MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO: F-46-R-4 STUDY TITLE: SURVEY AND INVENTORY OF COLDWATER AND WARMWATER ECOSYSTEMS

JOB NO: V-e JOB TITLE: NORTHEAST MONTANA WARMWATER ECOSYSTEM INVESTIGATIONS

JOB PERIOD: JULY 1, 1990 THROUGH JUNE 30, 1991

ABSTRACT

The sauger/walleye catch in the Fort Peck dredge cut area was similar to 1989 and ranked among the best catches recorded. The cisco catch was the second highest recorded in the dredge cuts, but no rainbow smelt were taken in 1990. Paddlefish harvest and tagging records were maintained for populations in the dredge cuts and Missouri River above Fort Peck Reservoir. Harvest rates for paddlefish remained low in both study areas. Gill netting in Fresno Reservoir produced good catches of lake whitefish, walleye, and northern pike. Yellow perch, however, were absent from the catch for the second consecutive year. Beach seining indicated good reproductive success for northern pike, but below average success for walleye and yellow perch. Marked fingerling walleye were planted to evaluate the contribution of stocked fish to the year-class. A creel census conducted at Fresno Reservoir throughout the summer revealed 5,262 anglers fished 18,353 hours between May 1 and September 30. The overall catch rate for walleye was 0.50 f/h. Approximately 4,784 walleye and 1,097 northern pike were harvested. Beach seining at Nelson Reservoir indicated a strong 1990 walleye year-class was produced through natural reproduction. H.C. Kuhr Reservoir was opened for fishing with some tiger musky catches reported. Growth of tiger muskies continues to be good. Growth rates of walleye in Beaver Creek reservoir are consistent with other regional populations, and sucker numbers have been significantly reduced by predation. Yellow perch and spottail shiners are expected to become the major forage fishes. The largemouth bass population in Reser Reservoir declined following an increase in the daily creel limit. Night electrofishing at Atlas Reservoir revealed a good largemouth bass population. Battle Creek fish populations were sampled and temperatures monitored to gather baseline data relating to a proposed dam in Canada. Management recommendations for all waters are presented.

OBJECTIVES AND DEGREE OF ATTAINMENT

Job Objectives: (streams)

1) To ensure within hydrologic constraints that streamflows do not fall below 1975-85 averages. Data was collected for water reservation recommendations on four streams. Data is presented for Battle Creek.

2) To maintain all the region's streambanks and channels in their present or improved condition. Objective accomplished using state funding.

3) To develop seasonal flow recommendations to improve flows for walleye spawning in the Milk River. Objective partially accomplished through participation in the Milk River Basin Advisory Committee.

4) To ensure that Fort Peck tailwater/dredge cut fish population is adequately protected from development related to hydropower expansion. Objective accomplished and data presented.

5) To acquire maximum spring flows within hydrologic constraints in the East Fork Poplar River through the International Joint Commission agreement. Objective accomplished using state funding.

6) To maintain paddlefish populations and angler catch rates at existing levels. A creel census was conducted in the spring of 1991 in the Missouri River study area above Fort Peck Reservoir and results will be presented in F-46-R-5. Objective accomplished and data presented.

7) To acquire public fishing access through lease or purchase and develop a fishing access site acquisition and development plan for the region. Objective accomplished using state funding.

Job Objectives: (lakes)

1) To collect 20-30 million walleye eggs for fry and fingerling stocking from the Miles City hatchery. Objective accomplished using state funding.

2) To develop 2 new fishing reservoirs and maintain 10 existing fisheries per year. Objectives accomplished.

3) To acquire public fishing access through lease or purchase and develop a fishing access site acquisition and development plan for the region. Objective accomplished using state funding.

4) To acquire suitable water level and minimum pool for Fresno and Nelson Reservoirs. Objective accomplished and data presented.

5) To maintain a variety of species combinations distributed geographically throughout the region in 45 small reservoirs. Objective accomplished using state funding.

6) To provide 10,000 angler days and catch of 0.25 walleye per hour at Nelson Reservoir. Objective accomplished; data presented. Quantification of fishing pressure will be accomplished by utilizing data from the statewide fishing pressure survey scheduled for 1991-92.

7) To maintain a population balance of predators versus perch and crappie. Objective accomplished and data presented.

8) To maintain or improve forage base for predator species in numerous reservoirs throughout the region. Objective accomplished and data presented.

PROCEDURES

Floating and sinking standard experimental gill nets 125 feet in length and 6 feet deep, consisting of 25-foot panels of 3/4-, 1-, 1 1/4-, 1 1/2- and 2-inch square mesh, were fished to acquire information on overall fish populations. Beach seining to determine abundance and reproductive success of sport and forage fish was conducted in late summer and early fall utilizing a 100- x 9-foot seine of 1/4-inch square mesh. Monofilament gill nets 100 x 6 feet with 1/2-inch square mesh were set horizontally in the dredge cuts to sample smelt and cisco. A boom-rigged electrofishing boat was employed to sample adult and juvenile fish in Reser, Atlas, Nelson, Fresno, and Beaver Creek Reservoirs. A backpack electro-fishing unit was used at Reser Reservoir to sample young-of-year (YOY) largemouth bass.

A creel census conducted at Fresno Reservoir utilized elements of both roving clerk and check station type interviews. Fishing pressure estimates were obtained by total angler counts made hourly during the creel census day from vantage points at the dam and Kiehns Bay. All shore and boat anglers were tallied. Sampling days were stratified into weekend/holidays and weekdays due to expected differential pressure. At least one weekend day/holiday and two weekdays per week were creeled. Weekday creel days were chosen randomly within the strata, while weekend days were alternated weekly. The length of fishing day was adjusted according to the daylight fishing period and was assigned monthly as follows: May--7 a.m. to 9 p.m. (14 hours); June--6 a.m. to 10 p.m. (16 hours); July--6 a.m. to 10 p.m. (16 hours); August--7 a.m. to 9 p.m. (14 hours); and September--8 a.m. to 8 p.m. (12 hours). The daily creel period was 10 hours long. Starting times were staggered within the strata to cover all daylight fishing hours. Fishermen were interviewed as to number in the party, hours fished, number and composition of fish kept and released. Whenever possible, fish were measured for total length and weighed to the nearest 0.01 pound. Scales and/or spines were taken in the middle two-week period of the month to determine age composition. Data was tabulated and analyzed by month. A single-day walleye tournament was held in August. All tournament fishermen were interviewed and data was entered separately into the monthly totals. Postage-paid survey cards were also given to anglers intending to fish beyond the interview period.

RESULTS AND DISCUSSION

Fort Peck Dredge Cuts and Tailwater

Fish population sampling continued in the Fort Peck dredge cut and tailwater complex in 1990, utilizing 10 experimental gill nets set overnight. This netting effort was initiated in 1979 to obtain information on the overall fish population due to potential impacts associated with a Corps of Engineers proposal to construct additional hydropower facilities which included a reregulation dam 8 miles downstream from Fort Peck Dam. An additional objective is to evaluate the abundance of game fish in relation to cisco and rainbow smelt numbers.

Sauger and walleye are the most popular sport fish in the study area. The combined catch for sauger and walleye was highest in 1980, which was believed to be associated with rainbow smelt abundance resulting from an upstream migration from Lake Sakakawea, ND. In 1990, the sauger/walleye catch of 45 was similar to 1989 and ranked among the best catches recorded (Table 1). Efforts have been made to correlate sauger/walleye abundance with forage fish numbers (Figure A). The catch of rainbow smelt has been low in recent years; however, the contribution of smelt to the forage supply has been replaced by cisco.

