MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATION

PROJECT NO.: F-46-R-7 STUDY TITLE: SURVEY AND INVENTORY OF WARMWATER LAKES

JOB NO.: IV-C JOB TITLE: FORT PECK RESERVOIR STUDY

PROJECT PERIOD: JULY 1, 1993 THROUGH JUNE 30, 1994

ABSTRACT

Nearly 2,000 walleye spawners were taken by spring trap netting in the upper Big Dry Arm. Approximately 36 million walleye eggs were obtained from 365 females, which resulted in the stocking of 24.3 million fry and over 2.0 million fingerlings into Fort Peck Reservoir. Condition factors and average weights of most walleye length groups appeared good. The average weight of female walleye spawners was 6.5 pounds, with male spawners averaging 2.5 pounds. Walleyes captured during summer gill net sampling also appeared to be in good condition. The average weight for both sexes of walleye combined was 2.01 pounds. Catch rates for gill-netted walleye reservoir-wide were down from 1992. Fall beach seining showed an increase in the production of forage fish. Greater production is attributed to increasing reservoir water elevations during the spring and summer of 1993. Cisco reproduction appears to have declined which could be the result of sampling gear inefficiency. Lake trout creel surveys during spring and fall indicated that catch rates were stable and condition of angler-caught fish was good. Average weight of lake trout during spring and fall creel was 8.86 and 7.57 pounds. A total of 55,000 3-7 inch pen reared chinook salmon were released into Fort Peck Reservoir. Approximately 99% of these fish were fin-clipped so absolute age and growth data could be collected from future samples.

OBJECTIVE AND DEGREE OF ATTAINMENT

Job Objectives:

1) To acquire a greater and consistent walleye egg supply for artificial propagation of fry and fingerlings. Accomplished entirely with state funds, results presented in Findings.

2) To determine success of walleye fry versus fingerling plants to develop future stocking guidelines. This objective was met and results are presented in Findings.

3) To determine abundance of walleye in spring spawning runs in the Missouri River upstream from Fort Peck Reservoir and assess impacts of river spawning attributable to Yellowstone River walleye stocking. This objective was partially met and is presented in Findings.

4) To encourage reservoir management practices to benefit the fishery as outlined in the water level management plan by coordinating needs with the Corps of Engineers and other states on the Missouri River Natural Resources Committee. Accomplished wholly with state funding.

5) To determine effects of reservoir water levels on abundance, distribution, and reproduction of key sport and forage fish. This objective was partially met and is presented in Findings.

6) To determine abundance and trends of spring spawning populations of walleye and northern pike. This objective was partially achieved and is reported in Findings.

7) To determine the rate of harvest for key species and angler preference for various species management. A lake trout creel survey was conducted in spring and fall and is presented in Findings.

8) To determine status of cisco and spottail shiners as to abundance, distribution, spawning success, and utilization by predators. This objective was met and results are reported in Findings.

9) To obtain greater public involvement by attending ten public/sportsmen's club meetings and providing at least five news releases per year. Accomplished entirely with state funds.

PROCEDURES

Spring trap-net sampling was conducted in the Big Dry Arm and lower Missouri Arm with 4- x 6-foot frame traps of 1-inch square mesh rigged with 50-foot leads. Sinking experimental gill nets 125 feet in length and 6 feet deep consisting of 25-foot panels of 3/4- x 1-, 1 1/4-, 1 1/2-, and 2-inch square mesh were fished during late summer to monitor condition, distribution and relative abundance of game fish species. Experimental gill nets were also used in the fall to acquire information on cisco spawners. Beach seining, to determine abundance and reproductive success of game and forage fish and to determine stocking success of walleye, was conducted in late summer and early fall utilizing a 100- x 9-foot beach seine of 1/4-inch square mesh. Monofilament gill nets 100- x 6-foot with 1/2-inch square mesh were fished vertically from the water's surface to sample young-of-year (YOY) cisco. Lake trout spawners were captured with 300-foot gill nets with 3-, 4-, and 5-inch square mesh.

FINDINGS

Trapping

Spring spawning fish populations were sampled in the upper Big Dry Arm with frame traps from April 15 - 30, 1993. Walleye, northern pike and forage fish populations have been sampled using this technique since 1979.

An effort of 172 trap days resulted in the capture of 1,945 walleye, of which 817 were weighed and measured. The catch rate for 1993 was 11.3 per trap-day, which nearly doubled last year's catch rate of 5.7. It was also the highest since 1989, where the average catch rate was 11.4 (Table 1).

The ratio of males to females was approximately 1:1 which was similar to last year. The average weight for female walleye spawners was 6.47 pounds and 2.50 for males. The average weight for both sexes of walleye is the largest observed since trapping began in 1979 (Table 2).

Weight composition of trap-netted walleye is shown in Figure 1. The percent of walleye weighing more than 3 pounds has decreased slightly from 1992, while the percent of walleye larger than 4 and 5 pounds has remained the same or increased slightly.

Condition factors and average weights for 1-inch length groups of walleye from 14-25 inches is shown in Figures 2 and 3, respectively. Since 1990, condition factors and average weight for these length groups appears to have remained the same, or improved slightly.

Scale and spine samples were taken from 214 trap-netted walleye and were aged through the use of a microscope and microfiche machine (Table 3). Age classes from 1-10 and age 12 were represented. The average weights of walleye in all age classes in 1993 was dramatically higher than those of 1990, as shown in Figure 4. The most dominant age class was five-year-olds, which averaged 21.6 inches in length. Five-year-olds in 1990 averaged only 16.4 inches, which is 5.2 inches less than five-year-olds in 1993. The population percentage of 21.6 inch fish in 1993 was 32% compared to 6% in 1990 (Table 3).

The catch rate for northern pike in frame traps in the upper Big Dry Arm was 1.2 fish per trap-day. This was the worst catch since 1988 (Table 1). Of the 170 northern pike weighed and measured, lengths ranged from 23.3- 40.0 inches, and weights from 2.60-18.50 pounds. The average length of northerns was 31.6 inches and average weight was 8.27 pounds.

Trap-netting was not conducted in the Lower Missouri Arm due to redirection of manpower to other projects.

Table 1. Summary of the walleye and northern pike caught during spring trap-netting in the upper Big Dry Arm of Fort Peck Reservoir, 1974-93.

Date	Trap-days	No. Walleye	Walleye/ Trap-day	No. No.Pike	No.Pike/ Trap-day
1974 (4/22-5/03)	71	1,243	17.4	125	1.8
1975 (4/25-5/12)	97	1,114	11.5	102	1.1
1976 (4/07-5/13)	100	2,108	21.1	95	1.0
1977 (4/12-5/24)	323	1,727	5.3	431	1.3
1978 (4/17-5/05)	81	1,896	23.4	399	4.9
1979 (4/28-5/17)	63	326	5.2	268	4.3
1980 (4/14-5/06)	97	535	5.5	301	3.1
1981 (3/31-4/28)	140	371	2.7	93	0.7
1982 (4/21-5/07)	89	655	7.4	221	2.5
1983 (4/06-5/09)	106	725	6.8	87	0.8
1984 (4/10-5/04)	96	579	6.0	21	0.2
1985 (4/08-4/26)	97	1,202	12.4	69	0.7
1986 (4/07-4/24)	102	1,448	14.2	174	1.7
1987 (4/07-4/24)	220	1,512	6.9	78	0.3
1988 (4/06-4/22)	214	1,610	7.5	163	0.8
1989 (4/25-5/06)	207	2,360	11.4	383	1.9
1990 (4/05-5/04)	292	1,863	6.4	513	1.8
1991 (4/09-5/10)	375	793	2.1	491	1.3
1992 (4/07-4/29)	278	1,585	5.7	684	2.5
1993 (4/15-4/30	172	1,945	11.3	201	1.2

Table 2. Summary of average weights and sex ratios for walleye trap-netted in the upper Big Dry, 1979-93.

Year	Average Weight Males	Sample Size	Average Weight Females	Sample Size	Sex Ratio[1] Male:Female
1993	2.50	446	6.47	351	1:1
1992	2.32	229	6.13	522	1:1
1991	1.82	234	5.31	106	2:1
1990	2.08	362	5.77	142	2:1
1989	1.78	192	4.88	129	3:1
1988	1.69	283	3.68	239	2:1
1987	1.22	152	2.94	94	2:1
1986	1.31	851	2.43	216	3:1
1985	1.31	606	2.54	111	5:1
1984	.88	454	2.14	34	13:1
1983	.80	644	3.24	37	18:1
1982	1.07	565	2.95	58	10:1
1981	2.27	209	3.70	96	2:1
1980	1.77	247	3.43	122	2:1
1979	1.50	204	3.40	61	3:1

[1]Sample size larger than fish sample used to determine average weights and lengths.

