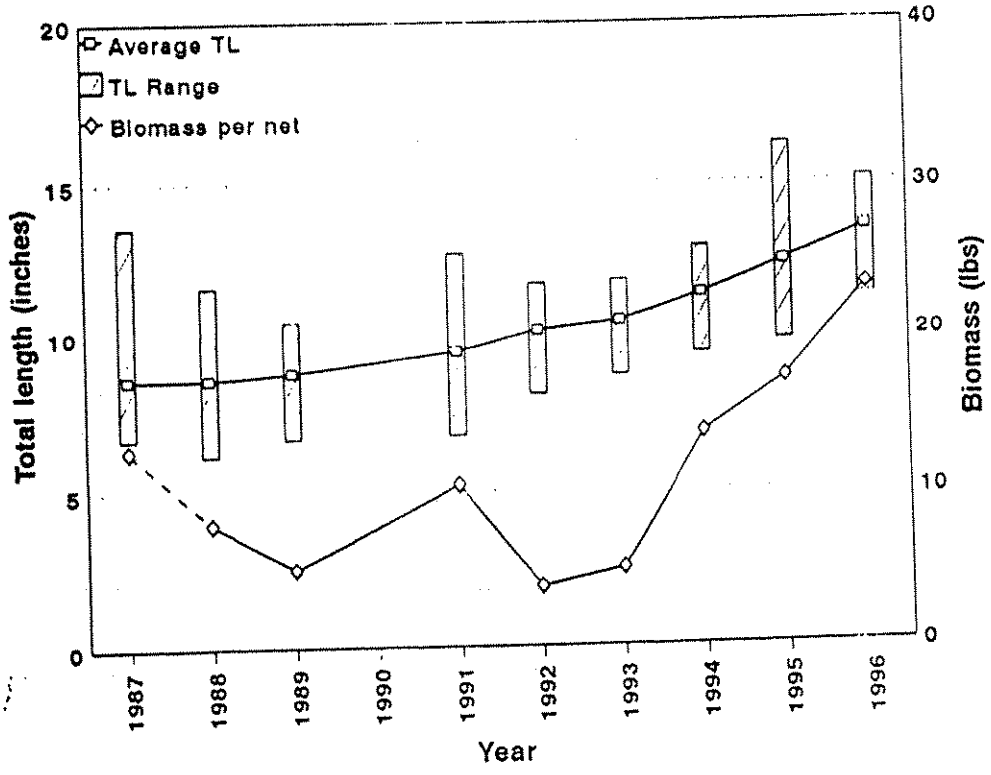

Figure 16. Fall gill netting trends of white sucker size and population after northern pike and yellow perch were introduced in East Fork Reservoir. Dashed line for 1987 total weight is extrapolated from weights taken in 1988.

Table 8. Trap netting catch at Lewistown area reservoirs during 1996.

Water name (Date surveyed)	# of trap nights	Species	Total # of fish	Length (in) Range	Length (in) (Mean)	Weight (lbs) Range	Weight (lbs) (Mean)	Condition Factor Range	Condition Factor (Mean)
Jakes Reservoir (6/2/96)	1	yellow perch	27	5.6-14.8	(7.9)	0.26-1.90	(0.26)	27.9-58.6	(35.5)
		flathead chub	1	-	(10.2)	-	(0.43)		

Table 9. Overnight gill netting results for small reservoirs in the Great Falls area during 1996.

Water (date sampled)	Maximum depth(ft)	No. of nets[1]/	Mean hrs/net	Species	No. of fish	Length range (mean)	Weight range (mean)
Harwood Lk (6/17/96)	9	1S	19.6	No fish			
				Tiger salamander	1		
Kolar Pd #8 (6/20/96)	17	1S	4.0	No fish			
		2 seine		No fish			
Pelican Pt Pond #1	16	1S	18.1	WE	4	20.7-23.2(21.9)	2.99- 4.44(3.76)
				YP	30	5.2- 8.8(6.2)	0.07- 0.32(0.12)
				LMB	1	(5.3)	(0.08)
				PUMP	2	3.7- 3.8(3.8)	0.05- 0.05(0.05)
		1F	18.5	YP	28	5.2- 7.9(5.9)	0.07- 0.24(0.19)
				LMB	1	(5.4)	(0.09)
				PUMP	7	3.5- 3.9(3.8)	0.05- 0.06(0.06)
Pelican Pt Pond #2	11	1S	17.0	NP	3	23.1-25.3(24.5)	3.36- 4.87(4.35)
				YP	16	5.4-10.1(6.6)	0.08- 0.54(0.17)

