MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO.: F-78-R-6 STUDY TITLE: SURVEY AND INVENTORY OF COLDWATER AND WARMWATER ECOSYSTEMS

JOB NO.: V-e JOB TITLE: NORTHEAST MONTANA WARMWATER ECOSYSTEMS INVESTIGATIONS

JOB PERIOD: JULY 1, 1999 THROUGH JUNE 30, 2000

ABSTRACT

Paddlefish harvest and tagging records were maintained for the Fort Peck Reservoir/Missouri River Paddlefish population. Harvest on this population remains low. Gill netting and beach seining were conducted at Fresno and Nelson Reservoirs. A creel census and population estimates for walleye and northern pike were completed at Nelson Reservoir. Gill netting and beach seining was conducted at Beaver Creek Reservoir. The fishery in Bailey Reservoir is improving. Walleye and tiger muskies are doing well in Little Warm Reservoir. Gill netting was conducted in the Fort Peck tailwater and dredge cut areas of the Missouri River.

OBJECTIVES AND DEGREE OF ATTAINMENT

Survey and Inventory - To survey and monitor the characteristics and trends of fish populations, angler harvest and preferences, and to assess habitat conditions in selected waters. Objective accomplished, data presented.

Fish Population Management - To implement fish stocking and/or fish eradication actions to maintain fish populations at levels consistent with habitat conditions and other limiting factors. Objective accomplished, data presented.

Technical Guidance - To review projects by government agencies and private parties which have the potential to affect fisheries resources, and provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources. Objective accomplished: two 310 projects reviewed and two 124 projects were reviewed with state and local agencies; advised Rocky Boy Indian Tribe on interbasin transfer of biota; supplied input to Compact Commission relative to water needs assessment on Rocky Boy Indian Reservation and Fort Belknap Reservation; advised Rocky Boy Reservation on stream enhancement projects; supplied comments to Bureau of Land Management (BLM) relative to development of Kipp Park; other information is presented in data.

Aquatic Education - To enhance the public's understanding, awareness and support of the state's fishery and aquatic resources and to assist young people to develop angling skills and to appreciate the aquatic environment. Objective accomplished: 14 meetings relating to aquatic education were held.

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 mesh were fished to acquire information on adult fish populations. Beach seining to determine abundance and reproductive success of sport and forage fishes was conducted in late summer utilizing a 100- X 10-foot seine of 1/4-inch square mesh. A 230-volt pulse DC boom shocking boat was used to collect young-of-the-year (YOY) walleye and adult walleye and bass after dark. Whenever possible, fish were measured for total length (TL) and weighed to the nearest .01 pound. Scales and/or spines were taken from walleye and lower dentaries from paddlefish for aging purposes. Stationary gill nets of 4-inch bar mesh measuring 300-feet long by 8-feet deep were used to capture paddlefish in the headwaters of Fort Peck Reservoir. Six and 8-feet deep by 100-feet long gill nets of 4-inch bar mesh were drifted to capture paddlefish in the Missouri River.

RESULTS AND DISCUSSION

Paddlefish

Fort Peck Reservoir and Missouri River Upstream

Tagging and harvest records for previously tagged fish were maintained. During the period 1973-92, a total of 527 paddlefish were tagged in this study area. In 1993, a project was initiated to tag a relatively large number of paddlefish over six consecutive years. A total of 434 paddlefish were tagged in 1993. The majority (314) were tagged in the Missouri River during the annual spawning run. An additional 120 fish were netted and tagged in the headwaters of Fort Peck Reservoir prior to trigger flows occurring in the river. An additional 499 fish were tagged in the river in 1994, 456 in 1995, 281 in 1996, 483 in 1997, 368 in 1998, and 380 in 1999. The 1999 catch consisted of 267 males and 113 females. No ripe females were captured during the tagging period, which encompassed May 4 through June 29. A single day of sampling was conducted upstream near the Stafford Ferry on June 16th. A single male paddlefish was captured.

Berg (1981) noted that significant upstream movement of paddlefish did not occur until flows reached 14,000 cubic feet per second (CFS) at the Virgelle gauging station. The 14,000 cfs flow in considered to be a "trigger" flow for spawning fish. Trigger flows in 1999 did not occur until June 3 and continued above that level for only 13 days (Figure A).

