MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO.: F-46-R-7 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, 1993 THROUGH JUNE 30, 1994

ABSTRACT

Paddlefish harvest and tagging records were maintained for populations in the dredge cuts and Missouri River above Fort Peck Reservoir. Harvest on the populations remains low. A paddlefish creel census was conducted on the fishery above Fort Peck Reservoir during the spring of 1993. A statewide mail/telephone harvest survey was also conducted. Total fishing pressure was estimated at 2,253 angler days with a total harvest of 422 paddlefish. Fishermen released 50% of the paddlefish landed. Anglers from 37 of Montana's 56 counties utilized the fishery as well as snaggers from 10 states and a Canadian province. Gill netting in Fresno Reservoir produced good catches of lake whitefish and walleye. Using recaptured marked fish, an estimate was made of the 1990 walleye year-class. Planted walleye contributed less than 10% to the year-class. Beach seining indicated high walleye production and average yellow perch reproductive success. Beach seining at Nelson Reservoir indicated reproductive success of northern pike and walleye was low. The catch-per-unit-effort (CPUE) for young-of-the-year (YOY) yellow perch, however, was the highest ever recorded. Experimental gill net stations which were established in 1991 were expanded and sampled in 1993. Walleye spawning shoals were constructed and evaluated at three sites on Nelson Reservoir. Large fingerling tiger muskies were planted in H. C. Kuhr Reservoir to aid survival and recruitment. Yellow perch and crappie may over-populate if suitable predation is not brought to bear upon the populations. Walleye sampled in Beaver Creek Reservoir provided sufficient recaptures to estimate three year classes of walleye. Natural reproduction of walleye was unconfirmed for the third consecutive year. Supplemental stocking of northern pike in Bailey Reservoir was unsuccessful. Large perch and northern pike have declined in numbers. Fishing pressure on large (>10 lbs.) northern pike may be excessive during the ice fishing/spearing season. Tiger muskies were introduced into Little Warm Reservoir. The fall catch of smelt in the dredge cuts was the highest recorded since sampling began in 1979.

OBJECTIVES AND DEGREE OF ATTAINMENT

Job Objectives: (streams)

1) To ensure within hydrologic constraints that streamflows do not fall below 1975-85 averages. Objective accomplished using state funding.

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.

5) To acquire maximum spring flow 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 1992 in the Missouri River study area above Fort Peck Reservoir. 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 1993-94.

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. Stationary gill nets of 4-inch and 5-inch bar mesh measuring 300 feet long by 8 feet deep were used to capture paddlefish in the headwaters of Fort Peck Reservoir. Gill nets of 4-inch and 5-inch bar mesh were drifted to capture paddlefish in the Missouri River. 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. Whenever possible, fish were measured for total length (TL) and weighed to the nearest .01 pound. Scales and/or spines were taken from walleye to determine age composition.

RESULTS AND DISCUSSION

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 fish were tagged in the study area in 1993. This report includes tagging data from work conducted by Ken Frazer in 1984, working on a Corps of Engineers funded study, and projects overseen by Bill Gardner and Phil Stewart under Dingell-Johnson Project FW-2-R.

Eight tagged paddlefish were harvested by fishermen during 1993, four returns were from Intake Dam on the Yellowstone River, and four were collected at the North Dakota caviar collection station near the confluence of the Yellowstone and Missouri Rivers. To date, 165 paddlefish tagged in the study area have been harvested; 72 (44%) in the Dredge Cuts and 93 (56%) in the Yellowstone River, primarily at Intake Dam. During the past ten years (1984-93), however, over 80% of the tag returns have been from the Yellowstone River. This is due in part to the higher fishing pressure and harvest at Intake Dam, and also suggests 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 1. The average annual percent harvest for 817 fish tagged during 1974-84 varied from 0.5-1.6%. The average annual harvest rate prior to 1974 was 1.0% (Needham, 1985). Paddlefish tagged in the Missouri River outside the Dredge Cuts experienced the same low exploitation rates as those tagged in the Dredge Cuts.

The largest groups of paddlefish tagged in a single season are 189 in 1974, 162 in 1978, and 151 in 1979. After 20, 16, 15 years of fishing pressure and harvest exposure, these groups have exhibited an average annual harvest rate of 0.09-1.6%, and the total harvest rate ranged from 18.9-25.6%.

Table 1. A summary of paddlefish tagging and harvest from the dredge cut complex and Missouri River, 1974-93. 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 1993	Total No. Tags Returned	Percent Tags Returned	Avg. Annual % Harvest
1968	12	0	1	8.3	*
1969[1]	94 (92)	0	15	16.3	*
1970	5	0	0	0	*
1974[2]	189 (185)	1	35	18.9	0.9
1976[3]	48 (47)	0	10	21.2	1.2
1977	40	1	10	25.0	1.5
1978[4]	162 (156)	3	40[5]	25.6	1.6
1979	151	1	30	19.9	1.3
1979	40 (River)	0	3	7.5	0.5
1980	29 (River)	0	2	6.9	0.5
1981	60 (River)	1	7	11.7	0.9
1982	21 (River)	1	4	19.0	1.6
1984	77	1	8	10.4	1.0
	928	8	165		

*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.

The Fort Peck Indian Reservation began selling paddlefish tags in 1992. This was initiated in response to increasing interest in paddlefish snagging, particularly in the Frazer pumpsite area downstream from Fort Peck Dam. No harvest data has been forthcoming from the tribe despite repeated requests. However, harvest is not thought to be significant at this time.

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. This total includes 192 fish tagged in the upper portion of Fort Peck Reservoir in 1978 and 29 fish tagged in the reservoir in 1992.

In 1993 a project was initiated which will involve the tagging of a relatively large number of paddlefish over the next five 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. All but one fish (15 lbs.) tagged in the reservoir appeared mature and capable of making a spawning run. The last time a large number of paddlefish were tagged in any one year was 1978. Though paddlefish are long lived, it was felt that the low number of tagged fish in the population was not conducive to making an accurate harvest rate assessment.