No smelt were taken by experimental gill nets in 1990. Additional sampling with four 100- x 8-foot monofilament gill nets with 1/2-inch square mesh has also been utilized to expand sampling for smelt, but none were taken by this method in 1990. In previous years, the highest smelt catch in monofilament nets was 41 and 39 in 1988 and 1981, respectively. The mean total catch from these monofilament nets during 1981-88 was 11.7 smelt.

Cisco appeared in the experimental net catch for the first time in 1985 and have become a significant forage source. The presence of cisco correlates with new introductions into Fort Peck Reservoir and is attributed to downstream migration through the dam. Numerous dead or injured cisco have been observed in the Fort Peck tailpool area on several occasions. The 1990 cisco catch was 40 in 10 experimental gill nets, which has been the standard sampling efforts beginning in 1979. In June 1990, an identical 10-net sampling effort was conducted as part of another study and this produced a catch of 67 cisco.

Table 1. A summary of the catch from ten 125-foot experimental gill net sets in the Fort Peck dredge cut/tailwater area, 1979-90.

	1979			1980			1981			1982			1983			1984		
	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)
Sauger	7	15.3	0.96	67	14.7	1.03	47	15.0	0.93	9	16.1	1.06	12	14.3	0.92	14	12.6	0.50
Walleye	8	16.4	1.48	27	16.8	1.80	9	17.4	1.86	7	18.3	1.82	8	17.2	1.58	8	13.6	0.92
Sh. sturg.[1]	137	25.1	1.94	66	25.4	2.15	83	25.9	2.25	52	25.6	2.19	54	26.8	2.55	30	26.1	2.28
Rb. smelt	---	----	----	29	06.9	0.08	4	07.0	0.08	---	----	----	2	07.2	0.10	---	----	----
Wht. suck.	5	13.6	1.78	7	14.6	1.57	16	12.5	1.04	7	15.7	1.85	8	14.6	1.65	17	13.9	1.39
R. carpsk.	32	15.2	1.62	23	15.6	1.75	12	15.2	1.72	17	15.0	1.58	16	15.6	1.59	21	15.9	1.75
Sht. redh.	---	----	----	6	15.0	1.45	2	16.4	1.98	2	13.1	0.80	---	----	----	3	14.5	1.19
Goldeye[2]	150	12.4	0.55	255	12.5	0.55	190	12.1	0.51	167	12.0	0.52	159	11.6	0.54	241	11.9	0.45
Carp	9	17.3	2.41	9	17.6	2.66	10	18.7	3.04	5	17.5	2.32	11	17.4	2.35	2	18.5	3.04
Ln. suck.	---	----	----	7	13.3	1.43	4	15.2	1.67	3	18.6	2.98	---	----	----	1	----	----
Ch. cat.	13	17.8	1.77	5	20.6	2.68	4	17.3	1.86	15	18.4	2.08	5	18.4	1.98	6	18.8	2.10
Bl. suck.	5	23.2	4.05	1	23.8	4.46	2	24.2	4.05	---	----	----	---	----	----	1	26.8	6.50
No. pike	3	26.8	4.33	1	28.5	6.90	---	----	----	23	22.8	2.27	3	31.0	8.10	4	23.8	3.46
Sm. buff.	1	27.5	12.20	---	----	----	1	24.3	6.25	2	16.7	1.98	1	19.2	2.98	1	20.5	4.20
Bm. buff.	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----
Burbot	---	----	----	---	----	----	---	----	----	1	12.8	0.43	---	----	----	---	----	----
Lk. white.	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----	1	23.0	6.58
Yel. perch	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----	2	05.9	1.10
Cisco	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----
Ch. sal.	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----
Paddlefish	---	----	---	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----

[1]Length data in 1981 is based on 66 fish.

[2]Length and weight data based on 122 fish in 1984; 127 in 1985 and 1986; 126 in 1987; 62 in 1988; and 127 in 1989.

Table 1. Continued.

	1985			1986			1987			1988			1989			1990		
	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)	No.	Avg. Lgth. (in.)	Avg. Wt. (lbs.)
Sauger	41	14.4	0.93	6	16.7	1.35	12	14.3	0.89	16	14.8	1.00	39	15.9	1.06	36	13.9	1.39
Walleye	6	14.1	0.82	1	18.6	1.90	2	15.6	1.20	3	16.3	2.00	7	14.9	1.18	9	17.2	1.76
Sh. sturg.[1]	53	27.4	2.70	23	26.9	2.76	20	26.8	2.35	40	27.5	2.40	27	27.6	2.29	46	27.4	2.48
Rb. smelt	---	----	----	---	----	----	---	----	----	5	06.4	NA	4	06.4	0.33	---	----	----
Wht. suck.	3	13.4	1.39	13	13.7	1.15	10	11.3	0.93	30	12.9	1.30	34	12.9	0.92	49	11.2	0.78
R. carpsk.	25	15.7	2.11	15	15.6	1.70	9	15.3	1.67	10	15.7	2.00	12	15.8	1.65	23	15.8	1.89
Sht.redh.	4	14.5	1.87	1	15.6	1.80	4	15.5	1.78	6	15.6	1.80	11	13.7	1.22	5	15.3	1.62
Goldeye[2]	187	11.3	0.47	224	11.5	0.54	208	11.4	0.49	150	11.1	0.50	158	11.2	0.38	180	11.0	0.45
Carp	5	17.3	2.64	3	17.3	2.33	4	17.2	2.34	2	20.2	3.50	5	19.5	3.79	4	17.2	2.30
Ln.suck.	---	----	----	1	17.8	2.30	---	----	----	1	16.4	1.90	4	07.3	0.48	3	14.9	1.53
Ch. cat.	2	20.2	3.30	5	17.8	1.84	11	17.3	1.88	5	18.8	3.40	74	17.2	1.68	29	16.9	1.53
Bl. suck.	---	----	----	---	----	----	---	----	----	1	25.6	5.80	---	----	----	---	----	----
No. pike	6	26.8	4.16	3	28.9	6.88	---	----	----	3	24.2	4.56	1	28.0	4.69	7	21.2	2.59
Sm. buff.	2	18.1	3.91	2	15.7	1.90	1	22.5	6.20	3	17.5	2.90	2	19.8	9.13	1	21.6	5.00
Bm. buff	---	----	----	---	----	----	---	----	----	---	----	----	1	16.0	2.07	---	----	----
Burbot	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----	---	----	----
Lk. white.	---	----	----	---	----	----	---	----	----	2	22.9	4.80	---	----	----	---	----	----
Yel. perch	8	05.9	0.09	3	06.9	0.15	1	07.1	0.22	1	07.5	0.20	---	----	----	7	06.1	0.14
Cisco	4	10.6	0.45	12	13.5	0.86	17	09.9	0.34	25	11.0	0.50	62	09.1	0.22	40	09.4	0.33
Ch. sal.	---	----	----	1	07.2	0.20	---	----	----	---	----	----	---	----	----	---	----	----
Paddlefish	---	----	----	---	----	----	1	52.0	15.40	---	----	----	1	54.0	31.94	---	----	----

[1]Length data in 1981 is based on 66 fish.

[2]Length and weight data based on 122 fish in 1984; 127 in 1985 and 1986; 126 in 1987; 62 in 1988; and 127 in 1989.

