MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO.: F-78-R-1 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, 1994 THROUGH JUNE 30, 1995

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 1994. A statewide mail/telephone harvest survey was also conducted. Total fishing pressure was estimated at 3,586 angler days with a total harvest of 561 paddlefish. Fishermen released 50% of the paddlefish landed. Anglers from 45 of Montana's 56 counties utilized the fishery as well as snaggers from 17 states, two Canadian provinces and the country of Germany. 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 6% to the year-class. Beach seining indicated average walleye and yellow perch reproductive success. Spottail shiners fared well however. Beach seining at Nelson Reservoir indicated reproductive success of northern pike was good and walleye success low. The catch-per-unit-effort (CPUE) for young-of-the-year (YOY) yellow perch was near historical averages. Experimental gill net stations were sampled in 1993. 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 fourth consecutive year. Supplemental stocking of northern pike to Bailey Reservoir from Fresno Reservoir was successful. 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. Walleye continue to do well in Little Warm Reservoir.

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. Six and eight-foot deep gill nets of 4-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. A 230 volt pulse DC boom shocking boat was used to collect YOY walleye and adult 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 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 1994. 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.

Four tagged paddlefish were harvested by fishermen during 1994. One return was from Intake Dam on the Yellowstone River, and three were collected at the North Dakota caviar collection station near the confluence of the Yellowstone and Missouri Rivers. To date, 169 paddlefish tagged in the study area have been harvested; 72 (43%) in the Dredge Cuts and 97 (57%) in the Yellowstone River, primarily at Intake Dam. During the past ten years (1985-94), 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 at the relatively new fishery near the confluence in North Dakota. It 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 21, 17, 16 years of fishing pressure and harvest exposure, these groups have exhibited an average annual harvest rate of 0.09-1.5%, 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, 1974-94. 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 1994	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)	0	35	18.9	0.9
1976[3]	48 (47)	0	10	21.2	1.1
1977	40	0	10	25.0	1.4
1978[4]	162 (156)	0	40[5]	25.6	1.5
1979	151	2	32	21.2	1.3
1979	40 (River)	0	3	7.5	0.5
1980	29 (River)	0	2	6.9	0.5
1981	60 (River)	1	8	13.3	1.0
1982	21 (River)	0	4	19.0	1.6
1984	77	1	9	11.7	1.2
	928	4	169		

*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.

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.

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 to tag 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. An additional 499 fish were tagged in the river in 1994.

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 is considered to be a "trigger" flow for spawning fish. Initial trigger flows in 1994 occurred about 4/23. Flows exceeded 14,000 cfs for only seven days in 1994.

Sampling with drift nets began in the river near Fred Robinson Bridge (FRB) on 3/31/94. Only two fish were netted in 4.5 hours of netting. The water temperature was 47F. The next drift netting attempt occurred on 4/21 several days prior to the river reaching trigger flows. Twelve fish were netted in 5 hours of effort. By 4/25 flows had peaked and large numbers of paddlefish were encountered at least as far upstream as the Power Plant Ferry site (river mile 1938). Road conditions prohibited access to the headwaters of Ft.Peck Reservoir until 4/30. This was seven days after trigger flows occurred. Paddlefish had completely vacated the upper reservoir area. A similar instantaneous mass exodus was observed in 1993 following trigger flow occurrence. Water levels in Ft. Peck had risen considerably since the 1993 sampling and the river/reservoir interface appeared to be located just above Soda Creek Bay, 14 miles above the interface area observed in 1993. Four 300-foot gill nets were fished in this area and a net was drifted in the river near Beauchamp Bay. No paddlefish were netted or observed. Netting effort was redirected to the river near FRB from 4/30 through 6/10.

Even at reduced flows of 8,000 cfs, large numbers of ripe fish were present in what is believed to be the lower spawning areas of the river. This may indicate that trigger flows are more important in moving fish upriver than keeping them there. On 6/10, two female paddlefish were captured one mile below FRB. Both females were running eggs and one was partially spent. They were captured on a small gravel bar below Armell's Creek. This is believed to be the first spawning site identified below FRB.