Paddlefish netting in 1993 began on April 2 in the Missouri River below Fred Robinson Bridge (FRB). CPUE with drift nets was low. Only two fish were netted in an area 17 miles below the bridge. The next effort focused on the river/reservoir transition area of Fort Peck Reservoir. A concentration of paddlefish was located two miles upstream from Mickus Coulee. Thirty-two fish were tagged between 4/13 and 4/16. We returned to the transition area on 4/21 and tagged 85 fish in 2.5 days. The netting effort was redirected to the river from FRB downstream on 5/6 and 5/7 during which time 30 fish were tagged. Berg (1981) noted that significant upstream movement of paddlefish did not occur until flows reached 14,000 cfs at the Virgelle gauging station. The 14,000 cfs flow is considered to be a "trigger" flow for spawning fish. Initial trigger flows in 1993 occurred about 5/8. On 5/11 we returned to the transition area of the reservoir, but few fish were present, most fish having moved upstream from the transition area of previous congregation. The movement of fish out of the reservoir appeared to coincide with Berg's observed trigger flow. Netting was redirected to the river area below and above FRB with good success. The last day of netting was 6/18. CPUE remained high throughout this period. During the netting/tagging operation, a female paddlefish was captured that was actively spawning. The fish was at least half spent and eggs ran freely. The fish was captured on May 14 at river mile 1927.2, which is several hundred yards above Lower Two Calf Island. Berg (1981) had previously observed concentrations of paddlefish at this site and believed it to be a key spawning location. Dozens of partially spent males were located at this site on later sampling dates in May and June. On July 1, a net was drifted from Boggs Island to the White Rocks area of the Missouri River. A total of 4.5 net-hours was expended. Two shovelnose sturgeon were the only river fish captured or observed.

Fourteen tagged paddlefish were harvested in 1993. Ten of those returns were from fish tagged in 1993. Three of the tagged fish were from the fish (n=120) tagged in the reservoir prior to the spawning run. This return rate is proportional to the return rate of fish tagged in the river in 1993. It is believed that most, if not all, of the fish found in the headwaters of Fort Peck Reservoir in early spring move into the river to spawn once a sufficient river flow occurs. The last year a large number of fish were tagged in the headwaters

area prior to spawning was 1978. In that year, following tagging, 2.1% (4 of 192) of the tagged fish were harvested in the river. In 1993, 2.5% (3 of 120) of the reservoir tagged fish were harvested from the river fishery.

Three male paddlefish of 51, 26, and 15 pounds were implanted with radio transmitters in 1993. These fish were part of the headwater congregation observed in early spring. The smallest fish (15 lbs.) appeared to stay in the headwaters area throughout the spring and summer. The 26-pound fish was located upriver near a known spawning site and the 51-pound fish was only relocated once a few miles upriver from the point of tagging after trigger flows had occurred. Movement information related to these radio tagged fish is presented in detail by Brunsing (1993). Additional tag recoveries and, perhaps, telemetry studies will be needed to determine spawning periodicity of fish congregated in the upper reservoir.

Tag return data reveals a low rate of harvest for this paddlefish population as summarized in Table 2. The average annual rate of harvest varies from 1.0-4.5%. However, the highest rate of 4.5% is based on only two fish tagged in 1983.

Table 2. A summary of paddlefish tagging and harvest data from the Missouri River and Fort Peck Reservoir, 1973-93. Percent harvest was derived by adjusting for previous harvest of tagged fish.

Year	No. Tagged	No. Tags Returned in 1993	Total No. Tag Returned	% Harvest	Avg. Annual % Harvest
1973	45	1	11	24.4	1.2
1974	55	0	12	21.8	1.1
1975	29	1	9	31.0	1.6
1976	23	0	6	26.1	1.5
1977[1]	60	0	10	16.7	1.0
1978	227[2]	2	42	18.5	1.2
1979	11	0	5	45.5	3.0
1980	33	0	13	39.4	2.8
1983	2	0	1	50.0	4.5
1986	13	0	4	30.8	3.9
1992	29	0	0	0.0	0.0
1993	434[3]	10	10	2.3	2.3
	498	14	123		

[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

The harvest of paddlefish from the Fort Peck Reservoir stock was determined by on-site creel census in 1993 and by a statewide mail/telephone survey. Complete census information from the mail/phone survey was unavailable at the time of this report. The data will be presented in a future report.

The creel census area consisted of approximately 20 miles of river downstream from Fred Robinson Bridge, upstream from Fort Peck Reservoir. The last complete census was conducted in 1992. Harvest occurs by snagging in the spring as paddlefish migrate upstream from the reservoir. Some fish apparently reside in the river over winter as indicated by the high catch rates experienced in the few days following ice-out in most years. On March 26 of 1993, between 50 and 100 paddlefish were caught, and most released, in an area known as the Big Swirl Hole. A large ice jam was present above the hole and the ice free area below was accessible to boat snaggers. The ice did not go out upstream at Fred Robinson Bridge until the following day. Fish were apparently very concentrated as snaggers reported hooking fish on almost every cast, some snagging vertically below their boats. Both males and large females were taken. On March 27 the ice jam blew out and snaggers reported no further success in that location.

Occasionally, paddlefish are also caught in the summer and fall, but due to the low number taken at these seasons, only spring harvest has been monitored. Almost all fish are taken within the boundaries of the Charles M. Russell Wildlife Refuge (CMR).

A system of sampling the entire day was utilized and no records on the length of trip (hours) were maintained. The absolute number of fishermen and fish taken could be determined on most days. Previous attempts to gather information on hours fished provided unreliable results. Due to the length of fishing trip and erratic fishing activity, information provided by fishermen was not judged to be accurate. It was found that most fishermen greatly over-exaggerated the actual time spent fishing. Estimates of fishermen and fish taken for non-creel days (usually weekdays with light fishing pressure) were made on the basis of known pressure preceding and following non-creel census days and from interviews with snaggers or refuge personnel present throughout the non-census days.

The creel census commenced April 1, 1993, which was four days after ice-out on the river. Based on warden and Charles M. Russell National Wildlife Refuge personnel observations and interviews, 28 angler-days of pressure and a harvest of 16 paddlefish was estimated to have occurred during the interim between ice-out and the start of the creel census. These estimates are reflected in the tables. The creel census extended through June 17 at which time fishing effort and success was negligible. An interview card system, which provided completed trip data on anglers leaving the area when the creel clerk was "off duty", assisted in gathering completed trip information.

Total fishing pressure was 2,253 angler-days in 1993 (Figure A). Snagging pressure in 1993 was 30% higher than that experienced in 1992, a low water year. Spring weather conditions and river flows often dictate the amount of use this area receives. The total paddlefish harvest in 1993 was estimated to be 422 fish (Table 3). Snagger interviews indicated fish were released at a rate of 40-50% which is higher than the rate observed (25-30%) in the poor fishing year of 1992. This would indicate that snaggers are more inclined to release fish as catch rates increase.

