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

STATE: Montana PROJECT NO.: F-46-R-6
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, 1992 through June 30, 1993

ABSTRACT

Warmwater investigations were carried out on Lake Frances, Bynum, Tiber, and Pishkun Reservoirs. Walleye numbers are good in Bynum and Tiber Reservoir. Numbers of adult walleye in Lake Frances are down but recruitment of young-of-the-year fish has been good for the past three years. Forage fish numbers vary considerably in the four large reservoirs. Yellow perch abundance is good in Pishkun and Bynum Reservoirs. Spottail shiner are plentiful in Lake Frances while Tiber Reservoir has adequate numbers. Spottail appear to be establishing a population in Pishkun Reservoir. Anglers voluntarily returned over 18 percent of the walleye tagged in Bynum Reservoir in 1992 and about 16 percent of the northern pike in Pishkun Reservoir. Low lake levels were experienced in all waters except Pishkun Reservoir. Both walleye and northern pike feed heavily on fish. Walleye and northern pike were aged up to 16 and 6 years, respectively, using cross-sectioned spines. Petrolia and three Great Falls area reservoirs were also sampled during fall 1992. Gill netting produced low fish number from Petrolia Reservoir while fair numbers were found in Morony Reservoir.
Six warmwater ponds in the Great Falls and Lewistown area were sampled. We did not capture fish in two ponds where largemouth bass had been planted.

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 were 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, 1.0, 1.25, 1.5 and 2.0 inch square mesh; 3 x 4 foot frame trap nets (0.25 inch square mesh); 4 x 6 foot frame trap nets (1.0 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, scale and fin ray samples were collected from some fish for food habit and age and growth studies. Northern pike were tagged with Floy T-Tags while walleye were tagged with Floy Cinch-up Tags. Northern pike fin rays and walleye spines were mounted and sectioned according to methods described by Mackay et al. (1990).

Walleye and northern pike stomachs were collected from creeled fish encountered during the Lake Frances creel survey in 1989. Stomach contents were emptied into labeled vials and preserved in 95 % ethanol. In the laboratory, samples were rinsed in water using a 153 micron nitex sieve and placed in a petri dish for enumeration. Fish were identified to the species level when possible, while other food items were taken to the level of order. Numbers and weights of each taxonomic group were recorded. Subsamples were taken when stomachs contained many small individuals. Organisms were placed on paper towels to remove excess water. Weights were then determined by volumetric displacement using a centrifuge graduated by 0.1 milliliters. An index of relative importance (IRI) was calculated to estimate the importance of each food item consumed (George and Hadley 1979). The IRI incorporates number, frequency of occurrence, and volume of a food item in the diet. It is the arithmetic mean of these parameters (all expressed as percentages) and ranges from 0 to 100, with a value of 100 indicating exclusive use of a food item.

FINDINGS

WALLEYE EGG SOURCE

Walleye eggs were not taken during 1992 spring surveys on Lake Frances, Bynum Reservoir and Tiber Reservoir because insufficient numbers of ripe females were collected.

Bynum Reservoir

Trap netting investigations were conducted from March 24-26, 1992, and from April 7-14, 1992. A total of 70 trap nights were expended using four to seven traps per night. Water temperatures ranged from 40-44°F. throughout this period. The traps caught a total of 90 walleye, 108 yellow perch, 1,772 white sucker, 2 brook trout and 1 cutthroat trout. Short-duration gill nets were also set to capture additional walleye for tagging purposes. A total of 84 gill net sets caught 203 walleye with nets fishing an average of 1.2 hours per set. Other species taken in gill nets include yellow perch (56) and white sucker (267). Using both types of sampling gear, a total of 255 walleye were tagged to aid in harvest determinations. Thirty-seven walleye were recaptures of fish tagged in previous years. The mean length of all walleye taken was 17.9 inches (range 15.2-22.9). Growth of recaptured fish showed average annual increments of 1.4 inches for fish tagged in 1991, 1.2 inches (1990), and 1.5 inches (1989).

Bynum Reservoir, although a fairly new walleye fishery, is rapidly becoming popular with fishermen. During 1992, anglers voluntarily returned 78 tags (Table 1). Forty-seven of these tags were from fish tagged in 1992 indicating a minimum annual exploitation rate of 18.4 percent. First-year returns of previous years range from

Table 1. Angler exploitation harvest of walleye and northern pike in area reservoirs during 1988-92 based on voluntary tag returns.

		Year	Number	Number of returns (%)					
Lake	Species	Tagged	Tagged	1988	1989	1990	1991	1992	Cumulative
Bynum Res.	WE	1989	126		15(11.9)	5(4.0)	1(0.8)	0(0.0)	21(16.7)
		1990	219			14(6.4)	4(1.8)	8(3.7)	26(11.9)
		1991	226				12(5.3)	23(10.2)	35(15.5)
		1992	256					47(18.4)	47(18.4)
Lake Frances	WE	1988	21	4(19.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	4(19.0)
		1989	202		28(13.9)	13(6.4)	1(0.5)	1(0.5)	43(21.3)
		1992	242					21(8.7)	21(8.7)
	NP	1988	13	2(15.4)	1(7.7)	0(0.0)	1(7.7)	0(0.0)	4(30.8)
		1989	430		87(20.2)	18(4.2)	10(2.3)	6(1.4)	121(28.1)
		1992	66					7(10.6)	7(10.6)
Pishkun Res.	NP	1992	80					13(16.3)	13(16.3)
Tiber Res.	WE	1988	299	45(15.1)	7(2.3)	3(1.0)	3(1.0)	1(0.3)	59(19.7)
		1990	271			19(7.0)	18(0.6)	3(1.1)	40(14.8)
		1991	692				70(10.1)	21(3.0)	91(13.1)
		1992	266					15(5.6)	15(5.6)
	NP	1988	249	25(10.1)	1(0.4)	1(0.4)	0(0.0)	0(0.0)	27(10.8)
		1990	346			33(9.5)	7(2.0)	0(0.0)	40(11.6)
		1991	314				32(10.2)	5(1.6)	37(11.8)
		1992	99					6(6.1)	6(6.1)

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5.3 to 11.9 percent. Periodic creel checks during June revealed that anglers kept approximately 60 percent of the walleye caught.

Forage fish surveys conducted August 18 captured four species with spottail shiner most abundant (Appendix I). Examination of Figure 1 shows a general decline in overall forage numbers in 1992 when compared to previous years. Water levels have decreased in recent years and recruitment of yellow perch is not expected to improve until water levels return to higher elevations that will inundate some vegetation. The extent of natural walleye reproduction in Bynum Reservoir is unknown. In an effort to maintain the fishery, 75,000 walleye fingerlings were stocked in June.

Yellow perch were most abundant in the September gill net survey followed by white sucker (Table 2). However, the abundance of these species is considerably lower that past years. Walleye were captured at the rate of 7.0 fish per net as compared to 4.5 fish per net in 1991. Species trends since 1986, as monitored with gill nets, are shown in Figure 2.

Analysis of eighteen walleye stomachs revealed that 28 percent were empty. Fish remains were found in 44 percent, crayfish in 22 percent and spottail shiners in 11 percent of the walleye stomachs that contained food.

Lake Frances

Lake Frances fish populations were sampled in early spring using trap nets and gill nets. Four to six trap nets were fished from March 19-25, and from April 7-17, 1992 for a total of 62 trap nights. They caught 101 northern pike, 31 walleye, 20 yellow perch, 3 ling and 77 white sucker. A total of 152 gill net sets (1.5 hours/set) collected 38 northern pike, 234 walleye, 77 yellow perch and 6 white sucker. Combining fish from both types of gear, a total of 66 northern pike and 242 walleye were tagged to monitor exploitation. Mean length of tagged fish was as follows: northern pike - 20.9 inches (range 16.0-36.2); walleye - 16.7 inches (range 14.0-26.0). Water temperatures ranged from 40 - 48°F. during sampling.