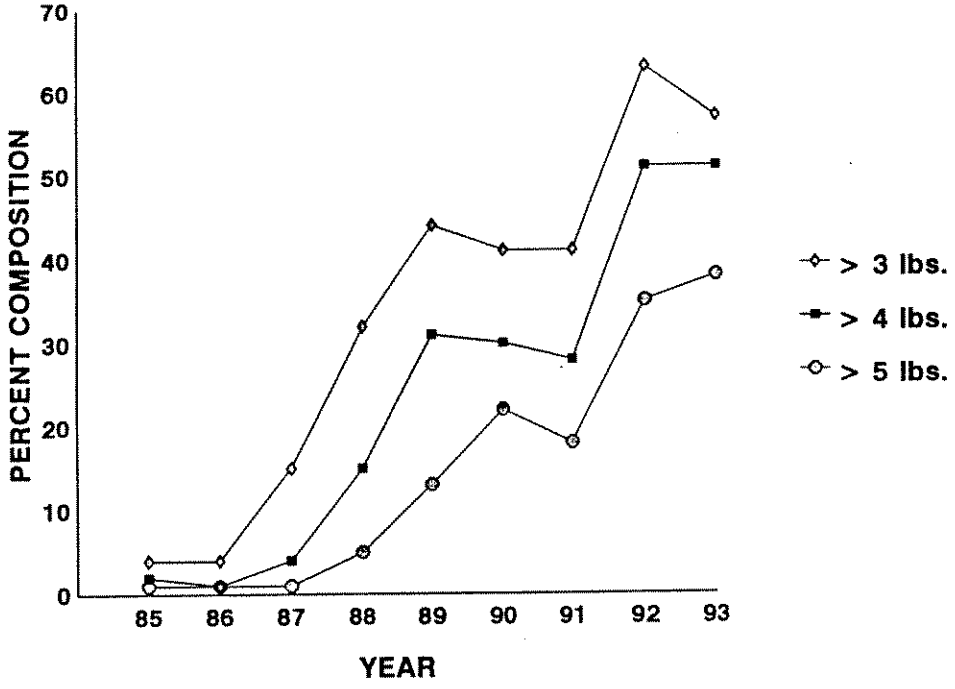

Figure 1. An illustration of the change in size of walleye captured during spring trapping in the upper Big Dry Arm of Fort Peck Reservoir, 1985-93.

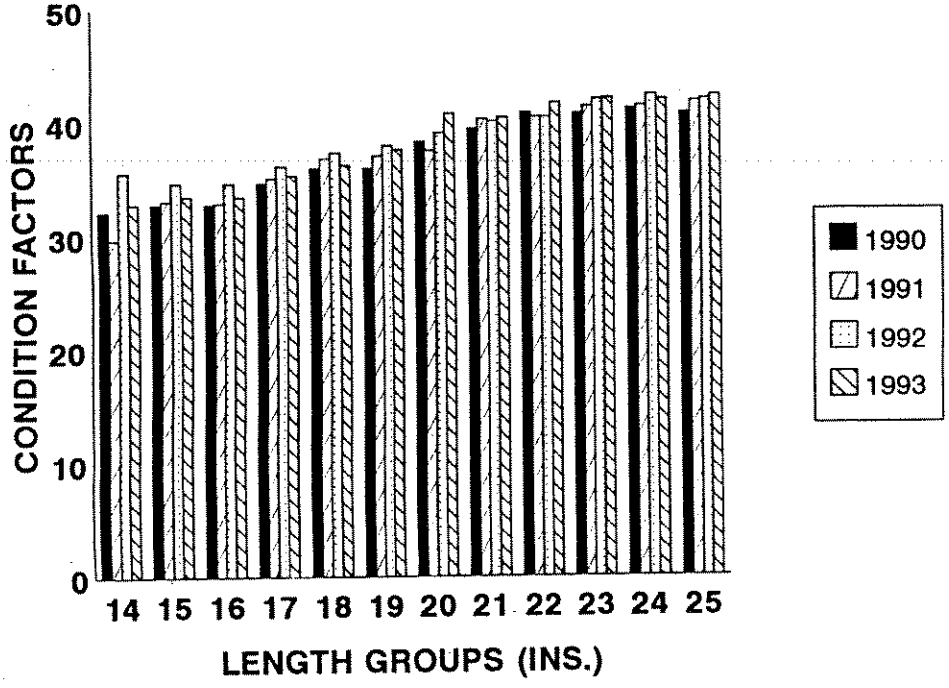

Figure 2. Average condition factors for various 1-inch length groups of walleye trap netted in the upper Big Dry Arm of Fort Peck Reservoir, 1990-93.

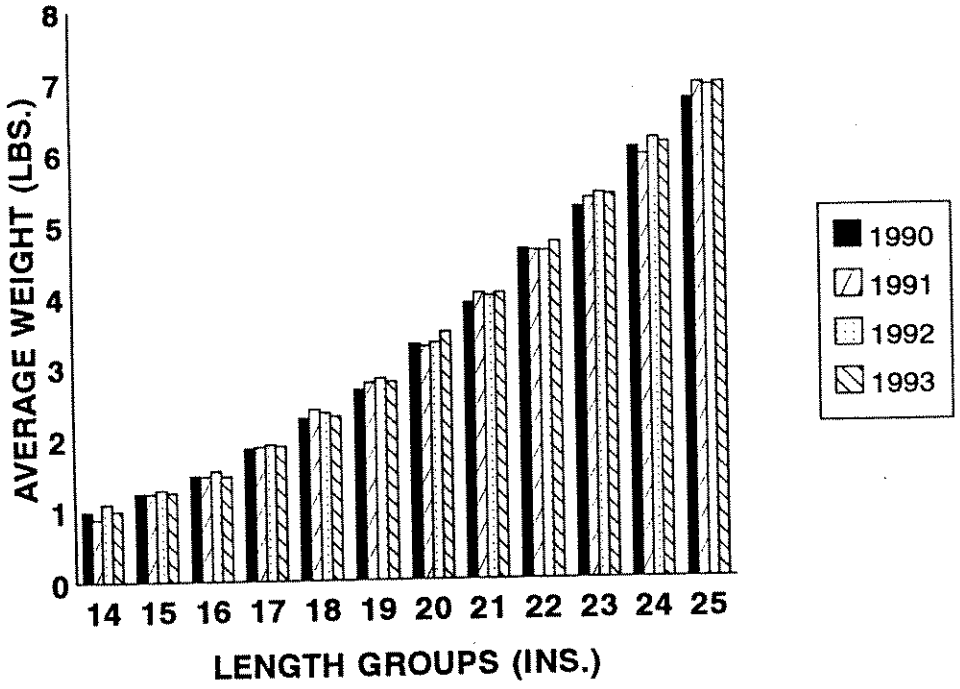

Figure 3. Average weights for various 1-inch length groups of walleye trap netted in the upper Big Dry Arm, Fort Peck Reservoir, 1990-93.

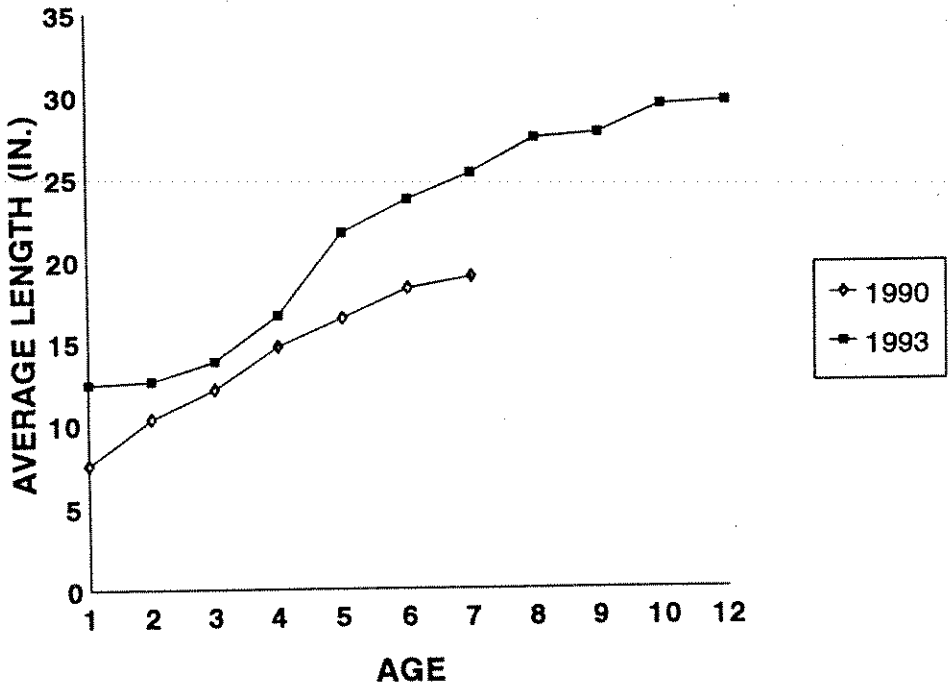

Figure 4. Average lengths for aged walleye trap-netted in the Upper Big Dry Arm of Fort Peck Reservoir, 1990 and 1993.