Pressure and Harvest
Paddlefish

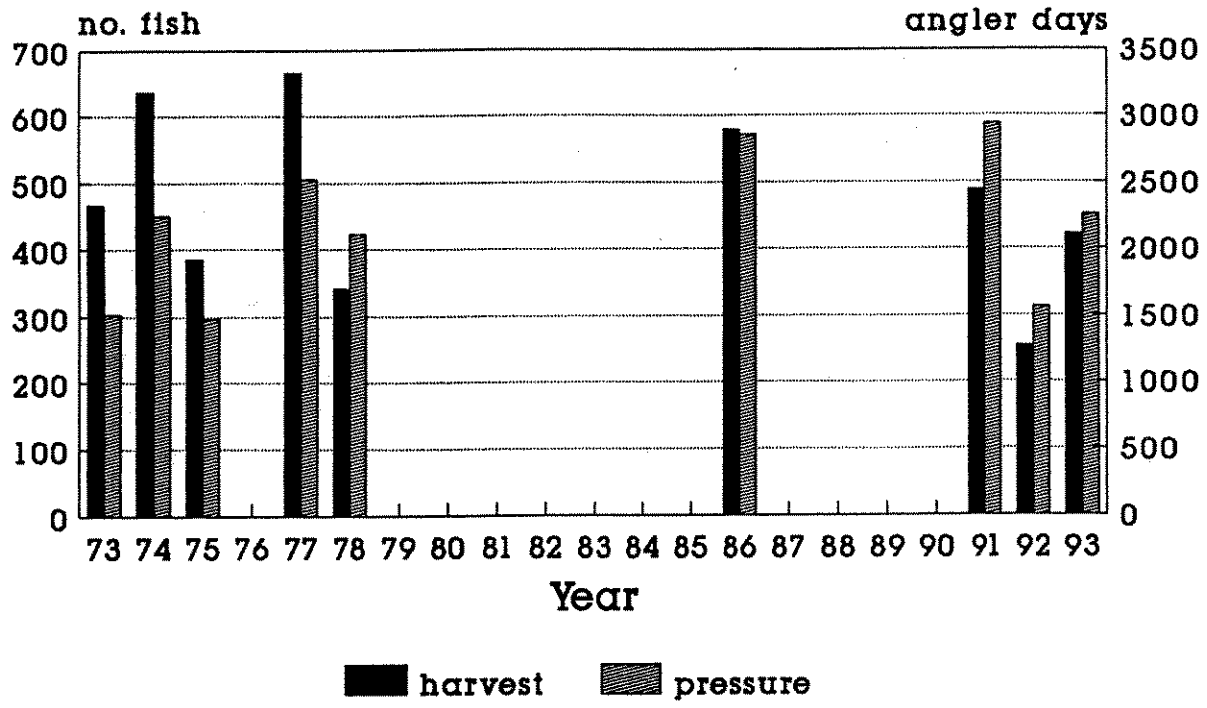

Figure A. Snagging pressure and total harvest as determined by creel census on the Missouri River above Fort Peck Reservoir, 1973-93.

The period of greatest fishing pressure occurred over the three-day Memorial Day weekend which produced 403 snaggers and a harvest of only 61 fish. The harvest rate during this weekend period was higher than that normally experienced at this time. This is probably due to decreased flows just prior to the weekend which is believed to concentrate fish in the snagging area, a known "staging" location.

Length and weight data was obtained from 336 paddlefish harvested: 199 males and 137 females (Table 4). Only body-length (BL) measurements were taken in 1993. Total-length measurements are no longer used due to an unacceptable level of accuracy and morphological variation due primarily to tail and paddle erosion or damage. Body length is defined as the distance between the anterior portion of the eye and the caudal fin fork. Paddlefish were selected at random and by availability for measuring. Paddlefish examined during the creel census period produced a sex ratio of 59% males and 41% females. Fish captured by gill nets (n=434) in 1993 produced a sex ratio of 78% males and 22% females. If the random gill netting was a true indicator of the sex ratio present in the run, then a significant amount of hygrading is probably occurring.

Table 3. A summary of fishing pressure, paddlefish harvest, and catch rates during the spring, 1973-93.

Year	Total Fishermen Man-days			Paddlefish Harvested			Harvest/Fisherman/Day		
	Bank	Boat	Total	Bank	Boat	Total	Bank	Boat	Overall
1973	984 (64.9%)	532 (35.1%)	1,516	290 (62.1%)	177 (37.9%)	467	0.29	0.33	0.31
1974	1,422 (63.1%)	831 (36.9%)	2,253	396 (62.2%)	241 (37.8%)	637	0.28	0.29	0.28
1975	916 (61.8%)	566 (38.2%)	1,482	180 (46.7%)	205 (53.3%)	385	0.20	0.36	0.26
1977	1,429 (56.5%)	1,096 (43.4%)	2,526	322 (48.3%)	344 (51.7%)	666	0.23	0.31	0.26
1978	699 (33.1%)	1,413 (66.9%)	2,112	135 (39.6%)	207 (60.4%)	342	0.19	0.15	0.16
1986	1,664 (58.2%)	1,194 (41.8%)	2,858	315 (54.4%)	264 (45.6%)	579	0.19	0.22	0.20
1991	1,645 (56.0%)	1,293 (44.0%)	2,938	260 (53.3%)	228 (46.7%)	488	0.16	0.18	0.17
1992	796 (50.0%)	796 (50.0%)	1,592	102 (40.3%)	152 (59.7%)	254	0.13	0.19	0.16
1993	1,254 (55.7%)	999 (44.3%)	2,253	232 (54.9%)	190 (45.1%)	422	0.19	0.19	0.19

Table 4. A summary of paddlefish size data from the Missouri River above Fort Peck Reservoir, 1965-93.

	Females				Males			
Year	No.	Avg. TL	Avg. BL	Avg. Weight	No.	Avg. TL	Avg. BL	Avg. Weight
1965	13	67.0	----	81.5	21	55.4	----	36.4[1]
1966	36	64.0	----	74.4	30	53.3	----	32.1
1970	7	70.2	----	77.0	2	58.5	----	44.0
1971	10	66.7	----	85.7	1	57.0	----	44.0
1973	46	66.2	----	76.1	50	54.9	----	35.0
1974	58	65.3	----	74.5	67	55.0	----	32.8
1975	63	65.7	----	74.8	56	55.9	----	34.6
1977	96	66.5	----	78.3	135	56.9	----	39.4
1978	58	67.7	----	87.9	76	55.3	----	38.2
1986	101	65.6	47.3	76.3	167	54.1	37.5	33.5
1991	168	59.1	45.0	59.7	192	50.8	37.8	32.2
1992	124	66.9	47.7	70.7	86	54.5	38.9	34.6
1993	137	---[2]	48.5	73.1	199	----[2]	36.5	32.6

[1]Based on 24 fish.
[2]Measurement discontinued.

The average weight of male paddlefish, from past creel census years in which 25 or more fish were weighed, was 34.7 pounds. Male paddlefish averaged 32.6 pounds (range 13-62 lbs.) in 1993. The average weight of female paddlefish, from past creel years in which 25 or more fish were weighed, was 74.8 pounds. In 1993, female paddlefish averaged 73.1 pounds (range 40-124 lbs.). The average weight of males taken by gill nets was 29 pounds and the average female was 66 pounds. Four (2.9%) of 124 females observed and harvested in 1993 weighed over 100 pounds.