Twenty-six tagged paddlefish were harvested in 1994. Nineteen of those returns were from fish tagged in 1994. Twelve fish tagged in 1993 were recovered in 1994. All recoveries were males, indicating some males make annual spawning runs or occasionally make dry runs. Eight of these fish were weighed upon recapture. Seven exhibited weight loss from initial tagging a year previously. Weight loss ranged from 5%-23% of body weight. A single male exhibited a weight gain of 7% body weight.

Twenty-one fish were netted and recaptured in 1994, usually only a few days or weeks apart. Movement up or downstream was correlated with river flows occurring between captures. In all cases, upstream movement was associated with a rise in flows. No movement or downstream migration occurred when declining flows were predominant. This flow related directional movement was consistent for both sexes.

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 0.9-4.2%. However, the highest rate of 4.2% 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, 1973-94. 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	0	11	24.4	1.1
1974	55	1	13	23.6	1.2
1975	29	0	9	31.0	1.6
1976	23	0	6	26.1	1.5
1977[1]	60	0	10	16.7	0.9
1978	227[2]	2	44	19.4	1.1
1979	11	0	5	45.5	2.8
1980	33	0	13	39.4	2.6
1983	2	0	1	50.0	4.2
1986	13	0	4	30.8	3.4
1992	29	1	1	3.4	1.1
1993	434[3]	3	13	3.0	1.5
1994	499	19	19	3.8	3.8
	1,460	26	149		

[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 1994 and by a statewide mail/telephone survey.

On-site creel census

The creel census area consisted of approximately 20 miles of river downstream from FRB, upstream from Fort Peck Reservoir. The last complete census was conducted in 1993. 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 FRB 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 at that location.

Occasionally, paddlefish are also caught in late 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 March 25, 1994, which was five days after ice-out on the river. Based on warden and CMR personnel observations and interviews, 15 angler-days of pressure was estimated to have occurred during the interim between ice-out and the start of the creel census. No paddlefish were reported harvested during this period. These estimates are reflected in the tables. The creel census extended through June 11 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 3,586 angler-days in 1994 (Figure A). Snagging pressure increased considerably from 1993. Spring weather conditions and river flows often dictate the amount of use this area receives. The total paddlefish harvest in 1994 was estimated to be 561 fish (Table 3). Snagger interviews indicated fish were released at a rate of 40-50%. Historical data indicates snaggers are more inclined to release fish as catch rates increase.