Anglers fishing during the 1992 season returned tags from 13 northern pike and 22 walleye. This indicates minimum annual exploitation of 10.6 percent for northern pike and 8.7 for walleye (Table 1). Highest cumulative returns are 30.8 percent for northern pike (1988) and 21.3 percent for walleye (1989).

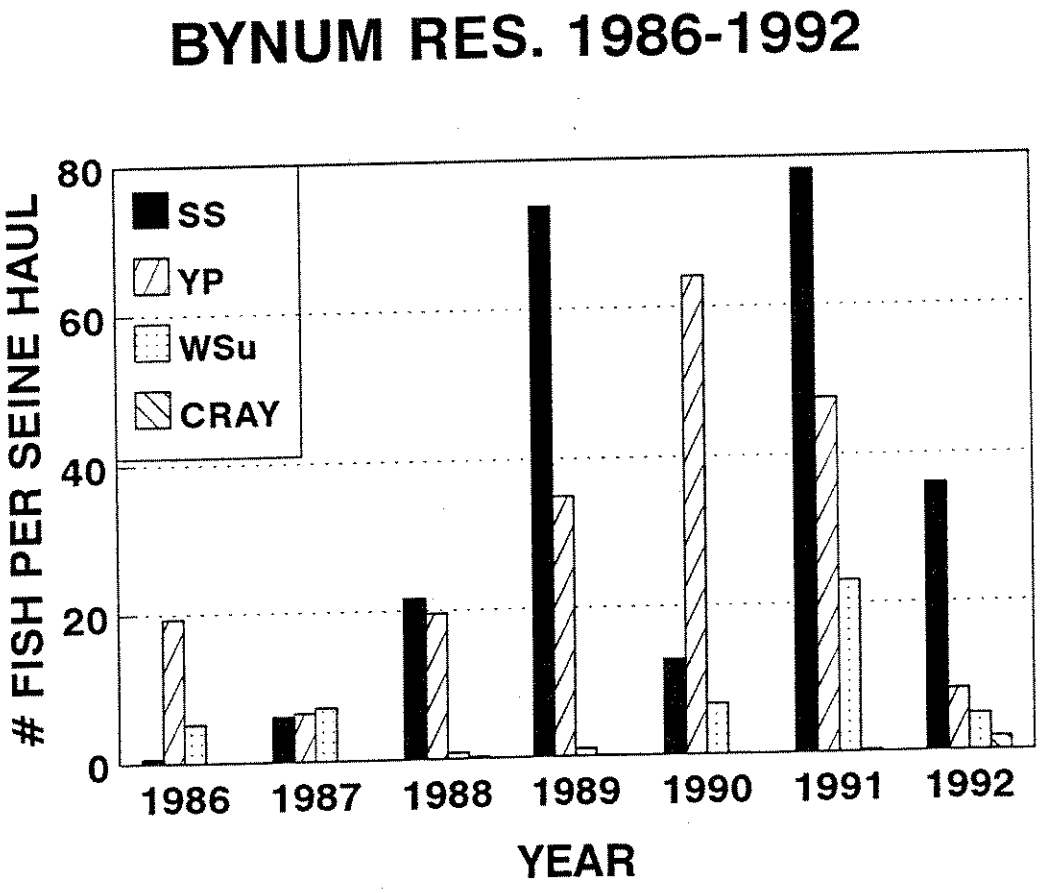

Figure 1. Forage fish surveys in Bynum Reservoir, 1986-92.

Table 2. Overnight gill netting results in warm water reservoirs in Region Four during 1992.

Water (date)	Surface acres1	No.of nets2	Mean hours fished/net	Species3	No.of fish	Length (in) range (avg)	Weight (pounds) range (avg)
Bynum Res. (9/24/92)	2,000	4-S	17.5	WE	12	8.5-12.6(10.5)	0.19- 0.62(0.38)
					9	13.8-15.7(14.3)	0.78- 1.13(0.79)
					5	16.5-19.6(18.0)	1.45- 2.60(1.94)
					2	20.2-20.4(20.3)	2.72- 3.34(3.03)
				YP	76	5.7- 8.9(7.3)	0.09- 0.38(0.21)
					13	9.0- 9.8(9.3)	0.34- 0.65(0.44)
					1	- (11.3)	- (0.72)
				WSu	11	6.7-12.8(9.6)	0.12- 0.99(0.47)
					70	13.7-18.2(16.4)	1.10- 3.03(2.14)
Lk. Frances (9/22-23/92)	4,000	12-S	21.5	WE	11	7.5-12.7(11.8)	0.12- 0.64(0.41)
					12	13.7-15.2(14.4)	0.78- 1.78(1.07)
					5	16.1-18.9(17.2)	1.28- 2.24(1.64)
				NP	13	10.9-15.9(14.1)	0.29- 0.81(0.54)
					30	16.0-19.9(17.8)	0.80- 1.83(1.24)
					12	20.0-35.0(24.1)	1.64- 4.47(2.73)
				YP	18	6.4- 8.8(8.0)	0.11- 0.41(0.27)
					14	9.1-10.9(9.9)	0.39- 0.71(0.53)
					3	11.2-12.0(11.6)	0.88- 0.93(0.91)
				WSu	7	16.4-18.4(17.5)	2.26- 2.95(2.62)
Tiber Res. (9/15-17/92)	14,500	25-S	19.3	WE	85	7.4-12.9(10.0)	0.12- 0.76(0.33)
					60	13.0-15.9(14.5)	0.63- 1.31(1.02)
					60	16.0-19.7(17.6)	1.29- 2.55(1.78)
					5	20.1-29.4(23.7)	2.46-10.20(4.49)
				NP	4	18.8-19.7(19.3)	1.40- 1.68(1.58)
					18	20.0-29.2(23.3)	1.78- 5.80(3.09)
				YP	7	7.4- 8.0(7.1)	0.06- 0.21(0.15)
					4	9.8-10.4(10.1)	0.46- 0.54(0.49)
					1	- (11.4)	- (0.70)
				Rb	4	18.9-21.8(20.6)	2.70- 3.95(3.29)
				Lt	5	24.9-25.2(25.0)	5.17- 5.42(5.29)
					1	- (29.8)	- -
				SNS	2	34.0-36.2(35.1)	- -
				WSu	3	7.2- 8.3(7.8)	0.14- 0.26(0.19)
					21	12.2-19.5(16.6)	0.75- 3.24(2.23)
				LnSu	1	- (6.8)	- (0.12)
					5	12.2-20.2(17.4)	0.75- 3.44(2.24)
				Carp	1	- (18.8)	- (3.16)
					1	- (28.8)	- (14.25)

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; WSu=white sucker; Rb=rainbow trout; Lt=lake trout; SNS=shovelnose sturgeon; LnSu=longnose sucker.