Paddlefish dentaries were collected from harvested fish to assist in determining the age structure of the Fort Peck Reservoir stock. A total of 270 jaw sections were collected and sent to the University of Idaho for sectioning and aging. Results of the aging will be presented in a later report. However, preliminary age data suggests good recruitment and a rather normal age distribution at this time.

Angler residence was obtained for 2,184 fishermen comprised of 1,971 (90%) residents and 213 (10%) nonresidents. Anglers from 37 of Montana's 56 counties utilized the fishery as well as fishermen from 10 states and the province of Alberta. Angler residence is summarized as follows:

Montana Fishermen (angler-days) By County

1.	Cascade	274	19.	Powell	18
2.	Yellowstone	237	20.	Lincoln	13
3.	Fergus	196	21.	Sanders	11
4.	Lewis & Clark	190	22.	Glacier	9
5.	Hill	171	23.	Custer	8
6.	Flathead	161	24.	Choteau	6
7.	Gallatin	145	25.	Prairie	6
8.	Blaine	88	26.	Broadwater	6
9.	Missoula	58	27.	Teton	5
10.	Stillwater	55	28.	Petroleum	5
11.	Musselshell	48	29.	Roosevelt	4
12.	Lake	45	30.	Judith Basin	3
13.	Phillips	34	31.	McCone	3
14.	Carbon	32	32.	Silver Bow	3
15.	Park	32	33.	Beaverhead	2
16.	Wheatland	26	34.	Big Horn	2
17.	Ravalli	23	35.	Madison	2
18.	Sweetgrass	20	36.	Pondera	2
			37.	Garfield	2

Nonresident Fishermen (angler-days)

1.	Wyoming	127	6.	Florida	8
2.	Idaho	22	7.	Minnesota	4
3.	Washington	21	8.	Colorado	4
4.	Arkansas	12	9.	Alberta, Canada	2
5.	South Dakota	11	10.	North Dakota	1
			11.	California	1

Mean weight of female paddlefish has been monitored for many years and was thought to be a good indicator of over-harvest. An assumption was made that paddlefish weight was directly related to age. It was believed that if the average size of females decreased significantly, it would indicate an over-harvest of mature, egg bearing fish on which the future of the stock depended.

Information recently analyzed from tagged fish over the last 20 years does not support this assumption, however. Aging of harvested fish was not routinely conducted and no age/weight relationships over time had been investigated until recently. It is now generally agreed that the majority of paddlefish growth occurs in the juvenile or early adult stages. After reaching maturity, paddlefish growth is often insignificant. Mean annual growth was determined from fish tagged and recovered from the Fort Peck/Missouri River stock (Table 5). Twelve males, at large since initial tagging an average of 10.8 years (range 4-20), provided the basis for the analysis. Mean annual weight change for male paddlefish was +0.5 pounds/year (range -0.9 to +1.7). Ten females, at large since initial tagging an average of 10.6 years (range 8-15), had a mean annual weight change of -0.2 pounds/year (range -3.0 to +2.3). Unless there is significant tagging related growth suppression, it would appear that the maximum size achieved by any particular paddlefish is likely due to food availability and habitat conditions present in Fort Peck Reservoir during the fish's early growth period. This period would encompass about the first 10 years for males and the first 15 years for females.

As previously mentioned, harvest rates are not believed to be excessive at present. However, the low number of successful spawning runs in recent years warrants additional scrutiny. A female paddlefish was observed in April of 1993 which was in the process of reabsorbing her eggs. This was most likely a fish that was ready to spawn in 1992, but due to low flows was unable to reach a suitable spawning site.

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 (Table 6). As mentioned, trigger flows of 14,000 cfs appear to be necessary to initiate spawning migrations upriver. Ratings of good, marginal and poor were assigned to each of the last twenty spawning season. 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 season was less than 30 days. A poor rating was assigned to those years in which trigger flows were never reached and successful spawning was very unlikely or severely limited. From 1974 to 1983, 7 good years, 2 marginal years, and 1 poor year were experienced. In contrast, only 3 of the last 10 years were rated as good and little or no reproduction was expected to have occurred in 7 of those years. It is probable 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 assumptions based on trigger flows.

Table 5. Weight differential over time for male and female paddlefish from the Fort Peck/Missouri River stock based on recaptures of tagged fish.

Tag No.	Date Tagged	Date Caught	No. Yrs. Growth	Initial Weight	Capture Weight	Difference (lbs.)	Mean Annual WT Change
MALES							
016	5/73	5/93	20	30.5	32.0	+ 1.5	+0.1
711	4/78	4/93	15	27.0	24.5	- 2.5	-0.2
695	4/78	5/92	14	20.0	35.0	+15.0	+1.1
779	5/78	5/91	13	27.0	32.0	+ 5.0	+0.4
789	5/78	5/90	12	17.0	37.0	+20.0	+1.7
033	4/74	4/86	12	13.0	22.0	+ 9.0	+0.8
947	4/80	5/91	11	55.0	45.0	-10.0	-0.9
627	4/78	4/86	8	29.0	36.0	+ 7.0	-0.9
722	4/78	4/86	8	18.0	28.0	+10.0	+1.3
932	5/79	5/86	8	32.0	35.0	+ 3.0	+0.4
1161	4/86	5/90	5	45.0	46.0	+ 1.0	+0.2
1160	4/86	5/90	4	32.0	37.0	+ 5.0	+1.3
FEMALES							
242	4/78	4/93	15	85.0	79.0	- 6.0	-0.4
181	5/77	5/91	14	50.5	68.5	+18.0	+1.3
639	4/78	5/91	13	84.0	80.0	- 4.0	-0.3
250	6/78	9/90*	12	98.0	76.0	-22.0	-1.8*
048	4/74	5/86	12	64.0	62.0	- 2.0	-0.2
793	6/78	5/88	10	79.0	80.0	+ 1.0	+0.1
950	5/80	5/89	9	62.0	35.0	-27.0	-3.0
760	5/78	5/87	9	40.0	61.0	+21.0	+2.3
654	4/78	5/86	8	102.0	103.0	+ 1.0	+0.1
649	4/78	5/86	8	92.0	95.0	+ 3.0	+0.4
245	5/78	6/86	8	67.0	60.0	- 7.0	-0.9

*Fall (post spawn) not included in totals.

Table 6. Paddlefish spawning success ratings for the years 1974-93 using trigger flow* 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	------	-

*Flows as measured at the Virgelle Gaging Station.