Pressure and Harvest
Paddlefish

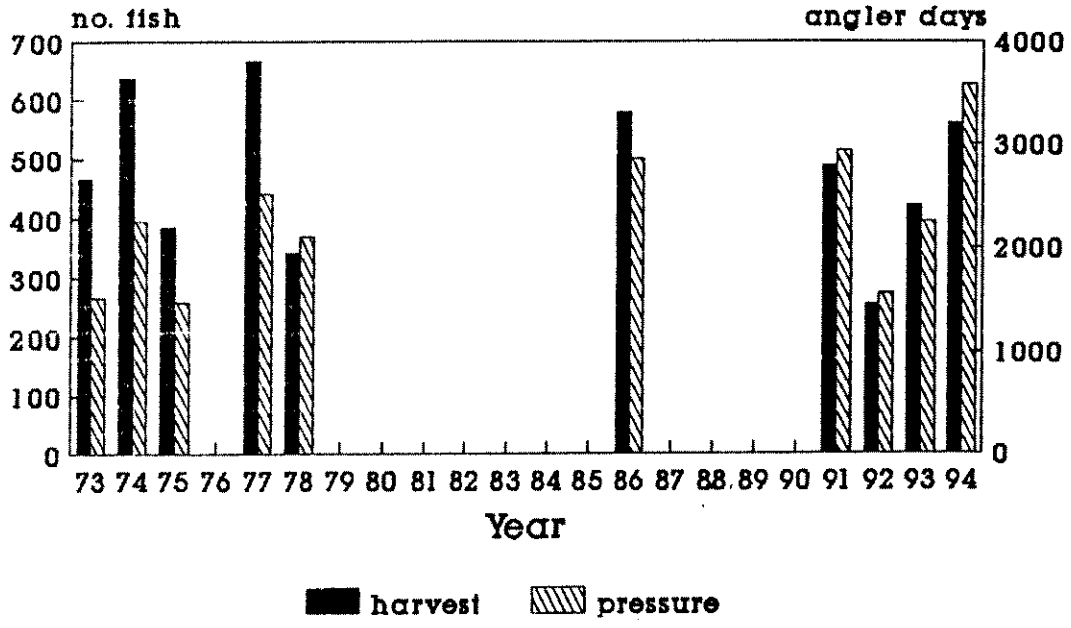

Figure A. Snagging pressure and total harvest as determined by creel census on the Missouri River above Fort Peck Reservoir, 1973-94.

The period of greatest fishing pressure occurred over the three-day Memorial Day weekend which produced 669 snaggers and a harvest of only 79 fish. Length and weight data was obtained from 381 paddlefish harvested: 140 males and 241 females (Table 4). 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 or eye-fork length is the accepted standard measurement currently used. 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 40% males and 60% females. Fish captured by gill nets (n=499) in 1994 produced a sex ratio of 64% males and 36% 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, 1973-94.

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
1994	1,780 (49.0%)	1,806 (51.0%)	3,586	313 (56.0%)	248 (44.0%)	561	0.18	0.14	0.16

Table 4. A summary of paddlefish size data from harvested fish on the Missouri River above Fort Peck Reservoir, 1965-94.

Year	Females		Males	
	No.	Avg. Weight	No.	Avg. Weight
1965	13	81.5	21	36.4[1]
1966	36	74.4	30	32.1
1970	7	77.0	2	44.0
1971	10	85.7	1	44.0
1973	46	76.1	50	35.0
1974	58	74.5	67	32.8
1975	63	74.8	56	34.6
1977	96	78.3	135	39.4
1978	58	87.9	76	38.2
1986	101	76.3	167	33.5
1991	168	59.7	192	32.2
1992	124	70.7	86	34.6
1993	137	73.1	199	32.6
1994	241	69.2	140	28.1

[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 33.9 pounds. Male paddlefish averaged 28.1 pounds in 1994. The average weight of female paddlefish, from past creel years in which 25 or more fish were weighed, was 73.6 pounds. In 1994, female paddlefish averaged 69.2 pounds. The average weight of males taken by gill nets in 1994 was 26 pounds and the average female was 65 pounds. Seven (2.5%) of 278 females observed and harvested in 1994 weighed over 100 pounds.

Paddlefish dentaries were collected from harvested fish to assist in determining the age structure of the Fort Peck Reservoir stock. 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 3,586 fishermen comprised of 3,101 (86%) residents and 485 (14%) nonresidents. Anglers from 45 of Montana's 56 counties utilized the fishery as well as fishermen from 17 states, two Canadian provinces, and the country of Germany. Angler use by residence is summarized as follows:

Montana Fishermen (angler-days) By County

1.	Yellowstone	515	23.	Big Horn	30
2.	Cascade	338	24.	Granite	19
3.	Fergus	269	25.	Valley	14
4.	Gallatin	259	26.	Chouteau	12
5.	Lewis & Clark	247	27.	Rosebud	11
6.	Missoula	186	28.	Broadwater	10
7.	Flathead	174	29.	Wheatland	10
8.	Blaine	150	30.	Madison	10
9.	Park	90	31.	Sanders	10
10.	Phillips	84	32.	Meagher	10
11.	Hill	81	33.	Custer	8
12.	Stillwater	77	34.	Judith Basin	7
13.	Lake	67	35.	Toole	7
14.	Carbon	50	36.	Pondera	4
15.	Jefferson	50	37.	Teton	3
16.	Lincoln	49	38.	Garfield	3
17.	Musselshell	43	39.	Roosevelt	2
18.	Ravalli	41	40.	Petroleum	2
19.	Sweet Grass	36	41.	Deer Lodge	2
20.	Silver Bow	34	42.	Daniels	1
21.	Glacier	32	43.	Mineral	1
22.	Powell	32	44.	Sheridan	1