[1]/ S = Sinking experimental gill net
F = Floating experimental gill net

Missouri River between Morony Dam and Marias River

The Portage Coulee section was electrofished on 10 and 13 September, 1996, for a total of 6.9 hours. Water temperatures ranged from 64-66° F. Sixteen species were collected for length and weight measurements (Table 11). Common carp, smallmouth buffalo, longnose dace, emerald shiners and mottled sculpins were observed but not captured. Up to thirty specimens for each species of all other non-game species were collected. Relative abundance is shown for game species and those non-game species where less than thirty were captured (Table 11). Shorthead redhorse suckers and goldeye were the most common non-game species observed during the electrofishing operation. Catch statistics for various non-game species are presented in Table 11.

Walleye catch per unit effort (CPUE) of 3.5 fish per hour equaled the all-time high recorded in 1995 (Table 12). No fin-clipped Morony Reservoir walleye were captured in 1996. Fifteen sauger were electrofished for a CPUE of 2.2 fish per hour. Catch rates for smallmouth bass increased to a high of 13.0 fish per hour in 1996. Sixty-eight percent of the 90 bass sampled were young-of-the-year. The largest smallmouth bass was 14.1 inches and weighed 1.92 pounds (Table 12). The high percentage of young-of-the-year bass appears to have been influenced by the initial boat plant of 10,000 fingerlings throughout the Portage Coulee section during July 1996. Ten thousand smallmouth bass were also planted in 1996 in the Missouri River below Morony Dam approximately 3.5 miles upstream of the Portage Coulee shocking section.

Rainbow and brown trout were taken in higher numbers in 1996 than any year since 1988. Sixty rainbow trout and 41 brown trout were captured for a CPUE of 8.7 and 5.9 fish per hour, respectively. Mountain whitefish catch rates declined to 3.9 fish per hour in 1996 (Table 12). Other game fish species collected include 1 eastern brook trout, 4 northern pike and 3 channel catfish.

Angler tag return information compiled from 1988 through 1995 are presented in Table 13. First-year harvest of walleye and sauger averaged 4.6 percent and ranged from 0.0 percent in 1989, 1991 and 1994 to 17.4 percent in 1995. The highest cumulative total observed was 25.0 percent in 1991 although only 4 fish were tagged. Statewide fishing pressure estimates for the 54-mile section of the Missouri River between Morony Dam and the Marias River ranged from 2,056 to 11,150 angler-days per year during 1982-1995, averaging 6,250 angler-days per year. A total of 6,606 angler-days were estimated for this section for the 1995-96 fishing season.

Table 11. Catch statistics from electrofishing surveys of the Portage Coulee Section on the Missouri River, Montana, 10-13 September 1966.

Species	Number of fish	Length (inches) Mean	Length (inches) Range	Weight (pounds) Mean	Weight (pounds) Range	Mean condition factor
Freshwater drum	50	13.4	9.9-21.5	1.48	0.58- 5.16	48.26
Goldeye	65	12.6	11.5-15.8	0.72	0.52- 1.39	35.79
Rainbow trout	60	10.4	3.6-18.7	0.79	0.01- 2.40	38.73
Brown trout	41	14.5	8.3-25.2	1.41	0.21- 8.20	36.37
Mountain whitefish	27	8.2	4.3-13.9	0.31	0.02- 1.30	37.69
Walleye	24	14.8	9.1-28.3	1.52	0.25-10.40	34.04
Sauger	15	15.3	12.8-18.2	1.10	0.60- 1.80	30.10
Smallmouth bass	90	5.4	3.1-14.2	0.27	0.02- 1.93	61.25
Eastern brook trout	1	11.4	--	0.50	--	33.75
Shorthead redhorse	39	17.5	9.8-21.7	2.59	0.04- 4.91	45.10
Longnose sucker	50	9.9	4.2-19.5	0.66	0.20- 2.86	41.21
White sucker	15	9.7	4.9-16.7	0.62	0.04- 1.85	45.31
Stonecat	10	6.8	4.8- 7.8	0.14	0.12- 0.20	36.45
Northern pike	4	27.8	24.9-29.5	5.21	3.42- 6.20	25.14
Channel catfish	3	20.5	19.2-21.2	3.22	2.54- 3.67	36.84
River carpsucker	13	17.7	15.0-20.5	2.80	1.78- 4.30	49.98

Table 12. Comparison of catch per unit (CPUE) of game species from electrofishing surveys of the Portage Coulee section on the Missouri River, Montana, 1988-1996.