A system of angler tagging of harvested paddlefish was first implemented on the Missouri River in 1992. This system has been used successfully for a number of years on the Yellowstone River. A 2-fish per year limit was imposed statewide in 1992. The only significant regulation difference between the Yellowstone and Missouri River fisheries is that snaggers may immediately release a snagged fish if they so desire on the Missouri River, but any fish snagged on the Yellowstone must be immediately tagged. No snagging mortality has been observed on the Missouri River. All mortality previously observed was connected with hygrading of held fish or from injuries sustained from contact with outboard propellers. Snaggers used to "tie up" fish in the river then release them later if a larger fish was caught. The new tagging regulation eliminates this type of mortality. The "must keep" regulation on the Yellowstone River fishery is primarily designed to help reduce sociological conflicts associated with severe crowding. This situation does not occur on the Missouri River as the fishery is spread over many miles. Observations and discussions with veteran snaggers over many years indicates there is a significant voluntary effort to return large females to the river which would otherwise be harvested under a no release restriction.

A 38-question attitude/opinion/preference survey concerning paddlefish and paddlefishing on the Missouri River was distributed on-site to 134 snaggers. A

similar survey was distributed at the Intake fishery on the Yellowstone River. Responses are being compiled and analyzed by Dr. Dennis Scarnecchia of the University of Idaho. The data will be presented in a future report.

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 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 for two consecutive days (12 net-days).

Lake whitefish and walleye represented 84% of the gill net catch (Table 7). Lake whitefish continue to comprise a significant portion of the gill-net catch, but are rarely caught by fishermen. Though not documented, it is assumed that they are utilized by northern pike and walleye as forage when young. Whitefish grow fast in this reservoir and thereby escape predation from all but the biggest walleye and pike. Lake whitefish appear to reproduce successfully in years of good over-winter storage. Several whitefish stomachs were examined in April, 1992. The contents consisted of filamentous algae, many small snails, several beetles, and a considerable number of walleye or perch eggs. The role of whitefish in this reservoir, either as a forage fish or competitor, is not understood at this time.

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. However, the adult yellow perch population does appear to be building up slowly following two years at very low levels.

Northern pike numbers appear to have declined from 1992 levels, however, spear fishermen took two fish through the ice in 1993 weighing 32 and 34 pounds.

The walleye gill net catch was good. The 1992 year-class was also well represented. In recent years a positive correlation has been made between over-winter water levels and recruitment of YOY walleye to the population (Needham and Gilge, 1990). The strong showing of the 1992 year-class in connection with good over-winter storage in 1990-92 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. A total of 122 walleye from this year-class have been collected with various sampling gear to date. Only seven of those fish exhibited marks. Using the Peterson estimator, the 1990 year-class was estimated to be 104,571 fish in the fall of 1990. The results indicate a strong year-class was produced through natural reproduction in 1990 and stocked fingerlings comprised less than 10% of the population. A similar stocking of 10,500 marked fingerling walleye was made in the fall of 1992. Over-winter reservoir storage in 1992-93 was much lower than

in 1990-91, which should allow for evaluation of this stocking under different water conditions. Ten walleye of this year-class were captured in 1993. None of the 10 were marked. Eight adult longnose suckers were the only other fish netted.

Table 7. A summary of the catch in overnight sinking experimental gill net sets in Fresno Reservoir, 1965-93. Number of nets used varied from 4 to 12.

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
	1991	37	6.2	12.7	1.03	24.5
	1992	66	11.0	16.0	1.69	32.2
	1993	38	3.2	16.3	1.78	21.8
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
	1991	16	2.7	8.2	0.40	10.6
	1992	3	0.5	7.8	0.29	1.5
	1993	12	1.0	9.2	0.43	0.7

Table 7. Continued.

Species	Year	No.	Average No. Per Net Set	Average Length (inches)	Average Weight (pounds)	Percent of Total
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
	1991	88	14.7	13.3	0.88	58.3
	1992	102	17.0	15.0	1.40	49.8
	1993	108	9.0	13.3	1.05	62.1
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
	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
	1991	10	1.7	19.3	2.28	6.6
	1992	34	5.7	21.1	2.49	16.5
	1993	16	1.3	16.1	1.06	15.4

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. Very unusual high water conditions were encountered. A full pool was present and shoreline trees and vegetation were inundated. Normally open, sandy beach stations were filled with vegetation. Seining was difficult and efficiency was reduced. The seining results showed relatively high numbers of YOY walleye, low numbers of YOY northern pike, and average reproductive success for yellow perch (Table 8). The highest number of spottail shiners since their introduction was observed in 1993. Other fish found in low numbers were: emerald shiners and crappie. Crappie and emerald shiner numbers were also found to be low.

Table 8. 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, 1965-93.

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	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	165	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

[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.

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. Beach seining was conducted in July at five sites on the reservoir, encompassing 520 feet of shoreline. The sport fish YOY catch consisted of 3 walleye, 1 northern pike, and 8,287 yellow perch (Table 9). Reproductive success of walleye and northern pike was low, but the yellow perch catch was the highest ever recorded. A relatively low YOY walleye catch was recorded in 1993 despite supplemental stocking of 20,000 walleye fingerlings in 1993. Walleye natural reproduction is still below that observed in the 1970's, but is higher than that experienced in much of the 1980's. Other forage species sampled in decreasing order of abundance were white sucker, spottail shiner, and carp. No crappie, buffalo sp. or goldeye were captured, which is quite unusual.

Table 9. A summary of walleye, yellow perch, and northern pike young-of-year captured by beach seining in Nelson Reservoir, 1974-93.

		Walleye		Yellow Perch		No. Pike	
Year	Shoreline 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	0.6	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
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

*Years in which walleye fry or fingerlings were stocked.

Sporadic gill netting has been attempted at Nelson Reservoir in the past, but sampling was neither uniform nor consistent enough to develop useful trend data on game fish population size of composition. In the fall of 1991, five experimental gill net stations were established and sampled for the first time. Netting at these stations was continued in 1992. In 1993, five additional stations were added to increase sample size and reservoir coverage.

Though several more years of netting will be required for viable trend analysis, the netting did confirm the strong walleye year-classes produced in 1990 and 1991.

A cooperative walleye spawning shoal construction project was completed in the winter of 1992-93. Cooperators included the Malta Chapter of Walleyes Unlimited, U.S. Bureau of Reclamation, Montana Department of Fish, Wildlife and Parks, Phillips County, and the Fish America Foundation. Three shoals were constructed, each consisting of 400-500 cubic yards of rock and covering 15,000 square feet of beach (Figure B).