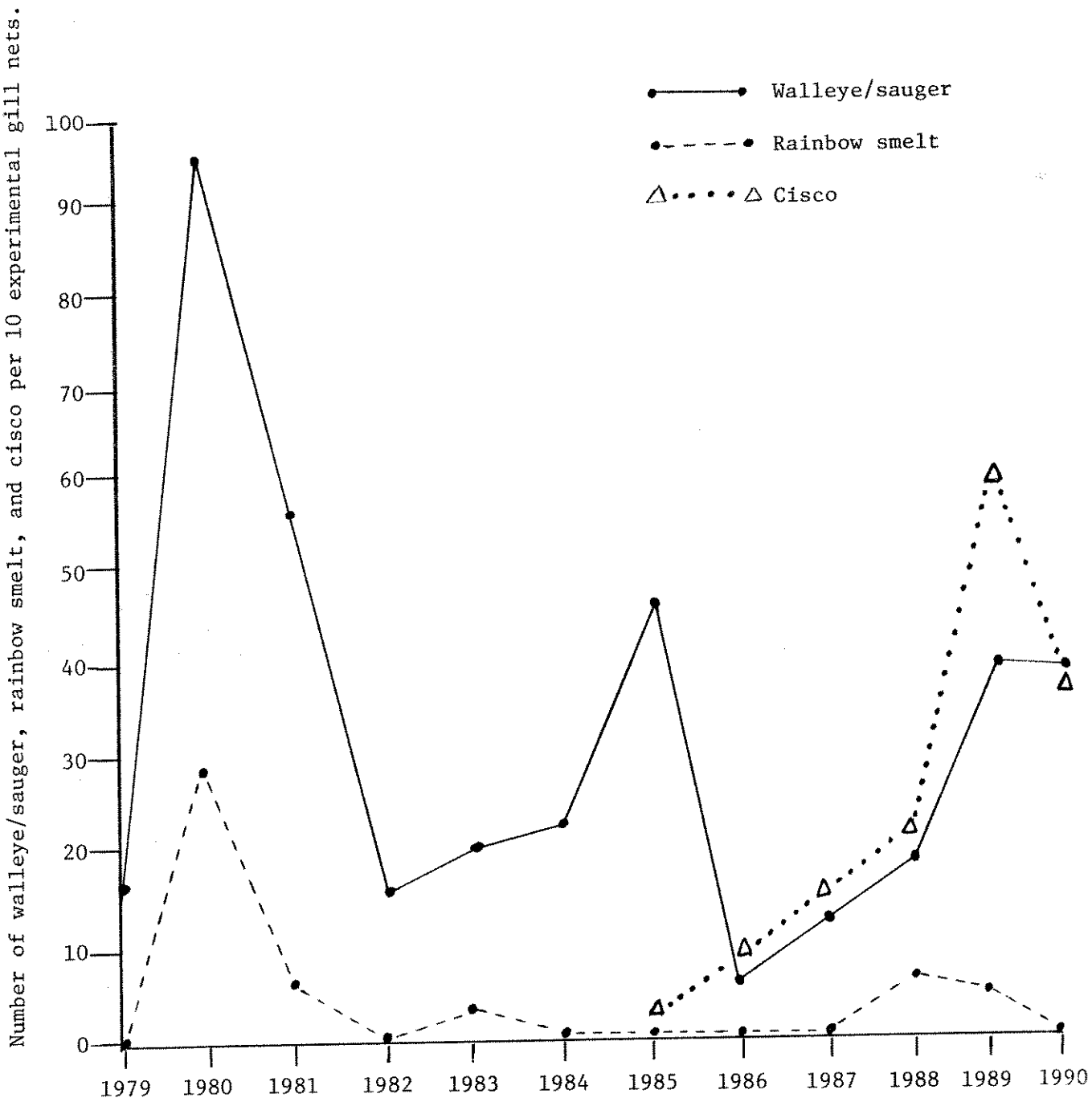

Figure A. An illustration of changes in numbers of walleye and sauger in Fort Peck dredge cuts/tailwater in relation to the catch of rainbow smelt and cisco.

Paddlefish

Dredge Cut Complex

Harvest and movement records for tagged paddlefish in the Dredge Cut area and Missouri River below Fort Peck Dam were maintained. No additional paddlefish were tagged in the study area in 1990. This report includes tagging data from work conducted by Ken Frazer in 1984, working on a Corps of Engineers funded study, and tagging work by Bill Gardner and Phil Stewart under Dingell-Johnson Project FW-2-R.

Nine tagged paddlefish were harvested by fishermen during 1990, one by bow and arrow in the dredge cuts where tagging originally occurred; seven by snagging at Intake Dam on Yellowstone River and one at the confluence of the Missouri and Yellowstone River. To date, 146 paddlefish tagged in the study area have been harvested; 71 (48.6%) in the dredge cuts where tagging occurred, and 75 (51.4%) in the Yellowstone River, primarily at Intake Dam. During the past nine years of 1982-90, however, 77.6% (59 of 76) of the tag returns for fish tagged in the study area have been harvested in the Yellowstone River. This is due in part to the higher fishing pressure at Intake Dam, and also reveals a high rate of paddlefish mobility and interchange between the Missouri and Yellowstone Rivers.

The harvest rate for paddlefish in this area remains low as summarized in Table 2. The average annual percent harvest for 817 fish tagged during 1974-84 varies from 0.6-1.8%. The average annual harvest rate prior to 1974 was 1.0% (Needham, 1985). Paddlefish tagged in the Missouri River outside the Dredge Cuts and downstream from the Milk River also have experienced a low exploitation rate. In this river segment of the study area, 150 paddlefish were tagged during 1979-82 and 13 have been returned, representing an average annual harvest rate varying from 0.6-1.1% after exposure to fishing from 9-12 years. All tag returns from this group of river-tagged fish have been from Intake Dam, Yellowstone River, or its confluence with the Missouri River.

The largest groups of paddlefish tagged in a single season are 189 in 1974, 162 in 1978, and 151 in 1979. After 17, 13, and 12 years of fishing pressure, these groups have exhibited an average annual harvest rate of 1.3-1.5%, and the overall harvest rate ranges from 16.8-21.6%. The highest overall harvest rates for any group are 34.2% for 40 fish tagged in 1977, 23.7% for 48 fish tagged in 1976, and 21.6% for 189 fish tagged in 1974.

Fort Peck Reservoir and Missouri River Upstream

Paddlefish tagging and harvest records were maintained, but no additional fish were tagged in 1990. From 1973-86, a total of 497 paddlefish were tagged in this study area. This total includes 191 fish tagged in the upper portion of Fort Peck Reservoir in 1978.

Six tagged paddlefish were harvested by snagging in 1990. One of these was tagged in 1973, two in 1978, one in 1980, and two in 1986. Most of the harvest occurs in the spring as fish migrate upstream from Fort Peck Reservoir to spawn, but some fish are also caught in the fall.

Table 2. A summary of paddlefish tagging and harvest from the dredge cut complex and Missouri River, 1974-90. Percent harvest was derived by adjusting for harvest of tagged fish. All fish were tagged in the dredge cuts except 40 fish in 1979 and all fish in 1980-82 which were tagged in the Missouri River.

Year	No. Tagged	No. Tag Returns 1990	Total No. Tags Returned	Percent Tags Returned	Avg. Annual % Harvest
1968	12	0	1	8.3	*
1969[1]	94 (92)	0	15	17.2	*
1970	5	0	0	0	0
1974[2]	189 (185)	1	33	21.6	1.3
1976[3]	48 (47)	0	10	23.7	1.6
1977	40	2	9	24.8	1.8
1978[4]	162 (156)	2	34[5]	24.1	1.8
1979	151	1	25	16.8	1.4
1979	40 (River)	0	3	7.7	0.6
1980	29 (River)	0	2	7.0	0.6
1981	60 (River)	1	6	10.4	1.0
1982	21 (River)	0	2	9.5	1.1
1984	77	2	6	8.7	1.1
	928	9	146		

*Calculation discontinued.

[1]Harvest based on 93 fish in 1978 and 92 in 1984 for dead fish or tag removal.

[2]Harvest based on 188 fish in 1979; 187 in 1983; 186 in 1984; and 185 in 1987 for dead fish or tag removal.

[3]Harvest based on 47 fish in 1978 for one fish found dead.