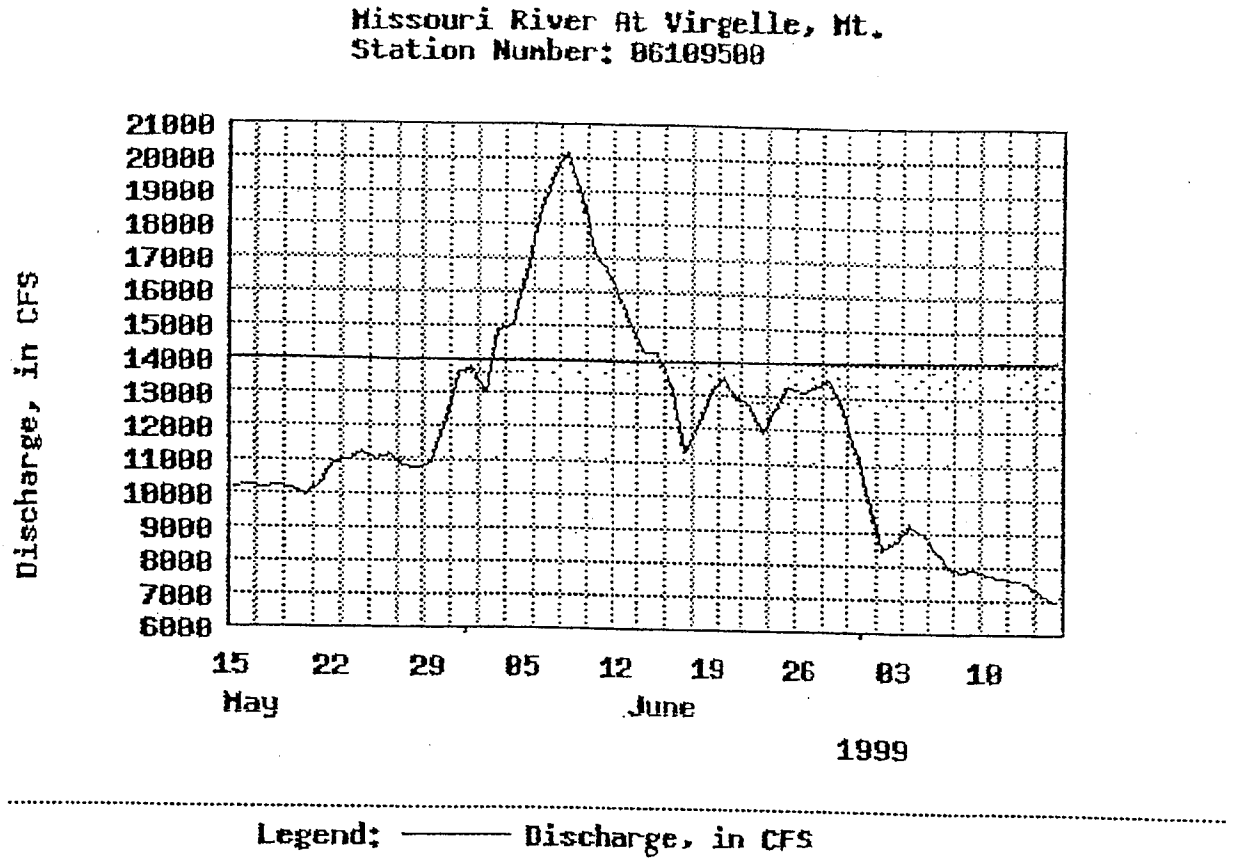

Figure A. Missouri River hydrograph at Virgelle during paddlefish spawning season, 1999.

The number of reported tag returns fell from 43 in 1996 to 12 in 1997, then rebounded to 39 in 1998. No on-site creel census was conducted in 1997. The decline, observed in 1997, is believed to be directly related to the lack of personnel on-site. Tag return data from non-creel years should be used with caution.

Thirty-two tagged paddlefish were reported in 1999. Four of the tags were from fish tagged in 1999. Tag return data reveals a low rate of harvest for this paddlefish population as summarized in Table 1. The average annual rate of harvest over the period 1976-99 varied from 0.7-2.9%.

Table 1. A summary of paddlefish tagging and harvest data from the Missouri River and Fort Peck Reservoir, 1976-99. Percent of harvest was derived by adjusting for previous harvest of tagged fish.

Total	No. Tagged	No. Tags Returned In 1999	Total No. Tags Returned	% Harvest	Avg. Annual % Harvest
1976	23	0	6	26.1	1.1
1977[1]	60	0	10	16.7	0.7
1978	277[2]	0	44	19.4	0.9
1979	11	0	5	45.5	2.2
1980	33	0	13	39.4	2.0
1983	2	0	1	50.0	2.9
1986	13	1	5	38.5	2.8
1992	29	0	3	10.3	1.3
1993	434[3]	7	20	4.6	0.7
1994	499	4	23	4.6	0.8
1995	456	4	28	6.1	1.2
1996	281	1	23	8.2	2.0
1997	483	7	13	2.3	0.8
1998	368	4	12	3.3	1.1
1999	380	4	4	1.1	1.1
	3,299	31	187		

[1]Total adjusted for one fish killed by commercial fisherman August, 1981
[2]192 tagged in Fort Peck Reservoir from UL Bend to Beauchamp Bay
[3]120 tagged in Fort Peck Reservoir near Mickus Coulee

As previously mentioned, harvest rates are not believed to be excessive at present. However, the potentially low number of successful spawning runs (based on observed trigger flow duration) in recent years warrants additional scrutiny.

No creel census was conducted on the fishery in 1999. An on-site creel census in scheduled for the spring on 2000.

Annual spawning migrations were rated as to their probable success based solely on the fish's ability to ascend the river and reach spawning sites above Fred Robinson Bridge (FRB) (Table 2). As mentioned, trigger flows of 14,000 cfs appear to be necessary to initiate spawning migrations upriver. Ratings of good, marginal or poor were assigned to each of the last 25 spawning seasons. Good years were determined to be those in which trigger flows occurred and the duration of those flows exceeded 30 days during the mid-May to mid-July spawning period. A **Marginal** rating was assigned to those years in which trigger flows occurred, but the duration during the spawning seasoning was less than 30 days. A **Poor** rating was assigned to those years in which trigger flows were not reached and successful spawning was unlikely or severely limited. From 1974 to 1983, 7 good years, 2 marginal years, and 1 poor year were experienced. In the contrast, 7 of the next 10 years were rated marginal or poor. Low recruitment is anticipated from those years. It is

possible that no year-classes were developed within the 6-year span from 1985 to 1990. The potential loss of recruitment will not be evident in the snagging fishery until 1995 and could persist until the year 2005. Aging of harvested fish during that time period may validate spawning success assumption based on trigger flows. The aging of dentaries was not complete at the time of this report.

Table 2. Paddlefish spawning success ratings for the years 1974-99 using trigger flows[1] (TF) incidence and duration as the sole criteria.

Year	Good	Marginal (#days TF)	Poor
1974	X	-----	-
1975	X	-----	-
1976	X	-----	-
1977	-	-----	X
1978	X	-----	-
1979	-	X(20)	-
1980	X	-----	-
1981	X	-----	-
1982	X	-----	-
1983	-	X(29)	-
1984	X	-----	-
1985	-	-----	X
1986	-	X(19)	-
1987	-	-----	X
1988	-	-----	X
1989	-	X(05)	-
1990	-	X(03)	-
1991	X	-----	-
1992	-	-----	X
1993	X	-----	-
1994	-	X(06)	-
1995	X	-----	-
1996	X	-----	-
1997	X	-----	-
1998	-	X(25)	-
1999	-	X(13)	-

[1]Flows measured at the Virgelle Gauging Station

Fresno Reservoir

Fresno Reservoir is a highly fluctuating reservoir on 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 though maximum depth is only 48 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 on two consecutive days (12 net-days).

The lake whitefish catch has been very stable the last four years (Table 3). Whitefish continue to comprise a significant portion of the gill-net catch, but are rarely caught by fisherman. Whitefish exhibit high growth rates in the reservoir, and thereby escape predation from all but the largest walleye and pike. Lake whitefish appear to reproduce successfully in years of good over-winter storage. The role of whitefish in this reservoir, either as a forage fish or competitor, is not understood at this time. Lake whitefish have not been found in stomachs of walleye or northern pike.

Table 3. A summary of the catch in overnight sinking experimental gill net sets in Fresno Reservoir, 1965-99. Number of nets used varied from 4 to 12.

