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

STATE: Montana PROJECT NO.: F-46-R-7
PROJECT TITLE: Statewide Fisheries Investigations JOB NO. IV-b
STUDY TITLE: Survey and Inventory of Warmwater Lakes
JOB TITLE: Northcentral Montana Warmwater Lakes Investigations

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

ABSTRACT

During the report period, investigations were conducted on four warmwater irrigation storage impoundments. Natural reproduction of walleye was documented in Bynum Reservoir. Walleye recruitment from 1990 and 1991 is now entering the fishery at Lake Frances. Increased exploitation of walleye is occurring in the Marias River above Tiber Reservoir. Spottail shiner numbers are decreasing in Bynum and Tiber Reservoirs, while increases were noted for yellow perch in these same waters. Water temperatures averaged 5-10 degrees cooler than normal throughout most of the summer. Age determinations using cross-sectioned spines is presented for northern pike and walleye for the years 1991 through 1993. Only one fish, a walleye, was sampled during fall gill netting in Petrolia Reservoir. Additional yellow perch spawning structures were placed in Tiber and Petrolia reservoirs.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To find a source of walleye eggs that can be used to satisfy management demand.

2. To improve spawning habitat to maintain natural sport fish and forage fish populations. (State funded).

3. To enhance over-winter survival in Split Rock Lake for yellow perch and northern pike. (State funded).

4. To provide 2,000 angler days use for yellow perch and 3 to 6 pound northern pike in Pishkun Reservoir.

5. To provide a walleye fishery in Bynum and Morony Reservoirs to provide 6,000 angler days for 2 pound fish.

6. To provide 25,000 angler days for 2-4 pound walleye and 4-8 pound northern pike in Tiber Reservoir and Lake Frances.

7. To maintain current population levels of walleye in Holter and Hauser Reservoirs. (State funded).

8. To develop a largemouth or smallmouth bass fishery in Lake Helena to provide 1,000 angler days of use. (State funded).

9. To develop fishable populations of largemouth bass, crappie and yellow perch in 20 farm ponds to provide 5,000 angler days use.

10. To maintain forage fish species to sustain game fish populations.

11. To evaluate need for new introductions of forage fish. (State funded).

12. To involve sportsman groups and general fishing public in management and planning process. (State funded).

Progress was made on most federally funded objectives and data are included in this report. Data for some state funded objectives is included to update Regional files.

PROCEDURES

Fish populations were sampled with 125 x 6 foot experimental gill nets 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 samples, were collected from some fish for food habit, and age and growth studies, respectively. Northern pike fin rays and walleye spines were mounted and sectioned according to methods described by Mackay et al (1990). Floy T-tags were used to mark northern pike and some walleye, while Floy Cinch-up tags were used exclusively on walleye.

FINDINGS

Walleye Egg Source

For the past several years, attempts have been made during spring trapping operations to collect walleye eggs for the hatchery system. Eggs have been taken from Tiber Reservoir on two previous occasions. During 1993, only three ripe females at Bynum Reservoir and four ripe females at Tiber Reservoir were handled. At Lake Frances, 23 gravid females were taken. Eggs were not taken because few numbers were expected from the size of the fish.

Bynum Reservoir

A total of 34 trap net nights were expended from April 12-16, 1993. Six to seven traps were fished per night. Total numbers of fish taken in traps include 305 walleye, 1149 yellow perch, 1196 white sucker and 2 brook trout. A total of 51 one-hour gill net sets caught an additional 54 walleye, 162 white sucker, 40 yellow perch, 4 mountain whitefish and 1 brook trout. From the total walleye taken with the two types of sampling gear, 225 were tagged and released to aid in harvest determinations, 42 were recaptures of fish tagged in previous years, and 2 fish were released without being tagged. These fish averaged 18.0 inches (range 14.0-26.5). The remaining 90 walleye were under 14 inches. Figure 1 depicts the length frequency of fish over 14 inches and shows that the population has good numbers of 16-19 inch fish. Water temperatures ranged from 44-45°F during the April surveys.

Angler success was considered poor during the summer of 1993. Anglers voluntarily returned 25 tags, representing fish tagged from 1989 through 1993 (Table 1). Only 3.6 percent of the fish tagged in 1993 were reported harvested. Cumulative harvest of earlier tagging years ranges from 13.2-21.9 percent.

Seining conducted on August 18, 1993, collected three species of forage fish along with walleye and crayfish (Appendix I). Figure 2 shows that spottail shiner populations continue to decrease while yellow perch numbers have rebounded dramatically. Natural reproduction of walleye was also documented during the report period, as no fry or fingerling were stocked in 1993. Water levels were somewhat stable throughout the summer, with slight increases noticed due to above normal precipitation. Inflows generally kept up with discharges for irrigation.

Four experimental gill nets were fished in September to monitor trends. Examination of Table 2 shows that white sucker were most abundant followed by walleye and yellow perch. A slight increase is noted in walleye numbers when compared to 1991 and 1992 (Figure 3). Trends for yellow perch continue downward while white sucker (less than 12 inches) showed a slight increase.

A total of 23 stomachs were analyzed from walleye taken during the gill net survey. Approximately one-half were empty (Table 3) and about one-third contained fish remains. Fish remains are most likely yellow perch or spottail shiner.

Lake Frances

Four to six trap nets were fished from April 12-15, 1993, to collect walleye and northern pike for tagging purposes. Short duration gill nets were also used, but caught few fish. Water temperatures varied from 43-46°F during the surveys. A total of 14 gill net sets (1-hr sets) and 20 trap net nights caught 344 walleye, 86 northern pike, 9 yellow perch, 2 burbot and 82 white sucker. Of the fish caught, 76 northern pike and 250 walleye were

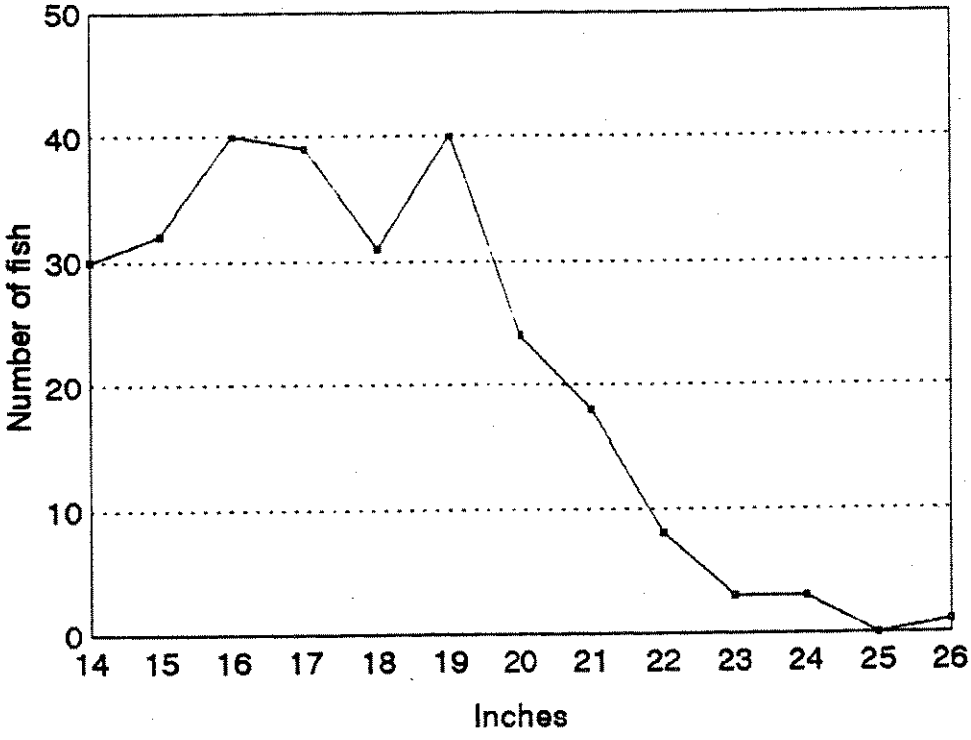

Figure 1. Length frequency of 269 adult walleye (Bynum Res. - April, 1993).