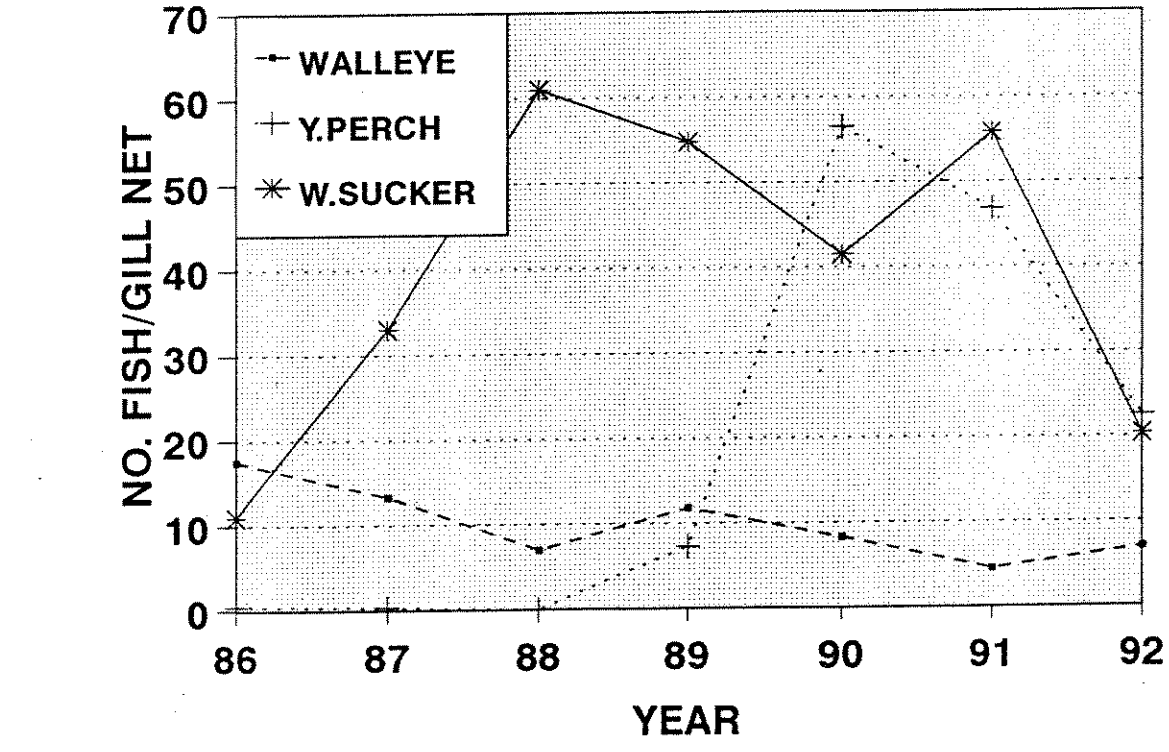

Figure 2. Changes in fish populations in Bynum Reservoir (fall gill netting).

The forage fish population in Lake Frances is very good at the present time. Spottail shiner continue to increase dramatically, but yellow perch numbers are declining, as shown in Figure 3. A complete listing of species taken in 16 seine hauls on August 17, 1991, appears in Appendix I. Recruitment of walleye is very good and continues to show increases for the third consecutive year (Figure 4).

A total of 12 gill nets were fished over a two-day period in September and results appear in Table 2. Northern pike were most abundant, followed by yellow perch and walleye. Examination of Figure 5 indicates a downward trend of walleye since 1987. This may be a result of poor reproduction over a several year period during the mid 1980's when the reservoir was drafted to minimum levels due to irrigation withdrawal. Water levels were low in 1983, at dead storage in 1984, at low levels in 1985, and at full pool in 1986 (Stokes, 1993). As mentioned in the preceding paragraph, walleye reproduction was good for the past three years. Figure 5 also indicates a substantial increase in yellow perch from 1988 through 1991. Abundant terrestrial vegetation was produced in stranded shoreline areas during years when the lake was at low levels. This vegetation apparently provided excellent spawning habitat for yellow perch in subsequent years as this area was inundated by rising water levels.

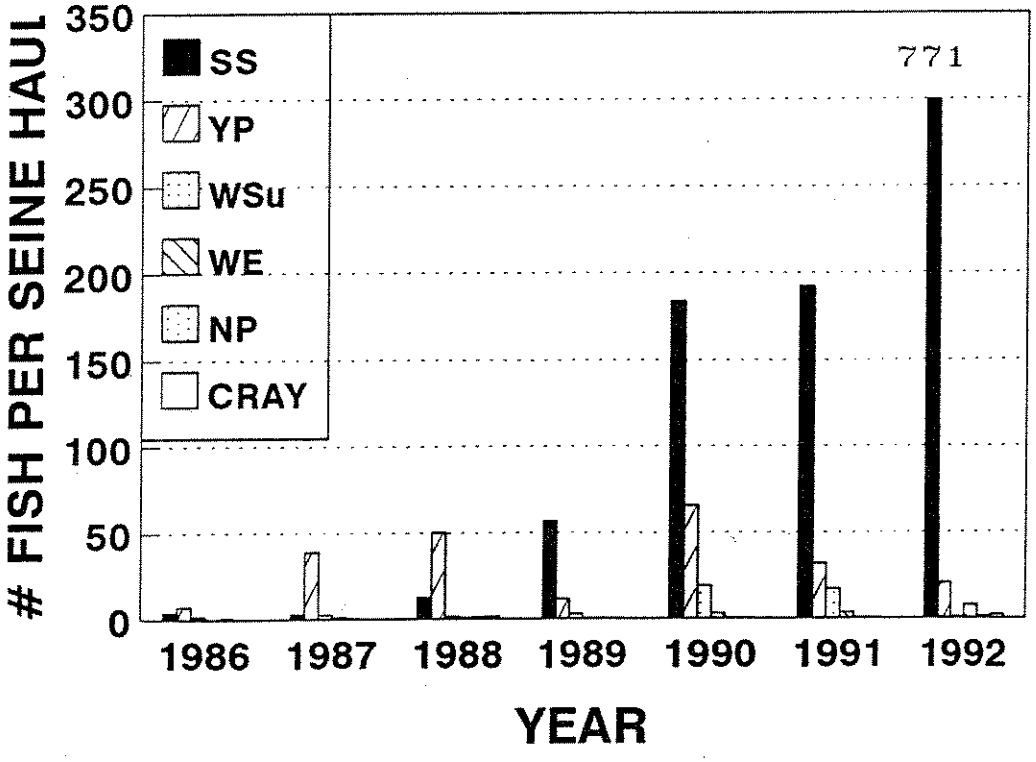

Figure 3. Forage fish surveys in Lake Frances, 1986-92.

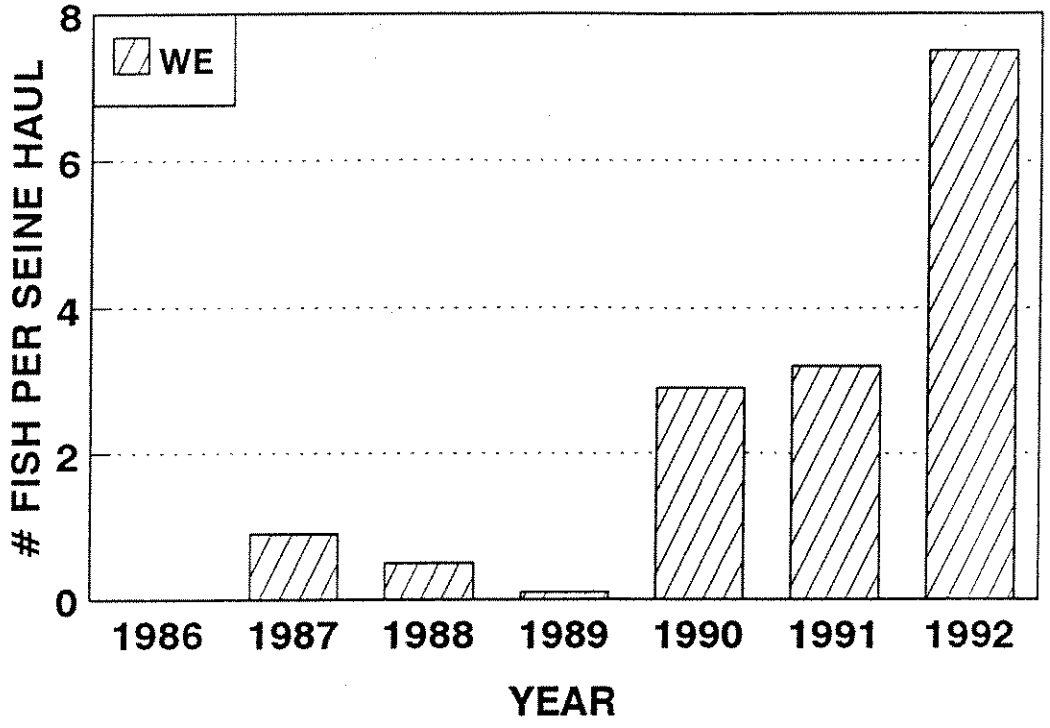

Figure 4. Walleye recruitment from 1986-92 in Lake Frances (beach seining).