Species	Year	No.	Avg. No. Per Net Set	Avg. Length (ins.)	Avg. Weight (lbs.)
Lake Whitefish	1970	1	0.1	19.9	3.30
	1971	1	0.2	18.7	2.94
	1972	4	0.5	17.8	2.35
	1974	3	0.8	19.5	3.15
	1987	65	10.8	12.2	0.71
	1988	55	9.2	17.5	2.45
	1989	22	3.7	14.4	1.06
	1990	46	7.7	10.0	0.98
	1991	37	6.2	12.7	1.03
	1992	66	11.0	16.0	1.69
	1993	38	3.2	16.3	1.78
	1994	93	7.8	14.9	1.81
	1995	36	3.0	15.4	1.74
	1996	54	4.5	----	-----
	1997	53	4.4	11.0	0.36
	1998	65	5.4	15.7	1.40
	1999	53	4.4	16.5	1.88
Yellow Perch	1969	7	0.9	5.4	0.07
	1970	20	2.5	6.9	0.16
	1971	6	1.5	7.6	0.23
	1972	2	0.3	8.7	0.40
	1974	2	0.5	5.7	0.09
	1987	43	7.2	6.2	0.13
	1988	24	4.0	8.7	0.32
	1989	0	----	----	----
	1990	0	----	----	----
	1991	16	2.7	8.2	0.40
	1992	3	0.5	7.8	0.29
	1993	12	1.0	9.2	0.43
	1994	25	2.1	11.2	0.56
	1995	19	1.6	8.3	0.40
	1996	6	0.5	7.1	0.19

Table 3. (Con't)

Species	Year	No.	Avg. No. Per Net Set	Avg. Length (ins.)	Avg. Weight (lbs.)
Yellow Perch	1997	21	1.8	7.0	0.16
	1998	9	0.8	7.8	0.23
	1999	3	0.3	10.8	0.70
Walleye	1965	14	0.9	12.4	0.80
	1966	14	2.3	11.6	0.62
	1967	11	1.6	12.9	0.88
	1968	29	3.6	12.3	0.64
	1969	24	3.0	12.9	0.92
	1670	95	11.9	14.4	1.16
	1971	28	7.0	13.6	1.08
	1972	34	4.3	16.1	1.44
	1974	22	5.5	15.9	1.35
	1987	37	6.2	16.7	1.99
	1988	67	11.2	15.5	1.97
	1989	32	5.3	14.6	1.14
	1990	28	4.7	15.7	1.74
	1991	88	14.7	13.3	0.88
	1992	102	17.0	15.0	1.40
	1993	108	9.0	13.3	1.05
	1994	180	15.0	13.4	1.08
	1995	219	18.3	14.4	1.29
	1996	123	10.3	13.7	1.11
	1997	190	13.8	13.6	1.05
	1998	253	21.1	13.8	1.03
	1999	140	11.7	13.6	0.91
Northern Pike	1965	23	1.6	18.2	1.23
	1966	6	1.0	20.1	1.68
	1967	7	1.0	20.6	2.50
	1968	9	1.1	17.8	1.66
	1969	9	1.1	19.7	1.88
	1970	12	1.5	16.3	1.33
	1971	30	7.5	17.0	1.12
	1972	5	0.6	17.3	0.93
	1974	1	0.3	20.6	1.84
	1987	35	5.8	19.1	1.74
	1988	46	7.7	20.6	2.85
	1989	19	3.2	21.6	2.74
	1990	20	3.3	19.2	2.09
	1991	10	1.7	19.3	2.28
	1992	34	5.7	21.1	2.49
	1993	16	1.3	16.1	1.06
	1994	72	6.0	18.2	1.41
	1995	89	7.4	19.7	2.04
	1996	60	5.0	20.5	2.01
	1997	48	4.0	19.9	2.26
	1998	25	2.1	22.4	2.88
	1999	15	1.3	18.8	1.50

The paucity of adult yellow perch in the gill-net catch, since their introduction in 1968, can only be explained as the result of consistent heavy predation. Reproduction appears to be significant in most years, but few adults are ever captured by gill nets. The catch-per-unit-effort (CPUE) is of concern, as it is far below the CPUE of other north central walleye/perch fisheries.

The northern pike population has declined steadily since 1995; however, ice fishermen consistently take several fish over 25 pounds each winter.

The walleye gill-net catch declined 45% from 1998. Relative weight of walleye has declined steadily since 1997, which coincides with supplemental stocking of walleye fingerlings (Figure B).

