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

STATE: Montana PROJECT NO. F-46-R-5
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, 1991 through June 30, 1992

ABSTRACT

During the report period, warmwater investigations were conducted on four large reservoirs and two smaller lakes. An apparent spawning run of walleye is occurring into the Marias River above Tiber Reservoir. Walleye numbers increased in Tiber Reservoir but decreased in Lake Frances and Bynum Reservoir. Cumulative exploitation rates for tagged walleye varies from approximately 17 to 19 percent in these waters. Forage fish composed of yellow perch and spottail shiner are good overall with the exception of reduced perch numbers in Tiber Reservoir. A creel census at Tiber Reservoir estimated a harvest of 13,584 walleye and 2,378 northern pike during an April through September period. Walleye catch rates averaged 0.35 fish per hour. Artificial yellow perch spawning structures were placed in Tiber Reservoir. Spottail shiner introduced into Pishkun Reservoir have yet to become established. Using cross sections of spines, Walleye were aged up to 17 years old and northern pike up to 9 years.

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), and 4 x 6 foot frame trap nets (1 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 and scale/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. Vertical plankton tows were made using a 30 cm conical net with a 15 cm radius (0.153 mm mesh). Brush structures were transported by boat and sunk at selected depths. Northern pike fin rays and walleye spines were mounted and sectioned according to methods described by Mackay et al. (1990).

FINDINGS

WALLEYE EGG SOURCE

Walleye eggs were not collected during the spring of 1991 because few ripe females were taken. Attempts were made in Bynum Reservoir and at two locations in Tiber Reservoir.

Bynum Reservoir

Four to seven trap nets fished a total of 36 trap nights from April 16 - 25, 1991 and captured the following: 200 walleye, 1,453 yellow perch, 6,486 white sucker, 8 brook trout, 1 rainbow trout, 1 cutthroat trout and 1 mountain whitefish. An additional 60 walleye were collected by short-duration gill net sets. A total of 226 walleye were tagged to aid in age determination. These walleye averaged 16.9 inches total length (range 14.0 - 26.1 inches). Of the total walleye taken, 18 were recaptures of fish tagged in 1989 and 1990. These fish showed average annual growth increments of 1.6 inches (1990 fish) and 1.8 inches (1989 fish). During 1991, anglers voluntarily returned 17 tags (Table 1). Annual exploitation for 1991 tagged walleye was 5.3 percent and cumulative returns for 1989 has increased to 16.7 percent. Water temperatures ranged from 40 - 46 F during trapping. Forage fish surveys conducted August 20 1991, show good numbers of yellow perch and spottail shiner (Appendix I). Figure 1 shows trends in forage numbers since quantitative surveys began in 1986. Yellow perch and spottail shiner have essentially increased each year with a one-year decrease of spottail in 1990 and a slight decrease of perch in 1991. Overall, forage in Bynum Reservoir is very good. Approximately 1000 adult spottail were transferred from Tiber Reservoir on June 14, 1991, to help reproduction potential.

Gill net surveys in September were dominated by yellow perch and white sucker (Table 2). Walleye were collected at the rate of 4.5 fish per net. This compares to past years: 1990 - 8.3 fish per net; 1989 - 11.8; 1988 - 7.0; 1987 - 13.3; and 1986 - 17.5. It is not known if natural reproduction is occurring since walleye are still stocked. Yellow perch numbers under nine inches available as prey for walleye are considered very good. A comparison of perch numbers taken per gill net and the percent available as prey is presented in Figure 2. Crayfish were also abundant in the gill nets.

Lake Frances

Spring trapping investigations were not conducted at Lake Frances due to efforts being directed at Tiber and Bynum Reservoirs. Although fish have not been tagged since 1989, anglers voluntarily returned tags from 11 northern pike and 1 walleye. Cumulative returns for walleye tagged in 1988 and 1989 is now 19.0 and 20.8 percent respectively (Table 1). Exploitation of northern pike is somewhat higher, with rates of 30.8 percent for 1988 and 26.7 percent for 1989.

Trends in forage fish abundance over a six-year period are displayed in Figure 3. The most noticeable change is shown by

spottail shiner, increasing each year to very high levels in 1990 and 1991. Yellow perch have fluctuated with highest numbers observed in 1990. White sucker were most abundant in 1990 and 1991. Young-of-the-year walleye and northern pike are generally taken in small numbers. At the present time, forage numbers are considered good, and a complete listing is found in Appendix I.

Yellow perch dominated gill net catches in September (Table 2). Walleye were captured at the rate of 4.3 fish per net which is lower than previous years. (From 1986 to 1990, gill net catch rates ranged from 7.5-22.0 walleye per net). Northern pike catches are comparable to past years. Figure 2 shows that Lake Frances presently has fairly good numbers of perch available as prey for walleye and northern pike. Perch were taken at the rate of 28.3 fish per net and 44.7 percent of these were less than nine inches. Also abundant in gill nets were crayfish. Stomach analysis indicates that walleye utilized yellow perch, spottail shiner, crayfish and invertebrates. The majority of the northern pike utilized crayfish but also used a variety of food organisms including walleye, perch, burbot, unidentified fish remains, and a mouse.

Table 1. Angler harvest of walleye and northern pike, 1987-91.

Lake	Species	Year tagged	Number tagged	Number of returns (%)					
				1987	1988	1989	1990	1991	Cumulative
Bynum Res.	WE	1989	126	-	-	15(11.9)	5(4.0)	1 (0.8)	21(16.7)
		1990	219	-	-	-	14(6.4)	4 (1.8)	18 (8.2)
		1991	226	-	-	-	-	12 (5.3)	12 (5.3)
Lake Frances	WE	1988	21	-	4(19.0)	0(0.0)	0(0.0)	0 (0.0)	4(19.0)
		1989	202	-	-	28(13.9)	13(6.4)	1 (0.5)	42(20.8)
	NP	1988	13	-	2(15.4)	1(7.7)	0(0.0)	1 (7.7)	4(30.8)
		1989	430	-	-	87(20.3)	18(4.2)	10 (2.3)	115(26.7)
Tiber	WE	1987	444	50(11.3)	28(6.3)	4(0.9)	3(0.6)	0 (0.0)	85(19.1)
		1988	299	-	45(15.1)	7(2.3)	3(1.0)	3 (1.0)	58(19.4)
		1990	271	-	-	-	19(7.0)	18 (6.6)	37(13.6)
		1991	692	-	-	-	-	70(10.1)	70(10.1)
	NP	1987	495	55(11.1)	7(1.4)	1(0.2)	1(0.2)	0 (0.0)	64(12.9)
		1988	249	-	25(10.1)	1(0.4)	1(0.4)	0 (0.0)	27(10.8)
		1990	346	-	-	-	33(9.5)	7 (2.0)	40(11.6)
		1991	314	-	-	-	-	32(10.2)	32(10.2)