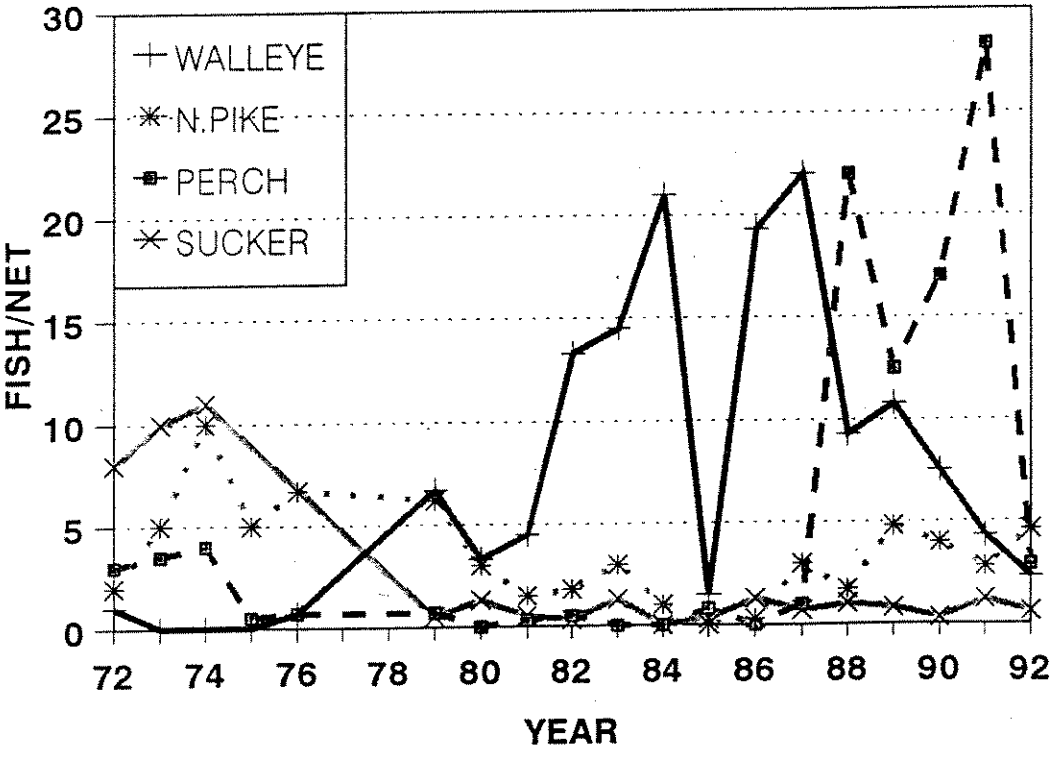

Figure 5. Changes in fish populations in Lake Frances (fall gill netting).

A total of 32 northern pike and 18 walleye stomachs were analyzed for food content. Thirty-eight percent of the northern pike and 41 percent of the walleye stomachs examined were empty. Of northern pike stomachs with food, 41 percent contained crayfish and 19 percent had unidentifiable fish remains. Walleye stomachs with food had 41 percent occurrence of both crayfish and fish remains.

Lake Frances Food Habits - 1989

Walleye Food Habits

Stomach contents were analyzed from 54 walleye collected throughout the creel period of April - September of 1989. Samples were taken from stomachs which contained contents during angler interviews. No records were kept for percent empty stomachs. These fish averaged 14.9 inches with a range of 10.6-23.5 inches. Weight ranged from 0.4-3.70 pounds.

Emerging Dipteran pupae recorded the highest IRI value at 44.3 followed by amphipods and fish with IRI's of 38.1 and 18.4 respectively (Table 3). The high number (4559) of dipteran pupae contributed to the high IRI but represented only 33% occurrence and 17% of the total biomass consumed by walleye. Amphipods (Gammarus sp.) were the most common observed food item with 76% occurrence and highest in food biomass at 27% of the total diet. Fish were important prey items with 25% of the total biomass and 26% frequency of occurrence. Yellow perch was the most common fish species identified followed by unidentified fish parts. Leeches comprised 26% of the total biomass and occurred in 20% of the stomachs analyzed. Mayfly, damselfly and dipteran larvae were consumed by walleye but represented less than 4% of the total biomass.

Table 3. Composition by number, weight and frequency of occurrence and calculated index of relative importance (IRI) for major food items in the stomachs of 54 walleye collected April - August 1989 in Lake Frances.

Item	Number	(%)	Wet Weight grams	(%)	Frequency	(%)	IRI
Aquatic Insects							
Dipteran Larvae	19	(0.3)	0.07	(0.1)	8	(14.8)	5.1
Dipteran Pupae	4559	(82.8)	10.77	(16.9)	18	(33.3)	44.3
Ephemeroptera Larvae	4	(0.1)	0.13	(0.2)	3	(5.5)	1.9
Odonata Larvae	22	(0.4)	1.66	(2.6)	6	(11.1)	4.7
Unidentified Parts	21	(<0.1)	Trace		2	(3.7)	1.2
Fish							
Yellow Perch	227	(4.1)	4.85	(7.6)	6	(11.1)	7.6
Ling	1	(<0.1)	6.60	(10.4)	1	(1.9)	4.1
Unidentified Fish	21	(0.4)	4.41	(6.9)	8	(14.8)	(7.4)
Total Fish	240	(11.0)	17.51	(27.5)	15	(25.9)	18.4
Miscellaneous							
Amphiphoda (Gammarus sp.)	603	(11.0)	17.51	(27.5)	41	(75.9)	38.1
Hirudinea (Leeches)	29	(0.5)	16.36	(25.7)	11	(20.4)	15.5
Plant material/debris	17	(0.3)	1.26	(2.0)	17	(31.5)	11.3

Northern Pike Food Habits

Twenty eight northern pike stomachs were collected and analyzed. Total length ranged from 17.5-32.2 inches with an average of 22.1 inches. Weight ranged from 1.30-8.14 pounds with a sample average of 2.98 pounds.

Total fish recorded the highest IRI value of 51.2 followed by amphipods (suborder Gammaridae) and plant material/debris with IRI's of 47.2 and 11.6 respectively (Table 4). Fish comprised 88.1% by weight of the total diet of northern pike with a 60.7% frequency of occurrence. Five species of fish were consumed by pike with yellow perch the highest identified species with a 10.7% frequency of occurrence. Amphipods were the most numerous prey item found in pike stomachs (83.6% by number) and were found in 50% of the stomachs. Hirudinea (leeches) were found in 25% of the stomachs with a 10.6 IRI value. Dipteran larvae, Dipteran pupae, Ephemeroptera larvae, Odonata larvae, crayfish and plant material/debris were also consumed by northern pike but represented less than 1% of the diet by total weight.