[4]Harvest based on 161 fish in 1979; 160 in 1980; 158 in 1982; 157 in 1986; and 156 in 1988 due to dead fish.

[5]Total includes one fish possibly tagged in 1977.

Tag return data reveals a low rate of harvest for this paddlefish population as summarized in Table 3. The average annual rate of harvest varies from 1.1-6.5%. However, the highest rate of 6.5% is based on only 13 fish tagged in 1986.

Table 3. A summary of paddlefish tagging and harvest data from the Missouri River and Fort Peck Reservoir, 1973-90. Percent harvest was derived by adjusting for previous harvest of tagged fish.

Year	No. Tagged	No. Returned in 1990	Total No. Returned	% Harvest	Avg. Annual % Harvest
1973	45	1	10	24.7	1.4
1974	55	0	12	24.3	1.4
1975	29	0	8	31.1	1.9
1976	23	0	6	29.2	1.9
1977[1]	60	0	9	15.7	1.1
1978	226[2]	2	35	16.8	1.3
1979	11	0	5	54.3	4.5
1980	33	1	12	42.8	3.9
1983	2	0	1	50.0	6.2
1986	13	2	3	32.7	6.5
	497	6	101		

[1]Total adjusted for one fish killed by commercial fisherman Aug., 1981.

[2]191 tagged in Fort Peck Reservoir from UL Bend to Beauchamp Bay.

In 1978, 226 fish were tagged, including 191 (84.5%) tagged in the upper portion of Fort Peck Reservoir near Beauchamp Bay. These fish have exhibited a lower tag return rate than fish tagged in the river, which indicates some fish remain in the reservoir and do not make annual spring migrations into the river where they are subject to snagging.

Fresno Reservoir

Fresno Reservoir is a highly fluctuating reservoir of 5,757 surface acres located on the Milk River 12 miles northwest of Havre. In most years, the demand for irrigation water results in water level fluctuations of 10-25 feet. Systematic gill netting at predetermined stations was conducted in the 1960's and 1970's but was discontinued in 1974. Traditional gill-net stations have been sampled since 1987 to determine changes in sport fish abundance and species composition. Samples were collected utilizing six experimental gill nets fished overnight.

Lake whitefish, walleye, and northern pike were well represented in the catch (Table 4). Lake whitefish continue to comprise a significant portion of the gill-net catch, but are rarely caught by fishermen. The large number of YOY whitefish captured may be indicative of the good spawning conditions afforded the previous fall by high reservoir levels. The adult yellow perch population is very depressed at present. No yellow perch have been captured in gill nets for two consecutive years. Eight adult longnose suckers were also netted. The walleye catch was considered average. The 1987 year-class comprised over 50% of the catch and yearling walleye from the 1989 cohort were well represented. In recent years, a positive correlation has been made between over-winter water levels and year-class success (Needham and Gilge, 1990). The strong showing of the 1989 year-class in connection with the excellent over-winter storage in 1989-90 reinforces this correlation.

In September of 1990, 6,000 walleye fingerlings averaging 4.7 inches in length were marked by clipping the right opercle and planted in mid-reservoir. Future sampling efforts should indicate if the contribution of these fingerlings to the fishery is significant under a given set of water conditions.

Night electrofishing in October was unsuccessful in capturing any marked fingerlings, although an unmarked YOY walleye was netted. Many lake whitefish were observed and a large rainbow trout was netted. Reports of rainbow trout are occasional and origin of this species is unknown.

Beach seining was conducted at 12 standard sampling sites around the reservoir in a continuing effort to evaluate reproductive success of sport fishes and assess forage abundance. The seining results indicated low numbers of YOY walleye, high numbers of northern pike, and below average reproductive success for YOY yellow perch (Table 5). However, the catch of yearling yellow perch was large. Spottail shiners and black crappie showed marked increases in abundance.

Table 4. A summary of the catch in overnight sinking experimental gill net sets in Fresno Reservoir, 1965-90. Number of nets used varied from four to eight.

Species	Year	No.	Average No. Per Net Set	Average Length (inches)	Average Weight (pounds)	Percent of Total
Lake Whitefish	1970	1	0.1	19.9	3.30	0.7
	1971	1	0.2	18.7	2.94	1.2
	1972	4	0.5	17.8	2.35	6.2
	1974	3	0.8	19.5	3.15	8.6
	1987	65	10.8	12.2	0.71	36.1
	1988	55	9.2	17.5	2.45	28.6
	1989	22	3.7	14.4	1.06	30.1
	1990	46	7.7	10.0	0.98	48.9
Yellow Perch	1969	7	0.9	5.4	0.07	12.3
	1970	20	2.5	6.9	0.16	13.8
	1971	6	1.5	7.6	0.23	7.4
	1972	2	0.3	8.7	0.40	3.1
	1974	2	0.5	5.7	0.09	5.7
	1987	43	7.2	6.2	0.13	23.9
	1988	24	4.0	8.7	0.32	12.5
	1989	0	----	----	----	0.0
	1990	0	----	----	----	0.0
Walleye	1965	14	0.9	12.4	0.80	17.9
	1966	14	2.3	11.6	0.62	34.2
	1967	11	1.6	12.9	0.88	24.4
	1968	29	3.6	12.3	0.64	56.9
	1969	24	3.0	12.9	0.92	42.9
	1970	95	11.9	14.4	1.16	65.5
	1971	28	7.0	13.6	1.08	34.6
	1972	34	4.3	16.1	1.44	52.4
	1974	22	5.5	15.9	1.35	62.9
	1987	37	6.2	16.7	1.99	20.6
	1988	67	11.2	15.5	1.97	34.9
	1989	32	5.3	14.6	1.14	43.8
	1990	28	4.7	15.7	1.74	29.9
Northern Pike	1965	23	1.6	18.2	1.23	29.5
	1966	6	1.0	20.1	1.68	14.6
	1967	7	1.0	20.6	2.50	15.6
	1968	9	1.1	17.8	1.66	17.6
	1969	9	1.1	19.7	1.88	16.1
	1970	12	1.5	16.3	1.33	8.3
	1971	30	7.5	17.0	1.12	37.0

Table 4. Continued.

Species	Year	No.	Average No. Per Net Set	Average Length (inches)	Average Weight (pounds)	Percent of Total
Northern pike (continued)	1972	5	0.6	17.3	0.93	7.7
	1974	1	0.3	20.6	1.84	2.9
	1987	35	5.8	19.1	1.74	19.4
	1988	46	7.7	20.6	2.85	24.0
	1989	19	3.2	21.6	2.74	26.0
	1990	20	3.3	19.2	2.09	21.2

Creel Census

A creel census was conducted at Fresno Reservoir during the months of May through September, 1990. The ice-free fishing period usually includes April and October, but fishing is estimated to be minimal (<50 angler days) during these two months. It was estimated that during the creel period a total of 5,262 anglers expended 18,353 hours on the reservoir (Table 6). Boat fishermen accounted for 90% of those hours.

Fishermen harvested approximately 4,784 walleye, averaging 14.8 inches and 1.07 pounds throughout the summer (Table 7). Harvest was greatest in July. Boat fishermen accounted for 97% of all walleye taken. Combined catch rates varied from 0.25 walleye/hour in September to 0.74 walleye/hour in July. The overall catch rate for the creel period was 0.50 walleye/hour. Sixteen percent of the anglers caught a limit (5) of walleye, however, 48% of all walleye caught were released. Catch rates and fishing pressure were positively correlated. Age composition of the summer walleye harvest was determined by aging a cross-section of creeled fish each month and extrapolating to the total estimated harvest each month (Table 8). Age III walleye comprised 73% of the catch followed by Age IV fish at 22%. Walleye less than Age III and older than Age IV accounted for only 5% of the catch.

