MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATION

PROJECT NO.: F-113-R-6 STUDY TITLE: SURVEY AND INVENTORY OF COLDWATER AND WARMWATER ECOSYSTEMS

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

JOB PERIOD: JULY 1, 2010 THROUGH JUNE 30, 2011

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ABSTRACT

Paddlefish netting and tagging was conducted on the Missouri River paddlefish population upstream of Ft. Peck Reservoir, and tagging and harvest records were maintained. A paddlefish creel survey was conducted on a 28-mile stretch of the Missouri River. The telemetry study was continued for a fifth year on paddlefish in the Missouri River and young-of-year paddlefish surveys were conducted in the headwaters of Ft. Peck Reservoir. Overall harvest on this population has been reduced in recent years, the average size of adult fish continues to decrease, and recruitment has been poor. As a result, regulations were changed in 2007 and were again restructured in 2008. Standardized gill netting and beach seining surveys were conducted at Fresno, Nelson, and Beaver Creek Reservoirs. Select ponds were sampled through Hill, Blaine, and Phillips Counties to assess fish population levels, survival and recruitment. Self-creel boxes were also maintained at select ponds in Hill, Blaine, and Phillips Counties to assess fishing pressure. Results of all other sampling are presented.

OBJECTIVES AND DEGREE OF ATTAINMENT

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

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

Technical Guidance- To review projects by federal, state and local government agencies and private parties that have the potential to affect fisheries resources, and to provide technical advice or decisions to mitigate impacts on these resources. Provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources. Objective accomplished: (26) 310 and (15) 124 projects were reviewed along with one sub-division and one waste water review with state and local agencies; attended three walleye unlimited meetings and helped with three school programs and fishing events related to the "Hooked on Fishing" program.

Angler Education- To enhance the public's understanding, awareness and support of the state's fishery and aquatic resources and to assist young people to develop angling skills and to appreciate the aquatic environment. Objective accomplished through staff participation in the "Hooked on Fishing" programs with local grade school children, planning and conducting of fall and winter fishing trips with area grade school and junior high children. Public presentations were also given on area fisheries in Havre and Malta. Staff also attended Walleye Unlimited meetings in Havre and Malta to provide information.

PROCEDURES, RESULTS, & DISCUSSION

Fort Peck Reservoir and Upper Missouri River Paddlefish Stock

The Ft. Peck stock was isolated from the Yellowstone-Sakakawea population upon closure of the Ft. Peck Dam in June of 1937. Completion of the Ft. Peck Dam isolated the Ft. Peck stock but it also created productive rearing habitat. This resulted in increased numbers and size of paddlefish and in turn created a valuable recreational snag fishery in the Missouri River.

However, alteration of flows from upstream dams and low water levels on Ft. Peck Reservoir prior to 2008 are thought to be a reason for poor reproductive success of paddlefish over the last 10 to 15 years as well as

reduced sizes of adults and thus fecundity of females in the Upper Missouri River. In addition, the popularity of the fishery has increased during this time period bringing into question whether or not natural reproduction and recruitment is adequate for current harvest levels.

The goal of current management is to provide a stable recreational fishery while maintaining the population size and historical age structure of the spawning stock. To meet this goal, regulations were changed during the 2007-snagging season. New regulations limited harvest to one paddlefish per person and a choice where snaggers would fish (Missouri River above Ft. Peck Reservoir; Ft. Peck Dredge Cuts; lower Yellowstone River/Missouri River below Ft. Peck Reservoir). To distribute harvest and reduce size selective harvest, mandatory catch and release days (Sunday, Monday, & Thursday), and mandatory harvest days (Friday, Saturday, Tuesday, & Wednesday) were enacted. Additionally snagging was limited to 6 am to 9 pm to help reduce potential illegal take of paddlefish and make enforcement of the regulations more manageable.

Based on the results of the 2007 season, additional changes were made during the 2008 season. A quota of 500 fish was established, a season was set (May 1st to June 15th), hook size restriction were set, mandatory catch and release and harvest days were eliminated, and immediate release was further defined for paddlefish.

Data Collection Methods

For more effective management of the Ft. Peck paddlefish stock, a thorough understanding of several key aspects of their life history was necessary. Data collected includes population size, harvest rates, spawning periodicity, age-structure, reproductive success, spawning locations, movements, and habitat use of paddlefish during their spawning migrations.