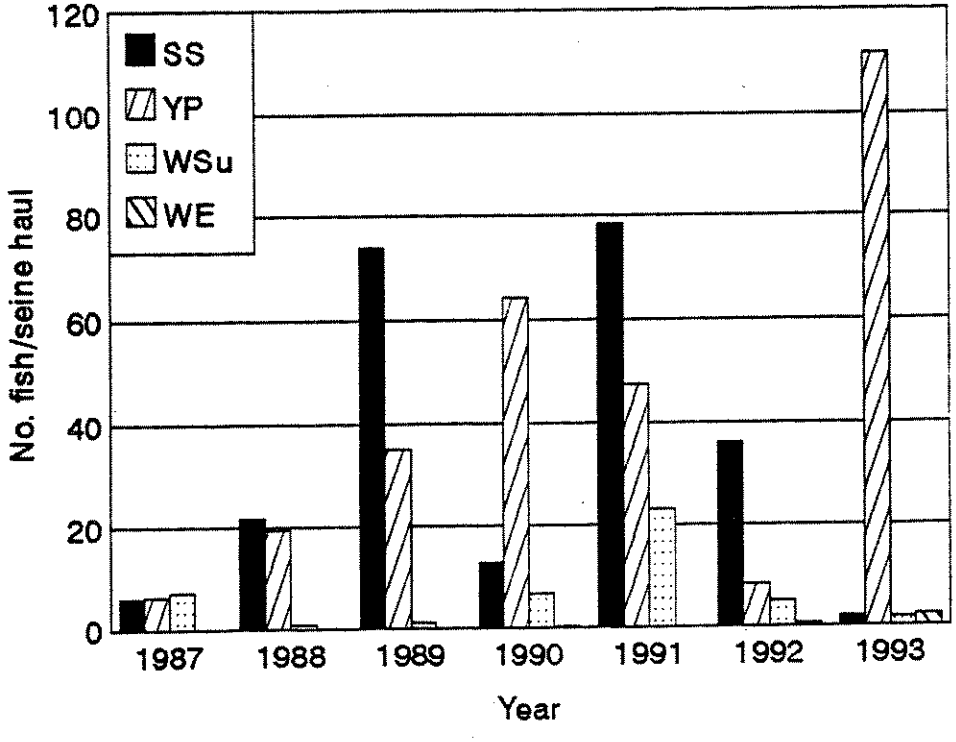

Figure 2. Forage fish trends in Bynum Reservoir, 1987-1993.

Table 1. Angler exploitation of walleye and northern pike in area reservoirs. (Based on voluntary tag returns, 1989-1993.)

Lake	Species	Year tagged	Number tagged	Number of returns (%) 1989	1990	1991	1992	1993	Cumulative
Bynum Res.	WE	1989	126	15(11.9)	5(4.0)	1(0.8)	0(0.0)	1(0.8)	22(17.5)
		1990	219		14(6.4)	4(1.8)	8(3.7)	3(1.4)	29(13.2)
		1991	226			12(5.3)	23(10.2)	4(1.8)	39(17.3)
		1992	256				47(18.4)	9(3.5)	56(21.9)
		1993	225					8(3.6)	8(3.6)
Lake Frances	WE	1989	202	28(13.9)	13(6.4)	1(0.5)	1(0.5)	0(0.0)	43(21.3)
		1992	242				21(8.7)	12(4.9)	33(13.6)
		1993	250					19(7.6)	19(7.6)
	NP	1989	430	87(20.2)	18(4.2)	10(2.3)	6(1.4)	1(0.2)	122(28.4)
		1992	66				7(10.6)	1(1.5)	8(12.1)
		1993	76					3(3.9)	3(3.9)
Pishkun Res.	NP	1992	80				13(16.2)	3(3.8)	16(20.0)
		1993	157					27(17.2)	27(17.2)
Tiber Res.	WE	1990	271		19(7.0)	18(6.6)	3(1.1)	4(1.5)	44(16.2)
		1991	692			70(10.1)	21(3.0)	15(2.2)	106(15.3)
		1992	266				15(5.6)	20(7.6)	35(13.2)
		1993	398					35(8.8)	35(8.8)
	NP	1990	346		33(9.5)	7(2.0)	0(0.0)	1(0.3)	41(11.8)
		1991	314			32(10.2)	5(1.6)	2(0.6)	39(12.4)
		1992	99				6(6.1)	5(5.0)	11(11.1)
		1993	225					21(9.3)	21(9.3)

Table 2. Overnight gill netting results in warm water reservoirs in the western portion of Region Four during 1993.

Water (date surv)	Surface acres1/	No. of nets2/	Mean hrs/net	Species3/	No. of Fish	Length(in.) range (avg.)	Weight(pounds) range (avg.)
Bynum Res. (9/15/93)	2,000	4 S	16.5	WE	18	8.9-12.7(11.4)	0.20- 0.68(0.47)
					29	13.0-15.8(14.1)	0.73- 1.40(1.00)
					8	16.5-19.7(18.3)	1.75- 2.98(2.30)
					1	(21.6)	(3.62)
				YP	7	7.3- 8.8(8.3)	0.18- 0.36(0.28)
					14	9.0-10.9(9.7)	0.34- 0.75(0.51)
					3	11.3-11.6(11.5)	0.76- 1.13(0.94)
				Wf	1	(12.3)	(1.39)
				WSu	31	5.5-11.9(9.6)	0.24- 0.78(0.49)
					139	14.4-16.6(15.3)	1.26- 2.11(1.58)
					17	17.8-18.3(18.0)	2.60- 3.14(2.82)
Lake Frances (9/14/93 & 9/17/93)	4,800	10 S	19.8	WE	17	10.0-12.8(11.5)	0.30- 0.67(0.49)
					14	13.0-15.9(14.5)	0.70- 1.40(1.05)
					13	16.2-19.7(17.9)	1.45- 2.44(1.93)
					3	23.9-24.9(24.3)	4.25- 5.75(4.84)
				NP	6	8.6-15.5(12.8)	0.11- 0.86(0.47)
					14	16.3-19.7(18.2)	0.90- 1.73(1.31)
					12	20.1-25.8(21.3)	1.73- 3.90(2.19)
				YP	10	6.9- 8.9(7.8)	0.15- 0.36(0.24)
					12	9.3-10.7(10.2)	0.43- 0.83(0.62)
					3	11.0-11.5(11.2)	0.78- 1.03(0.88)
				WSu	5	18.0-19.4(18.9)	2.72- 3.41(3.18)
Tiber Res. (9/22-24/93)	16,400	25 S	18.6	WE	66	7.3-12.5(10.8)	0.09- 0.62(0.41)
					47	13.1-15.9(14.5)	0.55- 1.40(0.98)
					36	16.3-19.6(17.7)	1.34- 2.37(1.82)
				NP	2	10.8-11.1(11.0)	0.30- 0.31(0.31)
					21	22.1-27.2(24.6)	2.89- 4.63(3.53)
				YP	4	5.6- 7.7(7.0)	0.06- 0.18(0.15)
					6	9.1-10.5(9.6)	0.32- 0.60(0.44)
					1	(11.2)	(0.70)
				Rb	2	20.4-21.0(20.7)	2.71- 2.90(2.81)
				Lt	1	(28.6)	-
				Wf	2	9.7-10.8(10.3)	0.29- 0.40(0.35)
				Ling	1	(23.0)	(2.70)
				WSu	7	7.0-12.0(10.1)	0.17- 0.79(0.54)
					11	15.4-19.6(17.4)	1.87- 3.58(2.59)
				LnSu	9	7.9-13.1(10.3)	0.17- 0.81(0.42)
				Carp	5	23.7-30.1(26.4)	7.50-13.50(10.50)