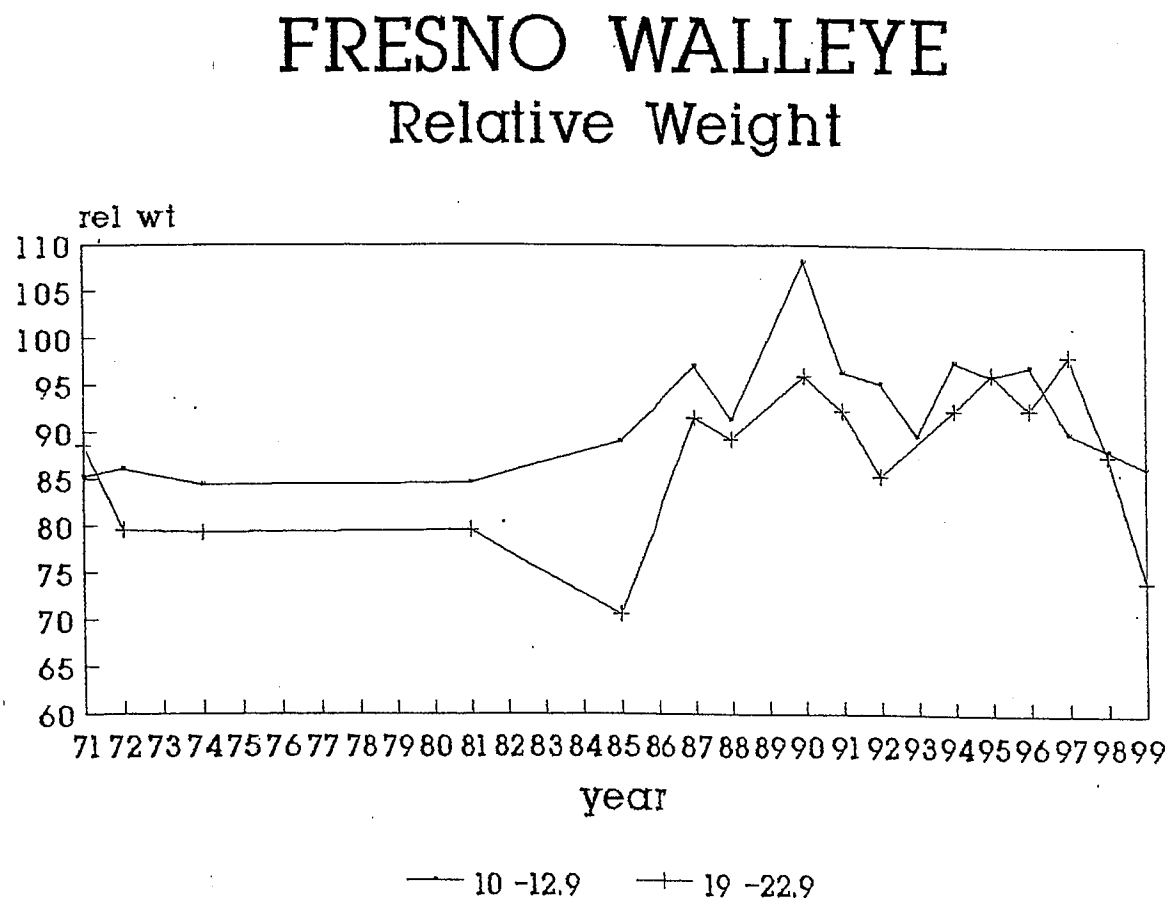

Figure B. Relative weight of two size groups of walleye from Fresno Reservoir, 1971-00.

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 fish abundance. The seining results indicated good reproductive success for walleye and yellow perch. Small year classes of pike and spottail shiners were produced (Table 4).

Table 4. A summary of forage fish and YOY game and sport fish taken with a 100- x 9-foot x ¼-inch square mesh beach seine in Fresno Reservoir, 1965-99.

Date	Seine Hauls	Species & 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	6,077	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	465	44	1	2	0
August 1991	12	8	36	3,425	0	42	53	0	0	0
August 1992	12	45	2	6,550	28	0	48	0	1	0
August 1993	12	24	9	5,595	12	2	162	0	0	0
August 1994	12	19	19	2,960	3	287	1,421	1	0	0
August 1995	12	5	2	1,080	0	2	129	0	1	0
August 1996	12	52	21	3,576	0	1	1,484	42	0	0
August 1997	12	46	15	3,006	2	1	887	2	0	0
August 1998	12	44	1	1,413	9	0	1,041	1	3	0
August 1999	12	50	7	4,271	176	12	182	13	0	0

[1]Consists of white and longnose sucker
[2]Consists of silvery minnows, lake chubs, flathead chubs, and fathead minnows
[3]Consists of burbot, smallmouth bass, and brook sticklebacks

Montana State University - Northern embarked on a project in the summer of 1994 to gather baseline water quality data from Fresno Reservoir. This is the first data of this type ever gathered at Fresno. Additional data was collected in 1996, 1997, and 1998. Some qualitative and quantitative zooplankton sampling was also conducted with Montana Fish, Wildlife & Parks (MFWP) assistance.

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. Water levels in the reservoir have been good to very good over the last decade, which has provided almost optimum growing conditions for sport and forage fish. Spottail shiners were initially introduced to the reservoir in 1984, to supplement the existing walleye forage base. Three artificial walleye spawning shoals were constructed in 1993, and were immediately utilized by spawning walleye, as well as white suckers. Beach seining is conducted annually to determine reproductive success of sport and forage fishes. Beach seining was conducted in July at a number of sites on the reservoir, encompassing 340 feet of shoreline. The sport fish YOY catch consisted of 11 walleye, 2 northern pike, and 1,489 yellow perch (Table 5). Walleye and yellow perch production is below optimum. The northern pike reproduction was the first documented in three years.

Table 5. A summary of walleye, yellow perch, and northern pike YOY captured by beach seining in Nelson Reservoir, 1974-99.

		Walleye		Yellow Perch		No. Pike	
Year	Shorline Seined (ft.)	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	0.7	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	651	31	50.6	8859	14,300	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	4,445	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
1991*	660	8	12.1	77	117	1	1.5
1992	635	21	33.0	140	220	6	9.0
1993*	520	3	5.8	8,287	15,937	1	1.9
1994*	830	6	7.2	1,802	2,171	10	12.0
1995*	760	36	47.4	232	305	0	0.0
1996*	870	25	28.7	4,521	5,197	13	14.9

Table 5 (Con't)

Year	Shorline Seined (ft.)	Walleye No.	Walleye No./ 1,000 (ft.)	Yellow Perch No.	Yellow Perch No./ 1,000 (ft.)	No. Pike No.	No. Pike No./ 1,000 (ft.)
1997*	890	53	59.5	2,205	2,478	0	0.0
1998*	340	0	0.0	126	371	0	0.0
1999	750	11	14.7	1,489	1.895	2	2.7

*Years in which walleye fry or fingerlings were stocked

Sporadic gill netting was conducted at Nelson Reservoir in the past, but sampling was neither uniform, nor consistent enough, to develop useful trend data on game fish population size, or composition. In the fall of 1991, five experimental gill-net stations were established and sampled for the first time. In 1993, five additional stations were added to increase sample size and reservoir coverage. Since 1993, all 10 stations have been utilized. The CPUE of walleye increased to an all time high in 1996, but has steadily declined every year since (Table 6). Walleye year-class strength, as observed in the gill-net catch, appears to correlate more strongly with years of supplemental stocking than with beach seining results. Yellow perch CPUE continues to rise. The northern pike catch decreased in 1999. White sucker was the third most common fish captured. Population trends of key sport fish are exhibited in Figure C.

Table 6. Relative catches of fishes from Nelson Reservoir with experimental sinking gill nets, fall 1991-99.