Nonresident Fishermen (angler-days)

1.	Wyoming	195	9.	South Dakota	5
2.	Idaho	46	10.	Florida	4
3.	Washington	33	11.	British Col.	4
4.	Minnesota	15	12.	Germany	3
5.	Colorado	14	13.	Nebraska	2
6.	Oregon	13	14.	Utah	1
7.	Iowa	10	15.	California	1
8.	North Dakota	6	16.	Wisconsin	1

Mail harvest survey

The requirement that all snaggers purchase tags before fishing allowed the department in 1993 and 1994 to mail surveys to all who purchased tags. For reporting purposes the Missouri River was divided into three areas. Area 1 was described as the Missouri River upstream from FRB. Area 2 included Ft. Peck Reservoir upstream to FRB. This area corresponds closely with the study area for the on-site creel census. The reach from Ft.Peck Dam to the Montana Border was designated Area 3. In 1993, a survey return rate of 88% was achieved by following up on non-returnees by telephone. No such follow up was attempted in 1994 and the return rate fell to 58%. Results of the mail survey and on-site creel census were compared for Area 2 (Table 5). In both years, pressure and harvest were reported significantly higher from the mail survey. The number of reported harvested fish was 26% higher in both years from the mail survey. This can be explained by the fact that the mail survey encompassed five additional months than the on-site creel census and a creel clerk is not on duty every day in the spring. However, pressure estimates exceeded that of the on-site by 50-70%. As yet, this wide discrepancy is unexplainable. Fishermen from both surveys reported a similar release rate.

Table 5. Comparison of a mail harvest survey (Area 2) and on-site creel census of paddlefisherman on the Missouri River, 1993 and 1994.

	Angler Days		Harvest	
Year	Mail	On-Site	Mail	On-Site
1993	3,857	2,253	530	422
1994	5,334	3,586	706	561

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 22 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 6).

Table 6. 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							
508	5/73	6/94	22	50.0	59.0	+ 9.0	+0.4
461	4/74	4/94	21	88.0	89.0	+ 1.0	+0.1
756	5/78	5/94	17	52.0	57.0	+ 5.0	+0.3
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
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

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). Thirteen females, at large since initial tagging an average of 12.8 years (range 8-22), 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 (based on trigger flows) 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 FRB (Table 7). 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 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 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 11 years were rated as good and little or no reproduction was expected to have occurred in 7 of 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 assumptions based on trigger flow.

Table 7. Paddlefish spawning success ratings for the years 1974-94 using trigger flow* (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)	-

*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. In 1994, fishermen were allowed to harvest only one paddlefish from the Yellowstone and Lower Missouri River, while two per year could still be taken from the middle Missouri fishery. The only other significant regulation difference between the Yellowstone and Missouri River fisheries is that snaggers may immediately release a snagged fish if they so desire at the middle Missouri River fishery, but any fish snagged on the Yellowstone or lower Missouri River 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, in the past, would often "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 indicate there is a significant voluntary effort to

return large females to the river which would otherwise be harvested under a no release restriction. There was some concern that restricting the harvest to one fish on the Yellowstone River might cause a mass relocation of fishermen to the Missouri River. Angler interviews indicate this did not happen in 1994.

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 on two consecutive days (12 net-days).

Lake whitefish and walleye represented 74% of the gill net-catch (Table 8). 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 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. 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 several years at very low levels. The 1989 year-class was very strong and is now providing catches of large perch previously unheard of in Fresno Reservoir.

Northern pike are present in large numbers. Spear fishermen took several fish through the ice in 1994-95 weighing over 25 pounds. On August 20,1994, local fishermen were employed to provide hook and line caught northern pike to the department for transplant purposes. Twenty-five two man teams brought in 810 live northern pike in 3.5 hours. The fish averaged approximately 18 inches long. Handling mortality was estimated to be around 15%.