Site attributes are as follows:

Site	Rock Composition (dia.)		Slope	Prevailing Winds
Bluff site #1	01-03 in.	20%	6%	off shoal
	08-12 in.	40%		
	12-18 in.	30%		
	18-24 in.	10%		
North side Cabin site #2	08-12 in.	60%	2%	across shoal
	12-18 in.	35%		
	18-24 in.	05%		
South side Ramp site #3	08-12 in.	40%	4%	on shoal
	12-18 in.	40%		
	18-24 in.	20%		

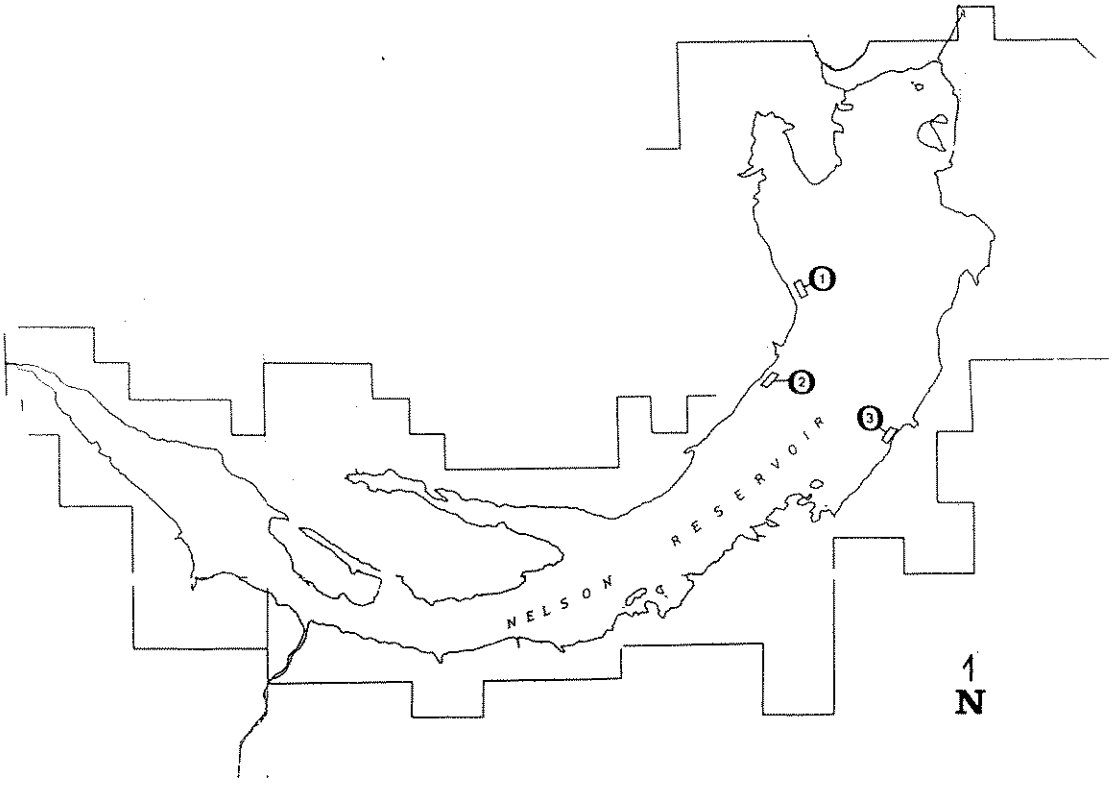

Figure B. Location of three rock walleye spawning shoals artificially placed in Nelson Reservoir, 1993.

Use of the shoals by walleye was evaluated in the spring of 1993. An attempt was made to collect walleye eggs from the shoals as well as unaltered (control) shorelines. A .5 meter conical net of .75mm mesh was weighted to maintain contact with bottom substrate at all times. The net was towed from the bow of a jet boat which was run in reverse at a speed of approximately 2 ft./sec. The jet wash disturbed the bottom and a leaf rake was used to manually disturb the area directly in front of the net. The net was pulled through the suspended material along two transects parallel to shore. Control sites were selected from the same shoreline, but a sufficient distance was maintained so as not to capture any eggs which may have washed off the rocky shoals. Control sites consisted of small gravels often impacted in sand. All samples were taken from water depths of 1 to 4 feet. Sampling for eggs was initiated on April 28. At that time, sites #2 and #3 were completely submerged, but site #1 was only 80-90% submerged.

Egg sampling efficiency was believed to be considerably lower on the shoals than the control sites due to the large interstitial spaces in the rock which probably made many eggs inaccessible. Results of the one-day sampling were as follows:

	Number Walleye Eggs/100 m^3 Water Sampled
Bluff site #1	31
Control #1	0
North side cabin site #2	43
Control #2	0
South side ramp site #3	24
Control #3	11

Though there was no effort made to quantify total production from the shoals, it is apparent that walleye successfully used the new shoals, particularly in areas that were previously unused as spawning sites.

H.C. Kuhr Reservoir

This 125-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 1980'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 of 1987 at a rate of 55/acre. Adult crappie were planted simultaneously at a rate of 8/acre. Both species have spawned successfully since 1987. The reservoir contained significant forage, but over-population 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 involved 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.

The reservoir opened in May of 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. In 1992, a new hook and line record was entered with a fish weighing 11.88 pounds.

Due to concern over the high post-stocking mortality of muskies, plans were made 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. In 1991, pure strain musky sperm was secured from the Spooner State Fish Hatchery in Wisconsin. The milt was packaged in Erdahl's extender and transferred to Fort Peck Reservoir where eggs from northern pike were fertilized. In May 1991, 1,500 2-inch fingerlings hatched from these eggs were stocked. This was followed with an August planting of 300 fingerlings averaging 6.4 inches. In late September, 149 8.5-inch tiger muskies were fin clipped and added to the reservoir.

Seining in July captured a single musky measuring 4.8 inches. This indicated that at least some muskies from the earliest stocking in 1991 survived. Stomach content examination revealed it had eaten several damsel fly naiads and YOY crappie. Gill netting conducted the following spring confirmed survival of individuals from the May or August plants. A plant of 300 7-inch tiger muskies was made in the fall of 1992.

In light of poor tiger musky survival, fingerling walleye have been 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. Walleye fingerling stocking was initiated on an alternate year basis beginning in 1992 with a plant of 400 4-inch walleye fingerlings. Fishermen reported good catches of 1-2 pound walleye throughout the summer of 1993.

Reproductive success of perch in 1991 and 1992 was poor as no YOY were captured by seining. Perch production in 1993 was deemed only fair. The low perch recruitment from these years may assist in reducing overpopulation and subsequent stunting of panfish in the reservoir. Several strong older year-classes of perch developed in the absence of adequate predator numbers. Black crappie showed limited reproductive success until 1991 when large numbers of YOY were found. Suckers and minnows of forage size have dramatically declined, or have been eliminated from the reservoir by predation. The smallest sucker captured in 1993 was 12.3 inches. Growth and condition of tiger muskies declined as the main forage base of suckers and minnows was replaced by spiny-rayed panfish.

Tiger muskies in this reservoir exhibit an interesting behavior. At times, the larger fish (> 25 inches) swim at the surface with most of their head out of the water. The fish often do this with mouths open as if skimming invisible objects off the water's surface. They will typically surface for a distance of 3-50 feet before submerging. Occasionally, several can be seen "skimming" at the same time.

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 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 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. Some of the initial introduced fish have exceeded 30 pounds in weight.