Year	No. Nets	Walleye n	Walleye CPUE	Yellow Perch n	Yellow Perch CPUE	Northern Pike n	Northern Pike CPUE	Lake Whitefish n	Lake Whitefish CPUE	White Sucker n	White Sucker CPUE	Goldeye n	Goldeye CPUE
1991	5	49	9.8	51	10.0	15	3.0	25	5.0	18	3.6	24	4.8
1992	5	36	7.2	37	7.4	19	3.8	29	5.8	26	5.2	2	0.4
1993	10	76	7.6	38	3.8	21	2.1	22	2.2	182	18.2	11	1.1
1994	10	115	11.5	32	3.2	24	2.4	60	6.0	82	8.2	3	0.3
1995	10	120	12.0	23	2.3	10	1.0	37	3.7	113	11.3	16	1.6
1996	10	183	18.3	68	6.8	18	1.8	32	3.2	135	13.5	22	2.2
1997	10	175	17.5	73	7.3	26	2.6	21	2.1	91	9.1	16	1.6
1998	10	158	15.8	83	8.3	30	3.0	12	1.2	86	8.6	38	3.8
1999	10	115	11.5	113	11.3	26	2.6	14	1.4	95	9.5	11	1.1

Nelson Reservoir
population trends

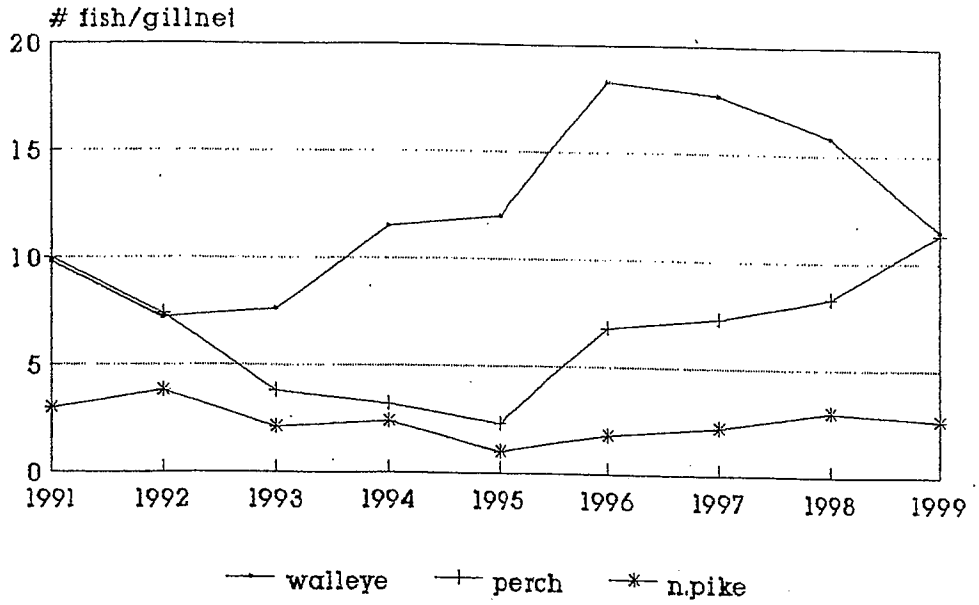

Figure C. Population trends of three key sport fishes in Nelson Reservoir using CPUE of fall gill nets.

In September of 1995, 9,500 4-inch walleye fingerlings from the Miles City Hatchery were opercle clipped and released to assist in estimating the numbers of fish in the 1995 year-class. Marking also helped determine the contribution of hatchery fish to the cohort. A total of 262 fish of that year-class have been captured to date by electrofishing and gill net. Only seven in the recapture sample were marked. Assuming 25% initial handling mortality, the number of YOY walleye as of September, 1995, was estimated to be approximately 235,000 fish. The contribution for stocked walleye amounted to only 3% of the estimated year-class.

On-site Creel and Population Estimates

A creel census was conducted from May through September to determine harvest rates of walleye, northern pike and perch. A mark/recapture estimate was also made of walleye and pike numbers by observing fishermen catches for the recapture sample.

Walleye and northern pike were captured for marking with trap nets in April. The west end of the reservoir was ice free more than a week before the main lake. The west end is separated from the main lake by a narrow, shallow channel, but fish moved freely between the two parts of the lake throughout the spawning season. It is not known whether walleye and pike used the west end for spawning, or simply as a location to "warm up" before heading to spawning sites on the deeper, rockier main reservoir. Both walleye and pike concentrated in the ice-free west end

of the reservoir. Large concentrations of predominantly male walleye were found on two "humps" or gravel bars rising up from deep water in the main lake. There may be some spawning occurring in mid-reservoir on these humps.

Walleye were marked with a double-length, magnetic, coded wire tag inserted into the left cheek musculature. Northern pike were marked by removing the left pelvic fin. All fish were sexed, measured and weighed. Only healthy vigorous fish were marked and released.

The creel census used a roving interviewer to gather fishermen information. Sampling was stratified into weekend and weekday periods. All weekend days were creeled and two randomly selected weekdays were sampled. A minimum of 10 pressure counts were taken each day on the hour. Interview data included number of fishermen in the party, whether they fished from boat or shore, hours fished, and the total number of all species caught, kept and released. Whenever possible, fish were measured, weighed, and examined for marks. A hand-held magnetic tag sensor was used on all walleye to determine the presence or absence of wire tags.

Scale and/or dorsal spines were taken from walleye throughout the spring and summer for aging. Scale aging was employed after sufficient confidence was obtained from relating scale age determinations to those from corresponding spine sections. Walleye were grouped within five time periods; April-May, June, July, August, and September. Aging fish within these time periods allowed for the assignment of fish into their respective age groups thereby accounting for recruitment and growth over the five-month recapture period. The population estimates reflect only mature fish (age III and older) and all fish weighed were in pre-spawn condition.

Data analysis was confined to the May through September period as fishing pressure was insignificant in April and October. Fishermen harvested 6,019 walleye during this period. The mean total length was 15.7 inches and the fish averaged 1.27 pounds (Table 7). Forty percent of the walleye were caught in May. Boat fishermen accounted for 99% of the walleye taken. Fisherman voluntarily released 5,056 walleye back to the lake.

Table 7. Combined catch and harvest figures for walleye, northern pike and yellow perch for the May-September creel period at Nelson Reservoir, 1999.

	Catch Rate		Harvest Rate					
	Comb.	(Boat/ Shore)	Comb.	(Boat/ Shore)	Total Harvest	No Fish Released	$\bar{X}L$	$\bar{X}WT$
Walleye	.50	(.52/.09)	.25	(.26/.06)	6,019	5,056	15.7	1.27
Northern Pike	.09	(.09/.09)	.03	(.03/.07)	690	1,303	25.3	4.31
Yellow Perch	.36	(.37/.10)	.07	(.07/.02)	1,533	6,441	9.1	0.36

The overall catch rate for walleye was .50 fish/hour. Thirty percent of all parties angling for walleye went fishless.

The northern pike harvest was 690 fish. Mean length of harvested pike was 25.3 inches and the fish averaged 4.31 pounds. Fishermen reported releasing 1,303 pike. The overall catch rate for pike was .09 fish/hour.

Though 6,441 yellow perch were caught, only 1,533 were kept. Perch harvested averaged 9.1 inches in length and .36 pounds. The catch rate for the summer was .36 fish/hour.