Species	Date						
	9/8-9/88	8/23-24/89	8/24&28/91	9/14/93	9/1-2/94	9/7-8/95	9/10&13/96
	CPUE - number of fish/hour (total number captured)						
Sauger	13.8 (94)	2.3 (15)	0.4 (3)	4.2 (11)	0.1 (1)	3.5 (19)	2.2 (15)
Walleye	2.1 (14)	0.2 (1)	0.1 (1)	2.3 (6)	0.4 (3)	3.5 (19)	3.5 (24)
Rainbow trout	1.2 (8)	0.5 (3)	0.3 (2)	2.7 (7)	4.8 (34)	3.3 (18)	8.7 (60)
Brown trout	2.4 (16)	0.5 (3)	0.1 (1)	3.8 (10)	2.9 (20)	1.9 (10)	5.9 (41)
Mountain whitefish	0.3 (2)	0.2 (1)	- (0)	0.4 (1)	3.4 (24)	6.9 (37)	3.9 (27)
Smallmouth bass	- (0)	- (0)	- (0)	0.4 (1)	0.3 (2)	2.0 (22)	13.0 (90)
Total effort (hours)	6.8	6.5	7.2	2.6	7.0	5.4	6.9

Table 13. Angler exploitation of walleye and sauger in the Portage Coulee section of the Missouri River indicated by voluntary log returns, 1988-1995.

River section	Year tagged	No. tagged	Species	Years until harvested (percent) 1	2	3	Cumulative
Missouri River							
-Portage Coulee	1988	105	WE & SGR	2(1.9)	1(1.0)	0(0.0)	3 (2.9)
-Portage Coulee	1989	16	WE & SGR	0(0.0)	0(0.0)	0(0.0)	0 (0.0)
-Morony Dam-Fort Benton[1]/	1990	270	WE & SGR	13(4.8)	4(1.5)	0(0.0)	17 (6.3)
-Portage Coulee	1991	4	WE & SGR	0(0.0)	0(0.0)	1(25.0)	1 (25.0)
-Portage Coulee	1993	16	WE & SGR	1(6.3)	0(0.0)	0(0.0)	1 (6.3)
-Portage Coulee	1994	3	WE & SGR	0(0.0)	0(0.0)		0 (0.0)
-Portage Coulee	1995	23	WE & SGR	4(17.4)			4 (17.4)

[1]/ Fish tagging conducted by the consulting firm - EA Engineering, under contract with Montana Power Company.

Habitat Protection

Private individuals or government entities that wish to construct projects that may alter streambeds or banks are required to obtain a permit. The 1975 Natural Streambed and Land Preservation Act (310) involves the private sector while the Stream Protection Act of 1963 (SPA) covers government agencies. In the Choteau area, nine projects were reviewed and processed under the 310 law. In the Lewistown area, there were six 310 permits and four SPA permits processed. Site inspections were made on most of these projects.

No significant water discharge permit applications or renewals were received and no significant pollution complaints were received during the report period.

DISCUSSION AND RECOMMENDATIONS

Although angling success was poor at Bynum Reservoir during 1996, walleye occur in adequate numbers and are considered stable when compared to past years. Forage fish continue at fairly low levels but abundant crayfish populations provide an adequate food source. Walleye have successfully reproduced in four of the last five years with some recruitment evident. At the present time, approximately 75 percent of the walleye are over 16 inches in length. This fishery should be closely monitored and if necessary, supplementary stocking could be made on an as-needed basis, or special regulations could be imposed to protect the fishery if angler exploitation is found to be excessive.

Yellow perch, spottail shiner and crayfish are abundant in Lake Frances and should provide adequate forage for walleye and northern pike. Excellent reproduction of walleye has occurred for several years but recruitment is poor as nearly 60 percent of the walleye are over 16 inches in length. Poor recruitment is thought to be related to predation by a fairly large northern pike population. Anglers will be encouraged to keep limits of small northern pike, which may reduce overall pike numbers in time. Although predation may be a limiting factor, an experimental stocking program of walleye fingerlings is recommended in alternate years beginning in 1997 and should continue at least through 1999. If possible, the stocked fingerlings will be marked so they can be kept separate from those produced naturally.