Table 3. Age analysis and growth increment of 214 walleye taken from Fort Peck Reservoir during 1993 spring trap-netting operations. (ages based on scale and spine samples)

Age	1	2	3	4	5	6	7	8	9	10	12
Ave. L. (in.)	12.4	12.6	13.8	16.6	21.6	23.6	25.2	27.3	27.6	29.3	29.5
Lower L. Range	12.4	11.7	11.0	12.6	15.0	19.9	20.8	19.8	26.3	28.3	29.1
Upper L. Range	12.5	14.0	18.8	23.0	26.1	27.9	29.6	29.6	28.5	30.4	29.9
Sample Size	2	10	13	45	69	21	20	21	6	5	2
Growth Increment		0.2	1.2	2.8	5.0	2.0	1.6	2.1	0.3	1.7	0.2
N=214 1993	1%	5%	6%	21%	32%	10%	9%	10%	3%	2%	1%
N=170 1990	14%	20%	16%	29%	6%	8%	7%				

Gill Netting

Gill nets were set at 24 different locations throughout the reservoir from July 27-August 11, 1993. Ninety-nine net sets provided information on the distribution, composition and relative abundance of sport and forage fish populations (Table 4).

The largest concentration of walleye was located in the Big Dry Arm, which is consistent with previous annual sampling (Table 5). The overall catch rate for walleye reservoir-wide decreased from 3.7 fish per net-day in 1992, to 2.7 fish per net-day in 1993. The catch rates for walleye in various sampling areas decreased in all areas of the reservoir.

The average size of gill-netted walleye has increased over 1992 walleye samples in both the Big Dry Arm and Lower Reservoir. Average size has decreased in the Middle and Upper reservoir. The percentage of fish gill-netted that were greater than 1 pound has decreased in all areas of Fort Peck, with the exception of the Lower Reservoir. This data suggests that strong year classes of young fish exist which should provide excellent recruitment of fish into the larger year classes (Table 5). Figures 5 and 6 show that weights and condition factors remain similar compared to previous years.

Catch rates for gill-netted northern pike, sauger, and yellow perch have remained relatively similar to those in 1989, with catch rates of 0.5, 1.2, and 0.7, respectively (Table 4). Catch rates for goldeye have continued to increase slightly from 1992, while the catch for cisco remained constant. Gill-net sampling shows cisco to be well dispersed throughout the reservoir. Figure 7 shows the annual catch rates for goldeye taken with experimental gill nets since 1981.

Beach Seining

Seining was utilized as a method to determine reproductive success of sport and forage fish throughout the reservoir from August 30-September 16, 1993. Seine hauls at 176 different reservoir locations captured 15,663 fish (Table 6). Total numbers and the overall catch rate for 1993 was much greater than 1992 when only 8,564 fish were sampled. The reservoir-wide catch rate increased from 64 fish per seine haul to 89.4 fish per seine haul. The apparent increase in production resulted from a rising reservoir pool which inundated vegetation providing spawning and rearing habitat for most fish species. However, the rise started later in the spring so species that spawn early were not able to utilize the flooded vegetation for spawning purposes.

Smallmouth bass, as in the past, was the most common game fish captured by seining (Table 7). However, the number of bass collected per seine haul in 1993 was only 0.3 compared to the 1992 average of 1.6. This was the lowest number of bass sampled since 1985, where only 0.1 were collected per seine haul. The lowest catch rate for YOY smallmouth bass occurred in the Upper Big Dry and Upper Missouri Arm (Table 6).

Table 4. Fish captured by 125-foot experimental gill nets in Fort Peck Reservoir, 1993.

Species[1]	UBD[2] No. Fish	UBD[2] No./ Net Day	LBD[3] No. Fish	LBD[3] No./ Net Day	LMA[4] No. Fish	LMA[4] No./ Net Day	MMA[5] No. Fish	MMA[5] No./ Net Day	UMA[6] No. Fish	UMA[6] No./ Net Day	Total No. Fish	Total No./ Net Day
WE	107	5.4	55	2.3	45	2.3	50	2.1	6	0.8	263	2.7
NP	15	0.8	19	0.6	10	0.5	4	0.2	0	---	48	0.5
SG	5	0.3	6	0.3	8	0.4	74	3.1	20	2.5	113	1.2
YP	16	0.8	10	0.4	5	0.3	34	1.4	1	0.1	66	0.7
GE	218	10.9	103	4.3	131	6.6	242	10.1	223	27.9	917	9.6
CC	34	1.7	7	0.3	2	0.1	3	0.1	24	3.0	70	0.7
SS	0	---	0	---	0	---	0	---	0	---	0	---
CI	55	2.8	53	2.2	28	1.4	172	7.2	25	3.1	333	3.5
CH	0	0.0	3	0.1	0	0.0	1	.04	0	0.0	4	.04
ST	17	0.9	8	0.3	4	0.2	15	0.6	8	1.0	52	0.5
Totals	467	23.6	264	10.8	233	11.8	595	24.8	307	38.4	1,866	19.4
No. Net Days	20		24		20		24		8		96	

[1]WE - walleye
NP - northern pike
SG - sauger
YP - yellow perch
GE - goldeye
CC - channel catfish
SS - shovelnose sturgeon
CI - cisco

[2]Upper Big Dry: Nelson Cr., Short Cr., Lone Tree Cr., McGuire Cr.
[3]Lower Big Dry: Box Cr., S. Fork Rock Cr., N. Fork Rock Cr., Box Elder Cr., Sandy Arroyo, Spring Cr.
[4]Lower Missouri Arm: Spillway Bay, Bear Cr., N. Fork Duck Cr., S. Fork Duck Cr., Main Duck
[5]Mid Missouri Arm: Pines, Gilbert Cr., Cattle Cr., Hell Cr., Sutherland, Snow Cr.
[6]Upper Missouri Arm: Timber Cr., Devil's Cr.

Table 5. A summary of walleye size and catch rates in 125-foot experimental gill nets for areas of Fort Peck Reservoir.

Area	Year	No. Sampled	Length (in.) Ave.	Length (in.) Range	Weight (lbs.) Ave.	Weight (lbs.) Range	Weight (lbs.) % >1.0#	Net Sets Total Sets	Net Sets No./ Set
Big Dry Arm	1993	162	14.7	5.0-31.2	1.79	0.04-11.8	34.6	44	3.7
	1992	144	14.5	5.6-29.8	1.58	0.03-9.80	40.0	31	4.6
	1989	219	13.6	6.4-26.5	0.94	0.10-7.03	26.0	30	7.3
	1988	86	13.3	6.6-23.4	0.88	0.06-4.26	19.8	24	3.6
	1987	106	14.1	6.5-21.4	1.04	0.12-3.33	34.7	33	3.2
	1986	109	13.4	7.3-24.6	0.86	0.07-5.40	27.8	24	4.5
	1985	219	13.7	7.7-26.5	0.91	0.14-4.56	29.7	30	7.3
Lower Reservoir	1993	45	16.7	6.9-28.5	2.53	0.10-9.80	50.6	20	2.3
	1992	70	15.9	7.2-27.0	2.02	0.10-8.30	46.4	20	3.5
	1989	93	15.5	7.8-24.1	1.61	0.13-5.60	55.0	15	6.2
	1988	57	15.1	8.1-23.9	1.46	0.14-5.30	59.6	18	3.2
	1987	48	16.3	10.8-21.5	1.61	0.32-4.08	66.7	15	3.2
	1986	---	----	---------	----	---------	----	--	---
	1985	65	13.5	9.9-19.3	0.71	0.24-2.94	12.3	18	3.6
Mid Reservoir	1993	50	15.3	6.8-28.8	2.17	0.10-10.7	38.4	24	2.1
	1992	81	16.9	7.9-29.9	2.66	0.15-11.0	50.0	24	3.4
	1989	80	16.5	10.0-24.2	1.85	0.32-5.90	58.8	18	4.4
	1988	49	15.8	8.2-22.8	1.67	0.15-4.70	57.1	21	2.3
	1987	88	14.0	8.0-22.0	0.98	0.14-4.35	30.7	21	4.2
	1986	56	13.4	8.4-22.3	0.85	0.20-3.00	30.0	21	2.7
	1985	102	14.7	7.9-22.1	1.01	0.11-3.60	35.3	21	4.9
Upper Reservoir	1993	6	16.7	10.6-25.6	2.34	0.30-6.50	33.2	8	0.8
	1992	15	16.3	7.8-29.3	2.54	0.10-10.0	35.7	8	1.9
	1989	11	19.4	9.9-25.8	3.36	0.23-6.20	63.6	6	1.8
	1988	15	11.8	7.6-19.3	0.57	0.19-2.57	13.3	12	1.3
	1987	32	12.7	8.8-20.4	0.72	0.14-2.96	18.8	12	2.7
	1986	3	11.5	9.2-14.4	0.50	0.20-0.97	0.0	6	0.5
	1985	31	12.7	8.5-18.2	0.65	0.20-1.72	19.4	18	1.7