Baseline data on the paddlefish population above Ft. Peck Reservoir has been collected since the early 1970s. In 1993, a standardized monitoring program was established to assess population size, harvest rates, spawning periodicity, and gather baseline data on movement patterns and spawning sites. To gather this information, sampling occurs in the Missouri River during the time when paddlefish are staging around the Fred Robinson Bridge. Sampling typically occurs from April through May on the ascending arm of the hydrograph, typically at or above 8,000 cfs. Adult paddlefish are collected using drifted floating gill nets measuring 100 to 150 ft long, 6ft deep, with 4 inch mesh. Collected paddlefish are weighed, measured (eye-fork length), sexed, and tagged with an individually numbered jaw tag that is either a metal or plastic chicken leg band.

To assess angler pressure, catch and harvest rates of paddlefish, information on the ratio of tagged fish harvested, the size, sex, and age of fish harvested we conduct on-site roving creel surveys on a 28 mile stretch of the Missouri River downstream of the Fred Robinson Bridge. In addition a phone creel survey has been conducted since 2003 to assess harvest outside of the creel areas and as a check on the accuracy of the on-site creel surveys.

Beginning in 1996, concern over low flows and recruitment prompted the establishment of visual count surveys as a means of producing an annual index of recruitment of young of year (YOY) paddlefish. Visual counts have been found to be the most effective means to survey YOY paddlefish. Counts are conducted from an open bow powerboat using standardized methods and fixed transects. Observed YOY paddlefish are divided into age groups based on estimated length.

To increase our specific knowledge of the spawning locations, movements, and habitat use of paddlefish above Ft. Peck Reservoir, a contract with the University of Idaho was initiated in 2006 to conduct a four-year telemetry and egg sampling study. The telemetry study was continued in 2010.

Adult Paddlefish Monitoring and Tagging

In 2010, paddlefish tagging started on May 3rd. Tagging efforts were continued until May 27th when we tagged our 415th paddlefish. Since tagging was initiated in 1977, 6,329 paddlefish have been tagged and 680-tagged paddlefish have been recaptured during annual gill netting surveys. Approximately 10.7% of the annual catch is comprised of recaptured fish. In 2010, 11.7% of the paddlefish captured were recaptured fish. Based on the tagging and recapture data, the reproductive periodicity of male paddlefish is one to two years and for females it is every two to three years.

Since tagging was initiated in 1977, a total of 719-tagged paddlefish have been reported as harvested, which is about 11.4% of all tagged paddlefish. While snaggers are encouraged to report catches of tagged fish, reporting rates are low in years when on-site creel surveys are not conducted. In 2010, 32-tagged paddlefish were reported as harvested and 12-tagged paddlefish were reported as snagged and released. Anglers harvested 10 paddlefish tagged in 2010.

Preliminary population estimates

Estimates of population size of the recruited portion of the Ft. Peck stock were developed from 1993 through 2006 based on mark recapture sampling associated with gill netting and tagging conducted prior to and during the paddlefish snagging season. Point estimates and confidence intervals were developed using two approaches for estimate verification purposes: a modified Schnabel estimate and a modified Peterson estimate. Modifications, which allow for multiple years of marking and recapture data, were necessary because only a fraction of the recruited paddlefish stock matures and thus migrates upstream in a given year.

While the preliminary estimates were run for the entire tagging period, the most reliable Peterson estimates were developed from 1993 to 1999, when all five succeeding years of net catches could be used to assemble recaptures and high numbers of paddlefish were tagged during those years (Table 1). Based on the Peterson estimates the population size was approximately 20,500 fish from 1993 to 1999. The Schnabel estimate based on tagging over the period of 1993 to 1999 was 17,373 paddlefish with a 95% confidence interval of 15,614 to 20,336 fish. Both estimates indicate that the population size of recruited adult fish is approximately 20,000 fish. The number of adults that migrate in any given year is directly affected by the annual flows, however based on the periodicity of the fish, this means that approximately 11,700 fish migrate up the Missouri River to spawn and are "fishable" per year. As a comparison, the Yellowstone-Sakakawea stock has approximately 28,548 adults that migrate up the Yellowstone & Missouri Rivers (are "fishable") in any given year and their total population size is approximately 53,017 (Scarnecchia 2006).

Table 1. - Population estimates (N-Hat) for paddlefish using the modified Peterson method with Ft. Peck tagging data from 1993 through 2001 where M is the number of new fish marked, C_{t+i} (i=1,2,3,4,5) is the number of marked fish in year t+i, C_R is the number of recaptures in years from t+1 to t+5 with fish tagged in other years, and R is the number of recaptures in years during t+1 and t+5 with fish tagged in year t.