Tiber Reservoir continues to have good natural reproduction of walleye and also good recruitment into the fishery. Creel census conducted in 1996 as well as several previous years shows that catch rates on walleye are very good. But adequate forage has been

a limiting factor. Yellow perch numbers are limited by fluctuating water levels, lack of suitable habitat and high predation. Spottail shiner numbers continue at stable levels but due to their small body size do not provide adequate biomass for all of the predators in the lake. The cisco introduction is intended to correct the lack of adequate forage. This introduction should be closely monitored in future years.

Tagging has been used extensively over the past twenty years to monitor angler exploitation of walleye and northern pike in area waters. Exploitation rates based on voluntary tag returns from anglers are potentially biased by two major factors. Anglers may not return a portion of tags they recover and tags are also naturally shed by fish over time. While it is very difficult to quantify angler compliance, it should be relatively simple to estimate tag retention. However, our recent investigations concerning retention of "cinch-up" and "T-tags" on walleye have yielded contradictory and confusing results.

Retention of T-tags on walleye from Tiber Reservoir (1977-1980) and Bynum Reservoir (1993-1996) produced similar results. Walleye in both waters lost from 60-100 percent of T-tags after two years. However, results from Tiber during 1995-1996 were dramatically different. Only 5 percent of walleye caught by anglers lost T-tags after two years, and only 13 percent of walleye recaptured in nets or electrofishing lost T-tags after one year. T-tags are preferred for use because of ease of application and minimal physical effects on the fish. The recent finding of high retention of T-tags on Tiber Reservoir walleye is encouraging. However, conversion to exclusive use of T-tags on walleye in area reservoirs is not recommended until questions concerning variable retention rate are resolved.

Cinch-up tags have been the standard walleye tag used in Region 4 waters for approximately the past decade. Cinch tags causes some disfigurement and are relatively time-consuming to apply, but we assumed retention would be very high. Recent evaluations suggest otherwise. Approximately 53 percent and 47 percent of cinch tags were shed by walleye in Bynum and Tiber reservoirs, respectively, after two years. Loss of cinch tags has varied from 13-35 percent after one year in Tiber.

We cannot explain the observed discrepancies in retention of cinch and T-tags by walleye in Tiber and Bynum reservoirs. Low sample sizes and method of recapture (anglers, nets, electrofishing) may explain some of the variability. More investigation will be required to identify the most effective tagging method and to determine appropriate factors to adjust exploitation estimates to account for tag loss. Preliminary results indicate metal jaw tags

have very good retention and jaw tags have been used on walleye in the Midwest with good success (Haas 1990). Walleye will be double tagged in each reservoir (jaw and T-tags in Bynum: jaw and cinch tags in Tiber) for at least the next year or two to further evaluate the rate and levels of tag loss.

Year-class strength of walleye in Bynum, Frances and Tiber was determined by grouping several years of age data collected in fall gill net surveys. Ageing of walleye from these waters should continue in order to add to the data base and to obtain a more reliable index, which can be used to evaluate stocking programs, other management actions, and factors regulating walleye abundance.

As of February 25, 1997, continuing access to Petrolia Reservoir has not been assured. The Montana Department of Natural Resources and Conservation has yet to transfer the access site to any party. MDFWP continues to work on this issue. Spottail shiners should be planted one more time in Petrolia Reservoir to insure a successful transplant. Walleye should continue to be stocked at rates seen during the past few years.

East Fork Reservoir needs additional monitoring to insure the game species are being well-managed. A spring trapping and tagging operation may be warranted to determine if the fishery is being over harvested and to determine size structure of the northern pike and yellow perch populations.

Largemouth bass stocking was terminated in C-1 Reservoir in 1996, since bass did not overwinter successfully. The pond has good access and is productive, so catchable trout will be stocked in that pond starting in 1997. Benes' pond should be stocked with more yellow perch in 1997 and needs to be monitored to determine if northern pike are still present. If northerns are not found they should be stocked in 1998.

Boat planting of smallmouth bass in the Portage Coulee section appears to have been successful. Distributing bass throughout the habitat should continue along with evaluation by electrofishing.

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PRINCIPAL FISH SPECIES INVOLVED: Walleye, northern pike, yellow perch, spottail shiner, largemouth bass.

CODE NUMBERS OF WATERS REFERRED TO IN REPORT:

14-6840	Arod Lake (Eyraud Lake)
14-7080	Bynum Reservoir
14-7440	Lake Frances
14-9240	Tiber Reservoir
16-4461	Benes Pond #3
16-4590	C-1 Reservoir
16-4950	East Fork Spring Creek Reservoir
16-6070	Jakes Reservoir

CODE NUMBERS cont.