The walleye gill-net catch was good. The 1993 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 1993 year-class in connection with good over-winter storage in 1993-94 reinforces this correlation. Walleye year-class strength appears to be normally distributed based on gill net results (Figure B).

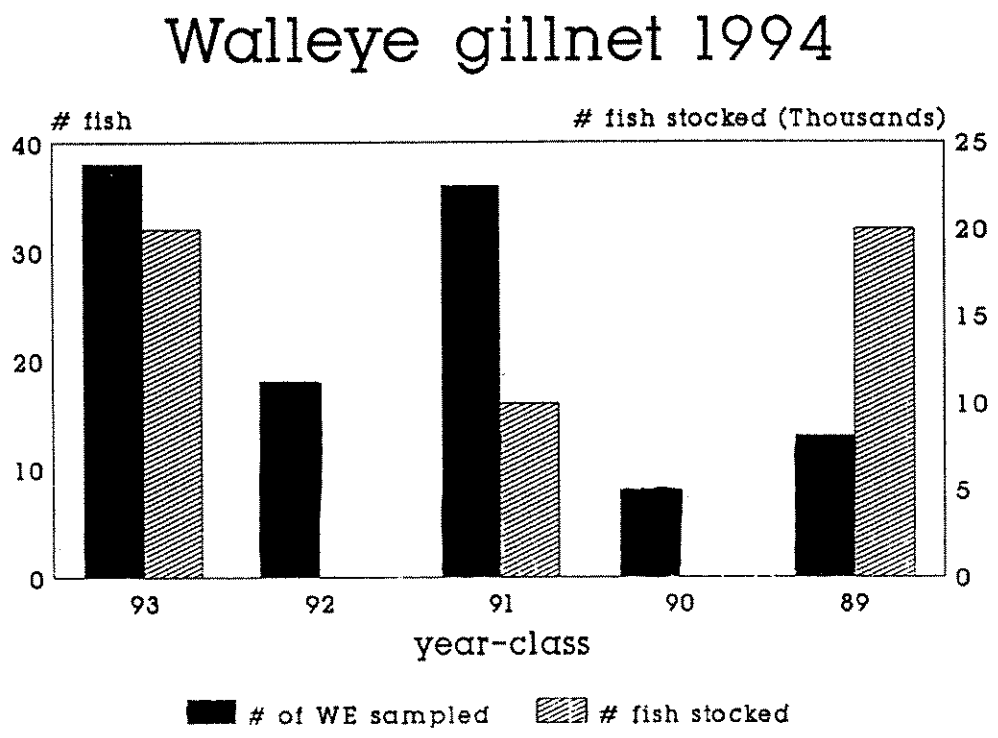

Figure B. Comparison of relative walleye gill-net catches with stocking incidence at Nelson Reservoir, fall 1994.

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 138 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 93,840 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 6% 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 lower than in in 1990-91, which should allow for evaluation of this stocking under different water conditions. Forty-three walleye of this year-class have been captured to date with no recaptures of marked fish. An additional 9,348 4-inch walleye were marked and released in September of 1994. Late fall sampling captured 29 fish of this year-class of which one was marked.

Table 8. A summary of the catch in overnight sinking experimental gill net sets in Fresno Reservoir, 1965-94. 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
	1994	93	7.8	14.9	1.81	37.9
Yellow Perch	1969	7	0.9	5.4	0.07	12.3
	1970	20	2.5	6.9	0.16	13.8
	1971	6	1.5	7.6	0.23	7.4
	1972	2	0.3	8.7	0.40	3.1
	1974	2	0.5	5.7	0.09	5.7
	1987	43	7.2	6.2	0.13	23.9
	1988	24	4.0	8.7	0.32	12.5
	1989	0	----	----	----	0.0
	1990	0	----	----	----	0.0
	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
	1994	25	2.1	11.2	0.56	5.6

Table 8. 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
	1994	180	15.0	13.4	1.08	40.4
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
	1994	72	6.0	18.2	1.41	16.1

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 showed below average numbers of YOY walleye, YOY northern pike, and yellow perch (Table 9). The highest number of spottail shiners since their introduction was observed in 1994. Other fish found in low numbers were: emerald shiners and longnose sucker. The crappie catch was the highest encountered since 1974 and is believed to be due to relatively stable water levels since 1989.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. Some qualitative and quantitative zooplankton sampling was also conducted with the Montana Department Fish, Wildlife & Parks (MDFWP) assistance.