1/ Approximate surface acres at time of survey.
2/ Standard experimental gill nets: S = sinking.
3/ Species abbreviations: WE = walleye; YP = yellow perch; NP = northern pike; Wf = mountain whitefish; Rb = rainbow trout; Lt = lake trout; Ling = burbot; WSu = white sucker; LnSu = longnose sucker.

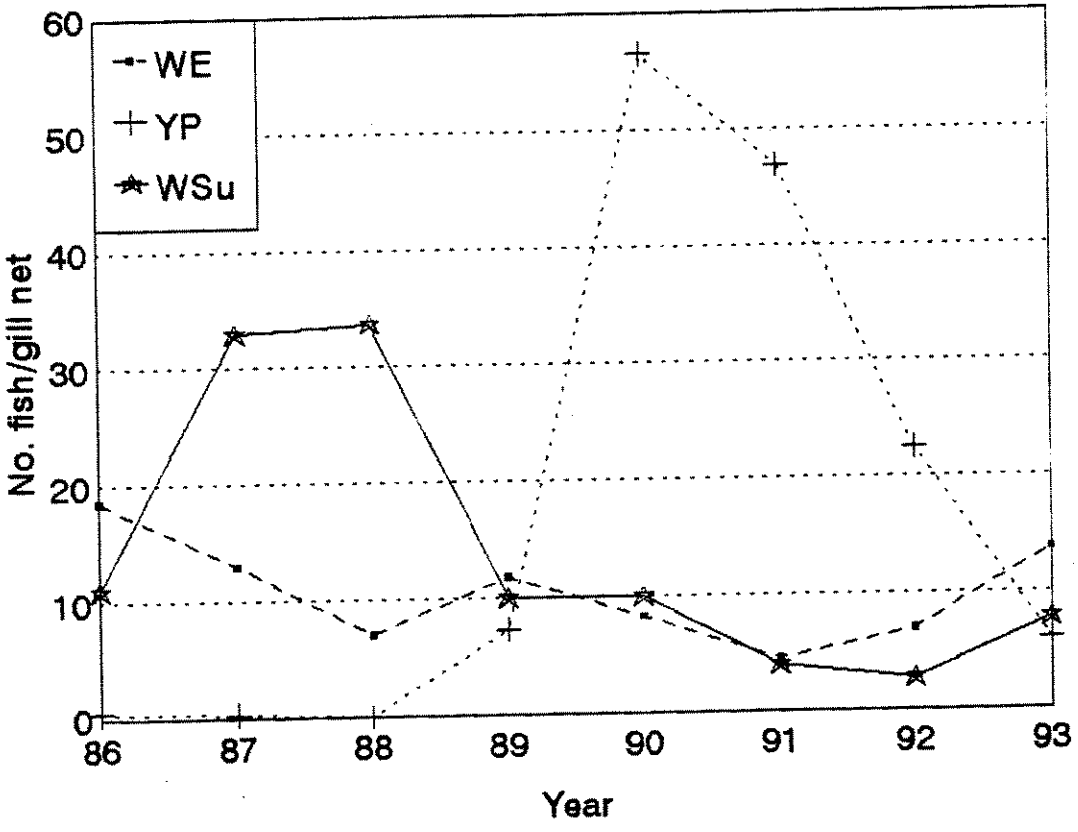

Figure 3. Trends of Bynum Reservoir fish populations (fall gill nets, 1986-93)

Table 3. Number of walleye and northern pike stomachs containing various food items from three warmwater lakes, 1993.

Item	Walleye			Northern Pike	
	Tiber	Frances	Bynum	Tiber	Frances
Empty	30	9	11	10	9
Fish remains	53	10	7	9	6
Spottail shiner	6	2	0	0	1
Walleye	0	1	0	1	0
Northern pike	0	0	0	0	1
Yellow perch	0	1	0	0	2
Carp	1	0	0	0	0
Crayfish	1	4	4	2	7
Snails	0	0	0	0	2
Aquatic insects	2	0	0	0	1
Shrimp	0	7	1	0	6
Tapeworms	2	0	0	0	0
Vegetation	6	1	0	1	0
No. of stomachs	87	30	23	21	27

tagged and released. Mean length was as follows: northern pike-20.2 inches (range 16.0-37.6); walleye-17.7 inches (range 14.0-27.2). Figure 4 shows that the majority of the walleye taken during the April surveys were between 14 and 17 inches. Fish released without tagging include 3 northern pike and 10 walleye that were recaptures of fish tagged in previous years. Other walleye released include 43 fish under 14 inches, 11 over 14 inches and 30 collected for mercury testing.

During the report period, anglers voluntarily returned tags from 31 walleye and 5 northern pike (Table 1). Exploitation rates in 1993 for walleye is comparable to past years but considerably lower for northern pike. Cumulative harvest ranges from 13.6 to 21.3 percent for walleye and 12.1-28.4 percent for northern pike tagged in previous years.

Forage fish surveys were conducted on August 17, 1993. The lake was nearly full on the date of the survey, with abundant vegetation in most shoreline areas. Vegetation made it difficult to seine, as the net would roll and pull to the surface, allowing fish to escape under the net. For this reason, results are not included in Appendix I. It can be reported, however, that the following forage fishes were sampled: yellow perch, spottail shiner and white sucker. Young-of-the-year walleye and burbot were also captured.

Surface water temperature during the forage fish survey (64°F) was 4-7° cooler than temperatures recorded in previous years. Temperature profiles conducted in mid-July showed nearly 10° lower than normal. The July profile was a uniform 58° from surface down to 30 feet.

The fall gill net survey included 6 sinking nets on September 14, and 4 sinking nets on September 17, 1993. Results in Table 2 show walleye were most abundant followed by northern pike and yellow perch. Figures 5a and 5b depict trends in the fishery since 1972. In 1993, walleye numbers doubled from those found in 1992. Yellow perch, northern pike and white sucker numbers all show decreases from the previous year.

Stomachs of walleye and northern pike taken in the gill net survey were examined for food content. Of 30 walleye stomachs, nearly one-third were empty while another one-third contained remains of unidentified fish (Table 3). Crayfish and amphipods also occurred in several stomachs. One-third of 27 northern pike stomachs contained no visible food items while about 20 percent had fish remains. Crayfish and amphipods were also utilized.