16-	Kolar Pond # 8
17-4864	Missouri River Sec. 07
17-	Pelican Point Pond # 1
17-	Pelican Point Pond # 2
17-9040	Harwood Lake
18-8720	Petrolia Reservoir
20-7950	Pishkun Reservoir

Appendix I. Forage fish/reproduction beach seining survey results for several Region 4 reservoirs during August, 1996.

Water	Date	Water temp °F	No. of pulls	YP	SS	WE	NP	Carp	MSc	LC	ES	SB	WSu	FHC	Cray	LND
Bynum Res.	8/20/96	64°	18	10.1	9.7	0.8			Tr.				2.3		2.5	
Lake Frances	8/19/96	64°	18	187.3	141.9	1.3	1.7						3.7		0.6	
Pishkun Res.	8/21/96	60°	14	28.8	0.3		0.2						7.9		0.1	
Tiber Res.													0.3		1.4	
Dam	8/27/96	68°	17	39.9	165.5	2.5	0.2	0.8	0.1				1.4	0.1	1.7	
WCA	8/28/96	68°	17	39.4	195.5	2.5	0.6	4.2	0.1		0.1	0.4	0.8	0.2	6.5	
BT	8/29/96	67°	15	11.5	74.3	1.6	0.2	0.5	0.2	0.3			0.8	0.2		0.1
Devon	8/26/96	68°	17	6.6	101.8	15.4	0.1		0.3	4.6	0.4		0.8	0.2		Tr.
Tiber combined			66	24.8	136.1	5.6	0.3	1.4	0.2	1.3	0.1	0.1	0.8	0.1	2.3	

Appendix II. Gill net summaries by area of Tiber Reservoir (1996).

Area Date)	No. of nets	Hours fished	Species	No. of fish	Length range (Avg)	Weight range (Avg)
WCA Area (9/4/96)	10	16.8	WE	11	7.0-12.9 (10.1)	0.10- 0.68 (0.36)
				15	13.0-15.4 (14.4)	0.60- 1.16 (0.91)
				7	16.0-19.1 (17.5)	1.18- 2.22 (1.68)
				4	20.3-28.8 (23.0)	2.54- 8.70 (4.22)
			NP	1	(8.1)	(0.14)
				8	18.1-19.5 (18.9)	1.43- 1.65 (1.54)
				26	20.1-24.1 (21.8)	1.14- 3.40 (2.19)
			YP	36	4.6- 8.0 (6.6)	0.05- 0.24 (0.15)
				4	9.6-10.2 (9.9)	0.42- 0.52 (0.48)
				2	11.2-11.6 (11.4)	0.68- 0.84 (0.76)
			WSu	27	14.8-19.9 (16.3)	1.50- 3.24 (2.04)
			Rb	4	18.4-20.7 (19.4)	1.98- 3.16 (2.53)
			Carp	1	(4.2)	(0.05)
Dam Area (9/5/96)	6	18.0	WE	3	6.8- 8.2 (7.3)	0.10- 0.16 (0.12)
				5	13.3-15.8 (14.6)	0.72- 1.53 (1.02)
				1	(18.0)	(1.83)
			NP	2	16.5-17.6 (17.1)	0.90- 1.14 (1.02)
				5	21.1-23.3 (21.9)	1.85- 2.70 (2.35)
			YP	9	5.3- 8.6 (6.5)	0.07- 0.34 (0.15)
			WSu	11	15.0-17.9 (16.4)	1.74- 2.64 (2.13)
			LnSu	2	15.0-15.1 (15.1)	1.34- 1.38 (1.36)
			Rb	4	17.5-19.1 (18.2)	1.96- 2.26 (2.12)
			Carp	1	(27.3)	(12.50)
BT Area (9/5-6/96)	6	18.9	WE	7	9.3-12.4 (10.8)	0.24- 0.60 (0.39)
				5	13.2-14.5 (13.9)	0.67- 0.88 (0.79)
				1	(16.7)	(1.10)
			NP	1	(14.7)	(0.83)
				2	18.1-18.1 (18.1)	1.32- 1.36 (1.34)
				2	20.9-26.3 (23.6)	1.82- 4.30 (3.06)
			YP	13	6.7- 8.4 (7.5)	0.18- 0.28 (0.21)
				4	10.1-10.4 (10.2)	0.51- 0.52 (0.52)
			WSu	2	15.3-15.4 (15.4)	1.58- 1.71 (1.65)
			LnSu	3	10.8-14.7 (13.3)	0.44- 1.32 (1.01)
			Rb	4	12.1-13.6 (12.6)	0.79- 1.09 (0.87)
				2	19.3-20.3 (19.8)	2.59- 3.20 (2.89)
			Carp	1	(26.4)	
Devon Area (9/6/96)	5	20.5	WE	8	8.7-12.2 (10.9)	0.19- 0.52 (0.38)
				1	(13.5)	(0.76)
				1	(17.9)	(1.92)
			NP	1	(23.2)	(2.38)
			YP	2	5.4- 7.1 (6.3)	0.08- 0.16 (0.12)
				2	10.1-10.4 (10.3)	0.50- 0.58 (0.54)
			WSu	4	14.7-18.8 (16.3)	1.48- 3.02 (2.05)
			LnSu	4	6.9-11.1 (8.8)	0.12- 0.52 (0.29)
			Rb	3	12.0-13.9 (13.0)	0.70- 1.10 (0.97)
			Carp	1	(21.5)	(5.36)
			FHC	1	(7.0)	(0.12)