Pishkun Reservoir

A total of 16 seine hauls were made on August 21, 1991 with results found in Appendix I. Forage fish numbers have improved over 1990 with perch increasing from 43-71 fish per haul and white sucker increasing from 13-31 fish per haul. Spottail shiner, stocked in 1987, 1989 and 1990, still occur only in very

limited numbers. A total of 2,000 adult spottail were stocked on June 11, 1991, to further attempts at establishing this species as an additional forage base.

Yellow perch were most abundant in gill nets fished in September (Table 2). Other species taken include northern pike, kokanee salmon, and white sucker.

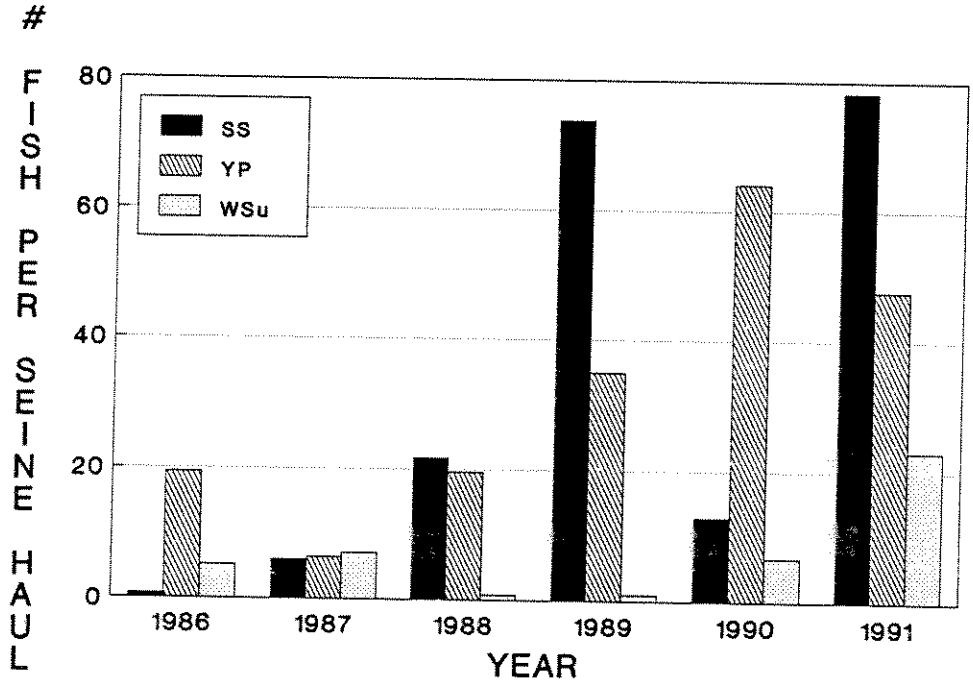

Figure 1. Trends in forage fish numbers, Bynum Reservoir, 1986-1991.

Table 2. Overnight gill netting results in warmwater reservoirs in Region Four during 1991.

Water (date)	Surface[1] acres	No. of[2] nets	Mean hrs fished/net	Species[3]	No. of fish	Length (in) Range (Avg.)	Weight (pounds) Range (Avg.)
Bynum Reservoir (9/11/91)	2800	4S	20.0	WE	4	9.2-11.8 (10.3)	0.23-0.52 (0.34)
					2	14.0-14.5 (14.3)	0.84-0.98 (0.91)
					10	16.0-18.8 (17.0)	1.27-2.40 (1.70)
					2	21.4-21.5 (21.5)	3.50-3.90 (3.70)
				YP	186	6.0- 8.5 (6.5)	0.10-0.30 (0.13)
					1	- (10.0)	- (0.54)
				WSu	4	- (7.0)	- (0.15)
					12	10.9-11.9 (11.0)	0.51-0.79 (0.65)
					207	14.1-17.0 (15.7)	1.40-2.60 (1.48)
Lake Frances (9/10/91)	4700	6S	20.5	WE	9	10.8-12.9 (11.9)	0.38-0.67 (0.54)
					10	13.0-15.7 (14.4)	0.64-1.40 (0.97)
					7	16.4-18.7 (17.7)	1.56-2.26 (1.92)
				NP	4	10.1-14.7 (13.0)	0.20-0.62 (0.45)
					5	16.0-19.5 (17.6)	0.80-1.95 (1.21)
					8	21.5-32.6 (26.5)	2.30-9.00 (4.73)
				YP	76	6.5- 8.5 (7.3)	0.14-0.38 (0.20)
					61	9.0-10.8 (9.6)	0.40-0.71 (0.53)
					33	11.6-12.2 (11.6)	0.82-0.96 (0.82)
				WSu	1	- (14.8)	- (1.52)
					6	- (19.2)	- (2.80)
Morony Reservoir (11/14/91)		3S	19.1	WE	5	9.6-20.1 (13.0)	0.29-3.00 (0.98)
				Rb	2	14.7-15.7 (15.2)	1.01-1.36 (1.19)
				LL	1	- (18.9)	- (2.14)
				YP	2	5.7- 8.0 (6.9)	0.10-0.25 (0.18)
				Ling	1	- (13.0)	- (0.59)
				WSu	97	6.3-16.6 (13.1)	0.11-2.33 (1.09)
				LnSu	12	8.2-14.8 (11.0)	0.23-1.32 (0.61)
Petrolia Reservoir (10/23/91)	514	1F,1S	16.0	WE	26	7.0-24.6 (13.3)	0.09-6.90 (1.05)
				NP	1	- (24.0)	- (3.62)
				WSu	10	12.8-17.0 (15.4)	0.81-2.08 (1.67)
Pishkun Reservoir (9/13/91)	1200	4S,1F	19.0	NP	2	11.0-15.6 (13.3)	0.25-0.85 (0.55)
					3	22.2-23.2 (22.6)	2.86-3.25 (3.18)
				YP	28	5.7-8.8 (7.4)	0.08-0.34 (0.21)
					2	- (10.3)	- (0.57)
					1	- (11.1)	- (0.78)
				KOK	3	7.8- 8.1 (8.0)	0.14-0.17 (0.15)
					1	- (13.2)	- (0.78)
				WSu	2	- (11.8)	- (0.68)
					9	15.0-17.0 (15.7)	1.48-2.46 (1.81)