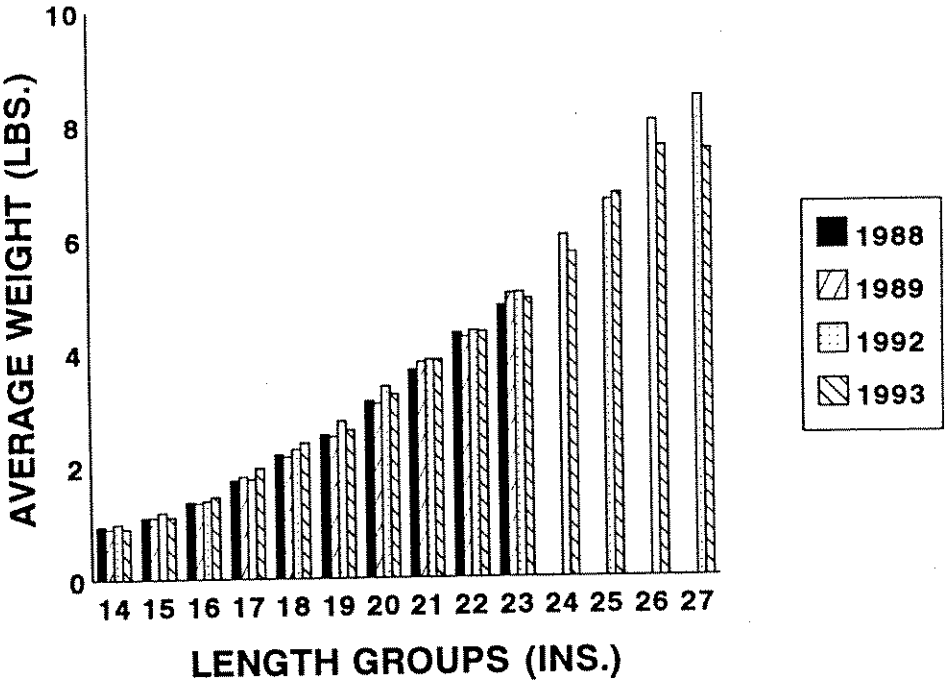

Figure 5. Average weight of various 1-inch length groups of walleye captured with experimental gill nets in Fort Peck Reservoir, 1988-93.

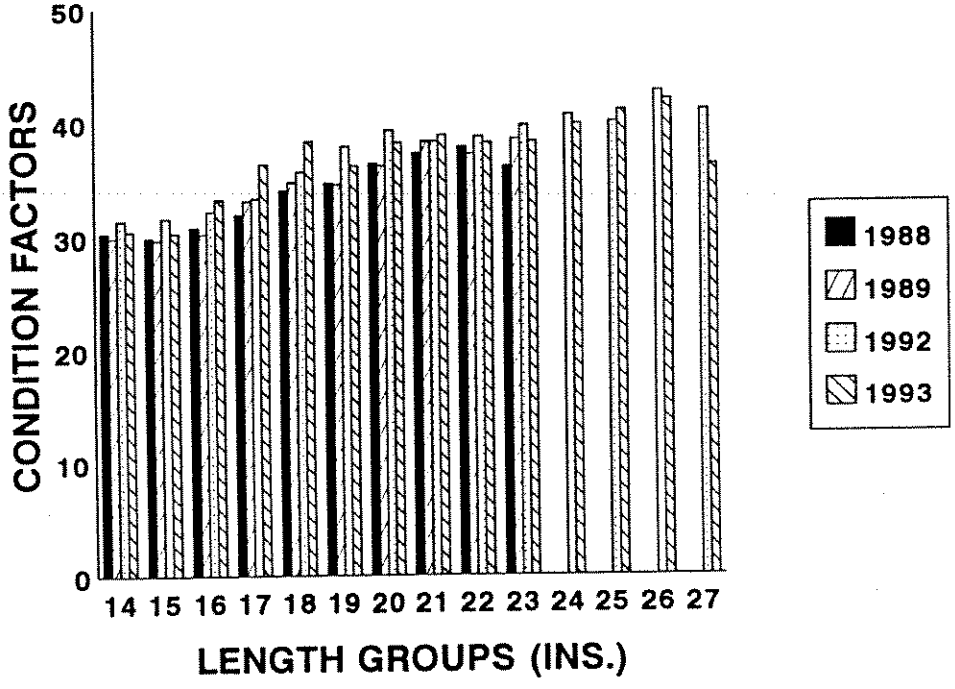

Figure 6. Average condition factors for various 1-inch length groups of walleye captured with experimental gill nets in Fort Peck Reservoir, 1988-93.

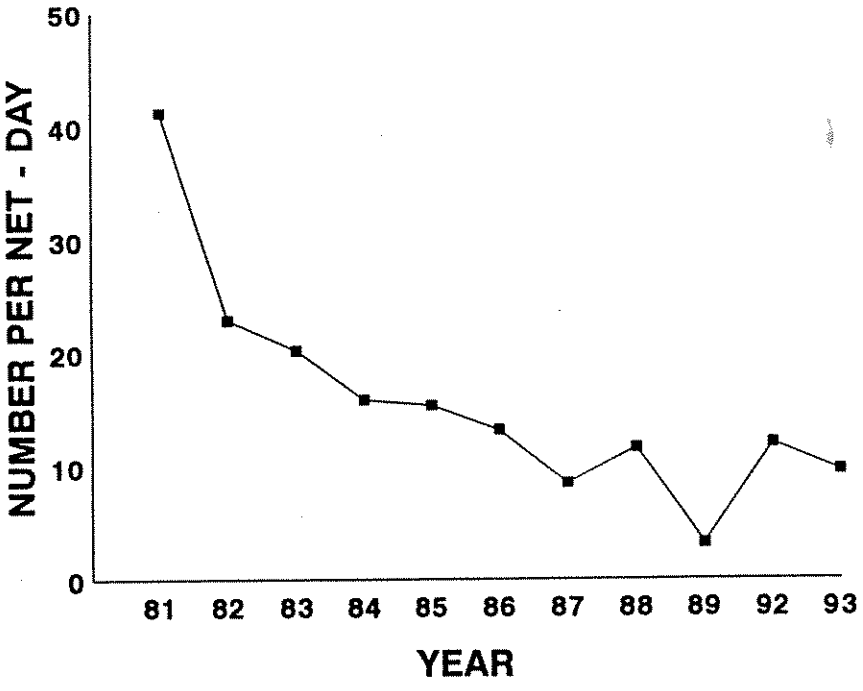

Figure 7. Annual catch rate of goldeye captured by experimental gill nets, Fort Peck Reservoir, 1981-93.

The catch rate for walleye seined reservoir-wide in 1993 was 0.2 fish per haul. This was more than 1992, which had a rate of 0.1 fish per haul (Table 7). The largest concentration of YOY walleye occurred in the Upper Big Dry Arm, where 0.6 YOY were captured per haul. All other areas of the reservoir yielded approximately 0.1 fish per seine haul. Table 8 shows a summary of seining results to evaluate stocking of walleye fry and fingerling. A total of 24.3 million walleye fry and 2.1 million fingerling were stocked in 1993. Approximately 2 out of 3 walleye seined in the reservoir were captured in the upper Big Dry Arm. This is probably the result of the 4.0 million walleye fry planted in McGuire Creek. The average catch rate for regions where walleye fry were stocked was 0.38 and locations where fingerling were stocked was 0.17. Fry stockings appeared to be more successful in 1993 than in 1992.

A catch rate of 0.1 for northern pike YOY seined in 1993 indicated very poor production which is similar to previous years (Table 7). Sauger production appeared to decrease in 1993 with <0.1 fish captured per haul.

Table 6. Species and number of forage minnows and young-of-year fish captured by seining in Fort Peck Reservoir, August 30 - September 16, 1993.