Table 4. Composition by number, weight and frequency of occurrence and calculated index of relative importance (IRI) for major food items in the stomachs of 28 northern pike collected April - August 1989 in Lake Frances

Item	Number	(%)	Wet Weight grams	(%)	Frequency	(%)	IRI
Aquatic Insects							
Dipteran Larvae	9	(2.1)	0.07	(<0.1)	4	(14.3)	6.9
Dipteran Pupae	8	(1.9)	0.10	(<0.1)	3	(10.7)	4.2
Ephemeroptera-Larvae	2	(0.5)	0.03	(<0.1)	2	(7.1)	2.5
Odonata Larvae	2	(0.5)	0.09	(<0.1)	2	(7.1)	2.5
Fish							
Yellow Perch	3	(0.7)	66.95	(24.0)	3	(10.7)	11.8
Ling	1	(0.2)	37.60	(13.5)	1	(3.6)	5.8
Sucker sp.	1	(0.2)	81.72	(29.4)	1	(3.6)	11.1
Spottail Shiner	2	(0.5)	5.30	(1.9)	1	(3.6)	2.0
Northern Pike	1	(0.2)	3.73	(1.3)	1	(3.6)	1.7
Unidentified Fish	12	(2.8)	49.94	(17.9)	10	(35.7)	18.8
Total Fish	20	(4.7)	254.24	(88.1)	17	(60.7)	51.2
Miscellaneous							
Amphiphoda (Gammarus sp.)	353	(83.6)	22.48	(8.1)	14	(50.0)	47.2
Hirudinea (Leeches)	15	(3.6)	9.1	(3.3)	7	(25.0)	10.6
Plant material/debris	9	(2.1)	1.32	(0.5)	9	(32.1)	11.6
Crayfish	4	(0.9)	-	(-)	1	(3.6)	_

Pishkun Reservoir

A total of 24 trap nights were fished in Pishkun Reservoir from April 20-23, 1992, with a catch of effort of 84 northern pike, 19 yellow perch, 45 white sucker and 5 rainbow trout. A northern pike population estimate was curtailed because of small sample size. Number of fish trapped was influenced by higher than normal water levels which inundated the best trap sites, and also by traps being tampered with by unknown individuals. Water temperatures varied from 47-48°F.

A total of 80 northern pike were tagged to monitor exploitation. These fish averaged 23.5 inches (range 16.0-35.1). During 1992, anglers voluntarily returned 13 tags, or 16.3 percent of the total tagged (Table 1).

Surveys conducted August 19, 1992, indicate that yellow perch were the most abundant forage fish in Pishkun Reservoir (Appendix I). Figure 6 compares forage fish numbers over a several year period. Spottail shiner appear to be slowly establishing themselves in the reservoir. Several introductions have been made in recent years and an additional 5,000 spottail were transplanted from Tiber Reservoir on June 10, 1992.

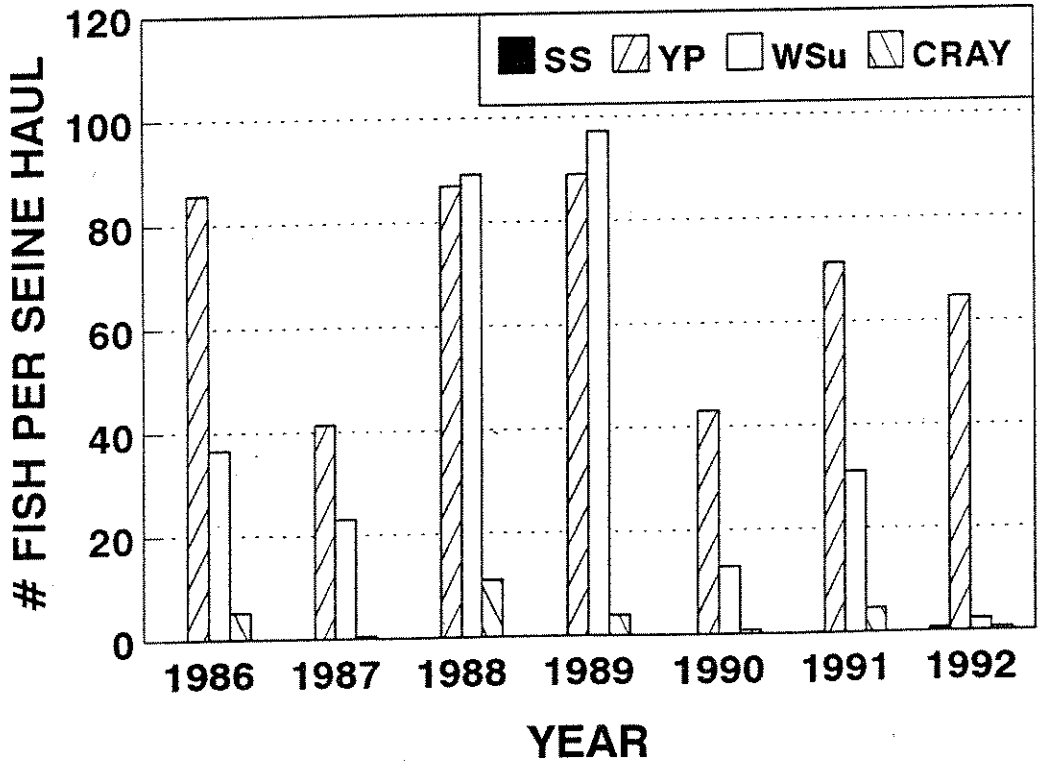

Figure 6. Forage fish surveys in Pishkun Reservoir, 1986-92.

A discussion of the September 1992 gill netting results appears in another report (Hill and Liknes 1993).

Tiber Reservoir

Seven to twelve trap nets were fished in the Devon area of Tiber Reservoir from March 28 to April 4, 1992, to monitor trends in species composition and abundance, and to collect walleye and northern pike for tagging purposes. Nets were fished a total of 73 trap nights and caught 263 walleye, 123 northern pike, 48 yellow perch, 32 carp, 23 ling, 17 rainbow trout, 11 white sucker, 1 crappie and 1 mountain whitefish. Of all walleye and northern pike taken, 14 and 21, respectively, were recaptures of previously tagged fish. Growth of recaptured northern pike averaged 2.4 inches per year for fish tagged in 1991. Determining growth increments of tagged walleye was not possible due to problems interpreting tag numbers. Water temperatures varied from 45-49°F. during trapping operations. The reservoir remained fairly stable at elevation 2975 feet m.s.l. and inflows ranged from 230 to 430 cfs.

Short-term gill nets were also used in early April to obtain additional walleye for tagging purposes. Twenty gill nets (1.0 hour sets) caught 53 walleye, 1 channel catfish, 1 white sucker and 1 longnose sucker.

Combining fish caught in both types of sampling gear, a total of 99 northern pike and 266 walleye were tagged to aid in harvest determinations and movement. Mean length of northern pike was 23.4 inches (range 17.4-45.7) while walleye averaged 16.4 inches (range 14.0-24.4). Both species show higher mean lengths than that found in 1991 (n.pike-20.2; walleye-16.0).

Anglers voluntarily returned tags from 40 walleye and 11 northern pike during the report period (Table 1). Returns from fish tagged in 1992 indicate minimum annual exploitation rates of 5.6% for walleye and 6.1% for northern pike. Exploitation of both species in 1992 was considerably lower than previous years, based on voluntary tag returns. A possible explanation for the low exploitation is that fishing pressure was lighter than normal due to low lake levels that hampered launching boats.

Movements of tagged walleye and northern pike in Tiber Reservoir, based on voluntary tag returns from anglers, are summarized in Table 5 for the years 1984-1992. The Devon and Bootlegger (BT) areas are combined for purposes of analysis because they are in close proximity to one another in the upstream end of the reservoir. Both species display strong fidelity to areas where they were tagged. Fish tagged in the Devon area appear to be more prone to be recaptured in Willow Creek Arm (WCA) than vice versa. However, this may be a sampling artifact caused by high

fishing pressure in WCA compared to Devon.

Crayfish, young of the year walleye, and nine forage fish species were collected during forage fish surveys conducted from August 25-28, 1992 (Appendix I). Spottail shiner were the most abundant species in all areas sampled. Trends in forage numbers over a several year period are displayed in Figure 7. Yellow perch continue to decrease and spottail shiner are considered abundant, although their numbers were fewer than that found in 1991. The 1992 survey was conducted immediately following an unexpected snowstorm, which resulted in water temperatures seven to ten degrees cooler than normal. Actual forage numbers may be somewhat higher because fish may have pulled away from the shoreline into warmer water.