1-Approximate surface acres at time of survey.
2-Standard experimental gill nets; F=Floating; S=Sinking
3-Species abbreviations: WE=Walleye; NP=Northern Pike; YP=Yellow Perch; Rb=Rainbow Trout; SNS=Shovelnose Sturgeon;KOK=Kokanee salmon; LL=Brown trout; WSu=White Sucker; LnSu=Longnose Sucker.

Table 2. (continued).

Water (date)	Surface[1] acres	No. of[2] nets	Mean hrs fished/net	Species[3]	No. of fish	Length (in) Avg. (Range)	Weight (pounds) Avg. (Range)
Tiber Reservoir (9/17-9/19/91)	15900	24S	18.2	WE	104	6.2-12.9 (11.4)	0.07-0.81 (0.52)
					85	13.0-15.9 (14.5)	0.64-1.48 (1.04)
					66	16.0-19.9 (17.4)	1.22-2.82 (1.83)
					2	21.7-22.5 (22.1)	-
				NP	20	16.0-19.9 (18.8)	0.90-2.05 (1.53)
					33	20.0-34.9 (23.1)	1.65-6.53 (2.91)
				YP	113	2.9-8.3 (6.4)	0.01-0.30 (0.13)
					18	9.3-10.5 (9.9)	0.39-0.65 (0.46)
					7	11.2-12.1 (11.6)	0.68-0.80 (0.73)
				Rb	3	13.0-20.3 (17.3)	0.86-2.52 (1.94)
					4	19.6-20.8 (20.2)	2.70-3.02 (2.86)
				SNS	1	- (34.5)	-
				Carp	2	- (4.5)	- (0.04)
					2	13.0-13.2 (13.1)	1.20-1.35 (1.28)
					1	- (23.8)	- (6.50)
				WSu	12	13.8-15.7 (15.5)	0.98-1.90 (1.60)
					10	16.3-18.5 (17.9)	1.98-3.92 (3.24)
				LnSu	2	7.7- 9.6 (8.7)	0.16-0.32 (0.24)
					4	17.0-18.5 (18.1)	2.00-2.68 (2.51)
Tiber Reservoir (9/17-19/91)	15900	6F	18.5	WE	1	- (10.8)	- (0.34)
				NP	1	- -	- -
				Rb	1	- (14.7)	- (1.15)

1-Approximate surface acres at time of survey.
2-Standard experimental gill nets; F=Floating; S=Sinking
3-Species abbreviations: WE=Walleye; NP=Northern Pike; YP=Yellow Perch; Rb=Rainbow Trout; SNS=Shovelnose Sturgeon;KOK=Kokanee salmon; WSu=White Sucker; LnSu=Longnose Sucker.