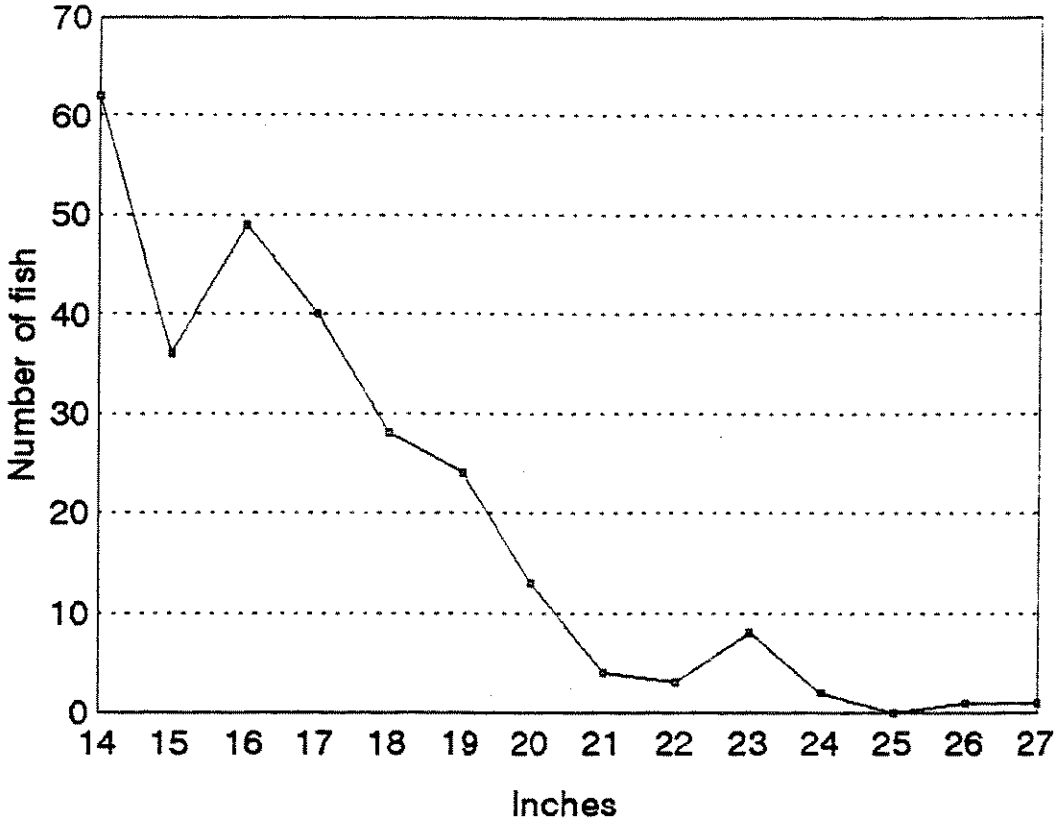

Figure 4. Length frequency of 277 adult walleye (L.Frances - April, 1993).

In a previous document, (Hill et al. 1993), it was reported that poor walleye reproduction occurred in the mid 1980's but recruitment was fairly significant for the years 1990 through 1992. Analysis of spines from fish collected in the spring and fall of 1993, indicate that the 1990 and 1991 year classes are now coming into the fishery. Additional information on aging of walleye and northern pike appears in a later section of this report.

Pishkun Reservoir

Spring trap net investigations were conducted in this water for purposes of estimating the northern pike population. Seven to 10 nets were fished from April 18-22, 1993. Water temperatures ranged from 45-48°F during the surveys. A total of 43 trap net nights captured 192 northern pike, 172 yellow perch, 132 white sucker, 27 rainbow trout, 2 cutthroat trout and 16 kokanee salmon. Of the total northern pike taken, 157 were tagged and released to help determine harvest, 2 were recaptures of previously tagged fish, and 33 were released without tagging (under 16"). Tagged fish averaged 20.5 inches and ranged from 16.0-38.5 inches. A population estimate was not made due to the small number of recaptures obtained. Trapping operations were suspended after five nights.

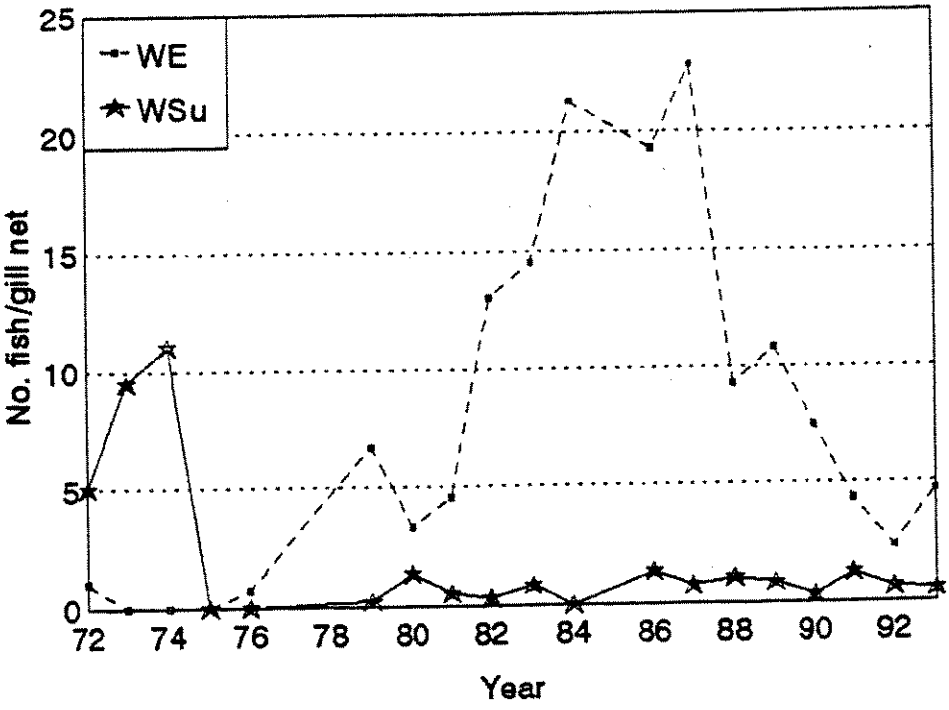

Figure 5a. Trends in walleye and white sucker populations in Lake Frances (fall gill nets, 1972-1993).