The northern pike harvest was 1,092 fish, averaging 19.8 inches and 1.69 pounds (Table 9). However, 2,641 pike, or 71% of the total caught, were released. Boat fishermen were responsible for 86% of the northern pike harvest.

The total estimated summer harvest of yellow perch was 446 fish. Perch averaged 10.8 inches and 0.68 pounds. Only three crappie were reported caught. Although a large population of lake whitefish exists in the reservoir, no whitefish were reported caught.

A fishing derby was held Saturday, August 25. A total of 184 fishermen fished 654 hours and caught 242 walleye, 91 northern pike, and 124 yellow perch.

Table 5. A summary of forage fish and young-of-year game and sport fish taken with a 100- x 9-foot x 1/4-inch square mesh beach seine in Fresno Reservoir, 1965-90.

Date		No. Seine Hauls	Species and Number								
			Walleye	No. Pike	Yellow Perch	Emerald Shiner	Crappie sp.	Spottail Shiner	Sucker sp.[1]	Minnow sp.[2]	Other[3]
July	1965	7	0	8	0	0	2	0	0	0	0
August	1966	6	0	2	0	0	14	0	0	11	0
August	1967	10	24	5	0	15	19	0	0	276	0
August	1968	12	16	6	2,909	147	552	0	0	161	0
August	1969	12	4	6	1,140	385	67	0	2	380	0
August	1970	12	27	45	10,151	521	883	0	1	122	0
August	1972	12	102	22	1,005	205	379	0	0	72	0
August	1974	12	13	59	1,583	29	1,355	0	0	25	0
August	1975	11	10	32	4,154	155	59	0	0	0	0
August	1978	12	22	42	10,684	12	3	0	0	0	0
August	1979	12	29	45	8,516	340	127	0	1	0	1
August	1982	12	102	70	8,993	121	166	0	0	0	3
August	1983	12	23	0	2,254	448	9	0	1	7	0
August	1984	12	247	0	197	375	0	2	40	55	0
August	1985	12	64	0	379	684	3	2	0	9	0
August	1986	12	0	23	3,077	142	2	20	1	5	1
August	1987	12	80	113	6,233	1,979	7	3	0	3	0
August	1988	12	53	4	3,122	182	0	20	0	1	0
August	1989	12	56	32	24,706	22	0	16	2	0	0
August	1990	12	8	57	2,033	7	165	44	1	2	0

[1]Consists of white and longnose suckers.

[2]Consists of silvery minnows, lake chubs, flathead chubs, and fathead minnows.

[3]Consists of burbot, smallmouth bass, and brook sticklebacks.

Table 6. Fishing pressure and walleye catch rates for boat and shore fishermen on Fresno Reservoir, May - September, 1990.

Month	Boat Anglers No.	Boat Anglers Total Hrs.	Boat Anglers Fish/ Hr.	Shore Anglers No.	Shore Anglers Total Hrs.	Shore Anglers Fish/ Hr.	Shore Anglers Combined Fish/
May	568	2,208	0.32	101	141	0.02	0.30
June	1,120	3,292	0.72	198	475	0.15	0.66
July	1,024	4,097	0.79	216	503	0.24	0.74
August	954	3,888	0.45	118	259	0.11	0.43
September	773	3,067	0.28	196	423	0.00	0.25
TOTALS	4,439	16,552	0.54	829	1,801	0.12	0.50

Table 7. Number and average size of walleye harvested by boat and shore anglers at Fresno Reservoir, May - September, 1990.

Month	Boat	Shore	Combined Harvest	Mean Length (in.)	Mean Weight (lbs.)	Total Harvest (lbs)
May	442	2	444	14.4	0.92	406
June	1,218	62	1,280	14.2	0.95	1,216
July	1,762	65	1,827	14.5	0.99	1,809
August	816	18	834	15.6	1.27	1,059
September	399	0	399	16.4	1.55	618
TOTALS	4,637	147	4,784	14.8	1.07	5,108

Table 8. Age distribution of walleye harvested during the summer creel period at Fresno Reservoir, 1990. (Year class in parenthesis).

	Age			
	II ('88)	III ('87)	IV ('86)	≥ V ('85)
May	0	351	84	9
June	0	896	358	26
July	91	1,443	238	55
August	25	492	300	17
September	0	303	72	24
TOTALS	116	3,485	1,052	131
% of TOTAL	2%	73%	22%	3%

Table 9. Number and size of northern pike kept and number of pike released during the May-September creel period at Fresno Reservoir, 1990.

	Mean Length (in.)	Mean Weight (lbs.)	No. Kept	No. Released
May	20.9	1.93	43	235
June	19.3	1.38	231	795
July	18.9	1.39	327	461
August	20.4	1.99	264	625
September	20.5	2.05	227	425
TOTALS	19.8	1.69	1,092	2,641

Nelson Reservoir

This reservoir is utilized by the Bureau of Reclamation for off-stream storage of irrigation water. At full storage capacity, it covers approximately 4,500 surface acres, but reservoir levels have fluctuated dramatically during the last

10 years. Beach seining is conducted annually to determine reproductive success of sport and forage fishes. In recent years, dense aquatic vegetation has hampered seining efforts, but shorelines were relatively clear in 1990.

Beach seining was conducted in July, 1990, at seven sites on the reservoir, encompassing 1,320 feet of shoreline. The sport fish YOY catch consisted of 7 walleye, 1 northern pike, and 2,631 yellow perch (Table 10). Reproductive success of northern pike was poor, while yellow perch appeared in fair numbers. Other forage species sampled in decreasing order of abundance were white sucker, spottail shiner, buffalo sp., crappie sp., and carp. No supplemental walleye stocking occurred in 1990 indicating a fair walleye year-class was produced by natural reproduction.

Night electrofishing in late October failed to capture any walleye. The late sampling date is believed to be the cause of the poor showing as fish tend to move off shore when water temperature declines.

Table 10. A summary of walleye, yellow perch, and northern pike young-of-year captured by beach seining in Nelson Reservoir, 1974-90.

Year	Shoreline Seined (ft.)	Walleye		Yellow Perch		No. Pike	
		No.	No./ 1,000 (ft.)	No.	No./ 1,000 (ft.)	No.	No./ 1,000 (ft.)
1974	1,590	36	22.6	1,365	860	0	0.0
1975	1,845	112	60.5	3,008	1,630	0	0.0
1976	1,590	119	74.8	74	50	1	0.6
1977	1,740	1	0.6	2,939	1,690	0	0.0
1978	870	428	492.0	6,568	7,550	0	0.0
1979	1,530	23	15.0	1,832	1,200	2	1.3
1980	----------	----------	No seining conducted	----------	----------	----------	----------
1981	615	31	50.6	8,859	14,400	1	1.6
1982	660	0	0.0	4,553	6,898	3	5.0
1983	1,420	4	2.8	138	100	18	12.7
1984	1,530	0	0.0	133	87	0	0.0
1985	510	3	6.0	2,272	4,455	16	31.4
1986	700	0	0.0	3	4	7	10.0
1987	495	5	10.1	1,987	4,014	0	0.0
1988	520	0	0.0	783	1,506	0	0.0
1989	910	10	11.0	736	809	4	4.4
1990	1,320	7	5.3	2,631	1,993	1	0.8

H. C. Kuhr Reservoir

This 25-acre reservoir is located 15 miles south of Chinook on private land. For many years the reservoir provided good trout fishing for a private fishing club until white suckers appeared in the early 80's. The sucker population expanded and trout growth and survival became poor. The landowner did not want the reservoir chemically treated, but desired to provide some kind of fishing opportunity. The Department of Fish, Wildlife and Parks agreed to develop a perch/crappie fishery in exchange for public use of the reservoir.