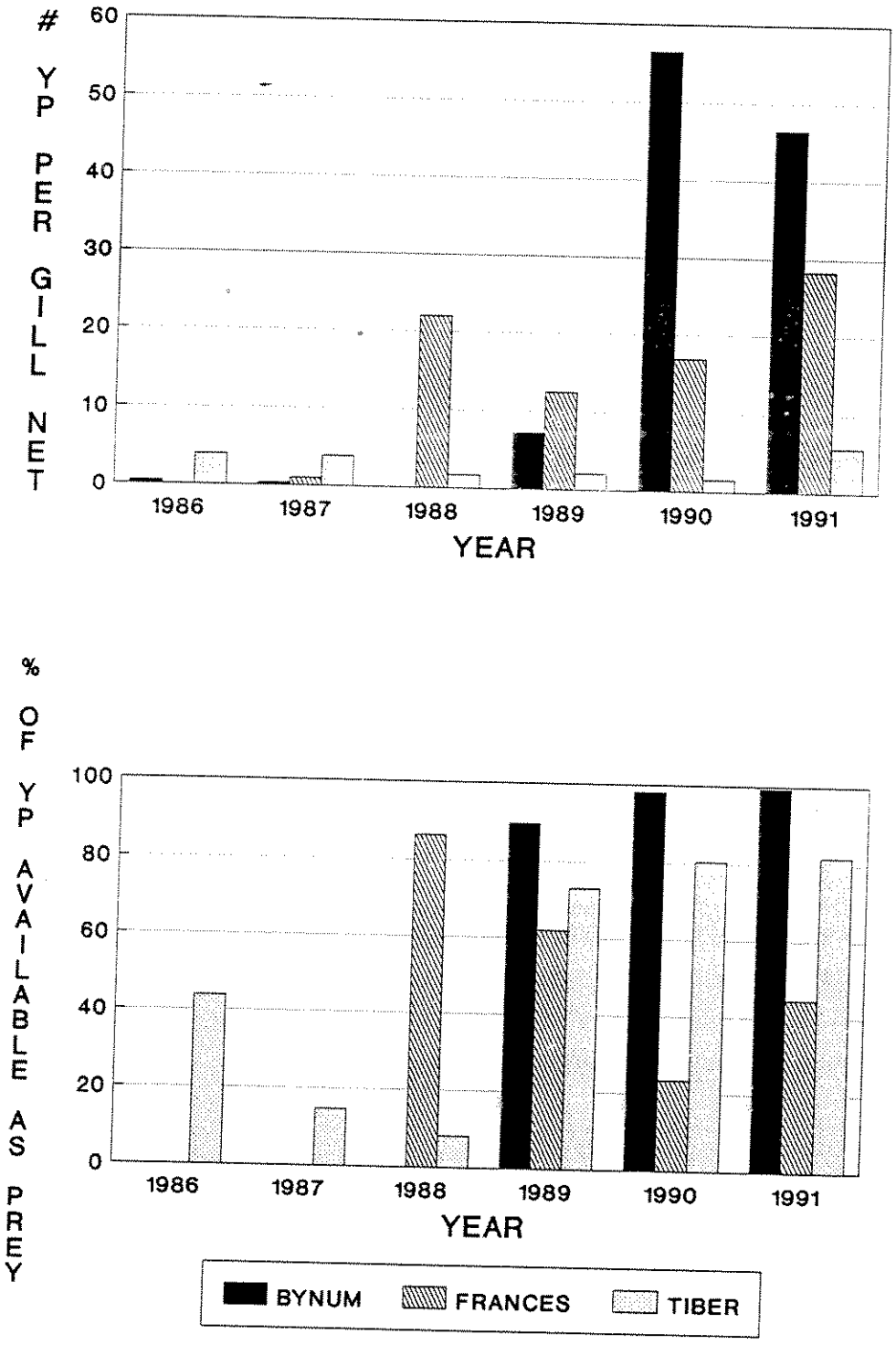

Figure 2. Numbers of yellow perch (YP) per gill net vs. percent yellow perch (<9 inches) available as prey: Bynum, Francis and Tiber reservoirs, 1986-1991.

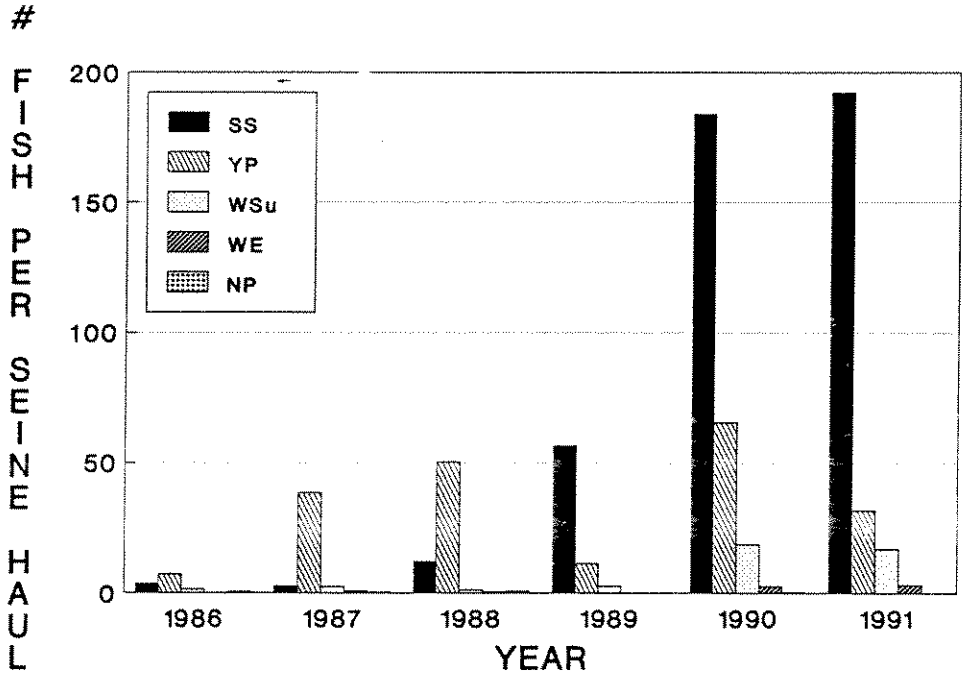

Figure 3. Trends in forage fish numbers in Lake Francis, Montana, 1986-91.1

Tiber Reservoir

Species composition and abundance trends were monitored during April 1991 in the Willow Creek Arm (WCA) and Devon areas of Tiber Reservoir. Trapping dates and number of fish taken by area are shown in Table 3. Catch per unit effort for walleye was higher in the Devon area while greater numbers of northern pike were found in the WCA. Numbers of walleye are comparable to 1990 but the numbers ofnorthern pike are down. Water temperatures ranged from 41-47F in the WCA and 41-48 F in the Devon Area during trapping.

To aid in determining exploitation and movement, a total 692 walleye and 314 northern pike were tagged in the two areas. Walleye averaged 16.4 inches in total length (range=14.0-25.1) in the WCA and 16.0 inches (range=14.0-29.2) in the Devon area. The total length of northern pike in the WCA averaged 20.1 inches (range=16.0-31.5) while those from Devon averaged 20.2 inches (range=16.0-45.0). The 1991 averages for walleye represent a slight increase over 1990 whereas a slight decrease in average length for northern pike was noted.

During 1991, anglers voluntarily returned tags from 70 walleye and 32 northern pike that were tagged in 1991. This results in annual exploitation rates of slightly over 10 percent for both species (Table 1). Anglers also returned tags from fish marked in previous years. Cumulative exploitation of walleye ranges from 13.6-19.4 percent for

tagging years 1987-1990. Likewise, northern pike have cumulative rates of 10.8-12.9 percent for the same time period.

A previous report (Hill et al. 1991) indicated significant post spawning movements for walleye tagged in the Devon area in 1990 and limited postspawning movements for northern pike tagged in both the Devon area and WCA. The report also suggested a spawning run of walleye into the Marias River above Tiber Reservoir. The 1991 data shows both species keying into the upper end of the reservoir during early April, again suggesting a spawning run into the river. Fairly significant flows occurred in the Marias River during spawning and may have been a factor in influencing fish movement to the area. Flows ranged from 750-2740 cfs (mean = 1255 cfs). Postspawning movements for 1991 are somewhat different than 1990. Based on tag returns over a twelve-month period, tagged northern pike caught in the WCA can be broken down as 47.1 percent originally tagged at Devon and 53.3 percent tagged in WCA (Table 4). Several Devon pike were caught in the Bootlegger trail area and several WCA pike were taken in the Dam area. Few or no tagged pike were caught in the Devon area or the Marias River. Walleye originally tagged in the WCA were predominately caught in the WCA (72.2%) whereas Devon tagged walleye were more readily caught in the Bootlegger Trail area (35.3%) closely followed by the WCA (32.4%). Few walleye were caught in the Dam, Devon or Marias River areas.

Table 3. Species composition and relative abundance from trap nets set in Tiber Reservoir, during April1991.