An estimated 4,706 anglers fished the reservoir between May 1 and September 30 and expended a total of 22,148 hours (Table 8). Water based recreation dropped off in late June following the death of some cattle drinking from the reservoir. Toxic blue-green algae was apparently to blame.

Table 8. Monthly breakdown of hours (angler-days) expended by fishermen at Nelson Reservoir, 1999.

	Weekends		Weekdays		Totals	
	Boat	Shore	Boat	Shore	Boat	Shore
May	2,729(551)	167(34)	1,851(348)	57(23)	4,580(889)	224(57)
June	4,072(730)	541(142)	3,724(716)	239(114)	7,796(1,446)	780(256)
July	2,473(560)	160(47)	1,555(347)	40(21)	4,028(907)	200(68)
Aug.	1,260(291)	84(16)	1,363(306)	160(37)	2,623(597)	244(53)
Sept.	1,089(256)	4(1)	580(143)	0(0)	1,669(399)	4(1)
Tot:	11,623(2,388)	956(240)	9,073(1,860)	496(218)	20,696(4,248)	1,452(458)

Population Estimates

A total of 1,109 walleye and 660 northern pike were marked and released in April. Recaptures used in the Modified Petersen estimate were obtained from creel inspections throughout the summer. The recapture sample consisted of 1,344 age III and older walleye. Small sample sizes prohibited estimation of the juvenile walleye population. The population of age III and older walleye was estimated to be 19,099 fish. Estimates of each age class and exploitation rates on each class are presented in Table 9. The population is about 11,000 fish higher than the last estimate made in 1984. The 1995 year-class (age IV) comprised 71% of the adult population and is obviously "carrying" the fishery at present. Older fish (age VI+) are being exploited at a very low rate (8%) and relative use is low (2%). However, the exploitation of age III walleye is very high (71%) and could be considered excessive. The overall exploitation rate for Nelson Reservoir walleye in 1999, was 32%. Currently there is a 5 walleye bag limit and no size restrictions. Fifteen percent of anglers interviewed could have kept a limit of five

walleye, however, only 33% of those fishermen actually kept their limit. The maximum allowable harvest rate on this walleye population is presently unknown, but the potential for over-harvest is possible. Schneider (1978) listed total annual mortality rates for adult walleye from 25 medium to large walleye waters in six midwestern states. Total annual mortality ranged from 11-70% with a mean of 43%. Natural mortality from nine of these same waters ranged from 4% to 48% with a mean of 18%. If the Nelson Reservoir summer exploitation rate is added to the mean natural mortality rate calculated from these midwestern waters, the sum, or 50% is 7% higher than the mean total annual mortality from the same waters.

Table 9. Estimates of age III and older walleye in Nelson Reservoir and exploitation rates on each age group, summer 1999.

Age	Pop. Est. (80% CI)	Harvest	Exploitation Rate	Relative Use (C/N)
III	2,685 ± 846	1,919	71%	16%
IV	13,624 ± 2,657	3,304	24%	6%
V	1,107 ± 355	416	38%	9%
VI+	1,683 ± 1,017	129	8%	2%
Total:	19,099 ± 4,875	6,019	32%	

The reservoir also receives a considerable amount of ice fishing pressure which has yet to be quantified.

A small reduction in a bag limit is not likely to have any effect toward reducing harvest and would not be well received by fishermen. Reducing harvest through minimum size restrictions may reduce the high exploitation rates on smaller fish. Maximum harvest reductions were projected for the 1999 season based on minimum size restrictions of 13 inches, 14 inches, and 15 inches. The respective corresponding reductions in harvest were: 7%, 17% and 37%. Additional factors that must be considered as possible reductions to these figures are increased hooking mortality, the ability of released fish to grow out of the protective size range and the potential for increasing pressure on larger fish to fill out a limit. Growth rates of fishes under the minimum limit may also decline if a large year-class begins to "stack up" under the limit.

The northern pike population was estimated at 5,361 fish. About 10% of these fish were over 28 inches long. The harvest rate on this population was only 13 percent.

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 its initial filling in 1975. Its 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 sport fish. Although bass reproduction has been documented. Largemouth bass never contributed significantly to the fishery and disappeared from the reservoir by 1986. Soon after bass introductions were made, northern pike appeared from an illegal introduction. The northern pike population increased steadily and peaked in 1987. No northern pike natural reproduction was documented in 1985, 1988, 1989 or 1992. However, the northern pike YOY catch in 1993 was the highest recorded to date. Reproductive success of pike was good in 1998. Some of the initially introduced fish have exceeded 30 pounds in weight. Northern pike are severely reducing rainbow trout numbers despite increased stocking rates.

Yellow perch were first found in the reservoir in 1986. Beach seining indicated good initial reproduction in 1987, but low YOY perch numbers were observed in 1989 and 1990 (Table 10). A large year-class of perch was produced in 1991, and was followed by another good production year in 1992. An exceptional perch production year occurred in 1995. No reproduction was evident in 1993 and very little in 1996 and 1997. Yellow perch, spottail shiners and suckers provide most of the forage base. No sucker YOY were captured by seining in 1998. Walleye YOY were captured by beach seining for the first time in 1996. This could be indicative of good survival of hatchery fish or successful natural reproduction. A single YOY walleye was captured in 1997. This fish was a result of natural reproduction, as no fry or fingerling were stocked prior to seining. This is the first confirmed natural reproduction in this reservoir since the introduction of walleye in 1987. A single YOY walleye was captured in 1998.

Spottail shiners were introduced in 1988 to supplement the forage base. They have become well established, as evidenced by the large numbers captured in the last few years. They are utilized as forage by pike, walleye, perch, trout and smallmouth bass.

Table 10. A summary of sport fish YOY and forage fish taken by beach seining from Beaver Creek Reservoir, 1985-99.