The reservoir also contains a variety of forage fish consisting of fathead minnows, brook sticklebacks, silvery minnows, lake chubs, Iowa darter, and northern redbelly dace. Adult yellow perch were stocked in April, 1987, at a rate of 55/acre. Adult black crappie were planted simultaneously at a rate of 8/acre. Both species have spawned successfully since 1987. The reservoir contained significant forage, but overpopulation of perch and crappie was anticipated in the absence of predators. Northern pike are usually chosen to control panfish populations, but problems with sporadic or excessive reproduction occur regularly, creating frequent imbalances. A sterile predator, the tiger musky, was selected as a possible management tool. Tiger musky were stocked for panfish control and to reduce some of the variability encountered with reproduction of other predators, such as northern pike. The original introduction of tiger musky in 1987 was made from 2-inch fingerlings obtained from Pennsylvania.

Tiger musky were stocked at a rate of 27/acre in 1987 and 22/acre in 1988. The 1987 plant exhibited some survival; however, the 1988 plant was apparently unsuccessful. In 1989, 2-inch fingerlings were stocked at a rate of 48/acre and a rearing pond was stocked at a rate of 140/acre. No muskies from this plant were taken by gill net, traps or seines, and only seven tiger muskies ranging from 10.6-12.8 inches were taken from the rearing pond in the fall. Although the only tiger muskies sampled from the reservoir to date are from the 1987 year-class, growth has been good (Figure B).

The reservoir opened for fishing in May, 1990, for the first time with a tiger musky creel limit of one fish per day over 30 inches. Interest in the trophy fishery was high and at least seven muskies were known to have been caught, three of which were legal size. Only one legal fish was recorded and was subsequently entered as a state record. The fish measured 30.9 inches and 7.70 pounds. However, fishery personnel netted and released a 12-pound musky in 1990.

Due to concern over the high post-stocking mortality of muskies, plans were to intensively rear tiger muskies in the hatchery in 1990 to 8-10 inches and stock in the fall. Water temperature fluctuations in the hatchery and a parasite infestation caused a complete loss of the fingerlings at the hatchery; therefore, no fish were planted in 1990. A similar attempt will be made in 1991 if hatchery problems can be solved.

In light of these tiger musky year-class losses, fingerling walleye were stocked to increase predation on juvenile perch and suckers. Walleye ranging from 3.0-5.0 inches were stocked in 1988 at a rate of 28/acre and in 1989 at 14/acre.

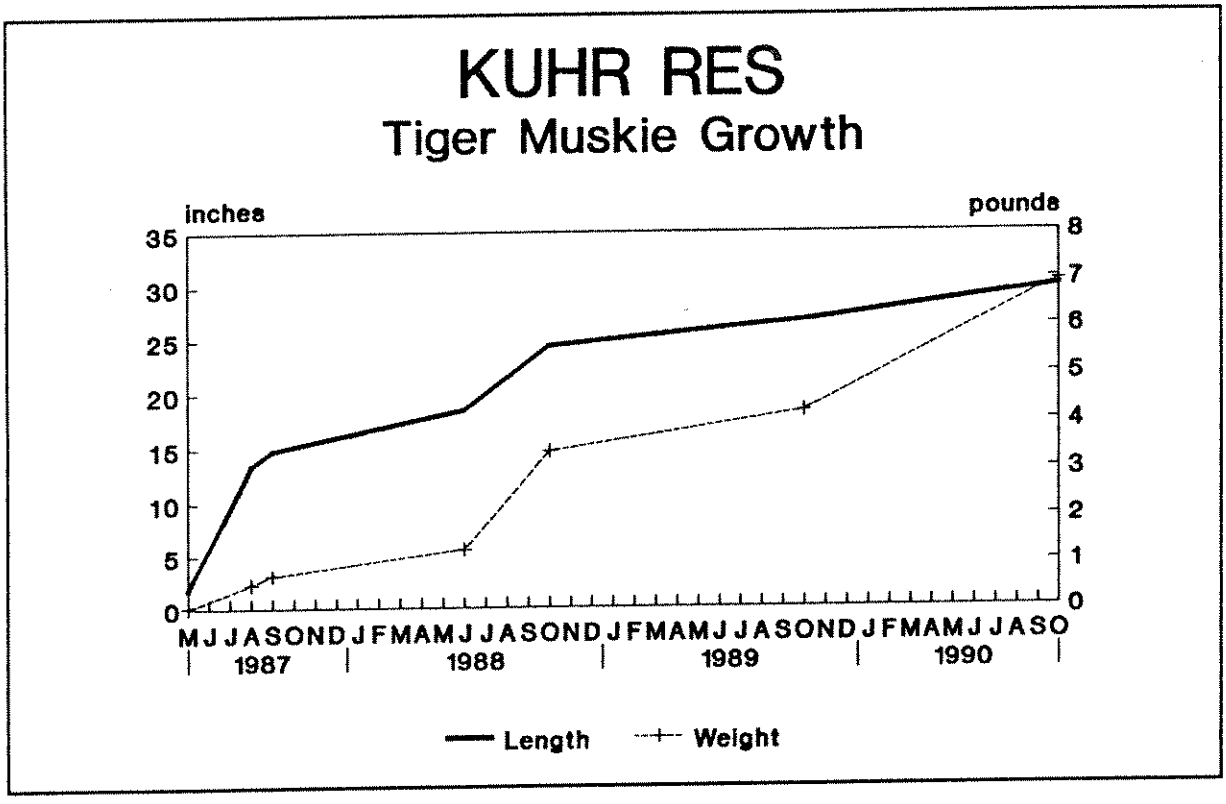

Figure B. Growth of tiger muskies in Kuhr Reservoir, 1987-1990.

Reproductive success of perch has been good and several strong year-classes have developed. Black crappie have shown limited reproduction and are found in low numbers (Table 11). Suckers and minnows of forage size have declined dramatically. Annual gill netting since 1987 indicates relatively stable numbers of tiger muskies, increasing occurrences of walleye and yellow perch and a declining white sucker population (Table 12).

Table 11. Forage fish abundance determined by beach seining at H. C. Kuhr Reservoir, 1987-90.

No. Hauls	Date	White Suckers (<10 in.)	Fathead Minnow	Silvery Minnow	Lake Chub	Black Crappie	Yellow Perch YOY	Yellow Perch Age I
3	7-14-87	77	1,450	58	26	0	332	0
4	6-28-88	83	294	34	10	5	20	127
4	7-07-89	0	1	0	0	0	8	26
4	7-19-90	2	1	0	0	1	1,128	58

Table 12. Results of fall gill netting at H. C. Kuhr Reservoir, 1987-90.

	Tiger Musky			Yellow Perch			Walleye/Sauger			Suckers	
Year	No.	$\bar{X}$ L (in.)	$\bar{X}$ WT (lbs.)	No.	$\bar{X}$ L (in.)	$\bar{X}$ WT (lbs.)	No.	$\bar{X}$ L (in.)	$\bar{X}$ Wt (lbs.)	No. <10 in.	No. >10 in.
1987	3	14.8	0.71	14	8.8	0.41	2	15.9	1.55	69	314
1988	15	24.4	3.37	1	10.8	0.59	1	7.7	0.16	14	186
1989	1	26.7	4.19	17	6.6	0.15	3	13.0	1.01	12	187
1990	5	29.9	6.94	24	6.3	0.12	6	10.9	0.57	3	27

Beaver Creek Reservoir

This 200-acre reservoir has a maximum depth of 90 feet and has provided a rainbow trout fishery of varying success since it's initial filling in 1975. It's proximity to the city of Havre makes this reservoir a valuable local resource and it has been managed intensively in recent years with a variety of species. In the early 1980's, largemouth bass were introduced to help curb excessive sucker numbers and provide an additional sportfish. Although bass reproduction has been documented, largemouth bass have not contributed significantly to the fishery. Soon after bass introductions were made, northern pike appeared from an illegal introduction. The northern pike population increased steadily and peaked in 1987. No natural reproduction was documented in 1988 or 1989. Yellow perch were found in the reservoir in 1986. Beach seining indicated good reproduction in 1987, but low YOY perch numbers were observed in 1988 and 1989.