	Willow Creek Arm	Devon Area
Trapping Dates	April 5-18	April 23-25
No. of trap nights	96	68
Species* and number trapped		
NP > 16"	125	205
NP < 16"	4	13
WE > 14"	212	495
WE < 14"	12	154
YP	47	63
Ling	93	56
WSu	253	25
Rb	10	37
Carp	6	73
Wf	1	1
CT	-	1

*Species abbreviations: NP=Northern pike; WE=Walleye; YP=Yellow perch; Ling=Burbot; WSu=White sucker; Rb=Rainbow trout; Wf= Mountain Whitefish CT=Cutthroat Trout.

Table 4. Tag returns by area caught in relation to area tagged, Tiber reservoir, 1991

			% of tagged fish caught by area[1]				
Species	Area tagged	No. of tags returned	Marias River	Devon	BT	Dam	WCA
Walleye	Devon	34	11.8	11.8	35.3	8.8	32.4
	WCA	36	5.6[2]	2.8	2.8	16.7	72.2
N.Pike	Devon	17	-	5.9	29.4	17.6	47.1
	WCA	15	-	-	13.3	33.3	53.3

1= Area abbreviation: BT= Bootlegger Trail; WCA=Willow Creek Arm.
2= 2.8% caught in river above reservoir, 2.8% in river below Tiber Dam.

Spottail shiner were collected in mid-June by small mesh trap nets and seining for purposes of transfer to other waters. This forage fish was found to be very abundant. Approximately 2000 adult spottail were transferred to Pishkun Reservoir on June 11 and 1000 adults to Bynum Reservoir on June 14.

Forage fish were sampled in four areas of Tiber Reservoir from August 26-29. Spottail shiner and carp were most abundant (Appendix I). Yellow perch and emerald shiner were the only other species taken in any quantities. A six-year trend in forage fish numbers is shown in Figure 4. Spottail shiner have increased every year since 1986 but essentially exploded in 1991. Conversely, yellow perch saw a steady decline throughout the period with the exception of a slight increase in 1990. The decline in perch numbers is related to the lack of suitable spawning habitat.

Efforts continue to improve forage fish numbers through improvement of spawning habitat. Water level management and timing are major goals to improve perch spawning success. In addition, artificial spawning structures have been placed with more planned for the future. These activities are annually negotiated with the Bureau of Reclamation and the Marias Management Committee. Water levels were too low in the spring of 1991 to accommodate successful perch spawning. The Hi-Line Sportsmen and Great Falls Walleye Unlimited assisted in placing 36 artificial spawning structures in the WCA during April, 1991. The structures measured approximately 3 foot diameter by 8 foot long and were made with discarded shelter belt brush. Structures are placed so as to prevent ice damage and minimize navigation hazards.

A total of 24 experimental sinking gill nets were fished from September 17-19, 1991. Sampling was conducted throughout the reservoir and individual netting summaries are presented in Appendix II. Walleye were most abundant followed by yellow perch. Six other species were also taken (Table 2). Walleye catch rates of 10.7 fish/net represent an increase of 3.5 fish/net when compared to several previous years. Yellow perch increased from an average of 2.3 fish/net for the years 1987-1990 to 5.8 fish/net in 1991. Although 82 percent of the perch population is considered available as prey for walleye and northern pike, overall perch numbers are quite low (Figure 2). Northern pike decreased from 3.5 fish/net in earlier years to 2.2 fish/net in 1991. Shovelnose sturgeon continue to exist in the reservoir as one fish was taken during netting surveys. Six floating gill nets caught only one each of rainbow trout, walleye, and northern pike (Table 2).

Numbers of larger walleye continue to increase (Table 5). Fish greater than 16 inches accounted for only 16-18 percent of the population in 1988 and 1989, but increased to 22 percent in 1990 and 26.5 percent in 1991. The overall average length of walleye, however, continues to fluctuate around 14 inches.

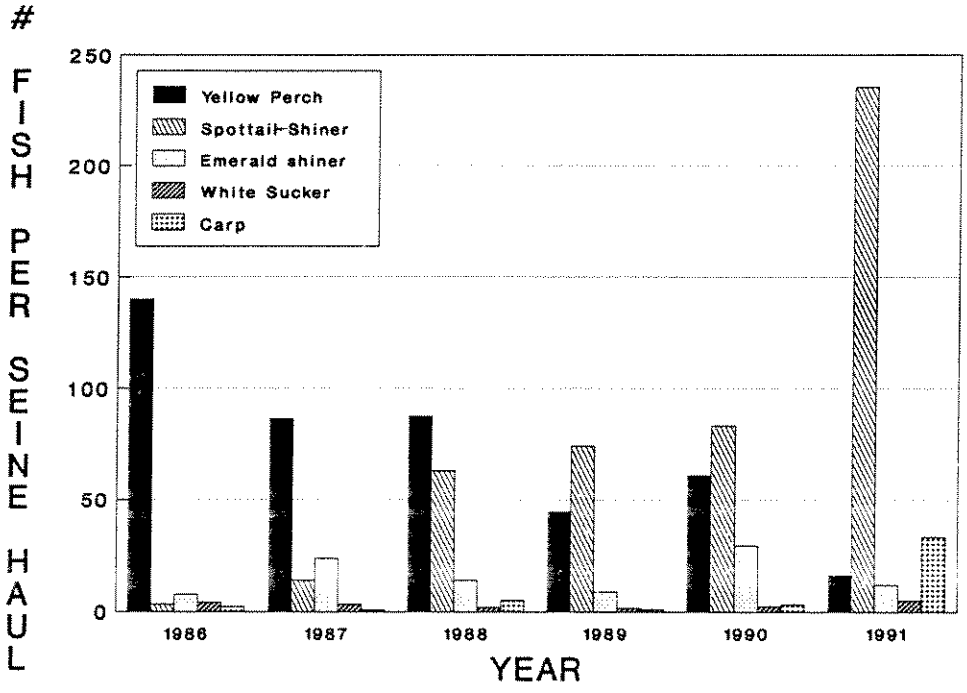

Figure 4. Trends in the numbers of forage fish from sein hauls in Tiber Reservoir, Montana, 1986-91.

Table 5. Abundance of walleye by percentage in each size groupbased on gill net data from Tiber Reservoir, 1986-1991.