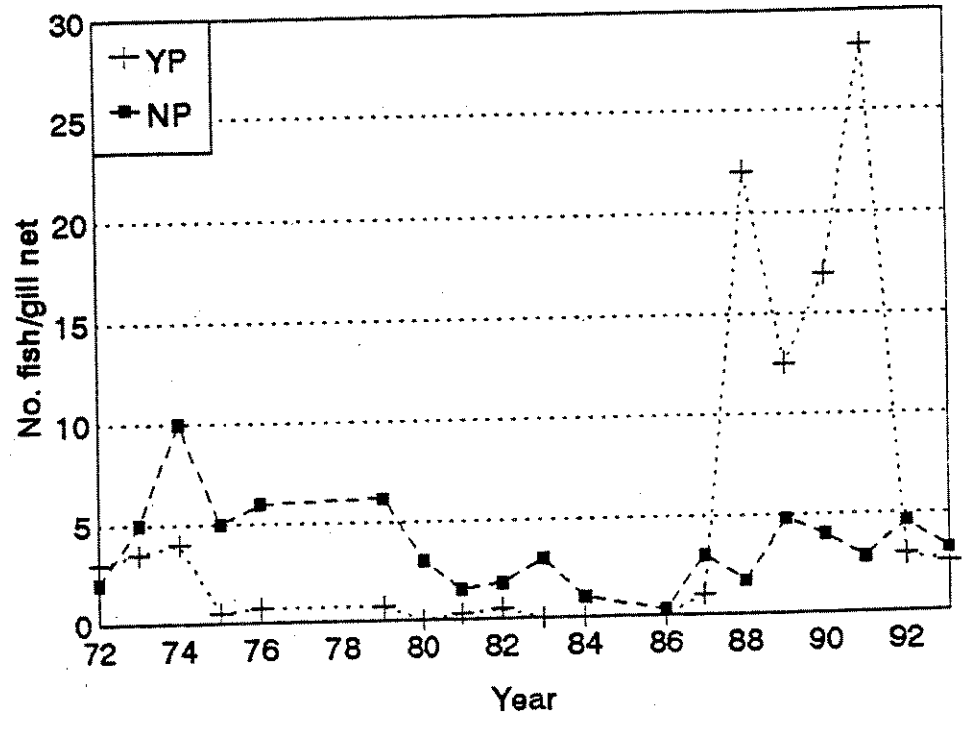

Figure 5b. Trends in northern pike and yellow perch populations in Lake Frances (fall gill nets, 1972-1993).

Anglers returned 30 tags from northern pike harvested during the report period. Angling success is rated good, with 17.2 percent harvest of fish tagged in 1993 (Table 1). Cumulative harvest of 1992 tagged fish is now 20 percent.

A total of 15 seine pulls were made during forage fish investigations on August 19. A listing of species collected and mean number per pull is found in Appendix I. Forage fish trends since 1987 is presented in Figure 6. Yellow perch numbers have decreased by nearly 50 percent from 1992. Spottail shiner were not taken in 1993 and apparently have failed to establish.

A gill net survey was conducted on September 27, 1993. The results are discussed in another report (Hill and Liknes 1994).

Tiber Reservoir

A total of 53 trap net nights were fished in the Devon and Willow Creek Arm (WCA) areas of the reservoir to monitor trends in species composition and relative abundance. Four to nine traps were fished in the Devon area from April 3-7, 1993 and ten traps fished April 8-9, 1993 in the WCA. Water temperatures ranged from 46-48°F during the investigations and the reservoir increased 0.4 feet to elevation 2979.7 feet m.s.l.

The following number of each species were caught during the trapping operation, Devon listed first, followed by WCA in parentheses: northern pike-141,(101); walleye-380,(110); yellow perch-8,(3); burbot-10,(8); white sucker-7,(139); rainbow trout-17,(0); cutthroat trout-1,(0); carp-36,(23).

Northern pike and walleye captured from both areas were tagged to help determine movement and harvest. A total of 225 northern pike and 398 walleye were tagged. Others handled include: recaptures of fish tagged in previous years (17-NP, 20-WE); fish released without tagging (50-WE); fish too small for tagging (22-WE). Northern pike averaged 23.1 inches (range 16.0-46.0) while walleye averaged 16.6 inches (range 14.0-29.8). Length frequencies of adult fish for both species, with areas combined, are illustrated in Figures 7 and 8. Good numbers of walleye occur between 14 and 18 inches while northern pike from 20 to 24 inches are common.

Temperature profiles conducted on July 15, 1993, ranged from 60.5°F at the surface to 58.5°F at 75 feet. Another profile taken on August 23, 1993, saw temperatures increase about six degrees at the surface and two degrees at 75 feet.

Angling success picked up in mid-July and remained good through the rest of the summer although water temperatures were cooler than normal. Anglers voluntarily returned tags from 74 walleye and 29 northern pike (Table 1). Minimum exploitation for fish tagged in

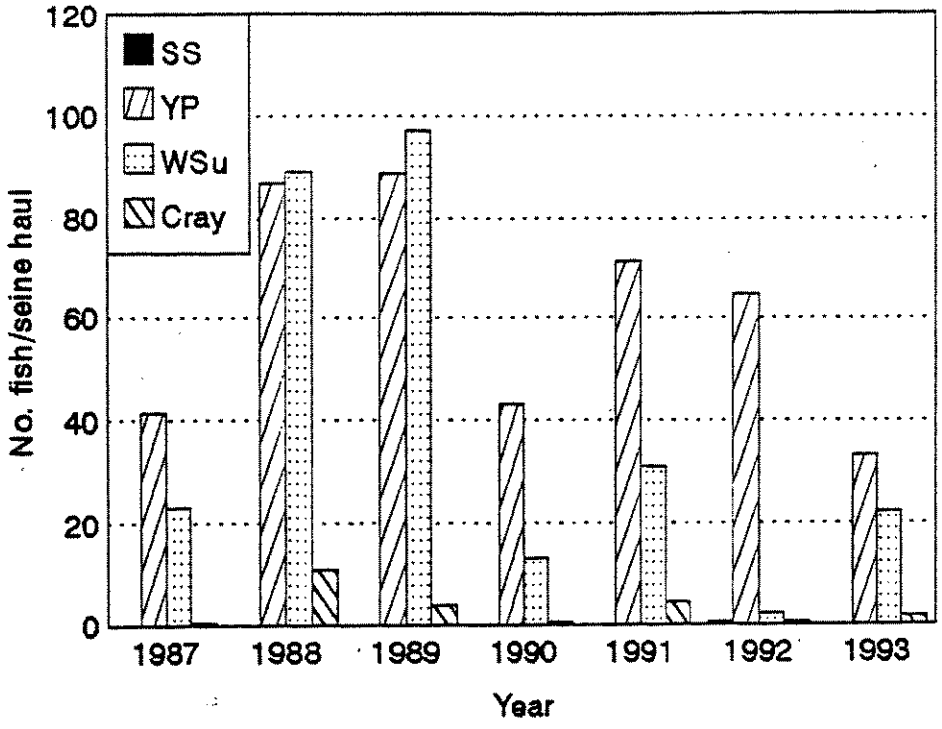

Figure 6. Forage fish trends in Pishkun Reservoir, 1987-1993.