Table 9. 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, 1965-94.

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
August	1994	12	19	19	2,960	3	287	1,421	1	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. 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 seven sites on the reservoir, encompassing 830 feet of shoreline. The sport fish YOY catch consisted of 6 walleye, 10 northern pike, and 1,802 yellow perch (Table 10). Reproductive success of walleye was below average. The yellow perch catch was near the historical average. Northern pike production was the highest recorded in 10 years. A relatively low YOY walleye catch was recorded in 1994 despite supplemental stocking of 20,000 walleye fingerlings in 1994. Walleye natural reproduction is still below that observed in the 1970's, but is higher than that experienced through most of the 1980's. Other forage species sampled in decreasing order of abundance were white sucker, spottail shiner, carp and crappie. Emerald shiners have not been sampled in the annual beach seining since 1983, the year prior to the initial spottail shiner introduction. Though the numbers of emerald shiners declined drastically beginning in 1980, it is worth questioning whether or not the similar food and habitat requirements of the spottail might have hastened the demise of emerald shiners in this reservoir.

Table 10. A summary of walleye, yellow perch, and northern pike young-of-year captured by beach seining in Nelson Reservoir, 1974-94.

		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
1994*	830	6	7.2	1,802	2,171	10	12.0

*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. In 1994 all 10 stations were utilized. The CPUE of walleye in 1994 increased significantly from levels observed in 1993 and was the highest catch rate observed since gill netting was instituted in 1991 (Table 11). Walleye year-class strength, as observed in the gill-net catch, appears to correlate more strongly with years of supplemental stocking than do beach seining results (Figure B). Yellow perch CPUE has declined steadily since 1991. Beach seining indicated a very strong year class was produced in 1993. Age I perch are not readily sampled in experimental gill nets so the degree of recruitment will not be seen until 1995. The northern pike catch continues to steadily increase. White sucker was the second most common fish captured followed by Lake Superior whitefish. Only three goldeye were captured. A channel catfish, weighing 7.5 pounds, was netted. This is the first reported catch of a channel catfish in Nelson Reservoir. Catfish are common in the adjacent Milk River and this fish is believed to be a result of an illegal bucket transfer from the river.

Table 11. Relative catches of fishes from Nelson Reservoir with experimental sinking gill nets, fall 1991-94.

		Walleye		Yellow Perch		No. Pike		Lake Whitefish		White Sucker		Goldeye	
Year	No. Nets	n	CPUE	n	CPUE	n	CPUE	n	CPUE	n	CPUE	n	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

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 of legal size. Only one legal fish was recorded and was subsequently entered as the first 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. The current state record tiger muskie was taken from another water and weighed 27 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. Attempts were abandoned in 1992 to use musky sperm in extender solely due to problems encountered with the early spawning period of northern pike in Montana and the late ripening of muskies in Wisconsin.

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. No suckers less than 12 inches total length were netted in 1994. Growth and condition of tiger muskies has declined as the main forage base of suckers and minnows was replaced by spiny-rayed panfish.

No seining was conducted in 1994 to assess reproductive success of panfish but experimental gill nets fished in the fall of 1994 captured large numbers of adult yellow perch (range 5.5-10.6 in.) and six black crappie (range .30-1.02 pounds). Eight walleye were captured (range 10.9-15.8 in.) and all had YOY crappie in their guts. A single tiger musky weighing 11.55 pounds was netted, though four others were observed swimming on the surface during netting operations.

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 or struggling for oxygen. 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 12). 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. However, YOY white suckers and yellow perch were captured in moderate numbers in 1994.