Walleye were stocked in 1987 due to local demand. The walleye management plan included three consecutive years of stocking followed by two non-stocking years to evaluate natural reproduction. An introductory plant of walleye was made in the spring of 1987 with 50,000 fry. This was followed by a fall plant of 322 marked fingerlings. Eleven fish of the 1987 year-class were subsequently sampled in 1988 of which four were marked. Using the modified Peterson formula, the 1987 year-class was estimated at 775 walleye. A plant of 100,000 fry was made in 1988 along with 193 marked fingerlings. No fish from this year-class were sampled in 1989. Walleye fry (300,000) and marked fingerlings (802) were stocked in 1989. Insufficient numbers of marked fish were sampled to estimate the population. Growth of walleye to date is consistent with other regional populations.

Eleven walleye were captured in the fall gill netting. The walleye averaged 13.2 inches and 0.86 pounds. These 11 fish ranged in length from 8.1-16.1 inches. No walleye stocking occurred in 1990. Beach seining and electrofishing were utilized to sample YOY walleye in the event limited natural reproduction occurred. No YOY walleye were encountered. Efforts to confirm natural reproduction will be ongoing for several years. Yellow perch and spottail shiners currently provide most of the forage base as juvenile sucker numbers have declined steadily since 1986 (Table 13).

Table 13. A summary of forage fish taken by beach seining from Beaver Creek Reservoir, 1985-90.

Date	No. Hauls	Species[1] WSU/LSU	YP	LK CH	FTHD MIN	S/P MIN	ID	EM SH	SP SH
9-04-85	5	2,535	0	7	0	0	11	0	0
6-16-86	4	3,110	0	1	0	0	2	0	0
8-19-87	6	969	2,281	2	1	2	72	1	0
8-23-88	6	54	4,401	0	0	0	4	0	1
8-21-89	6	45	29	2	0	0	0	3	602
8-21-90	6	1	42	0	0	0	2	1	93

1WSU/LSU --- white/longnose sucker
YP -------- yellow perch
LK CH ----- lake chub
FTHD MIN -- fathead minnow
SP/MIN --- silvery/plains minnow
ID ------- Iowa darter
EM SH ---- emerald shiner
SP SH ---- spottail shiner

Reser Reservoir

This 25-surface acre reservoir was constructed in 1980 and first filled in 1982. Golden shiners, fathead minnows, and black crappie were introduced to establish a forage base. Largemouth bass fingerlings were stocked at a rate of 300/acre in 1982 and 150/acre in 1983. The bass exhibited good survival and attained catchable size by 1984 when large numbers of 8- to 10-inch fish were harvested under a 10-fish limit. Fishing pressure was light in both 1985 and 1986 due to poor fishing success. Forty-two fishermen were interviewed in 1986 and none had caught a bass. A two-bass limit was imposed in 1986 to assist in rebuilding the population.

Electrofishing after dark has been conducted in most years since 1984 to determine the status of the bass population. The number of bass captured in one complete circuit of the reservoir has been used as an indicator of relative abundance. Largemouth bass reproduction has been monitored since 1985 by electrofishing shoreline vegetation in late summer. Figure C shows relative abundance of YOY and older bass over a 7-year period.

The strong year-class produced in 1986, along with the restrictive limit, allowed the population to recover to high levels by 1988. No reproduction was confirmed in 1985, but excellent success was observed in 1986. Reproductive success since 1986 has been fair to poor. The recent decline in the adult bass population coincided with an increase in the daily creel limit from 2 to 5 fish. The bass population appears to be at a pre-1986 level which provided a minimal return to fishermen.

RESER RESERVOIR

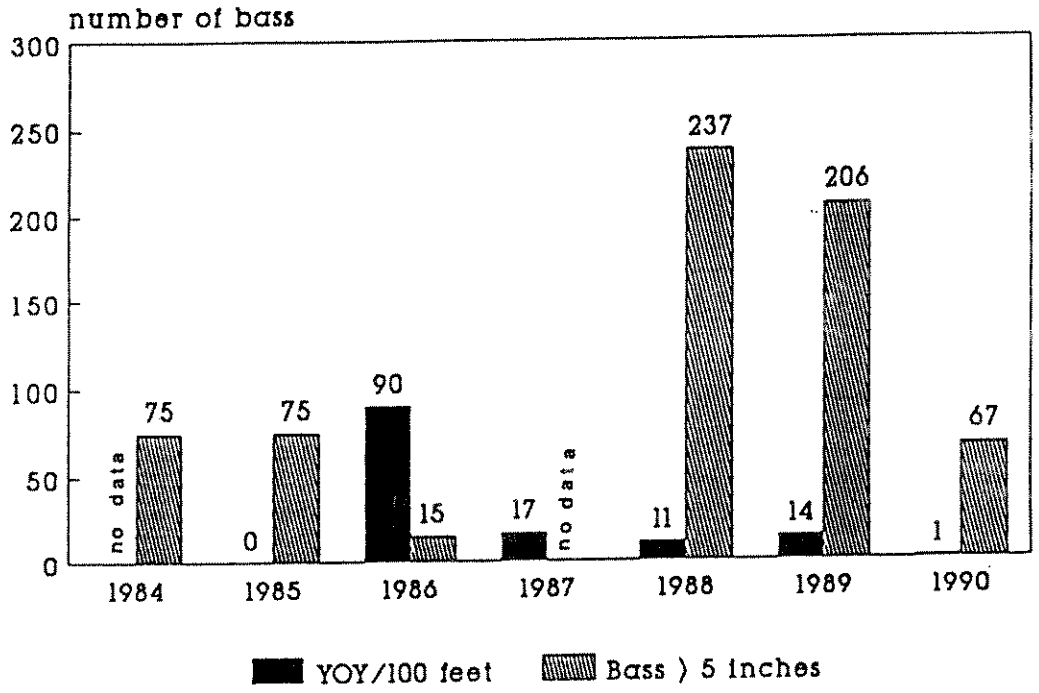

Figure C. Relative abundance of YOY and older bass in Reser Reservoir, 1984-90.

Yellow perch were illegally introduced into this reservoir in 1988. Though perch eggs have been observed in large quantities the last two years, only marginal year-classes appear to have developed. Growth of perch has been excellent due to the productivity of the reservoir. It is unknown at this time what impact the perch may be having on the bass population or if bass are reducing perch numbers through predation. It is conceivable that yellow perch may be limiting bass recruitment through predation. Forage fish also include golden shiners and black crappie. Crappie are present in low numbers, but yearling and YOY golden shiners are plentiful.

Atlas Reservoir

This new reservoir has 10 surface acres and filling occurred in 1986. Initial stocking to develop a sport fishery began in September, 1987, with 592 5-inch largemouth bass. An additional 865 and 600 bass (5-inch) were stocked in May, 1988, and June, 1989, respectively. Approximately 40,000 fathead minnows were stocked in the spring of 1988 to establish a forage base.

A 5-bass daily and possess creel limit was imposed in the spring of 1990 to help prevent over-harvest. Prior to this, angler use and harvest were extremely low since fishermen were unaware of this new fishery. Sampling was conducted in the spring of 1989 and 1990 utilizing a beach seine to secure information on the developing bass population. Sampling efficiency was poor and provided limited information on abundance, but size data was obtained.

Night electrofishing was initiated in October, 1990, as a sampling technique to acquire improved population data. The sampling effort consisted of one complete circuit of the reservoir shoreline. This sampling indicated good development of a bass fishery and good growth rates as presented in Table 14. Bass reproduction was excellent in 1990 and several hundred YOY, too numerous to count, were observed during electrofishing.