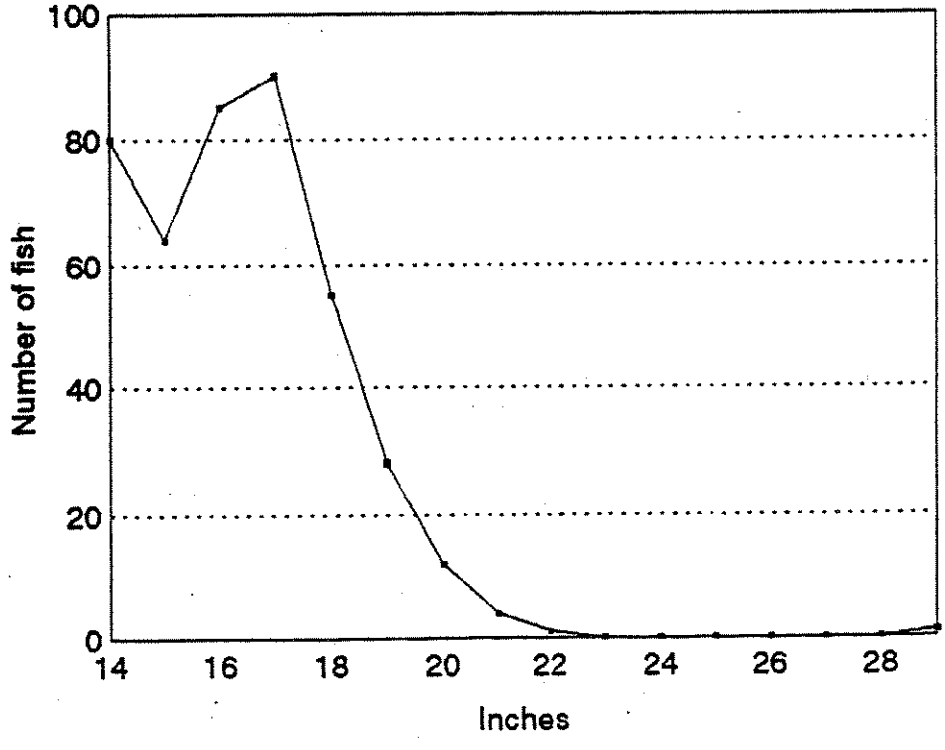

Figure 7. Length frequency of 420 adult walleye (Tiber Res. - April, 1993).

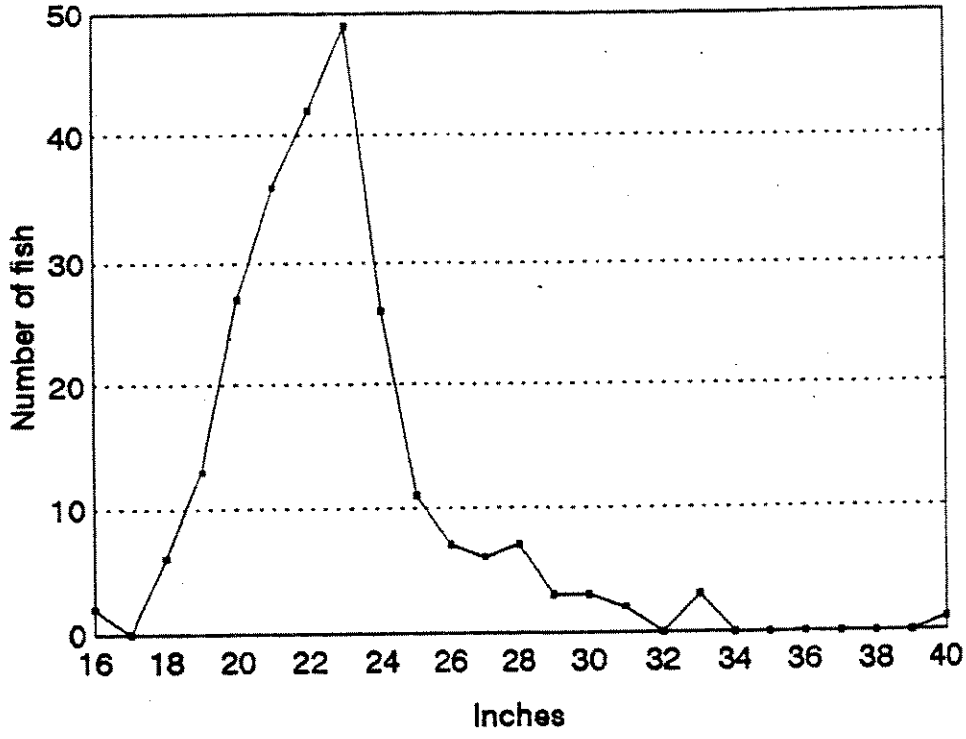

Figure 8. Length frequency of 244 adult northern pike (Tiber Res. - April, 1993).

1993 is 8.8 percent for walleye and 9.3 percent for northern pike. Cumulative harvest for tagging years 1990-1992 for walleye ranges from 13.2-16.2 percent, while northern pike is 11.1-12.4 percent.

Movement patterns of 1993 tagged fish are similar to previous years as summarized in a previous report (Hill et al. 1993). An exception is noted with walleye in that approximately 23 percent of the harvest was reported from the Marias River upstream of the reservoir. In 1991, walleye were harvested from the river at a rate of about 9 percent. Movement of walleye into the river and subsequent harvest during these two years coincides with high inflows and rising reservoir levels.

Seventy seine hauls were made throughout the reservoir from August 23-26, 1993. Vegetation in most areas made seining difficult. Water temperatures were five to seven degrees cooler than normal for this time of year. Appendix I gives a listing of the species collected in each of four established areas of the reservoir. Trends of the forage base is presented in Figure 9. Spottail shiner numbers decreased approximately 50 percent from 1992, and virtually no emerald shiners were taken. Yellow perch, white sucker and crayfish all showed slight increases. Walleye reproduction is rated good, with significant numbers noticed near the confluence with the river. Seining also indicates that 1993 is the first year in some time that measurable reproduction of northern pike has occurred.

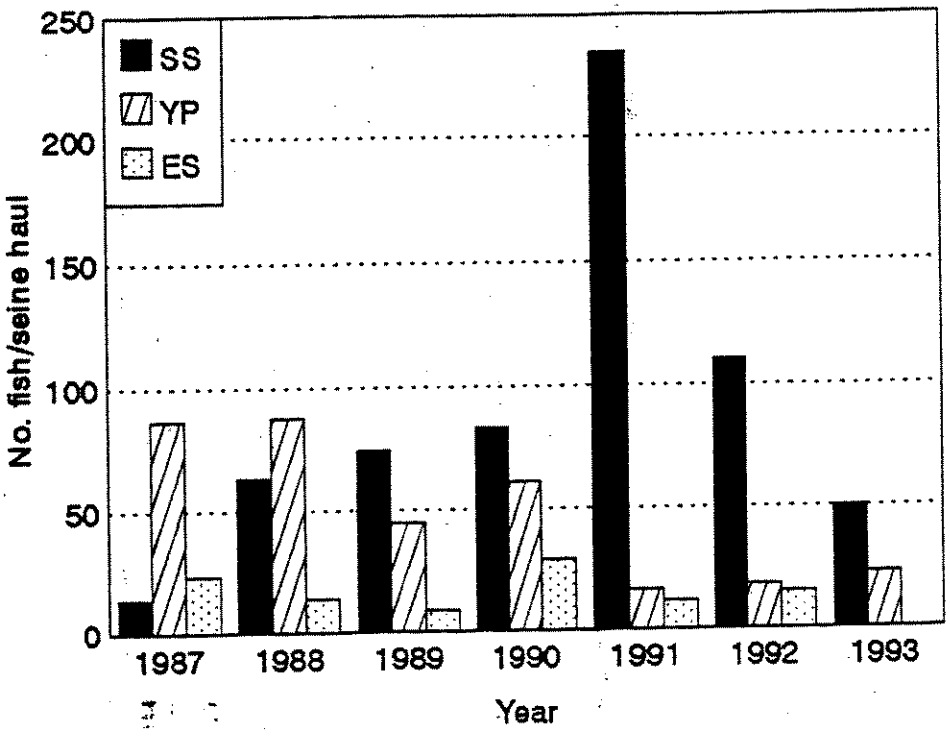

Figure 9. Forage fish trends in Tiber Reservoir, 1987-1993.