Species[1]	Upper Big Dry		Lower Big Dry		Lower Missouri		Mid-Missouri		Upper Missouri		Totals	
	No. Fish	No./ Haul	No. Fish	No./ Haul	No. Fish	No./ Haul	No. Fish	No./ Haul	No. Fish	No./ Haul	No. Fish	No./ Haul
WE	20	0.6	3	0.1	4	0.1	3	<0.1	2	0.1	32	0.2
NP	-----	-----	3	0.1	2	<0.1	6	0.2	1	<0.1	12	0.1
SG	-----	-----	-----	-----	-----	-----	1	<0.1	1	<0.1	2	<0.1
YP	34	1.1	14	0.4	16	0.4	143	3.8	18	0.8	225	1.3
GE	6	0.2	-----	-----	-----	-----	-----	-----	31	1.3	37	0.2
WS	11	0.3	4	0.1	31	0.7	9	0.2	1	<0.1	56	0.3
RC	-----	-----	-----	-----	3	0.1	-----	-----	14	0.6	17	0.1
Bsp	127	4.0	11	0.3	19	0.4	-----	-----	4	0.2	161	0.9
LC	-----	-----	-----	-----	4	0.1	-----	-----	1	<0.1	5	<0.1
CP	18	0.6	17	0.4	33	0.8	12	0.3	5	0.2	85	0.5
SR	-----	-----	-----	-----	-----	-----	-----	-----	1	<0.1	1	<0.1
SB	1	<0.1	-----	-----	-----	-----	-----	-----	-----	-----	1	<0.1
BA	-----	-----	7	0.2	3	0.1	35	0.9	-----	-----	45	0.3
SM	3	0.1	-----	-----	-----	-----	-----	-----	1	<0.1	4	<0.1
CR	-----	-----	44	1.1	22	0.5	292	7.7	973	40.1	1,331	7.6
FC	-----	-----	-----	-----	1	<0.1	-----	-----	-----	-----	1	<0.1
BU	-----	-----	-----	-----	-----	-----	-----	-----	1	<0.1	1	<0.1
FM	3	0.1	5	0.1	-----	-----	-----	-----	-----	-----	8	<0.1
ES	21	0.7	454	11.4	46	1.1	163	4.3	2,276	95.0	2,960	16.8
ST	63	2.0	4,696	117.4	2,566	61.1	2,182	57.4	1,172	49.0	10,679	60.7
Totals	307	9.7	5,258	131.6	2,750	65.5	2,846	74.9	4,502	187.7	15,663	89.4
No. Hauls	32		40		42		38		24		176	

WE - walleye
NP - northern pike
YP - yellow perch
ST - spottail shiner
FC - flathead chub
RC - river carpsucker
Bsp - buffalo
GE - goldeye
SR - shorthead redhorse
SM - plains/silvery minnow
BU - burbot
BA - smallmouth bass
WS - white sucker
SB - brook stickleback
FM - fathead minnow
ES - emerald shiner
SG - sauger
LC - lake chub
CR - crappie
CP - carp

Table 7. A summary of the total catch and catch rate for selected sport and forage fish taken by seining in Fort Peck Reservoir, 1982-93.

		Species[1]						
		WE	NP	SG	BA	YP	GE	WSU
1982	No. Hauls--195							
	No. Sampled	116	34	113	23	9,604	1,410	1,392
	No./Haul	0.6	0.2	0.6	0.1	49.3	7.2	7.1
1983	No. Hauls--263							
	No. Sampled	52	70	70	77	8,324	0	1,120
	No./Haul	0.2	0.3	0.3	0.3	32.0	0	4.3
1984	No. Hauls--21							
	No. Sampled	115	23	96	27	19,280	1,361	453
	No./Haul	0.5	0.1	0.5	0.1	91.8	6.5	2.2
1985	No. Hauls--197							
	No. Sampled	219	29	36	10	31,695	509	969
	No./Haul	1.1	0.1	0.2	0.1	160.9	2.6	4.9
1986	No. Hauls--176							
	No. Sampled	74	88	61	149	6,597	1,081	861
	No./Haul	0.4	0.5	0.3	0.8	37.5	6.1	4.9
1987	No. Hauls--185							
	No. Sampled	14	10	9	145	2,093	0	48
	No./Haul	0.1	<0.1	<0.1	0.8	11.3	0	0.3
1988	No. Hauls--174							
	No. Sampled	47	74	17	135	1,045	1	258
	No./Haul	0.3	0.4	<0.1	0.8	6.0	<0.1	1.5
1989	No. Hauls--176							
	No. Sampled	178	7	2	305	895	161	200
	No./Haul	1.0	<0.1	<0.1	1.7	5.1	0.9	1.1
1990	No. Hauls--165							
	No. Sampled	59	1	34	163	308	73	85
	No./Haul	0.4	<0.1	0.2	1.0	1.9	0.4	0.5
1991	No. Hauls--149							
	No. Sampled	0	19	10	170	1,630	13	259
	No./Haul	0.1	0.1	0.1	1.1	10.9	0.1	1.7
1992	No. Hauls--133							
	No. Sampled	18	7	22	207	1,324	1	45
	No./Haul	0.1	<0.1	0.2	1.6	10.0	<0.1	0.3
1993	No. Hauls--176							
	No. Sampled	32	12	2	45	225	37	56
	No./Haul	0.2	0.1	<0.1	0.3	1.3	0.2	0.3

Table 7. Continued.

		Species[1]					
		BUFF	CARP	FWD	B/WC	ES	ST
1982	No. Hauls--195						
	No. Sampled	4,577	742	658	6,958	2,764	0
	No./Haul	23.5	3.8	3.4	35.7	14.2	0
1983	No. Hauls--263						
	No. Sampled	2,345	1,582	245	9,244	5,859	1,681
	No./Haul	8.9	6.0	0.9	35.1	22.3	6.4
1984	No. Hauls--210						
	No. Sampled	11,414	1,853	584	7,858	10,312	2,120
	No./Haul	54.4	8.8	2.8	37.4	49.1	10.1
1985	No. Hauls--197						
	No. Sampled	363	289	640	1,907	14,109	4,444
	No./Haul	1.8	1.5	3.2	9.7	71.6	22.6
1986	No. Hauls--176						
	No. Sampled	1,378	951	713	3,011	6,443	22,436
	No./Haul	7.8	5.4	4.1	17.1	36.6	127.5
1987	No. Hauls--185						
	No. Sampled	388	509	43	40	3,688	10,027
	No./Haul	2.1	2.7	0.2	0.2	19.9	54.2
1988	No. Hauls--174						
	No. Sampled	24	154	405	12	1,449	10,089
	No./Haul	0.1	0.9	2.3	<0.1	8.3	58.0
1989	No. Hauls--176						
	No. Sampled	107	66	770	21	3,450	5,093
	No./Haul	0.6	0.4	4.4	0.1	19.6	28.9
1990	No. Hauls--165						
	No. Sampled	4	87	202	120	1,413	3,624
	No./Haul	<0.1	0.5	1.2	0.7	8.6	22.0
1991	No. Hauls--149						
	No. Sampled	101	214	112	616	5,762	5,849
	No./Haul	0.7	1.4	0.8	4.1	38.7	39.2
1992	No. Hauls--133						
	No. Samples	------	8	26	57	3,974	2,849
	No./Haul	------	<0.1	0.2	0.4	29.9	21.4
1993	No. Hauls--176						
	No. Samples	161	85	-----	1,331	2,960	10,679
	No./Haul	0.9	0.5	-----	7.6	16.8	60.7

[1] WE - walleye
NP - northern pike
SG - sauger
BA - smallmouth bass
YP - yellow perch
GE - goldeye
WSU - white sucker
BUFF - smallmouth & bigmouth buffalo
CARP - carp
FWD - freshwater drum
B/WC - black/white crappie
ES - emerald shiner
ST - spottail shiner

Table 8. Summary of walleye stocking and young-of-year abundance determined by beach seining in Fort Peck Reservoir, 1993.

Area	Fingerling	Fry	Number Seine Hauls	Number YOY WE Caught	No. WE/Haul
Bear Creek	-------	4.4 mil	6	0	0
Box Creek	-------	3.0 mil	8	0	0
Box Elder Creek	150,950	-------	6	0	0
Bug Creek	194,465	-------	7	0	0
Cattle/Crooked Creek	142,700	-------	8	0	0
Duck Creek	309,300	-------	14	1	.07
Gilbert Creek	-------	1.0 mil	6	1	0.2
Hell Creek	-------	1.8 mil	6	0	0
Lost Creek	194,465	-------	6	0	0
McGuire Creek	-------	4.0 mil	7	7	1.0
Rock Creek	-------	3.7 mil	8	0	0
Pines	277,650	-------	6	2	0.3
Sandy Arroyo	-------	1.1 mil	6	0	0
Snow Creek	-------	2.7 mil	6	0	0
Spillway Bay	763,850	-------	6	3	0.5
Spring Creek	117,630	-------	6	3	0.5
Sutherland Creek	-------	2.7 mil	6	0	0
Fourchette Bay	-------	-------	6	2	0.3
Lone Tree Creek	-------	-------	6	7	1.2
Short Creek	-------	-------	6	6	1.0
Totals	2,151,000	24.3 mil			

Catch rate for areas where fry were stocked = 0.38
Catch rates for areas where fingerling were stocked = 0.17

Beach seining to evaluate production of key forge fish species indicated a significant increase from 1992 (Tables 6 and 7). The spottail shiner catch rate increased significantly, with 60.7 fish collected per haul. This was the most fish collected since 1986. Crappie showed a large increase, with 7.6 collected per haul, which also was the most collected since 1986. Yellow perch and emerald shiner production appeared to decrease with 16.8 and 1.3 fish collected per haul in 1993, compared to 29.9 and 10.0 in 1992. Production of buffalo species seemed to increase, while freshwater drum production appeared to decrease.