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. No reproduction was evident in 1993, however. Yellow perch and spottail shiners provide much of the forage base as juvenile sucker numbers have declined steadily since 1986. However, due to the abundant alternate forage and a depressed northern pike population, white sucker YOY numbers increased in 1991 and 1992. For the first time in almost a decade, no sucker YOY were captured by seining in 1993.

Table 10. A summary of sport fish YOY and forage fish taken by beach seining from Beaver Creek Reservoir, 1985-93.

		Species[1]								
Date	No. Hauls	WSU/LSU	YP	LK CH	FTHD MIN	S/P MIN	ID	EM SH	SP SH	NP
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	2	1	2	72	1	0	10
8-23-88	6	54	4,401	0	0	0	4	0	1	0
8-21-89	6	45	29	2	0	0	0	3	602	0
8-21-90	6	1	42	0	0	0	2	1	93	2
8-13-91	6	348	8,615	0	0	2	0	2	835	12
8-10-92	6	492	1,938	0	0	0	4	0	156	0
8-18-93	6	0	0	0	0	0	11	0	455	27

[1]WSU/LSU --- white/longnose sucker
YP -------- yellow perch
LK CH ----- lake chub
FTHD MIN -- fathead minnow
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. The walleye management plan included three consecutive years of stocking followed by two 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 three walleye year-classes (Table 11). The estimates reflect cohort size at the end of their first growing season.It appears that fry plants have been quite successful in establishing a fishable population. Twenty walleye were captured in the fall gill netting. The walleye averaged 16.8 inches (range 14.8-19.6) and 1.72 pounds (range 1.11-3.19).

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	Recapture Size (in.)	Sample Size	No. Re-captures	Estimate of Year Class[1]
1987	50,000	none	fry	55	12	1,391 ± 418
	322	right opercle	6.0			
1988	100,000	none	fry	33	3	1,649 ± 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.

Growth of walleye to date is consistent with other regional populations.

No walleye were stocked in 1990 or 1991. Beach seining and electrofishing were utilized to sample YOY walleye in the event limited natural reproduction occurred. No natural reproduction has been documented to date. Efforts to confirm natural reproduction will continue in non-stocking years. Alternate-year plants of 200,000 fry began in 1992.

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 the management of the Department of Fish, Wildlife and Parks (MDFWP). Initial introductions of rainbow trout provided an excellent fishery. Northern pike were illegally introduced about 1980. No other 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 MDFWP began to develop a cool/warm water fishery. Trout stocking was discontinued. Yellow perch and black crappie were introduced in 1987, followed by largemouth bass in 1988. Reproductive success of all 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). Yellow perch, black crappie and northern pike have grown exceptionally fast in this productive reservoir. Large catches of perch exceeding .50 pounds were common 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. The strong year classes produced in 1991 and 1992 dominate the perch population at present and catches of large perch have declined significantly.

Table 12. Total catch from two experimental gill net sets at Bailey Reservoir, 1990-93.

	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	0.29	16	4.7	0.08
9-10-93	2	31.8	7.55	21	6.6	0.15	127	6.7	0.12

Though no largemouth bass were taken by gill netting, fishermen report regular catches of yearling bass and occasional fish up to two pounds. Black crappie are being taken in low numbers though 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 given 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. Successful 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 was found by late summer.

Heavy rains experienced throughout the summer of 1993 kept the water very turbid and fishing for all species was poor.

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 MDFWP manages the fishery which is open to the public. The reservoir was stocked with 100,000 walleye fry in 1989, 1990, and 1992. Sixty-eight ripe adult crappie were introduced in 1989. Three experimental sinking gill nets were fished overnight in late May to assess survival and growth of stocked fish. A total of 12 walleye were sampled representing all year classes. Three yearling walleye from the 1992 fry stocking were captured. The fish averaged 6.7 inches, which is considerably smaller than the first two introductions achieved at age I. The remaining nine walleye in the catch ranged from 15.0 inches and 1.36 pounds to 19.5 inches and 2.54 pounds.

Twelve crappie were captured ranging in length from 5.2-8.5 inches. 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. A total of 124 adult white suckers were netted in 1993 compared with 9 in 1991.

Because of the large increase in white suckers, an additional piscivore was considered for introduction. The tiger muskie was chosen and 429 7-inch fingerlings were introduced in the fall of 1993.

Management plans include alternate year stocking of walleye fry and tiger muskie fingerlings to maintain fishable populations.

Fort Peck Dredge Cuts and Tailwater

Fish population sampling continued in the Fort Peck Dredge Cut and tailwater complex in the spring and fall of 1993, utilizing 10 experimental and 4 smelt 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 eight 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 1993, the sauger/walleye catch decreased but still ranked among the best catches recorded (Table 13). Efforts have been made to correlate sauger/walleye abundance with forage fish numbers (Figure C). The catch of smelt has been low in recent years; however, in 1993, 70 smelt were collected which was the best catch since dredge cut gill netting began in 1979. The majority of smelt were caught during the fall sampling period. The cisco catch rate also was high with 56 sampled. Walleye and sauger abundance did not appear to correlate with smelt and cisco abundance during the 1993 sampling period.

Table. 13. Summary of the catch from ten 125-foot experimental and four 100-foot smelt gill net sets in the Fort Peck dredge cut/tailwater, 1987-93.

Species	1987			1988			1989			1990			1993*		
	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	12	14.3	0.89	16	14.8	1.00	39	15.9	1.06	36	13.9	1.39	32	15.80	1.15
Walleye	2	15.6	1.20	3	16.3	2.00	7	14.9	1.18	9	17.2	1.76	20	17.04	2.04
Sh. sturg.	20	26.8	2.35	40	27.5	2.40	27	27.6	2.29	46	27.4	2.48	39	27.20	2.11
Rb. smelt	---	----	-----	5	6.4	NA	4	6.4	0.33	---	----	----	140	5.90	NA
Wht. sucker	10	11.3	0.93	30	12.9	1.30	34	12.9	0.92	49	11.2	0.78	37	10.70	0.76
R. carpsk.	9	15.3	1.67	10	15.7	2.00	12	15.8	1.65	23	15.8	1.89	5	15.70	1.86
Sht. redh.	4	15.5	1.78	6	15.6	1.80	11	13.7	1.22	5	15.3	1.62	13	13.90	1.21
Goldeye	208	11.4	0.49	150	11.1	0.50	158	11.2	0.38	180	11.0	0.45	445	12.00	0.53
Carp	4	17.2	2.34	2	20.2	3.50	5	19.5	3.79	4	17.2	2.30	4	18.00	2.70
Ln. suck.	---	----	-----	1	16.4	1.90	4	7.3	0.48	3	14.9	1.53	1	14.10	1.10
Ch. cat.	11	17.3	1.88	5	18.8	3.40	74	17.2	1.68	29	16.9	1.53	78	16.70	1.57
Bl. suck.	---	----	-----	1	25.6	5.80	---	----	----	---	----	----	2	26.20	5.35
No. pike	---	----	-----	3	24.2	4.56	1	28.0	4.69	7	27.2	2.59	6	22.10	2.55
Sm. buff.	1	22.5	6.20	3	17.5	2.90	2	19.8	9.13	1	21.6	5.00	4	20.00	4.35
Bm. buff.	---	----	-----	---	----	----	1	16.0	2.07	---	----	----	---	-----	----
Burbot	---	----	-----	---	----	----	---	----	----	---	----	----	1	13.10	0.35
Lk. white.	---	----	-----	2	22.9	4.80	---	----	----	---	----	----	---	----	----
Yel. perch	1	7.1	0.22	1	7.5	0.20	---	----	----	7	6.1	0.14	12	5.90	0.10
Cisco	17	9.9	0.34	25	11.0	0.50	62	9.1	0.22	40	9.4	0.33	112	10.20	0.34
Paddlefish	1	52.0	15.40	---	----	----	1	54.0	31.94	---	----	----	---	-----	----
Spot. shin.	---	----	-----	---	----	----	---	----	-----	---	----	----	7	4.30	----