Surveys conducted in September employed a total of 25 sinking experimental gill nets and caught 10 species of fish (Table 2). Walleye predominated throughout the reservoir, followed by northern pike. Figures 10 and 11 display the trends in four species that are most common in the reservoir. After becoming established in the reservoir, walleye and northern pike have been a major influence on controlling yellow perch and white sucker numbers. Individual netting summaries for four areas of the reservoir are presented in Appendix II.

Stomach contents of walleye and northern pike taken in the gill net survey were analyzed in the field. The results appear in Table 3. Unidentified fish remains account for approximately 60 percent occurrence in walleye stomachs and 50 percent occurrence in northern pike stomachs. These remains are probably spottail shiner.

Negotiations continued with the Bureau of Reclamation through the Marias Management Committee to achieve desirable reservoir elevations during yellow perch spawning. As previously mentioned, yellow perch and northern pike showed slight increases in reproduction, and can be attributed to increasing levels and timing. With the help of the Hi-Line Sportsmen and Tri-anglers Walleye Unlimited clubs, a total of 24 artificial spawning

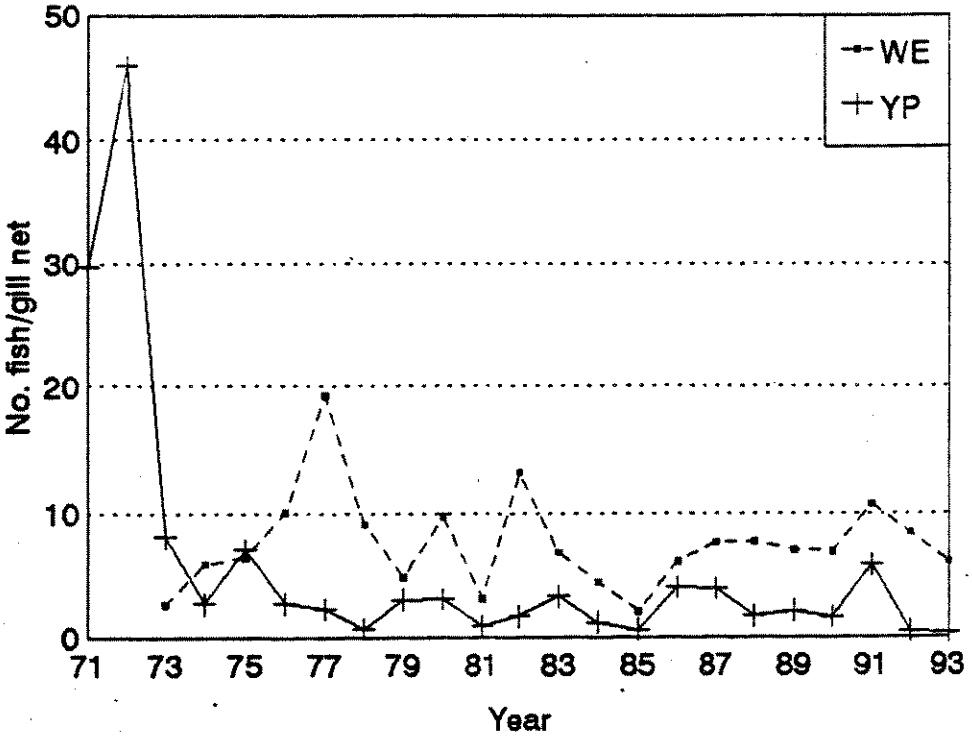

Figure 10. Trends in walleye and yellow perch populations in Tiber Res. (fall gill nets, 1971-93).

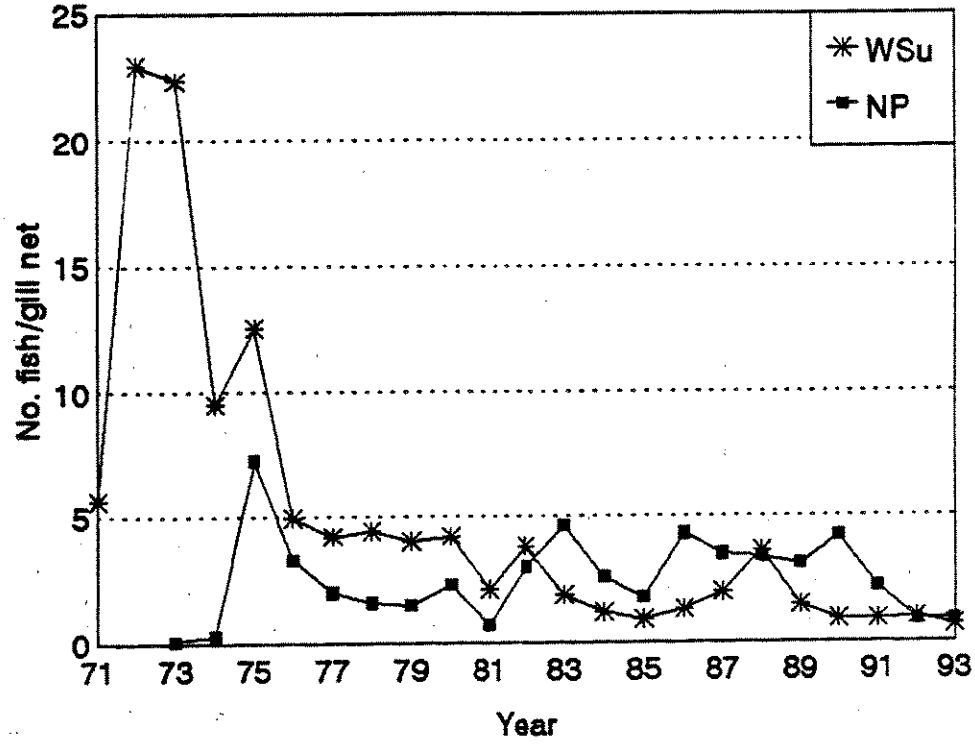

Figure 11. Trends in n. pike and white sucker populations in Tiber Res. (fall gill nets, 1971-93).

structures for yellow perch were placed in selected areas of the WCA, and an additional 32 structures were set in the Bootlegger Trail area.

Spottail Shiner

Seining and trap nets were used in Tiber Reservoir in early June of 1993 for purposes of collecting spottail shiner for transfer to Pishkun Reservoir. Although sufficient numbers were captured, none were moved due to the presence of a parasite that was visible under the scales. Specimens were preserved and sent in for analysis. Hoffman (1993) and Peterson (1993) identified the parasite as Unicauda clavicauda Kudo, 1934. Hoffman stated that no significant damage is caused to fish by this parasite, so it could be transplanted. In order to determine whether or not this parasite was also present in Lake Frances and Bynum Reservoir, seining was conducted in late June in both waters. No evidence was detected.

Age and growth

Since 1991, dorsal spines and pelvic fin ray have been collected to determine age of walleye and northern pike. During this report period, approximately 1380 walleye and 810 northern pike were aged from collections made in 1991, 1992 and 1993. Waters include Bynum, Pishkun and Tiber Reservoirs, and Lake Frances.

Although spines have been analyzed and ages determined, the data will be presented in the next report. Computer programs will be used to generate annual survival by age class as well as an index of year class strength.

Creel census

Weekend creel censuses were conducted at Lake Frances and Tiber Reservoir from Memorial Day to Labor Day. The data collected is presented in a separate document.