Lake Trout

Creel surveys at boat ramps near Fort Peck Dam were conducted in the spring and fall, 1993. During the spring creel from May 6-May 30, 380 fishermen were interviewed. The angler catch rate was 0.07 fish per hour, which was the same as spring creel in 1991 and 1992 (Table 9). Fall creel was conducted from October 8-November 4, with 168 anglers interviewed. The catch rate was up slightly from 1992, with 0.20 lake trout captured per hour, compared to 0.19.

During the spring creel, male lake trout averaged 27.3 inches and 8.70 pounds, while females averaged 27.6 inches and 9.02 pounds. The average length and weight for lake trout, sexes combined, was 27.5 inches and 8.86 pounds. This data indicates a substantial increase in the average size and weight of lake trout caught since 1989 (Table 9).

The average length and weight for lake trout during fall creel, sexes combined, was 27.0 inches and 7.58 pounds. Males averaged 26.7 inches and 7.11 pounds, while females averaged 27.2 inches and 8.04 pounds. A summary of condition factors and average weights sampled during the fall creels from 1985-93 is shown in Figure 8. The average condition of lake trout over this time period appears to be relatively stable. This also appears to be the case for various 1-inch length groups of lake trout sampled over the last four years (Figures 9 and 10).

During the spring and fall lake trout creel surveys, stomach contents of lake trout were examined to determine utilization of cisco. At the spring creel, approximately 47.0% of the angler-caught lake trout contained cisco. During the fall creel only 5.0% of the lakers contained cisco. A reduction in the number of cisco observed in lake trout stomachs is typical during the fall creel due to spawning.

During spring and fall creel surveys, otoliths from lake trout are extracted for aging. Scales are not used to age larger lake trout because annuli become difficult to distinguish. A total of 135 lake trout were aged and they ranged from 4 to 20 years old (Table 10). Six and seven year olds were the dominant age classes caught, with 18 and 23 collected. The average lengths of Fort Peck lake trout for each age class appear to be good. Lake trout sampled from six lakes in Canada were aged, and their average lengths were well below those of Fort Peck Reservoir (Scott and Crossman 1973).

Even though rising lake levels increased available lake trout spawning habitat in 1993, an attempt was made to capture spawning lake trout in order to augment natural reproduction lost due to prior low lake levels. Two gill nets 300' x 6' with 4-inch square mesh, were set off the dam face to capture spawners on October 27 and November 2. A total of 88 males were collected averaging 29.2 inches and 9.6 pounds. Sixteen females were collected which averaged 30.3 inches and 10.8 pounds. Nearly 100,000 eggs were extracted from seven ripe females. After these eggs hatch and grow to fingerlings, they will be transported from Bluewater hatchery to Fort Peck Reservoir in 1994.

Table 9. A summary of lake trout creel census of boat fishermen and size data collected near the dam, Fort Peck Reservoir, 1985-93 (spring creel: April-May and fall creel: October-November).

	No. Anglers Creeled	No. LT Caught	LT Per Trip	Avg. No.Hrs. Fished	Catch Rate/ Hour	Males Avg. Lgth. (in.)	Males Avg. Wt. (lbs.)	Females Avg. Lgth. (in.)	Females Avg. Wt. (lbs.)
1985									
Spring	72	77	1.1	3.8	0.28	20.2	3.05	20.9	3.26
Fall	97	176	1.8	3.8	0.48	21.4	3.20	22.0	3.66
1986									
Spring	56	56	1.0	3.8	0.26	21.2	2.98	20.9	2.95
Fall	206	299	1.5	4.9	0.30	21.4	3.49	23.0	4.26
1987									
Spring	58	48	0.8	4.9	0.17	22.0	3.73	22.2	4.40
Fall	240	239	1.0	4.7	0.21	23.8	5.50	23.8	5.84
1988									
Spring	153	105	0.7	4.5	0.15	24.1	5.63	24.1	5.56
Fall	164	194	1.2	4.6	0.26	25.8	7.16	24.8	6.33
1989									
Spring	207	197	1.0	5.6	0.17	25.0	6.85	26.4	8.28
Fall	142	194	0.5	4.8	0.09	26.5	7.44	25.4	7.12
1990									
Spring	451	356	0.8	5.4	0.15	26.6	8.06	27.2	9.07
Fall	551	201	0.4	3.8	0.10	26.5	7.52	27.6	8.56
1991									
Spring	550	267	0.5	6.1	0.07	27.0	8.47	26.4	8.21
Fall	215	83	0.4	3.8	0.10	26.7	7.97	27.4	8.60
1992									
Spring	437	150	0.3	4.8	0.07	26.2	7.58	26.7	7.85
Fall	129	88	0.7	3.6	0.19	27.0	7.87	26.9	7.59
1993									
Spring	380	147	0.4	6.0	0.07	27.3	8.70	27.6	9.02
Fall	168	141	0.8	4.2	0.20	26.7	7.11	27.2	8.04

Table 10. Age analysis and growth increment of 135 lake trout taken during the 1993 spring and fall creel survey on Fort Peck Reservoir. (Age based on otolith samples).

Age	4	5	6	7	8	9	10	11
Ave. L. (in.)	20.9	23.9	24.3	25.1	26.2	26.6	28.5	28.9
Lower L. Range	20.9	19.2	19.6	17.4	23.2	23.7	24.4	23.4
Upper L. Range	20.9	26.5	27.2	28.1	29.8	29.5	31.8	32.6
Sample Size	1	5	18	23	13	14	11	10
Growth Increment		3.0	0.4	0.8	1.1	0.4	1.9	0.4

Table 10. Continued

Age	12	13	14	15	16	17	18	19	20
Ave. L. (in.)	30.5	30.7	31.0	29.0	32.1	30.6	31.1	----	28.1
Lower L. Range	29.0	28.7	29.5	27.5	30.2	30.6	30.3	----	28.1
Upper L. Range	32.2	33.1	33.0	31.5	32.9	30.6	31.8	----	31.3
Sample Size	6	8	10	6	4	1	2	----	3
Growth Increment	1.6	0.2	0.3	-2.0	3.1	-1.5	0.5	----	----

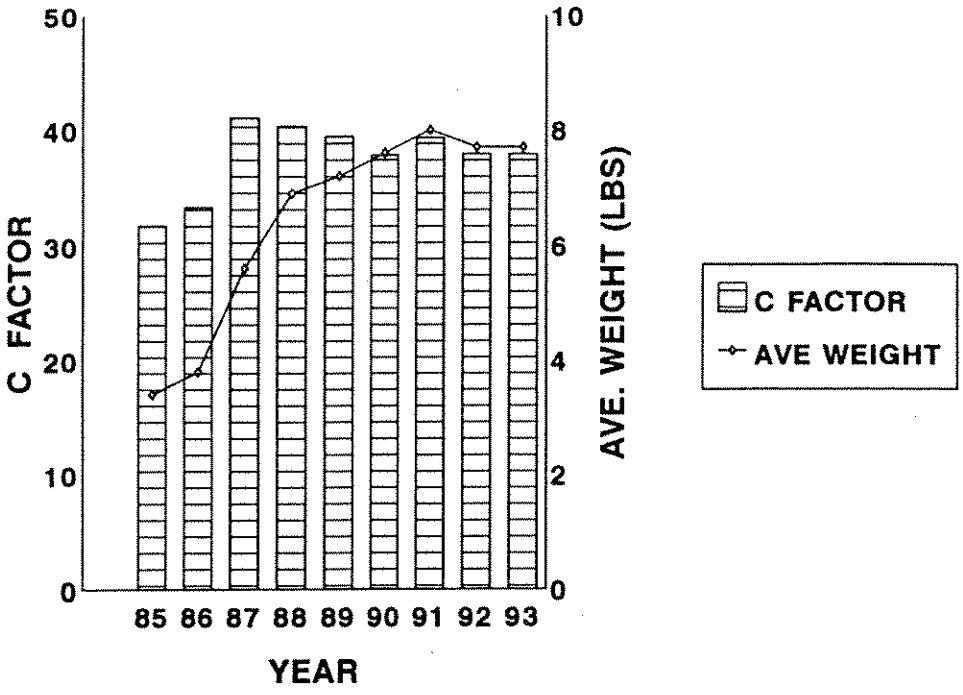

Figure 8. Condition factors and average weight of lake trout sampled during fall creel, Fort Peck Reservoir, 1985-93.