Appendix III. Age composition of walleye captured in fall gill nets on Bynum Reservoir, 1991-1996.

Year	No. of spines	No.of nets	Number of fish per age per gill net set									Totals
			1	2	3	4	5	6	7	8	9	
1991	14	4	1.00		0.50	1.75		1.25				4.50
1992	23	4		1.50	3.50	0.50	0.50	0.50				6.50
1993	45	4		4.00	7.50	0.50	1.18		0.33	0.25		13.76
1994	26	4		0.50	1.38	4.13	0.25	0.25			0.25	6.76
1995	94	10	3.10	0.10	0.31	3.69	1.97	0.53		0.10		9.80
1996	60	10	0.80	1.10	0.30	0.30	1.60	5.00			0.30	9.40
Mean catch for each age class			0.82	1.20	2.25	1.81	0.92	1.25	0.06	0.06	0.09	8.46
Avg % contribution by each age class			.097	.142	.266	.214	.109	.148	.007	.007	.011	1.001

Appendix IV. Age composition of walleye captured in fall gill nets in Lake Frances, 1991-1996.

Year	No. of spines	No.of nets	Number of fish per age per gill net set											
			1	2	3	4	5	6	7	8	9	10	11	12+	Totals
1991	41	6	0.67	0.83	2.00	1.50	0.83	0.50		0.33	0.17				6.83
1992	24	12		0.33	0.94	0.39		0.42	0.08						2.16
1993	45	10		0.70	1.30	0.70	0.80	0.10	0.30	0.30	0.20	0.30			5.40
1994	54	10		0.20	0.68	1.44	1.09	0.41	0.30	0.61	0.78		0.10	0.20	5.81
1995	57	20	0.65	0.05	0.40	0.40	0.25	0.45	0.20		0.25	0.10	0.05	0.05	2.85
1996	73	20	0.35	0.90	0.25	0.25	0.42	0.60	0.60	0.26	0.06	0.43	0.06	0.10	4.28
Mean catch for each age class			0.28	0.50	0.93	0.78	0.57	0.41	0.25	0.25	0.24	0.14	0.06	0.06	4.45
Average % contribution by ea. age class			.063	.112	.209	.175	.128	.092	.056	.056	.054	.031	.009	.013	.998

Appendix V. Age composition of walleye captured in fall gill nets on Tiber Reservoir, 1991-1996.

Year	No. of spines	No. of nets	Number of fish per age per gill net set													Total
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1991	105	24	0.91	4.18	2.12	1.44	1.05	0.42	0.36	0.15	0.05	0.04				0.04	10.76
1992	102	25		1.70	3.22	1.14	0.93	0.69	0.60		0.04						8.32
1993	92	25	0.28	0.59	2.80	0.72	0.68	0.44	0.33	0.13							5.97
1994	66	25		0.38	1.65	0.37	0.12	0.13		0.09	0.05	0.04	0.04	0.04			2.91
1995	97	28	0.18	0.48	1.58	2.13	0.92	0.23	0.26	0.08	0.04						5.90
1996	65	27	0.22	0.15	0.51	0.61	0.66	0.11	0.15	0.11						0.04	2.56
Mean catch for each age class			0.27	1.25	1.98	1.07	0.73	0.34	0.28	0.09	0.03	0.01	0.01	0.01		0.01	6.08
Avg % contribution by ea. age class			.044	.206	.326	.176	.120	.056	.046	.015	.005	.002	.002	.002		.002	1.002