Table 5. Movement of tagged walleye and northern pike in Tiber Reservoir during 1984-1992 based on percentages of voluntary tag returns by anglers. BT = Bootlegger area, WCA = Willow Creek Arm area.

Species	Area Tagged	Year Tagged	No. of Fish	% Caught by Area		
				Devon/BT	Dam	WCA
Walleye	Devon	1992	12	58	25	17
		1991	30	53	10	37
		1990	5	0	20	80
		1987	17	76	12	12
		1986	5	40	20	40
		1984	7	72	14	14
		Combined Data	76	57	14	29
	WCA	1991	26	8	19	73
		1990	9	0	0	100
		1988	39	3	23	74
		1987	26	8	8	84
		1986	22	18	14	68
		1985	11	0	27	73
		1984	21	5	14	81
		Combined Data	154	6	16	78
No. Pike	Devon	1992	2	50	0	50
		1991	15	33	13	54
		1990	4	100	0	0
		1987	20	65	20	15
		1986	8	88	12	0
		1985	4	100	0	0
		1984	4	75	25	0
		Combined Data	57	65	14	21
	WCA	1991	9	11	33	56
		1990	23	18	8	74
		1988	23	13	22	65
		1987	18	0	11	89
		1986	19	11	15	74
		1985	9	11	0	89
		1984	8	0	0	100
		Combined Data	109	10	14	76

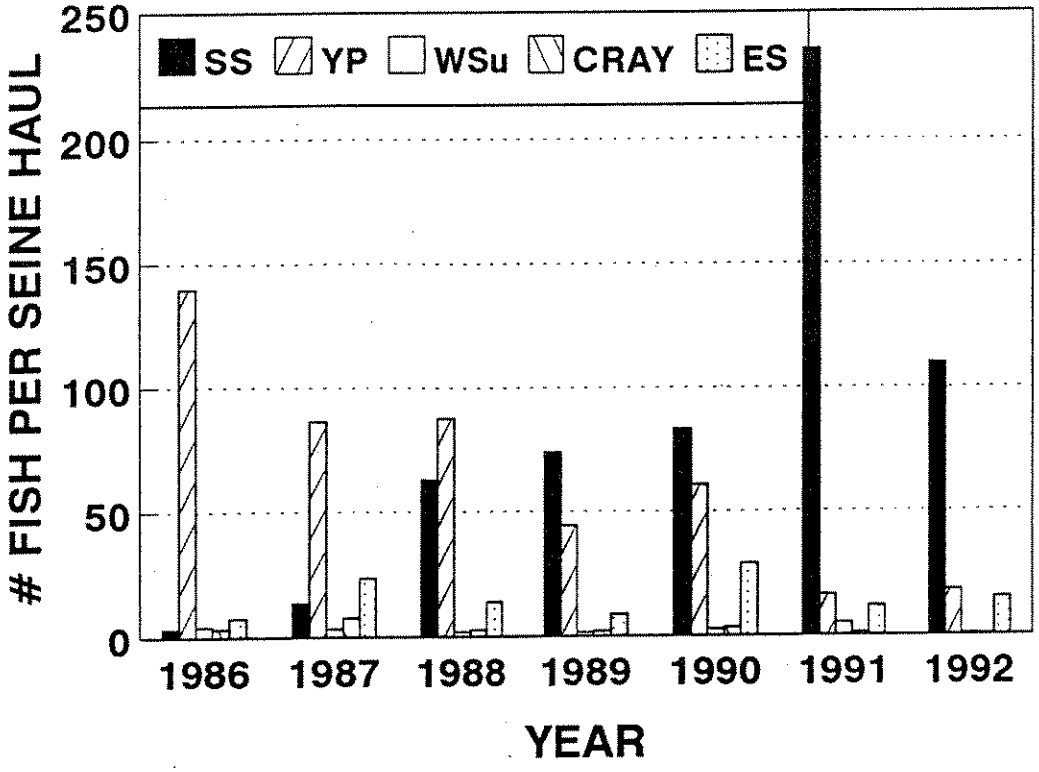

Figure 7. Forage fish surveys in Tiber Reservoir, 1986-92.

Water level management efforts continue with the Bureau of Reclamation through the Marias Management Committee to improve spawning conditions. Yellow perch populations are dependent on flooded vegetation for successful reproduction. Due to annual water level fluctuations, little vegetation exists at the present time. In past years, artificial spawning structures were placed in selected areas to encourage perch spawning. Although structures were not installed during 1992, necessary permits from the Bureau of Reclamation and Corps of Engineers were renewed to allow installation through 1994.
Twenty-five sinking experimental gill nets were fished throughout Tiber Reservoir from September 15-17, 1992. Individual netting summaries for four sampling areas are presented in Appendix II. A total of nine species were taken during the surveys with walleye being most abundant at 8.4 fish/net (Table 2). Northern pike and yellow perch were taken in relatively small numbers, at 0.9 and 0.5 fish/net, respectively. Figure 8 shows trends for four species in the reservoir. Walleye continue to dominate the fishery and have been fairly stable since 1986. Due to lack of suitable spawning habitat, northern pike and yellow perch fluctuate at much lower levels.

The average size of northern pike taken in gill nets is 22.5 inches while walleye average 14.1 inches. Percentage of walleye over 16 inches continues to increase with 31 percent of the

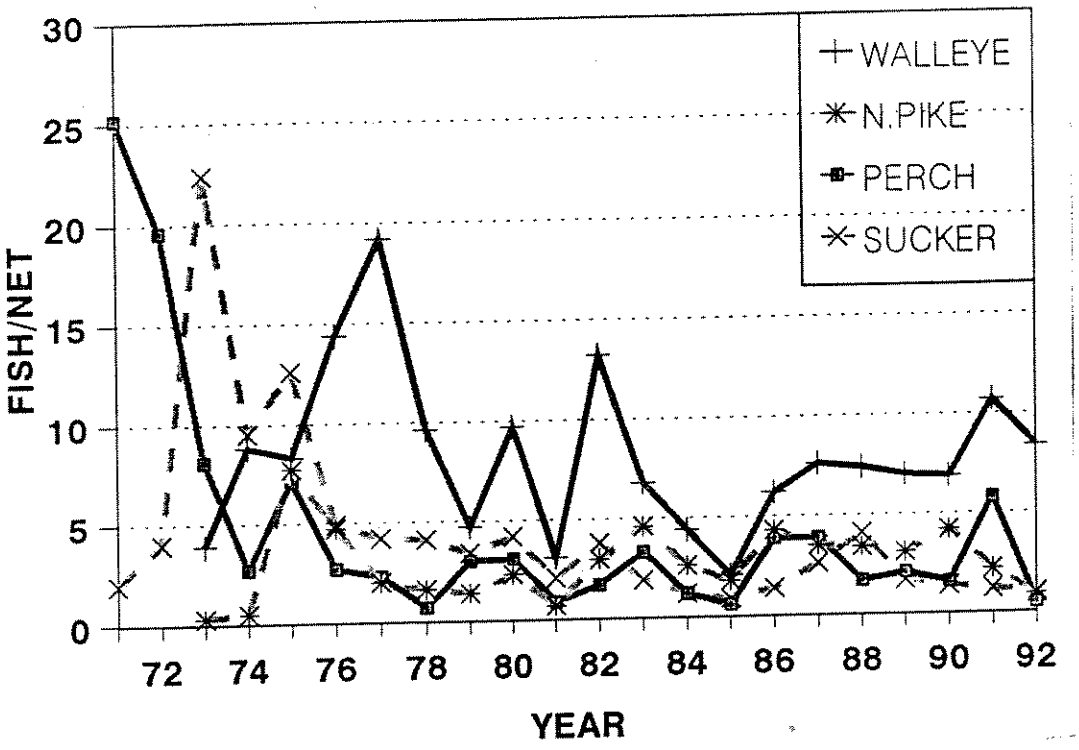

Figure 8. Changes in fish populations in Tiber Reservoir (fall gill netting).

population falling into this category. In 1991 and 1990, 26.5 percent and 22 percent, respectively, were over 16 inches.