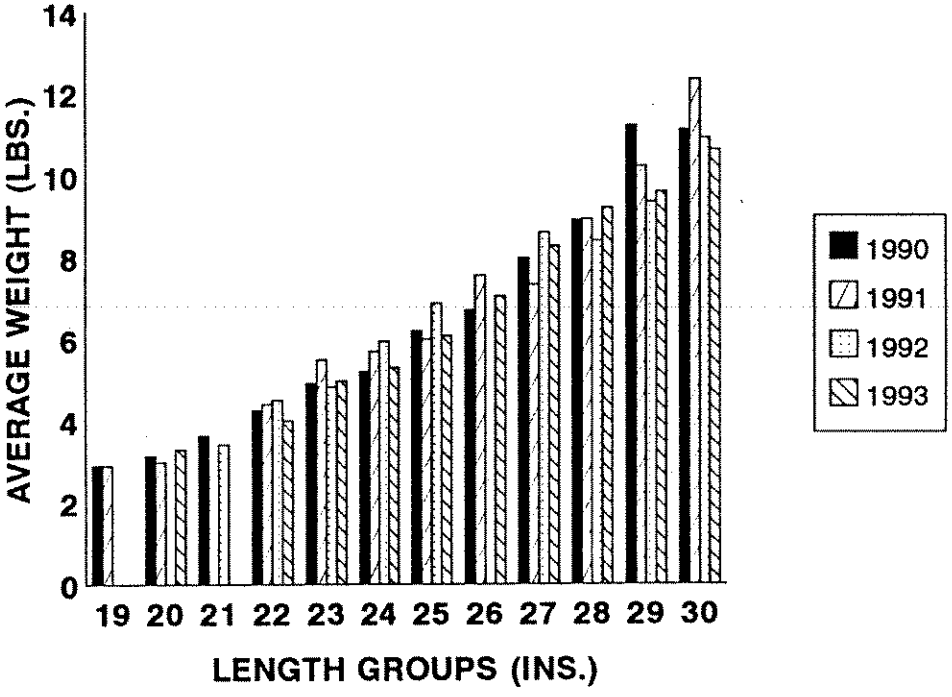

Figure 9. Average weight of various 1-inch length groups of lake trout sampled during fall creel, Fort Peck Reservoir, 1990-93.

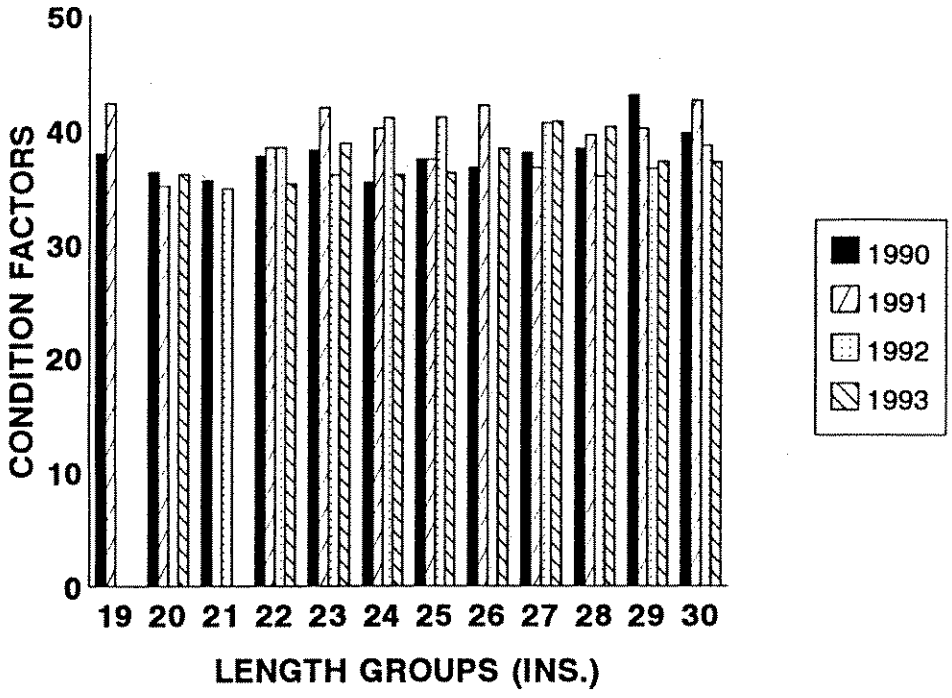

Figure 10. Condition factors of various 1-inch length groups of lake trout sampled during fall creel, Fort Peck Reservoir, 1990-93

Chinook Salmon

A floating cage with the dimensions of 24' X 40' X 10' deep was anchored in Marina Bay. Netting for the cage was composed of 3/16" nylon mesh which had to be cleaned periodically with a broom to prevent algae accumulation. Large mesh nets were draped over the cage to prevent avian predation on caged salmon. The cage was separated in the middle by a net so two compartments could hold different batches of fish. Two automatic feeders were mounted on the cage.

Salmon eggs were obtained from North Dakota and hatched at the Miles City Fish Hatchery. A total of 64,000 fingerling salmon were stocked into the cage on April 19 at an average of 104.5/lb totaling 588 pounds (Table 11). The fish were fed a total of 2,200 pounds and the utilized conversion rate (considering estimated 30% loss of feed) was 1.6. The mortality rate was 14.1%. A total of 55,000 fingerling were released into Fort Peck Reservoir on June 10 at an average of 34.5 fish/lb totaling 1,594 pounds.

Approximately 99% of the total salmon stock were fin-clipped at 34.5 fish to the pound. This operation occurred on June 9 & 10, 1993 by Fish Wildlife and Parks and Corps of Engineers employees. Salmon were fin-clipped so absolute age and growth, and survival information could be obtained during future spawning runs.

The effects of the salmon stock were already apparent in the summer and fall of 1993. Four 10-12 inch salmon were collected in the lake-wide gill-net survey. Anglers have also reported catching salmon in the same length groups throughout the reservoir. The spring and fall creel yielded only 3 adult salmon, which is probably due to lack of successive yearly plants.

Table 11. A summary of cage reared salmon in Marina Bay.

	1993
# stocked into cage	64,000
Date stocked into cage	April 19
# emptied from cage	55,000
Date released into Marina Bay	June 10
net loss	9,000
% loss	14.1
escapement	-----
% escapement	-----
mortality loss	9,000
% mortality loss	14.1
Pounds stocked	588
Pounds thinned	----
Pounds released	1,594
net gain	1,006
Size at stocking	104.5 fish/lb
Size at release	34.5 fish/lb
Total lbs. food used	2,200
Pounds food utilized	1,540
Total conversion rate	2.3
Utilized conversion rate	1.6
# fish fin-clipped at release	54,500
% fin-clipped	99%
Average water temperature	51°

Cisco

Small mesh, vertical gill nets were used to sample YOY cisco throughout the reservoir from September 14-October 6 (Table 12). The overall catch rate was only 4.0 YOY per net set, which was the poorest catch since sampling for cisco began in 1986.

The meager 1992 year-class was attributed to lack of reservoir ice cover during the 1991-92 winter. Studies of cisco in the Great Lakes have shown similar consequences during ice-free winters (Brown et al. 1993, Freeberg et al. 1990, Taylor et al. 1987). However, the poor catch rate in 1993 cannot be attributed to the lack of ice cover as the lake was frozen throughout the winter. The reason for the decline is unclear at present, but may be related to increasing water levels or the inefficiency of sampling gear and techniques. Experimentation with gear and techniques will be performed in 1994.

A total of 77 YOY cisco were captured in vertical gill nets in 1993. The average size was 5.5 inches, with lengths ranging from 4.8-6.6 inches.

Figure 11 compares lake elevations and annual cisco production from 1986-93. Although water levels have dropped since 1986, it is not believed that low water has significantly impacted cisco. Cold water habitat is believed to have been sufficient during this period, as no major fish kills during summer months were observed, or reported. The effects of the large water level rise in 1993 on cisco cannot be determined until the 1994 sampling period.

Two horizontal experimental gill nets were set off of Markles Point on November 30 to sample cisco spawners. A total of 354 cisco spawners were collected averaging 10.5 inches. Sixty two were females and 288 were males with the majority being in spawning condition.

Commercial Fishing

In 1993, no commercial fishing permits were issued on Fort Peck Reservoir.

Table 12. Summary of young-of-year cisco taken by vertical monofilament gill nets in Fort Peck Reservoir during August 1987, and during September 1988-93.