	% of Walleye Population					
Size Group (inches)	1986	1987	1988	1989	1990	1991
<12.9	34.9	43.8	34.9	40.0	27.0	40.5
13.0-15.9	26.5	24.8	46.7	44.3	50.9	33.0
16.0-19.9	35.5	28.8	14.8	14.8	21.4	25.7
>20.0	3.0	2.6	3.6	0.9	0.6	0.8

A total of 86 walleye and 46 northern pike stomachs were analyzed for food content. Approximately 26 percent of all stomachs were empty. Of stomachs with food, unidentified fish remains occurred in 65 percent of the walleye examined along with 15 percent occurrence by yellow perch. Spottail shiner were found in two stomachs. Fish remains (37%) and crayfish (28%) most commonly occurred in northern pike stomachs while spottail shiner accounted for 15 percent occurrence. Unidentified fish remains are thought to be spottail shiner.

A creel census was conducted at Tiber Reservoir from April 1, 1991, through March 31, 1992. Anglers were interviewed on shore and by boat.

An airplane counted numbers of shore anglers and fishing boats on the water. Preliminary analysis of data from April through September 1991 indicates fishing pressure of 12,808 angler-days. The total number of fish harvested is estimated as follows: walleye - 13,584, northern pike - 2,378, yellow perch - 2,196, burbot - 165, and rainbow trout - 868. Catch rates were highest for walleye at 0.35 fish per hour followed by northern pike at 0.07 fish per hour. The majority of the fish were caught in the WCA. A final creel census report covering the entire year will be prepared at a later date.

An investigation continues into the possibility of introducing cisco (Coregonus artedii) to provide additional forage for predatory fish in Tiber Reservoir. Zooplankton sampling and temperature measurements were conducted to aid in determining if these parameters are suitable for cisco in Tiber. Zooplankton were sampled from July - September 1990 and late May - mid-September 1991. Analysis indicates fairly low plankton densities: Daphnia - 1.47/liter; Cycloid copepods - 3.18/liter; Diaptomus - 2.54/liter; and Epischura - 0.053/liter. Maximum surface temperatures were recorded in August 1990 (72F) and August 1991 (71.5F). Maximum temperatures of 54F. were recorded at depths of 80 feet during July and August.

Age and Growth

Dorsal spines from walleye and pelvic fin rays from northern pike were collected during spring and fall surveys. A total of 195 and 81 walleye spines from Tiber and Bynum reservoirs, respectively, were analyzed from collections made during spring surveys (see Appendix III). The majority of the Tiber walleye were four to seven years old with considerable overlap of ages for any given length interval. The oldest Tiber walleye was seventeen years old which represents a fish originally stocked as a fry in 1974. All of the remaining walleye (Age 2-14) are the result of natural reproduction. A more defined age distribution is apparent for Bynum walleye with mostly four and six year old fish. Four-year old fish generally ranged from 13-16 inches in length and six-year olds from 17-21 inches.

Spring surveys at Tiber Reservoir also facilitated collection and analysis of 185 northern pike pelvic fin rays (Appendix IV). As noted for walleye, considerable overlap of ages occurs at length intervals. The oldest northern pike was nine years and 45 inches in length.

Walleye spines were analyzed from fall surveys with 105 taken at Tiber Reservoir, 15 from Bynum Reservoir and 41 from Lake Frances (Appendix V). Age overlap is evident at Tiber and Frances but not at Bynum. Growth is best at Bynum but is expected to change as the population increases from recruitment of naturally spawned fish.

Petrolia Reservoir

The catch of walleye in Petrolia Reservoir doubled from 1990. We captured a total of 26 walleye, which ranged from 7.0.-24.6 inches in

gill nets (Table 2). However, only 1 northern pike was sampled. Fish were found in 20 of the walleye stomachs. Four of the fish identifiable were carp and one was a yellow perch. Five of the walleye stomachs were empty, and 1 contained insects. The northern pike stomach contained a sucker.

Morony Reservoir

A variety of species were found in Morony reservoir. We sampled five walleye, two rainbow trout, one brown trout, one ling, two yellow perch and numerous suckers during 1991 (Table 2).

Small Ponds and Reservoirs

CHOTEAU AREA

Eight seine pulls were made in Eyraud Lake on August 22, 1991. Due to abundant vegetation, few forage fish were taken. Crayfish were most abundant. A few young-of-the-year carp were collected but only yearling yellow perch and northern pike were taken.

Gill nets and trap nets were fished on May 24, 1991 in Priest Butte Lake to obtain samples for the U.S. Fish and Wildlife Service to measure selenium levels. The following species were collected: white crappie, yellow perch, carp, white sucker, three-spined stickleback, fathead minnow, brassy minnow, lake chub and salamander larvae. Test results have not yet been received.

GREAT FALLS - LEWISTOWN AREA

Work on warmwater ponds in the Great Falls and Lewistown areas will be discussed in next years progress report.

DISCUSSIONS AND RECOMMENDATIONS

Attempts at taking walleye eggs at Tiber Reservoir again proved futile as few gravid females were collected. A spawning run in the Marias River above the reservoir is suspected. An egg take may be possible but will involve more effort and at the expense of data collection from other Region Four waters.

Development of the walleye fishery in Bynum Reservoir continues and fishing pressure is increasing as larger fish now approach four pounds. Yellow perch and spottail shiner occur in sufficient numbers to provide adequate forage. Due to fewer numbers of walleye per net in the September sampling, it is recommended to continue fingerling plants until strong year classes develop which may suggest that natural

reproduction is also occurring.

Game fish populations in Bynum Reservoir, Lake Frances and Tiber Reservoir are largely predator and thus dependent on adequate prey species. Spottail shiner and yellow perch are the main forage fish available. At the present time, spottail are found in good numbers in all three waters and perch less than nine inches (considered maximum prey size) are also good at Bynum and Lake Frances. However, perch continue to be depressed in Tiber Reservoir. To improve spawning habitat for perch in Tiber Reservoir, it is recommended to continue installation of brush structures and to work towards water level management with the Bureau of Reclamation through the Marias Management Committee. Perch spawning structures may also be necessary in Bynum and Frances in the future.

Pishkun Reservoir has a northern pike fishery with yellow perch as the forage base. Spottail shiner have been introduced several times to create supplemental forage, but to date, have not established a sustainable population. It is recommended to make one final effort at establishing this species. Kokanee salmon have been planted in this reservoir since the early 1970's but will be discontinued due to poor survival in recent years. A few large rainbow trout also occur as migrants from the Sun River. Due to public interest in a better salmonid fishery, a five-year stocking experiment with rainbow trout will be undertaken (Hill et al. 1992). Predation on stocked trout by northern pike will be monitored. A management decision will be made following completion of the experiment.