Petrolia Reservoir

Fall gill netting at Petrolia Reservoir produced only one fish, a walleye 11.4 in long and weighing 0.52 pounds (condition factor = 35.1). Sampling occurred one week earlier than in 1992. On 9 April 1994, 63 habitat structures were installed in the reservoir to help provide cover and spawning substrate for yellow perch. Fishing groups from Billings provided the labor and equipment to place the structures.

DISCUSSION AND RECOMMENDATIONS

Efforts to collect walleye eggs for statewide hatchery rearing and distribution were unsuccessful. Eggs will be taken if sufficient numbers of gravid females can be taken in future surveys. This will require additional time and manpower or at the expense of some of the waters now being investigated.

The walleye fishery in Bynum Reservoir continues to develop. Natural reproduction was documented in the absence of a scheduled fingerling plant. If walleye continue to reproduce successfully, future stocking could be eliminated. Spottail shiner numbers have decreased for the past two years but yellow perch increased dramatically in 1993. One or both of these species are important to provide the necessary forage base for walleye. It appears that walleye are beginning to crop down adult yellow perch and white sucker. Increased water levels predicted for 1994 should provide suitable spawning habitat for yellow perch.

Lake Frances is one of the most important walleye fisheries in the Region and State. The walleye population has been on a downward trend since the mid 1980's. However, strong year classes were produced in 1990, 1991 and 1992. Sampling gear is now picking up the first two year classes and the 1992 year class is expected to show in 1994 surveys. The addition of these three year classes will greatly improve the fishery. Sampling of forage fishes was limited by abundance of vegetation but it is felt that the lake has adequate numbers of spottail shiner and yellow perch. The forage base should continue to be monitored in the future.

A population estimate of northern pike in Pishkun Reservoir should be made during the next report period to determine predation potential on stocked rainbow trout. An estimate was not made during 1993. Forage sampling should continue and spottail shiner should be stocked as an additional food fish for northern pike.

Significant numbers of walleye are thought to move from Tiber Reservoir upstream into the Marias River. High inflows and rising reservoir levels possibly influence this movement. Tiber is also a very important walleye fishery and the population continues to be fairly stable when compared to the past several years. Forage sampling indicates that numbers are down but efforts were hampered by vegetation and cool water temperatures. The forage base should be closely monitored as well as the overall condition of walleye. If forage approaches unacceptable levels, consideration should be given to the introduction of cisco as presented in a paper prepared by Bennett (1993). Good reproduction of walleye was documented and northern pike are increasing for the first time in several years. Habitat improvement and water level management options should continue to be a priority. This would include installation of artificial spawning structures for yellow perch and discussions with the Bureau of Reclamation through the Marias Management

Committee.

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DATE: September 1994

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

CODE NUMBERS OF WATERS REFERRED TO IN REPORT:

14-7080	Bynum Reservoir
14-7440	Lake Frances
14-9240	Tiber Reservoir
18-8720	Petrolia Reservoir
20-7950	Pishkun Reservoir

Appendix I. Forage fish/reproduction surveys, 1993 (beach seining).

Water	Date	Water temp(°F)	No.of pulls	Number of fish/pull 1/ YP	SS	WSu	Cray	WE	NP	MSc	ES	Ling	LND	LC	FhC	Carp
Bynum Res.	8/18	63°	16	111.8	1.9	1.6	2.1	2.3								
LakeFrances	8/17	64°	12	*	*	*	*	*	*			*				
PishkunRes.	8/19	64°	15	33.4		22.3	1.7		0.1							
Tiber Res.																
Dam	8/23	66°	16	52.9	63.5	0.3	0.1	0.9	0.6							0.1
WCA	8/24	64°	18	13.8	50.9	6.3	0.1	0.3	0.3		0.2	0.1		0.1		
BT	8/25	64°	20	22.7	54.5	0.7	2.0	1.2	0.7	0.1		0.2	0.1	0.2	0.1	0.1
Devon	8/26	64°	16	2.5	29.4	0.6	0.5	7.5	0.1			0.1	0.1	0.8		0.2
Tiber combined			70	22.7	49.9	2.0	0.7	2.4	0.4	Tr.	Tr.	0.1	Tr.	0.2	Tr.	0.1

1/ Species abbreviations: YP = yellow perch; SS = spottail shiner; WSu = white sucker; Cray = crayfish; WE = walleye; NP = northern pike; MSc = mottled sculpin; ES = emerald shiner; Ling = burbot; LND = longnose dace; LC = lake chub; FHC = flathead chub.

* See explanation in text.

Appendix II. Gill net summaries by area, in Tiber Reservoir (1993).

Area (date)	No. of nets	Species	No. of fish	Length range (mean)	Weight range (mean)
Devon (9/24)	5	WE	6	7.8-12.2 (10.7)	0.12-0.52 (0.37)
			1	(15.1)	(1.00)
		NP	1	(11.1)	(0.30)
			1	(23.4)	(2.89)
		YP	1	(5.6)	(0.06)
			1	(9.1)	(0.35)
		Rb	1	(20.4)	(2.90)
		Wf	1	(10.8)	(0.40)
		LnSu	9	7.9-13.1 (10.3)	0.17-0.81 (0.42)
		WSu	1	(11.0)	(0.69)
Bootlegger (9/23-24)	6	WE	24	7.4-12.5 (11.1)	0.12-0.62 (0.43)
			15	13.6-15.9 (14.7)	0.75-1.24 (1.02)
			9	16.4-18.3 (17.3)	1.50-2.31 (1.86)
		NP	4	23.6-27.0 (24.6)	3.06-4.20 (3.56)
		YP	2	7.3- 7.4 (7.4)	0.18-0.18 (0.18)
			4	9.1-10.5 (9.7)	0.32-0.60 (0.43)
		Rb	1	(21.0)	(2.71)
		Ling	1	(23.0)	(2.70)
		Wf	1	(9.7)	(0.29)
		Carp	1	(30.1)	(13.50)
		WSu	1	(8.3)	(0.25)
			1	(17.8)	(2.50)
Dam area (9/23)	6	WE	14	7.4-12.3 (11.3)	0.09-0.56 (0.44)
			17	13.1-15.9 (14.5)	0.65-1.40 (1.02)
			15	16.5-19.6 (17.9)	1.50-2.37 (1.95)
		NP	4	24.6-27.2 (25.7)	3.18-4.63 (3.80)
		YP	1	(7.7)	(0.18)
		Lt	1	(28.6)	-
		WSu	3	10.4-11.4 (10.9)	0.54-0.72 (0.63)
		Carp	3	23.7-27.5 (25.7)	7.50-12.50(10.25)
WCA 9/22	8	WE	22	7.3-12.3 (10.1)	0.10-0.61 (0.38)
			14	13.1-15.3 (14.2)	0.55-1.27 (0.89)
			12	16.3-19.0 (17.6)	1.34-2.15 (1.80)
		NP	1	(10.8)	(0.31)
			12	22.1-25.5 (24.3)	3.04-3.76 (3.49)
		YP	1	(10.1)	(0.57)
			1	(11.2)	(0.70)
		WSu	2	7.0-12.0 (9.5)	0.17-0.79 (0.48)
			10	15.4-19.6 (17.4)	1.87-3.58 (2.60)
		Carp	1	(24.8)	(8.25)