Station	Number Net Sets							Young-of-Year Per Set						
	'87	'88	'89	'90	'91	'92	'93	'87	'88	'89	'90	'91	'92	'93
Bear Cr.	4	4	4	4	-	4	4	13	7	23	41	--	8	3
Shaft Houses	2	2	2	2	-	2	2	10	6	6	20	--	2	2
Dam	2	2	2	2	-	2	2	6	9	3	1	--	--	--
Bear Cr. West	2	--	2	2	1	2	2	10	---	8	3	12	2	--
Marina	2	2	2	2	-	2	2	1	46	17	72	--	5	4
So. Fork Duck Cr.	1	2	2	2	-	2	2	12	151	86	50	--	15	3
Pines-Gilbert Cr.	4	4	4	4	1	4	4	11	311	26	48	50	15	6
Hell-Sutherland Cr.	2	2	2	2	1	2	4	6	150	73	56	49	53	13
Timber Cr.	--	1	1	1	1	1	1	----	178	6	7	25	6	8
Devils Cr.	--	1	1	--	-	1	1	----	46	2	--	--	--	--
No. Fork Rock Cr.	2	2	2	2	-	2	2	24	164	9	1	--	6	1
Bug Cr.	2	2	2	2	-	2	2	16	11	1	1	--	--	0
Totals	23	24	26	25	4	26	28	11.4	107	22.9	31	34	10	4

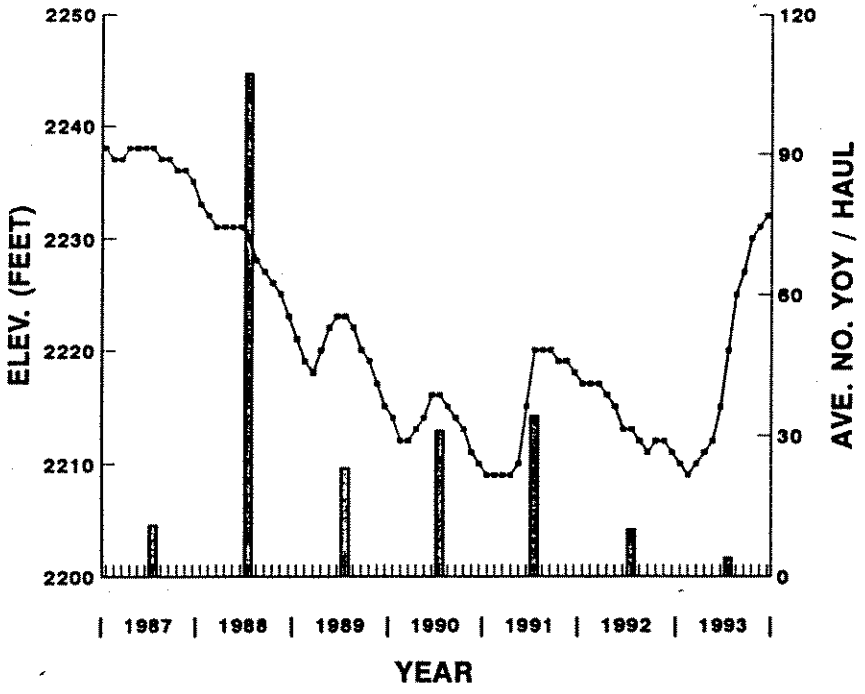

Figure 11. Mean monthly reservoir elevations and annual cisco production as determined by vertical gill netting, Fort Peck Reservoir, 1987-93.

Paddlefish

The paddlefish implanted with transmitter frequency 49.100 Mhz was captured on July 2, 1992, in the eastern portion of the UL Bend, river mile 1860. Contact in 1992 was last made at Mickus Coulee on September 29. No further contacts were made with this fish in 1993.

The paddlefish implanted with transmitter frequency 49.120 Mhz was initially captured in the eastern portion of the UL Bend near river mile 1861, on July 2, 1992. By December 10 it was located through the ice near Deadman Coulee, river mile 1854. This was the last contact in 1992. Contact was made on January 7 1993 at river mile 1854 near Deadmans Coulee and again on January 26 at river mile 1846. No further contacts were made with this fish in 1993.

A radio with a frequency of 49.140 Mhz was implanted into a 30 pound paddlefish of unknown sex on June 25. Contact in 1992 was last made on December 10 near Deadman Coulee, river mile 1854. In 1993 the fish was contacted often but remained in the Lost Creek area. By May 19 it was located at river mile 1845 near Fourchette Bay. The final contact of 1993 was made on June 29 at river mile 1852, only two miles from where it was first implanted.

On June 25, another paddlefish was captured by gill net near the same site as the one previously mentioned (river mile 1861 and was implanted with a radio transmitter of frequency 49.160 Mhz. The last contact of 1992 was made at Mickus Coulee, river mile 1858. Contact was not made in 1993 for a period of

three months. However, on April 4, 1993 the fish was recaptured by Fisheries Biologist Kent Gilge above Fred Robinson Bridge river mile 1924. The last contact of 1993 was made at Beachamp Bay near river mile 1885.

A transmitter with a frequency of 49.180 Mhz was implanted into a 28 pound paddlefish of undetermined sex which was captured at river mile 1861 on June 25, 1992. The last contact made in 1992 was at Deadmans Coulee near river mile 1854. By January 1 of 1993 the fish was located at river mile 1848 and did not move more than three miles for a four month period. On June 25, it was detected at Deadmans Coulee, at river mile 1854. This was the last contact made in 1993.

A radio with a frequency of 49.201 was implanted into a 15 pound paddlefish of unknown sex which was captured at river mile 1857 on April 15, 1993. The fish was also marked with a sequential jaw tag, number 97. On May 24, the fish began to move upstream and was loacted near Seven Blackfoot, river mile 1835. Final contact for 1993 was made at river mile 1857, which was the exact location where it was originally tagged in 1992.

A transmitter with a frequency of 49.220 Mhz was implanted into a 51 pound male paddlefish which was captured at river mile 1857 on April 15, 1993. The fish was also marked with a sequential jaw tag, number 95. Contact was made on May 19, at river mile 1862. No further contact was made with this fish in 1993.

The paddlefish implanted with transmitter frequency 49.241 was captured on April 14, at the Mickus Bottoms area, river mile 1857. The fish was tagged with a sequential jaw tag, number 92. The fish was located by boat on May 15, 1993 below Two Calf Island, river mile 1924.5. Contact was made 80 miles downstream on May 19, 1993 at river mile 1845. Final contact was made on June 25, 1993 at river mile 1859.5.

Transmitter frequency 49.855 Mhz was assigned to a 100+ pound paddlefish female on May 6 in the east UL Bend area, river mile 1860. On September 2, she had moved 19 miles further downstream to Bone Trail, river mile 1820. This was the last contact made in 1992. On January 7, 1993 the fish began to move upstream and was located through the ice at Seven Blackfoot, river mile 1836. The upstream movement continued and by May 6 the fish was located near Lost Creek, river mile 1856. Final contact for 1993 was made at the UL bend area, river mile 1859. The fish moved upstream a total of 39 miles through the year of 1993.

DISCUSSION

Spring walleye trap-netting was very successful with an adequate number of eggs collected. The Miles City Fish Hatchery also had a successful year on raising fingerlings and the 1993 requests were easily met. Weights and condition factors of walleye were the best observed since trapping started in 1979.

A rising pool throughout the late spring and summer resulted in an increase in forage fish production for many species. However seining results may be biased due to the large amount of inundated vegetation. Many spots were impossible to seine, and most hauls were made in thick vegetation. Spottail and crappie production was excellent while perch and bass production decreased. If an early spring rise occurs in 1994, natural reproduction of game and forage species should be excellent.

Cisco YOY production was extremely low which is very puzzling. The spring lake trout creel survey revealed that nearly 50% of lake trout utilized cisco as forage. Lakewide gill netting showed that cisco appear to be abundant and well dispersed. Fall gill netting during November also revealed that cisco spawners were abundant. The low YOY catch could be the result of high water levels and gear inefficiency. Experimentation with gear will be attempted during the 1994 sampling season.

Rearing of chinook salmon in a floating platform cage will be continued in 1994. Modifications in feeding and preventing avian predation will be made. An attempt at spawning Chinook at Fort Peck will also be conducted in 1994.

The monitoring of paddlefish movement through radio telemetry revealed that most fish remained in the headwaters of Fort Peck Reservoir. However, two fish did move substatnial distances. The fish with the transmitter frequency 49.160 Mhz moved 64 miles upstream near the Fred Robinson Bridge. The incision where the transmitter was inserted was checked and no infection or irritation was found. The fish implanted with the radio frequency of 49.241 moved 80 miles and exhibited a downstream movement. All radio transmitters have expired and telemetry work will be suspended during the 1994 season.

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