We will contiue to sample Morony Reservoir. Fingerling walleye plants should continue in Morony for at least another year, but may be discontinued if public access is not allowed.

We will continue to monitor gamefish and forage fish abundance in Petrolia Reservoir each fall. Additional habitat structures to provide cover and spawning substrate will be placed in the reservoir if continued assistance from local anglers can be secured. Walleye plants have been scheduled on an alternate year basis but low water levels or a reduced forage base may force cancellation of the stocking in some years. Some natural reproduction of walleye appear to be occurring. No additional plants of northern pike are anticipated because of adverse effects on the walleye food supply and the high potential for natural reproduction. We may also research the potential impacts of future introductions of spottail shiners into Petrolia Reservoir.

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DATE: September 1991 & KR.

PRINCIPAL FISH SPECIES INVOLVED:

Walleye, northern pike, yellow perch, spottail shiner

CODE NUMBERS OF WATERS REFERRED TO IN REPORT:

14-7080 Bynum Reservoir
14-6840 Eyraud Lake
14-7440 Lake Frances
14-8540 Priest Butte Lake
14-9240 Tiber Reservoir
17-9296 Morony Reservoir
18-8720 Petrolia Reservoir
20-7950 Pishkun Reservoir

Appendix I. Forage fish / reproduction surveys, 1991 (Beach seining).

Water	Date	Water temp(3F)	No. of pulls	Number of fish / pull[1]										
				WE	NP	YP	FHC	SPS	EMS	WSu	Carp	MWF	Crayfish	LCH	Sculpin
Bynum Reservoir	8/20/91	71	16	0.0	N/A	47.6	N/A	78.3	N/A	23.1	N/A	0.1	0.2	N/A	0.0
Lake Francis	8/19/91	71	17	3.2	0.2	31.9	N/A	192.4	N/A	17.1	N/A	N/A	0.3	N/A	0.0
Pishkun Reservoir	8/21/91	69	16	N/A	0.1	71.3	N/A	0.1	N/A	31.1	N/A	N/A	4.6	N/A	0.0
Tiber Reservoir															
Devon	8/26/91	71	15	5.7	0.0	2.9	0.1	334.0	39.1	1.9	10.5	0.0	1.3	2.1	0.1
BT	8/27/91	70	12	1.3	0.0	9.1	0.1	242.5	3.6	5.9	20.8	0.0	0.9	0.2	0.0
WCA	8/28/91	70	16	1.4	0.4	47.9	0.0	224.3	3.2	10.9	72.7	0.0	1.5	0.4	0.0
Dam	8/29/91	71	15	0.0	0.0	1.6	0.0	142.9	0.7	0.3	23.7	0.0	0.2	0.1	0.0
Tiber combined	-	-	58	2.1	0.1	16.3	Tr.	235.4	11.9	5.0	33.2	0.0	1.1	0.7	Tr.

1-Species abbreviations: WE=walleye; NP=northern pike; YP=yellow perch; FHC=flathead chub; SPS-spottail shiner; EMS=emerald shiner; WSu=white sucker; MWF=mountain whitefish; LCH=lake.

Appendix II. Gill net summaries by area, in Tiber Reservoir, Montna during 1991.

Area (date)	No. of nets	Species	No. of fish	Length (in) range	Length (in) (mean)	Weight(lbs) range	Weight(lbs) (mean)
Devon (9/19/91)	5	WE	16	8.1-12.9	(10.8)	0.14-0.70	(0.38)
			17	13.3-15.8	(14.5)	0.70-1.30	(0.96)
			1	-	(16.1)	-	(1.22)
			2	21.7-22.5	(22.1)	-	
		NP	2	22.5-25.0	(23.8)	2.41-3.95	(3.18)
		YP	4	7.4-8.0	(7.5)	0.18-0.24	(0.19)
			9	-	(10.1)	-	(0.45)
			5	11.2-12.0	(11.6)	0.68-0.80	(0.73)
		Rb	1	-	(18.5)	-	(2.45)
		Carp	1	-	(13.0)	-	(1.35)
			1	-	(23.8)	-	(6.50)
		WSu	1	-	(13.8)	-	(1.10)
			2	16.3-18.4	(17.3)	1.98-2.88	(2.43)
		LnSu	2	7.7-9.6	(8.7)	0.16-0.32	(0.15)
			4	17.0-18.5	(18.1)	2.00-2.68	(2.51)
Bootlegger (9/18-19/91)	6	WE	19	7.7-12.8	(11.4)	0.14-0.69	(0.49)
			28	13.0-15.9	(14.6)	0.64-1.30	(1.02)
			11	16.1-18.3	(17.0)	1.31-2.06	(1.60)
		NP	12	16.1-19.9	(18.5)	0.90-1.75	(1.39)
			11	20.2-34.9	(23.6)	1.82-6.53	(3.13)
		YP	21	5.9-8.0	(6.6)	0.07-0.22	(0.11)
			4	9.4-10.0	(9.6)	0.39-0.75	(0.41)
			2	-	(11.8)	-	(0.75)
		Rb	1	-	(13.0)	-	(0.86)
		Wsu	1	-	(18.2)	-	(2.34)
		SNS	1	-	(34.5)	-	-
		Carp	1	-	(13.2)	-	(1.20)
Dam (9/18/91)	5	WE	13	8.6-12.8	(11.0)	0.23-0.71	(0.47)
			8	13.4-15.7	(14.4)	0.76-1.31	(1.00)
			20	16.0-19.5	(17.6)	1.31-2.56	(1.89)
		NP	3	19.3-19.8	(19.5)	1.80-1.91	(1.87)
			6	20.0-23.8	(22.1)	1.65-3.41	(2.39)
		YP	25	3.1-8.3	(6.2)	0.01-0.23	(0.09)
		WSu	3	-	(15.7)	-	(0.98)
			2	16.8-18.5	(17.7)	2.46-3.13	(2.79)

Appendix II. (continued).