A total of 81 walleye and 22 northern pike stomachs were analyzed for food content. Approximately 44 percent of the walleye and 18 percent of the northern pike stomachs were empty. Of stomachs with food, unidentifiable fish remains occurred in 73 percent of the northern pike and 52 percent of the walleye examined. These fish remains are thought to be spottail shiner. Identifiable spottail shiner occurred in 45 and 9 percent, of northern pike and walleye stomachs, respectively. Crayfish, vegetation and rock also occurred in a few stomachs of both species.

Age and Growth

Dorsal spines of walleye and pelvic rays of northern pike were analyzed from collections taken from Lake Frances in the spring. Walleye from 13.0-16.9 inches show overlap of four to eight years of age, while 17.0-20.0 inch fish range from six to eleven years. The oldest walleye was aged at sixteen years and was 24.1 inches in total length. Northern pike from 15.0-19.9 inches were three and four years old while those from 20.0-30.0 inches were three, four and five years old. The oldest northern pike was six years at a length of 36.2 inches. Age determinations from Bynum Reservoir and Tiber Reservoir will appear in a future report.

Morony Reservoir

Morony Reservoir was netted in cooperation with the Montana Power Company during fall 1991. A total of six nets, three sinking and three floating nets were set in the reservoir. In past years, only three sinking nets were used. A substantial number of walleye were captured in the overnight sets (Table 6). A total of 25 walleye were netted compared to 5 in 1991; The maximum size captured had also increased to 23.2 in and 4.74 pounds. Large numbers of white suckers were also found. The timing of this netting was in early October compared to mid-November in 1991.

Petrolia Reservoir

Fall gill netting at Petrolia Reservoir occurred more than two weeks later in 1992 than the year before. Gill net catches were low with only one walleye, yellow perch, and northern pike captured (Table 6). This represents a considerable drop in walleye numbers from fall 1991. Water levels were low, about 25-30 feet down from full pool, which would be expected to concentrate fish and possibly increase gill net catches. Since fall 1991, water levels have increased in the reservoir.

Cochrane and Ryan Reservoirs

In addition to sampling Morony Reservoir, we also netted Cochrane and Ryan Reservoirs in cooperation with the Montana Power Company during late October 1992. Six gill nets, three floating sets and three sinking sets, were placed in each reservoir. A variety of species were captured (Table 6). Walleye numbers were considerably lower in Cochrane than in Ryan or Morony Reservoirs; only three walleye were captured in Cochrane, while 40 were caught in Ryan. Rainbow trout were the most numerous game fish captured in Cochrane Reservoir; brown trout were present in lower numbers and a mountain whitefish was captured in Cochrane Reservoir. Two black bullheads were netted in Cochrane. Suckers were common in both waters.

Small Ponds and Reservoirs

Choteau Area

Lands surrounding Eyraud Lakes were purchased by the U. S. Fish & Wildlife Service during 1992. The Montana Department of Fish, Wildlife & Parks also obtained easements to Middle Lake from landowners and the Brady Irrigation District. Public access to the lakes is now guaranteed and should eliminate problems that occurred in the past.

Table 6. Overnight gill netting results in warmwater lakes and reservoirs in the eastern portion of Region Four during 1992.

Water name (Date surveyed)	Surface acres	No. of[1] nets	Mean hours fished/net	Species, strain[2] & year planted	Total no. of fish	Length(in) Range	Length(in) Mean	Weight(pounds) Range	Weight(pounds) Mean	Condition Factor Range	Condition Factor Mean
Morony Reservoir (10/8/92)		3S,3F	17.0	WE	25	8.5-23.2	(12.8)	0.22-4.74	(0.98)	33.6-41.0	(37.4)
				YP	5	7.2- 9.6	(8.6)	0.20-0.54	(0.36)	52.8-61.0	(56.1)
				WSu	185	6.2-15.7	(10.7)	0.12-1.70	(0.61)	28.5-53.1	(43.4)
				LnSu	1	-	(14.8)	-	(1.30)	-	(40.1)
Petrolia Reservoir (11/9/92)		1F,1S	18.0	WE	1	-	(9.1)	-	(0.25)	-	(33.2)
				NP	1	-	(25.9)	-	(4.29)	-	(24.7)
				YP	1	-	(7.0)	-	(0.18)	-	(52.5)
Cochrane Reservoir (10/22/92)		3S,3F	16.0	WE	3	7.0-15.1	(12.4)	0.14-1.22	(0.86)	35.4-40.8	(37.5)
				YP	4	7.4-10.7	(8.3)	0.18-0.58	(0.29)	44.4-47.8	(46.0)
				Rb	10	12.8-19.9	(16.6)	0.82-4.10	(2.17)	31.8-55.7	(42.9)
				LL	3	14.6-17.1	(16.2)	1.00-2.10	(1.67)	32.1-42.0	(37.7)
				MW	1	-	(16.7)	-	(1.90)	-	(40.8)
				BB	2	8.7-8.7	(8.7)	0.24-0.42	(0.33)	36.4-63.8	(50.1)
				WSu	191	6.2-17.0	(11.1)	0.10-2.06	(0.64)	28.4-50.4	(39.4)
				LnSu	15	6.2-17.1	(9.2)	0.10-1.90	(0.40)	36.0-44.5	(39.1)
Ryan Reservoir (10/21/92)		3S,3F	15.0	WE	40	7.8-21.5	(15.3)	0.06-3.95	(1.29)	12.6-39.7	(32.0)
				YP	7	5.5-9.3	(8.1)	0.14-0.30	(0.22)	28.4-120	(47.4)
				Rb	8	13.4-17.6	(16.3)	0.84-2.04	(1.56)	33.3-37.4	(35.5)
				LL	1	-	(15.5)	-	(1.14)	-	(30.6)
				WSu	80	7.8-17.7	(12.2)	0.10-2.52	(0.77)	21.1-88.0	(37.7)
				LnSu	17	9.3-16.5	(13.5)	0.58-1.76	(1.02)	32.7-42.8	(37.6)

[1] Standard experimental gill nets (nylon and monofilament); F=Floating; S=Sinking

[2] Species abbreviations: Rb=Rainbow trout; LL=Brown trout;MW=Mountain whitefish; WE=Walleye; NP=Northern pike; YP=Yellow perch; WSu=White sucker; LuSu=Longnose sucker; BB=black bullhead

Great Falls and Lewistown Area

Two warmwater ponds in the Fort Benton-Big Sandy area containing largemouth bass were sampled during summer 1992. No fish were captured in overnight gill net sets or observed near the edge of the water at either Silvan Pond or Shaw Reservoir. Both appeared to have winterkilled. Four other ponds in the Lewistown area were also sampled by overnight gill net sets and seining. Good numbers of largemouth bass were found in Catfish and Holland Reservoirs. In Catfish, the 28 bass measured averaged 10.4 in and 0.67 pounds. We captured 47 largemouth in Holland Reservoir, which varied in length from 5.5-11.8 in and had a mean length of 8.8 in. In Payola Reservoir, the most common fish captured was yellow perch; 52 were sampled that had a mean length of 8.6 in and 0.33 pounds. Only six largemouth bass were captured in Payola Reservoir and all were between 5.1-5.8 in total length. A total of 103 perch were captured from Jakes Reservoir. All the yellow perch were small, ranging in length between 5.4-6.9 in and averaging 0.08 pound. Other largemouth bass ponds in both the

Great Falls and Lewistown area continue to suffer from low water levels, and many have apparently winterkilled during the reporting period.