*Includes spring and fall sampling (20 Exp and 8 Smelt nets).

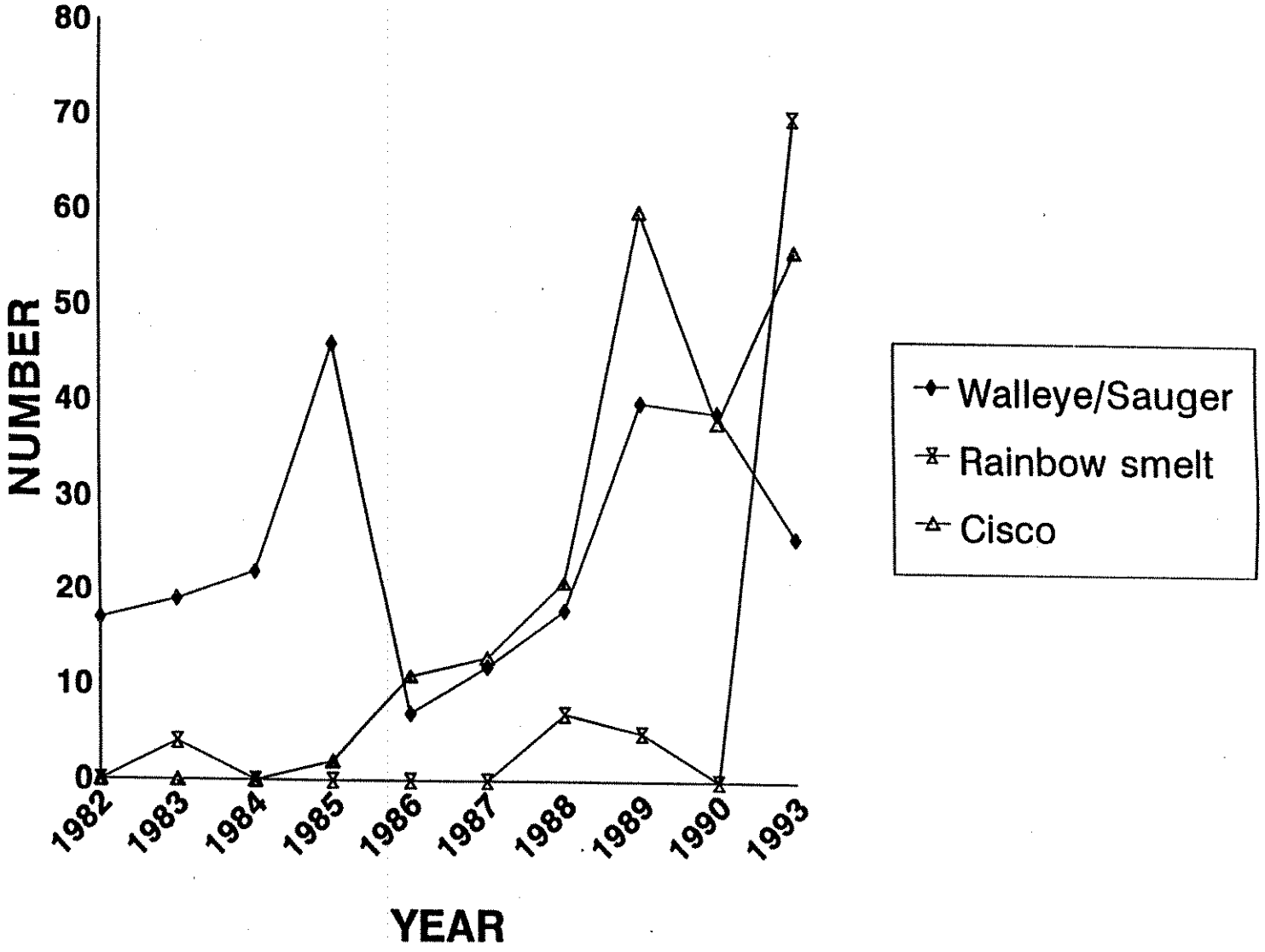

Figure C. An illustration of changes in numbers of walleye and sauger in Fort Peck dredge cuts/tailwater in relation to the catch of rainbow smelt and cisco. (Sampling conducted through experimental gill netting.)

Sampling of smelt with four 100- x 8-foot monofilament gill nets with 1/2-inch square mesh began in 1981. 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. The catch in 1993 increased dramatically with the majority being caught during the fall sampling period. The mean total catch rate for smelt during the spring and fall sampling periods combined in 1993 was 17.5.

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 cisco catch in 1993 increased from 1990 and is the second highest catch since gill netting was first initiated. The mean catch rate for cisco during the spring and fall sampling periods combined in 1993 was 5.6.

RECOMMENDATIONS

The 2-paddlefish annual limit, utilizing 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. An annual 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 five years. On-site creel census should be conducted annually. This information would be invaluable in determining harvest rates and total harvest.

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. Attempts should be made to quantify the walleye population and determine the potential for supplying eggs. The revised walleye stocking plan developed in 1991 should be implemented.

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 be continued. Newly constructed spawning shoals should be evaluated as to their usefulness to spawning walleye. A creel census similar to the one conducted in 1984 should be considered after several good water years have been experienced.

Beach seining and gill netting should be continued at Beaver Creek Reservoir to monitor growth and survival of stocked walleye. Continue alternate-year walleye fry plants.

Stocking of 8- to 10-inch muskies should continue in H.C. Kuhr Reservoir until survival and recruitment can be fully evaluated. Occasional walleye stocking will be necessary to increase predation on the expanding panfish populations.

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 population.

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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
15-4535 Bailey Reservoir
15-6105 Little Warm Reservoir

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