Area (date)	No. of nets	Species	No. of fish	Length (in) range	Length (in) (mean)	Weight (lbs) range	Weight (lbs) (mean)
Willow Creek Arm (9/17/91)		WE	56	6.2-12.9	(11.6)	0.07-0.81	(0.59)
			32	13.0-15.9	(14.5)	0.79-1.48	(1.11)
			34	16.0-19.9	(17.5)	1.40-2.82	(1.87)
		NP	5	18.3-19.7	(19.1)	1.45-2.05	(1.68)
			14	20.7-28.0	(22.9)	1.90-5.90	(3.01)
		YP	63	2.9-8.2	(6.4)	0.01-0.30	(0.14)
			5	9.3-10.5	(9.7)	0.40-0.65	(0.50)
		Rb	1	-	(20.3)	-	(2.52)
		Carp	2	-	(4.5)	-	(0.04)
		WSu	8	-	(15.7)	-	(1.90)
			5	-	(18.2)	-	(3.92)

Appendix III. Walleye spine analysis of age by half inch group from samples collected from Tiber and Bynum reservoirs during spring 1991.

Length interval (in)	Age	
	Tiber Reservoir	Bynum Reservoir
7.0	2	
7.5		
8.0		
8.5	2	
9.0	2	
9.5	2	2
10.0	2,3	
10.5	4,4,3	
11.0		
11.5	3,4,3,3,4	
12.0	4,3,5,4,5	4
12.5	3,4,3,4,5	
13.0	4,3,4,6,5,4,5,	4
13.5	3,6,4,3,3,3,5,4,5,4,5,6,4,5	4,4,4,4,4,4
14.0	4,6,6,7,6,6,4,4,4	4,4,4,4
14.5	6,4,5,6,6,4,4,5,4,3	4,4,4,4,4
15.0	6,5,4,5,4,6,4,5,5,5,6	4,4,4,4,4,4
15.5	8,4,5,6,5,7,6,7,5,5	4,4,4,4,4
16.0	4,4,6,5,5,5,5,6,5,6,6,4	4,4,4,6,4
16.5	8,5,7,5,6,5,6,5,6,5,6	5,5,6
17.0	5,7,5,5,6,6,5,5,7	6,6,6,6
17.5	5,6,6,6,5,6,6,6,6,5	6,6,5,5,6
18.0	5,6,7,7,7,6,9,6	6,6,6,6,6
18.5	7,6,6,8,8,9,7,7,6,7	6,6,6,6,6
19.0	7,8,6,8,7,7,7,6	6,6,6,4,6,6
19.5	7,9,9,9,7,7,7,9,6,7	6,6,5,6,6,6
20.0	8,6,6,7,7,9	6,6,6,5,6
20.5	8,8,8,8,7,6,7,8	6,6,6,6,6
21.0	10	6
21.5	9	6
22.0	9,11	
22.5	9,8	6
23.0	13,11	
23.5	13,11	
24.0	9	
24.5		
25.0	13	
25.5	12,12	
26.0		
26.5	11,14	
27.0		
27.5		
28.0		
28.5		
29.0	17	

Appendix IV. Northern Pike fin ray analysis of age by half inch group from samples collected from Tiber and Bynum reservoirs during spring 1991.

Length interval (in)	Age
10.5	1
11.0	
11.5	
12.0	
12.5	
13.0	
13.5	
14.0	1,3
14.5	
15.0	2,2,2,3,2,3
15.5	2,2,4,2
16.0	2,3,2,3,2,2,3
16.5	2,3,3,3,2,3,3,2,2,2
17.0	2,3,4,2,2,2,3
17.5	3,3,3,3,3,3,4,2,2,2,3
18.0	3,3,3,2,3,3,3,3,2,4,4,3
18.5	3,3,3,3,3,4,5,3,2,3,3
19.0	2,2,2,3,3,3,2
19.5	3,3,4,3,2,4,3,3,2,3,4
20.0	4,2,3,3,3,4,3,2,3,3
20.5	3,5,3,3,3,2,2
21.0	3,3,3,3,3,3,5,3
21.5	4,5,4,4,4,4,3
22.0	3,3,3,5,5,3,3,7,3
22.5	5,3,4,4,3
23.0	5,5,5,5,3,4,2,3,2
23.5	3,5,4,3,3,4,4
24.0	4,4,3,4,3,3
24.5	4
25.0	
25.5	4,5,5,3
26.0	4,4,5,3,3,5
26.5	4
27.0	5,5,3,5
27.5	5
28.0	3,4
28.5	5,6
29.0	
29.5	5
30.5	3
31.0	4
31.5	7,5
40.5	8
45.0	9

Appendix V. Walleye spine analysis of age by half inch group from samples collected from Tiber and Bynum Reservoirs and Lake Francis during fall 1991.

Length interval (in)	Age		
	Tiber Reservoir	Bynum Reservoir	Lake Frances
6.0	1+		
6.5			
7.0	1+		
7.5	1+		1+
8.0	1+		1+,1+
8.5	1+,1+,1+,1+,1+,1+		1+
9.0	1+,1,+,1+	1+	
9.5	1+,1+,1+,1+,2+	1+	
10.0	2+,2+	1+,1+	
10.5	2+,2+,2+,2+		
11.0	2+,2+,2+,2+,2+		2+
11.5	3+,3+,3+,2+,2+,2+	1+	2+
12.0	2+,2+,2+,2+		3+,3+,5+
12.5	2+,2+,2+,2+,2+,2+		3+,3+,3+,3+
13.0	2+,2+,2+,3+,2+		3+,3+
13.5	2+,3+,3+,3+		3+,4+,3+,4+,3+
14.0	3+,2+,3+,2+	3+	4+,4+
14.5	5+,4+,5+,4+	3+	
15.0	4+,4+,4+,3+		3+,5+,5+
15.5	4+,3+,5+,3+,3+		5+,5+
16.0	4+,5+,3+,5+,3+	4+,4+	4+,6+
16.5	3+,3+,4+,4+	4+	5+,5+
17.0	4+,5+,5+,7+,5+	4+	5+
17.5	7+,4+,5+,5+		8+
18.0	6+,4+,6+,6+,6+	6+	
18.5	7+,6+,7+,7+	6+	9+,6+,6+
19.0	8+		5+
19.5	8+,9+,6+,8+		
20.0			
20.5			
21.0		6+	8+
21.5		6+	
22.0			
22.5			
23.0			
23.5			
24.0	14+		
24.5	10+		