DISCUSSION AND RECOMMENDATIONS

Warmwater fishery investigations continued on four reservoirs in the Choteau area. Trends in fish populations were documented and compared to previous years. At the present time, Tiber and Bynum Reservoirs have the best walleye populations. Adult walleye in Lake Frances are at lowest levels since about 1980 but good reproduction was documented for the past three years. These fish are expected to enter the fishery starting in 1995 through 1997. Analysis of spines indicates that it takes five to seven years for walleye in Lake Frances to attain lengths of 14-17 inches. Lake Frances currently has the best northern pike fishery followed by Pishkun Reservoir. Yellow perch, the main prey species in all waters, were present in good numbers in Bynum and Pishkun Reservoirs but perch numbers were poor in Tiber Reservoir and Lake Frances. Numbers of young-of-the-year yellow perch were most abundant in Pishkun Reservoir. Spottail shiner, another important prey species, occurred in fair numbers in Bynum, with numbers rated "good" in Tiber and excellent in Lake Frances. Spottail appear to be establishing a population in Pishkun. During 1992, anglers harvested walleye from Bynum Reservoir at higher rates than other waters. Exploitation rates on walleye should continue to be monitored to evaluate the need for special fishing regulations. Population estimates of northern pike in Pishkun Reservoir were not made in 1992 but should be done in 1993 and subsequent years to determine predation potential on stocked rainbow trout. Investigations to monitor trends in warmwater fish populations on these four waters should continue.

Walleye egg take efforts were not successful in 1992 but will be considered in the future as the opportunity arises. Yellow perch spawning structures were not installed in Tiber Reservoir but will be done as time permits.

The survival of planted fingerings and possibly some natural reproduction appeared at least fair in Morony Reservoir during 1992. Planting of the fingerlings should continue if sufficient numbers are available.

We will attempt to net Petrolia Reservoir earlier in the fall to see if timing has had any affect on gill netting results. However, low water levels in the reservoir may have had substantial impacts on the forage fish numbers and habitat available to yellow perch. Additional habitat structure should be installed whenever possible.

We plan on replanting largemouth bass ponds in the Great Falls and Lewistown areas whenever adequate water levels are obtained.

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DATE: September 1993

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
14-6840 Eyraud Lake
14-7440 Lake Frances
14-9240 Tiber Reservoir
16-6070 Jakes Reservoir
16-8275 Silvan Pond
17-8773 Shaw Reservoir
17-8857 Cochrane Reservoir

17-9296	Morony Reservoir
17-9505	Ryan Reservoir
18-7395	Catfish Reservoir
18-7839	Holland Reservoir
18-8700	Payola Reservoir
18-8720	Petrolia Reservoir
20-7950	Pishkun Reservoir

Appendix I. Forage fish/reproduction surveys, 1992 (beach seining).

WATER	DATE	WATER TEMP(°F)	NO.OF PULLS	NUMBER OF FISH/PULL[1/]											
				YP	SS	WSu	Cray	WE	NP	Sculpin	EmS	LC	LND	FHC	CARP
BynumRes.	8/18	69	16	8.3	36.1	4.9	1.8	0.1	N/A	0.0	N/A	N/A	N/A	N/A	N/A
LkFrances	8/17	68	16	20.4	771.3	0.6	1.9	7.5	0.9	0.1	N/A	N/A	0.0	N/A	N/A
Pishkun Res.	8/19	67	15	64.7	0.7	2.3	0.6	N/A	0.1	0.0	N/A	N/A	N/A	N/A	N/A
TiberRes.															
Dam	8/25	64	17	11.4	220.7	0.3	0.1	0.2	0.0	0.1	11.6	0.1	0.0	0.0	0.9
WCA	8/26	61	17	18.8	63.6	0.0	0.3	0.2	0.0	0.0	14.8	0.0	0.0	0.0	0.6
BT	8/27	64	15	27.1	73.2	1.5	0.3	1.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Devon	8/28	59	13	16.2	68.2	0.4	0.5	2.2	0.0	0.0	22.6	2.5	0.1	0.0	0.0
Tiber Combined			62	18.2	110.0	0.5	0.3	0.8	0.0	Tr.	15.2	0.6	Tr.	0.1	0.4

1/ Species Abbreviations: YP=yellow perch; SS=spottail shiner; WSu=white sucker; Cray=crayfish; WE=walleye; NP=northern pike; EmS=emerald shiner; LC=lake chub; LND=longnose dace; FHC=flathead chub.

Appendix II. Gill net summaries by area, in Tiber Reservoir, MT, during 1992

AREA	NO.OF NETS	SPECIES	NO.OF FISH	LENGTH RANGE	LENGTH MEAN	WEIGHT RANGE	WEIGHT MEAN
Devon 9/16-9/17	5	WE	8	8.7-12.7	10.2	0.18-0.74	0.37
			4	13.5-15.5	14.5	0.83-1.14	0.98
			5	16.1-17.0	16.6	1.32-1.79	1.59
			1	-	28.2	-	-
		YP	3	5.7- 7.4	6.3	0.08-0.18	0.11
		Lt	3	24.9-25.2	25.1	5.17-5.42	5.29
			1	-	29.8	-	-
		WSu	1	-	19.5	-	3.24
		LnSu	1	-	6.8	-	.12
			2	12.2-16.4	14.3	0.75-1.64	1.19
		Sturgeon	1	-	34.0	-	-
Bootlegger 9/15-9/16	6	WE	31	8.3-12.9	9.8	0.15-0.76	0.29
			10	13.4-15.5	14.6	0.84-1.30	1.11
			13	16.4-18.3	17.4	1.46-2.08	1.78
		NP	4	20.2-23.4	21.9	2.09-3.05	2.52
		YP	2	7.5- 8.0	7.8	0.18-0.21	0.19
			3	9.8-10.4	10.1	0.46-0.54	0.50
		Lt	2	25.0	25.0	-	-
		WSu	1	-	8.3	-	0.26
			2	13.6-15.3	14.5	1.06-1.70	1.38
			1	-	18.8	-	2.62
		LnSu	1	-	18.5	-	2.04
		Sturgeon	1	-	36.2	-	-
Dam 9/15-9/16	5	WE	15	7.6-12.6	10.2	0.13-0.64	0.37
			14	13.4-15.9	14.7	0.80-1.31	1.05
			20	16.0-19.7	17.8	1.29-2.55	1.86
			1	-	20.1	-	2.46
		NP	5	23.2-26.7	24.6	3.05-3.75	3.63
		YP	1	-	11.4	-	0.70
		Rb	2	18.9-21.4	20.2	2.70-3.95	3.32
		WSu	1	-	7.8	-	0.18
			1	-	15.1	-	1.43
			1	-	17.4	-	2.12
		LNSu	1	-	20.2	-	3.31
WCA 9/14-9/15	9	WE	31	7.4-12.8	10.2	0.12-0.69	0.33
			32	13.0-15.9	14.4	0.63-1.28	0.98
			22	16.1-19.7	17.7	1.40-2.53	1.73
			3	20.2-29.4	23.4	2.51-10.20	5.17
		NP	4	18.8-19.7	19.3	1.40-1.68	1.58
			9	20.0-29.2	23.1	1.78-5.80	3.05
		YP	2	7.4-7.5	7.5	-	0.18
			1	-	10.1	0	0.48
		Rb	2	20.1-21.8	20.9	2.94-3.56	3.25
		WSu	1	-	7.2	-	0.14
			6	12.2-16.9	14.9	0.75-2.26	1.98
			9	17.0-19.1	17.8	2.10-3.22	2.53
		LNSu	1	-	19.8	-	3.44
		Carp	1	-	18.8	-	3.16
			1	-	28.8	-	14.25