Table 12. A summary of sport fish YOY and forage fish taken by beach seining from Beaver Creek Reservoir, 1985-94.

		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
8-08-94	6	49	707	0	0	0	0	0	181	11

[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 13). 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. Ten walleye were captured in the fall gill netting. The walleye averaged 17.4 inches (range 8.5-22.8) and 2.68 pounds (range 0.19-6.30).

Table 13. 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 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 14). 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 14. Total catch from two experimental gill net sets at Bailey Reservoir, 1990-94.

	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
9-19-94	7	20.1	2.59	38	6.0	0.10	43	6.3	0.14

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. 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.

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 each year 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 27 walleye were sampled representing all year classes. The walleye ranged from 10.8 to 22.1 inches. Weight of these fish ranged from .40 to 4.90 pounds.

Only six crappie were captured ranging in length from 7.2 to 9.3 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 was continued in the Fort Peck dredge cuts and tailwater complex during June and September 1994. Ten 125- x 6-foot multifilament experimental and four 100- x 8-foot, one-half inch bar mesh monofilament gill nets were set overnight and fished for an average of 19 hours each. This netting effort was initiated in 1979 to obtain information on the overall fish and 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 regulation 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 these species was the highest in 1980 when 94 were netted. This was believed to be associated with an abundance of rainbow smelt in the area originating from a migration of smelt out of Lake Sakakawea, ND. The combined walleye/sauger catch in 1994 was 55 (Table 15), compared to 52 in 1993 and is among the best catch recorded. The catch of smelt has been low in recent years; however, in 1993, 70 smelt were collected which was the highest catch recorded since netting began in 1979. Only a combined total of five rainbow smelt were netted in 1994.

Cisco appeared in the experimental net catch for the first time in 1985 and have become a significant forage source for piscivorous fish in the area. The presence of cisco correlates with introductions, beginning in 1984, into Fort Peck Reservoir and is attributed to passage through the dam. Numerous dead and injured cisco have been observed in the Fort Peck tailpool on several occasions. The combined cisco catch in 1994 was 136 and is the highest catch since gill netting was first initiated.

A combined total of 54 shovelnose sturgeon were captured. Standard fork length and standard length measurements were taken and numbered spaghetti tags were inserted through the base of the dorsal fin on all fish. This was done to augment ongoing shovelnose and pallid sturgeon research in the lower Missouri and Yellowstone rivers.

Table 15. Fort Peck Dredge Cut and Tailwater Standard Gill Netting, 1994.

	Avg. Std. Length Inches	Avg. Fork Length Inches	Avg. Lgth Length Inches	Avg. Wt. Pounds	Number
SNS	24.01	22.38		2.08	54
PF			48.50	17.40	1
GE			12.04	0.56	176
CI			11.27	0.60	136
NP			21.24	2.34	10
WS			13.24	1.14	55
LNS			11.80	1.34	2
SHR			15.21	1.54	14
RC			15.86	1.93	31
SMB			16.35	2.48	4
CP			16.07	2.13	3
CC			16.07	1.23	54
SG			14.80	1.12	37
WE			16.74	1.75	18
RBS			6.30	0.04	5

SNS-Shovelnose Sturgeon PF-Paddlefish GE-Goldeye CI-Cisco
NP-Northern Pike WS-White Sucker LNS-Longnose Sucker
SHR-Shorthead Redhorse Sucker RC-River Carpsucker SMB-Smallmouth Buffalo
CP-Carp CC-Channel Catfish SG-Sauger WE-Walleye RBS-Rainbow smelt

*June and September netting combined

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 at least through 1997. After that time alternate year creel census may be sufficient. This information would be invaluable in determining harvest rates and total harvest and pressure.

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. Due to consistently good water levels experienced over the past five years, it is recommended that a creel census and walleye population estimate be conducted to determine what near optimum conditions are capable of producing in this reservoir.

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. Marking of large fingerling stocked walleye may help assess the contribution of stocked fish to the fishery.

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

Key words or fish species:

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

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