		Species[1]									
Date	No. Hauls	WSU/ LSU	YP	LK CH	FTHD MIN	S/P MIN	ID	EM SH	SP SH	NP	WE
9-04-85	5	2,535	0	7	0	0	11	0	0	0	-
6-16-86	4	3,110	0	1	0	0	2	0	0	9	-
8-19-87	6	969	2,281	1	0	0	72	0	0	10	-
8-23-89	6	54	4,401	0	0	0	4	0	1	0	-
8-21-90	6	1	42	0	0	0	2	1	93	2	0
8-13-91	6	348	8,615	0	0	2	0	2	835	12	0
8-10-92	6	492	1,938	0	0	0	4	0	156	0	0
8-18-93	6	0	0	0	0	0	11	0	455	27	0
8-08-94	6	49	707	0	0	0	0	0	181	11	0
8-19-95	6	6	7,210	0	0	0	0	0	1,438	13	0
8-12-96	6	261	5	0	0	0	7	0	247	5	7
8-15-97	6	31	17	0	0	0	6	0	193	13	1
8-14-98	6	0	870	0	0	0	0	0	141	6	1
8-16-99	6	0	592	0	0	0	0	0	86	7	2

[1]WSU/LSU - white/longnose sucker
YP - yellow perch
LK CH - lake chub
FTHD MIN - fathead minnow
WE - walleye
S/P MIN - silvery/plains minnow
ID - Iowa darter
EM SH - emerald shiner
SP SH - spottail shiner
NP - northern pike

Walleye were stocked in 1987 due to local demand and to assist in controlling the expanding perch population. The walleye management plan included 3 consecutive years of stocking, followed by 2 non-stocking years to evaluate natural reproduction. Fish of each year-class were marked for future identification. Sufficient numbers of marked walleye were collected by 1992, to estimate all 3 walleye year-classes (Table 11). The estimates reflect cohort size at the end of their first growing season. It appears that fry plans have been quite successful in establishing a fishable population. Twenty-six walleye were captured in the fall gill netting. The walleye averaged 18.0 inches (range 8.8-25.5) and 2.66 pounds (range 0.20-7.40).

Table 11. Walleye stocking records and estimates of three walleye year-classes at the end of first growing season in Beaver Creek Reservoir.

Year Class	No. Fish Planted	Mark	Planting Size (in.)	No. Sample size	Recap-ture	Estimate of Year Class[1]
1987	50,000	none	fry	65	12	1391 ± 418
	322	right,opercle	6.0			
1988	100,000	none	fry	33	3	1649 ± 888
	193	left ventral	3.7			
1989	300,000	none	fry	103	23	3,722 ± 954
	858	right ventral	4.5			

[1]80% confidence interval

Walleye stomach analysis indicates yellow perch and spottail shiners are heavily utilized. Predation on trout by larger walleye has been documented, but it is not felt to be a major source of mortality at this time. Growth and condition of walleye exceeds that of other local populations.

Bailey Reservoir

This reservoir floods approximately 70 surface acres at full pool and has a maximum depth of 28 feet. It was constructed in the mid-1970's

primarily for use as a fishing reservoir. Though privately owned, it has been under management of MFWP. Initial introductions of rainbow trout provided an excellent fishery. Northern pike were illegally introduced about 1980. No other forage fish were present in the reservoir and predation on trout soon became excessive. During a severe drought in 1984, the remaining trout winter-killed, but the northern pike survived. Larger trout were planted to reduce the level of predation, but without success. Chemical rehabilitation was considered, but at the request of the landowner the MFWP began to manage for cool/warm water fishes. Trout stocking was discontinued. Yellow perch and black crappie were introduced in 1987, followed by largemouth bass in 1988. Reproductive success of all department introduced fish has been good in most years.

Monitoring of adult sport fish by gill netting was initiated in 1990. Two overnight experimental sinking gill-net sets were utilized in the sampling (Table 12). No netting was conducted in 1997. Yellow perch, black crappie and northern pike have grown exceptionally fast in this productive reservoir. Large catches of perch exceeding 0.50 pounds were commonly taken throughout the summer of 1991, and the following winter. A party of three fishermen remarked that they had taken home 93 pounds of perch fillets in a single weekend of ice fishing. Large numbers of small perch dominate the fishery at present, and catches of large perch have declined.

Table 12. Total catch from two experimental gill net sets at Bailey Reservoir, 1990-99.

	Northern Pike			Yellow Perch			Black Crappie		
Date	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.)
8-08-90	24	18.1	1.23	34	7.7	0.26	21	5.7	0.10
9-27-91	7	24.7	3.21	58	10.1	0.56	4	8.5	0.35
9-11-92	6	26.8	4.29	34	8.1	.29	16	4.7	0.08
9-10-93	2	31.8	7.55	21	6.6	0.15	127	6.7	0.12
9-19-94	7	20.1	2.59	38	6.0	0.10	43	6.3	0.14
9-12-96	14	23.8	3.54	86	7.2	0.19	15	6.8	0.21
1997	----------No netting----------								
9-17-98	3	22.2	2.43	132	8.0	0.26	32	9.0	0.44
1998	----------No netting----------								

Though no largemouth bass were taken by gill netting, fishermen report regular catches of yearling bass and occasional fish up to three pounds. Black crappie are being taken in good numbers and the population appears to be quite healthy. Fishing pressure on northern pike is occasionally heavy. During the winter of 1989-90, as many as 32 spearing houses were on the reservoir on any give day. Dozens of large pike (>10 pounds) were reportedly harvested that same winter. The catch of adult pike since that winter has declined noticeably. The gill-net catch and poor fishermen success are suggestive of a low pike population at present.

Good northern pike reproduction was last observed in 1990. A plant of 5,000 northern pike fingerlings was made in 1993 to supplement expected natural reproduction. Though high water levels in 1993 were conducive to spawning, no sign of naturally produced fish or hatchery fish were found by late summer. A transplant of 710 18-inch pike was made in August of 1994. These were fish that were "hook and-lined" from nearby Fresno Reservoir. An additional 140 22-inch pike were transplanted from Fresno Reservoir in October of 1995. Some YOY pike were observed in 1996, indicating at least some natural production occurred. Though no netting was conducted in 1995, fishermen reported good catches of pike throughout the winter of 1995-96. Several walleye in excess of 8 pounds have recently been caught by fishermen. These fish were apparently survivors from a single plant made in 1989. No gill netting occurred in 1999.

Little Warm Reservoir

Little Warm Reservoir provided good fishing for northern pike and yellow perch until the dam washed out by flooding in 1986. The reservoir was subsequently drained for repair and refilled in 1988. The reservoir is privately owned and utilized for stock water and irrigation. The MFWP manages the fishery, which is open to the public. The reservoir was stocked with 100,000 walleye fry in 1989, 1990, 1992, and 1994. Walleye fry plants were increased to 200,000 in 1996. Sixty-eight ripe adult crappie were introduced in 1989. Two experimental sinking gill nets were fished overnight in April 1998 to assess survival and growth of stocked fish. A total of five walleye were sampled representing three year classes. The walleye ranged from 8.9 to 17.7 inches.