Table 14. A summary of bass size from Atlas Reservoir. Spring samples for 1989 and 1990 were not differentiated by age groups since they appeared to be entirely comprised of stocked fish.

Date	No. Sampled		Average Total Length (in.)	Average Total Weight (lbs.)
05/08/89		31	8.8	0.34
05/22/90		9	11.1	0.75
10/01/90	Adults	42	13.0	1.21
	Yrlg.	10	7.3	0.21
	YOY	20	3.0	----

Battle Creek

Battle Creek originates in the relatively hilly terrain of Canada, and water quality is affected by land and irrigation practices in Canada before the creek enters the United States. Water apportionment agreements are in place to divide the flow. The water is calcium-bicarbonate type hard water and is generally of good quality. The drainage area is large, exceeding 1,500 square miles. The creek flows through prairie rangeland for the most part, though water is pumped and diverted to irrigate hay meadows throughout the narrow stream corridor. Land ownership is almost entirely private, crossing occasional tracts of land administered by the U.S. Bureau of Land Management. Access for hunting, fishing, and trapping is generally good, however.

The riparian zone contains an intermittent overstory of mature cottonwoods. Sagebrush, wild rose, snowberry, buffaloberry, and native grasses are present upon the usually high banks. Willows and cottonwoods predominate in the lower 10 miles.

Stream channel substrate is indicative of a low gradient stream winding through glaciated deposits. Gravel riffles and silty, long pools are the norm. Water

clarity is excellent with the exception of the extreme lower end, which is most affected by irrigation return flows. Flows typically peak with the snow melt in April. Occasionally, no measurable flow is present in late summer. Recharge by springs and fall showers usually provide good fall and winter flows. Although there is no dam regulation on the mainstream of Battle Creek at present, a joint U.S.-Canada proposal to build a storage regulation dam in Canada near the border is being considered. It's conceivable that such a regulatory dam may provide year-round flows to the mouth. Baseline fisheries data was gathered to assist in predicting benefits or impacts of such a project.

Northern pike are wide spread throughout the drainage, occasionally occurring in isolated pools of small tributaries. Walleye and sauger are confined to the lower 10 miles of creek. The reach upstream one mile from the mouth is heavily utilized by fishermen with many northern pike, walleye, and sauger taken year around. An occasional burbot is taken in setlines. Yellow perch and black bullheads are often sought after in this area. Several attempts were made to establish rainbow and brook trout in the 1970's and 1980's but proved unsuccessful.

The clear gravel riffles and deep, long pools provide spawning and rearing habitat for a variety of sport and forage fishes. Larval fish netting has documented successful walleye reproduction in the lower most reach. This creek is presumed to be a significant contributor of walleye to the Milk River.

Two overnight gill net sets were made in 1990 approximately 6 miles above the mouth. The nets produced a catch of game fish as shown in Table 15.

Table 15. Results of two overnight gill net sets in Battle Creek at river mile 6, 1990.

Species	Number	Mean Length (in.)	Length Range	Mean Weight (lbs.)
Northern pike	9	25.3	(19.6-35.2)	4.56
Walleye	7	11.7	(09.6-12.7)	0.52
Sauger	3	10.6	(10.2-11.2)	0.34

Battle Creek provides excellent habitat for a variety of forage fish and is, undoubtedly, a major contributor of forage to Milk River sport fish.

Non-game species usually present through much of the creek include: carp, white and longnose suckers, lake chubs, fathead minnows, flathead chubs, brook sticklebacks, silvery/plains minnows, emerald shiners, yellow perch, black bullheads, northern redbelly dace, longnose dace, stonecats, Iowa darters, and brassy minnows.

A Taylor 30-day thermograph was installed at river mile 13.2 to monitor summer water temperatures. Overnight low temperatures were usually between 65 to 70 degrees F. In late June, peak temperatures exceeded 80 degrees F. for three consecutive days. The highest single-day temperature was 84 degrees F. on July 1. Flows were average or above average throughout the period of record.

It is not surprising that past trout introductions failed in light of the water temperature data and extent of northern pike distribution. Computer modeling of flows with and without the proposed dam project is being conducted by the Montana Department of Natural Resources. Some impacts on the fishery may be evident as soon as hydrographs from the model are available.

RECOMMENDATIONS

Standardized late summer seining to assess sport fish reproduction and forage fish abundance should be continued at Fresno Reservoir. Sampling of adult sport fishes should be continued utilizing fall gill netting to gather recruitment information relating to walleye year-class strength and winter reservoir water levels. Periodic beach seining should continue below Fresno Reservoir to determine critical reservoir water levels as they relate to fish emigration. Two years of sampling indicate YOY are particularly vulnerable to flushing. Significant losses could be avoided with a conservation pool maintained at or above 2550 msl. Supplemental stocking of marked fingerling walleye should continue until benefits can be confirmed and evaluated. Fish plants should be scheduled in fall when water levels suitable for stocking can be assessed. If over-winter levels are anticipated to be low, stocking should be deferred until the following year. Attempts should be made to quantify the walleye population and determine the potential for supplying eggs.

Walleye reproduction is still considered to be below optimum at Nelson Reservoir but appears to be improving. Alternate years of walleye fingerling stocking should be continued. Monitoring reproductive success of sport and forage fish should be continued. A creel census similar to one conducted in 1984 should be initiated.

Beach seining, gill netting, and electrofishing should be continued at Beaver Creek Reservoir to monitor growth and survival of stocked walleye. A creel census would help assess the contribution of walleye to the fishery and determine their vulnerability to angling in this accessible reservoir. Sampling for YOY fish should be expanded to document natural reproduction.

It will be several years before significant numbers of yellow perch and crappie reach quality size in Kuhr Reservoir. The reservoir was opened for fishing in 1990 with most fishing pressure directed at tiger muskies. A limit of one fish per day over 30 inches was in effect and should remain. High post-stocking

mortality of tiger muskies can create management problems if the trend continues. Limiting factors have not been identified and the degree of predation-related mortality is unknown. Size at stocking may be an important factor. Attempts should again be made to stock larger fish in the fall of the year. Hybridization should be attempted in Montana so rearing can coincide better with hatchery water temperatures. Walleye fingerling stocking should continue on a limited scale.

The Reser Reservoir bass population has declined even under a fairly restrictive 5-fish limit. Annual monitoring of the bass population should continue. No changes in creel limits are recommended at this time.

Annual population monitoring should continue at Atlas Reservoir utilizing night electrofishing to evaluate the largemouth bass population and establish appropriate creel limits.

Recommendations should be presented to the Battle Creek Advisory Committee as soon as hydrographs from the computer model are available.

LITERATURE CITED

Needham, Robert G. 1985. Paddlefish Investigations. Job Prog. Rept. for Dingell-Johnson Project F-11-R-33, Job No. II-a. 6p. (mimeo).

Needham, R. G. and K. W. Gilge. 1990. Survey and Inventory of Coldwater and Warmwater Ecosystems. Job Prog. Rept. for Dingell-Johnson Project F-46-R-3, Job No. V-e. 24p. (mimeo).

Waters referred to:

16-5140	Fort Peck Reservoir
16-2500	Missouri River Sec. 05
16-2520	Missouri River Sec. 06
15-5240	Fresno Reservoir
15-6480	Nelson Reservoir
15-5880	H. C. Kuhr Reservoir
15-4570	Beaver Creek Reservoir
15-8860	Reser Reservoir
15-4532	Atlas Reservoir
15-0200	Battle Creek

Key words or fish species:

paddlefish, harvest, cisco, smelt, walleye, water levels, recruitment, tiger musky, stocking, creel census

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