No adult crappie were captured. Other species found in the reservoir are brook sticklebacks, Iowa darters, white suckers, golden shiners, yellow perch, black bullhead and fathead minnows. Most of these fish are common to the drainage and probably were introduced from upstream sanctuaries. Twenty-two white suckers were netted in 1998. Yellow perch are increasing in number and size.

Because of the large increase in white suckers, an additional piscivore was considered for introduction. The tiger musky was chosen and 429 7-inch fingerlings were introduced in the fall of 1993. Another 2,500 2-inch fingerlings were planted in 1997. Two tiger muskies were netted in 1997, weighing 4.80 and 4.58 pounds. Reports of larger muskies were received. Two tiger muskies from the 1997 plant were netted in 1998. They measured 12.3 and 14.2 inches.

Management plans include alternative-year stocking of walleye fry and tiger musky fingerlings, to maintain fishable populations.

Fort Peck Dredge Cuts and Tailwater

Fort Peck Dredge Cuts and tailwater complex fish population sampling continued in June and October, 1999. For both months, ten 125- x 6-foot multifilament experimental gill nets and four 100- x 8-foot 1/2-inch bar mesh monofilament gill nets, were set overnight. Nets were set for an average of 19.25 hours each. This sampling effort, initiated in 1979, was to obtain information on the overall fish population due to potential impacts associated with proposed construction of re-regulation dam below

Fort Peck Dam. Another objective is to evaluate the abundance of game fish in relation to cisco and rainbow smelt.

The walleye/sauger combined catch was the highest in the area in 1980-(94 were netted). This is believed to have been associated with the migration of large numbers of rainbow smelt from lake Sakakawea, ND. However, the combined walleye/sauger catch in 1998 was also 94, and was not accompanied by a large number of rainbow smelt being present (only 7 captured). In 1999, only 64 walleye/sauger were netted (Table 13), with only 20 rainbow smelt taken (Table 14).

The combined cisco experimental net catch in 1999 was 94, which is less than half the number caught in 1998. Cisco first appeared in this sampling in 1985, one year after they were introduced into Fort Peck Reservoir. Since then, they have become a significant forage fish in the area immediately below Fort Peck Dam.

A combined total of 80 shovelnose sturgeon were captured in standard experimental gill nets in 1999, down from 88 in 1998. Standard fork length and standard length measurements were taken and numbered spaghetti tags were inserted through the base of the dorsal fin on all shovelnose. This was done to augment on going shovelnose and pallid sturgeon research in the lower Missouri and Yellowstone Rivers.

Table 13. Summary of 1999 June and October combined standard experimental gill netting with 385.0 hrs. and 20 nets in the Fort Peck Dredge pools.

Species[1]	Average Length (ins.)	Average Weight (lbs.)	Number	CPUE Per Hr.	CPUE Per Net
SNS	25.2[2]	2.46	80	0.21	4.0
GE	13.0	0.61	137	0.36	6.9
LW	18.2	2.11	10	0.03	0.5
CI	10.2	0.35	94	0.24	4.7
RBS	----	----	2	<0.01	0.1
NP	24.7	4.14	33	0.08	1.7
CP	19.9	3.55	6	0.02	0.3
RC	16.9	2.18	25	0.06	1.3
SMB	17.8	2.95	3	<0.01	0.2
SHR	16.7	1.92	4	0.01	0.2
LNS	16.7	2.08	2	<0.01	0.1
WS	14.4	1.43	75	0.19	3.8
CC	16.3	1.22	136	0.35	6.8
YP	6.8	0.17	11	0.03	0.6
SG	16.0	1.13	21	0.05	1.1
WE	17.60	1.83	43	0.11	2.2
Total			682	1.77	34.1

[1]SNS-Shovelnose Sturgeon
GE-Goldeye
LW-Lake Whitefish
CI-Cisco
RBS-Rainbow Smelt
NP-Northern Pike
CP-Carp
RC-River Carpsucker
SMB-Smallmouth Buffalo
SHR-Shorthead Redhorse
LNS-Longnose Sucker
WS-White Sucker
CC-Channel atfish
YP-Yellow Perch
SG-Sauger
WE-Walleye

[2]Fork Length

Table 14. Summary of 1999 June and October combined standard Smelt netting with 155.9 hrs and 8 nets in the Fort Peck dredge pools.

Species[1]	Average Length (ins.)	Average Weight (lbs.)	Number	CPUE per hour	CPUE per net
GE	12.8	0.58	12	0.08	1.5
RBS	5.9	0.05	20	0.13	2.5
WS	9.1	0.44	1	<0.01	0.1
SG	17.3	0.87	1	<0.01	0.1
Total			34	0.22	4.25

RECOMMENDATIONS

The 2-paddlefish annual limit, utilizing fishermen tags, should be continued on the Missouri River. The ability to immediately release a paddlefish should be retained. Annual collections of paddlefish jaws should be made to assist in determining the age structure of the Fort Peck Reservoir paddlefish stock. A mail/phone survey should be conducted periodically, using names of anglers who purchased tags. Attempts should be made to tag 500+ paddlefish each year for the next three years. On-site creel census should be conducted every other year. This information is invaluable in determining harvest rates and total harvest and pressure. Enforcement activities should be logged so a record of monitoring can be established.

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. Efforts should be made to increase perch production through habitat improvement and an additional forage fish should be considered for introduction. Fishing regulations tailored to protection of smaller walleye should be investigated.

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 of reproductive success of sport and forage fish should continue. Determine if size restrictions on walleye would be profitable.

Beach seining and gill netting should be continued at Beaver Creek Reservoir to monitor growth and survival of stocked walleye. Consider annual walleye fry plants and alternate large fingerling plants. A northern pike suppression effort should be undertaken.

Sampling of adult sport fish at Bailey Reservoir should continue to establish trend data and monitor growth and recruitment. Supplemental stocking of northern pike should continue until population is strengthened.

Continue alternate year stocking of walleye and tiger musky in Little Warm Reservoir. Evaluate annually by gill netting.

Netting surveys in the Fort Peck Dredge Cuts should continue to maintain data on the overall fish populations.

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Waters referred to:

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16-2500 Missouri River Sec. 05
16-2520 Missouri River Sec. 06
15-5240 Fresno Reservoir
15-6480 Nelson Reservoir
15-4570 Beaver Creek Reservoir
15-4535 Bailey Reservoir
15-6105 Little Warm Reservoir

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Prepared by: Kent Gilge and James Liebelt
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