Year	M	C_{t+1}	C_{t+2}	C_{t+3}	C_{t+4}	C_{t+5}	C_R	C_Sum	R	N_Hat	SD	95% Confidence Interval		
1993	405	500	456	281	501	368	56	2,162	46	19,035.00	7.7E-06	14,802.91	to	26,655.76
1994	500	546	280	501	368	355	106	2,156	48	22,458.33	6.4E-06	17,549.21	to	31,180.64
1995	456	281	501	368	355	88	131	1,724	38	20,688.00	7.8E-06	15,739.14	to	30,176.36
1996	281	501	368	355	88	13	121	1,446	15	27,088.40	9.5E-06	18,017.64	to	54,551.91
1997	501	368	355	88	13	221	118	1,163	30	19,422.10	9.3E-06	14,352.72	to	30,027.98
1998	368	355	88	13	221	259	124	1,060	20	19,504.00	1.1E-05	13,600.02	to	34,466.37
1999	355	88	13	221	259	240	106	927	21	15,670.71	1.4E-05	11,013.73	to	27,151.17
2000	88	13	221	259	240	323	114	1,170	4	20,609.60	1.9E-05	11,556.82	to	95,118.72
2001	13	221	259	240	323	500	141	1,684	1	10,952.50	4.6E-05	5,530.75	to	555,703.76

Spawning and Recruitment

The spawning success and recruitment rate of paddlefish is directly influenced by the magnitude, timing, and duration of peak flows. Berg (1981) postulated that a minimum flow of 14,000 cfs maintained for a period of 30 days is required to trigger paddlefish to move out of their staging areas and migrate upriver to spawning locations. This requirement has been observed in the Ft. Peck stock by monitoring flows and movement patterns, and comparing those to year class strength through aging, as well as with YOY sampling.

During the 1980s and 90s only 12 of the 20 years met the requirements necessary for successful migration and spawning (Figure 1 and 2). From 2000-2007, flows did not meet the minimum flow and duration requirements (Figure 3). However, these requirements were met in 2008, 2009, and 2010. In 2010, flows on the

Missouri River stayed between 9,000 and 11,000 cfs from May 1st to May 17th and gradually increased to 18,000 cfs on May 31st. Flows peaked at 29,900 cfs on June 19th and declined to 10,000 cfs on July 17th. Peak flows met and exceeded trigger flows (14,000 cfs; Berg 1981) for about 48 days, slightly more than the 72-year average of 45 consecutive days (USGS 2009). The peak flow experienced in 2010 was the second highest in over a decade.

Hydrograph information (Figure 1, 2, and 3) suggests that good spawning conditions widely vary among years. Low recruitment has been verified by YOY surveys, which have been conducted annually since 1997 (Kozfkay & Scarnecchia 2002; Bowersox 2004; Miller 2005; Miller & Scarnecchia 2006). Good production of YOY paddlefish was observed in 1997 and 1998 when flows mimicked the historical hydrograph. Since that time less than five YOY paddlefish have been observed annually (Table 2). In 2010, no YOY and yearling paddlefish were observed during the fixed transects between RM 1863.5 and 1878.5 (Table 2). In addition to the standardized counts, we applied approximately 25 hours/week of random search time during the weeks of July 26, August 2 and September 27 in hopes of identifying habitats containing YOY paddlefish not sampled with the transect counts. These random searches were conducted primarily from the river/reservoir interface (RM 1874.5) upriver to approximately RM 1884. A night search was also conducted on August 3 in and around the river/reservoir interface area using a hand-held spotlight. No YOY were observed during any of the random searches. However, we did observe a congregation of sub-adults in the 20-30 inch TL range between RM 1872.5 and 1873.5 on September 29-30. These fish were likely Age-2 fish (2008 year class), however these fish were to elusive to dip net and precise lengths were not recorded. We counted 18 of these sub-adults on September 29 and eight of these sub-adults on September 30.

In addition to the transect counts and random searches, we used trammel nets, stationary floating gill nets, and cast nets during the weeks of July 27 and August 3 to attempt to capture YOY paddlefish. These efforts resulted in no YOY paddlefish but several other species were captured (primarily goldeye and channel catfish).

Figure 1. - Historical and observed Missouri River hydrograph at the USGS Virgelle, MT gauging station 1980-1989.

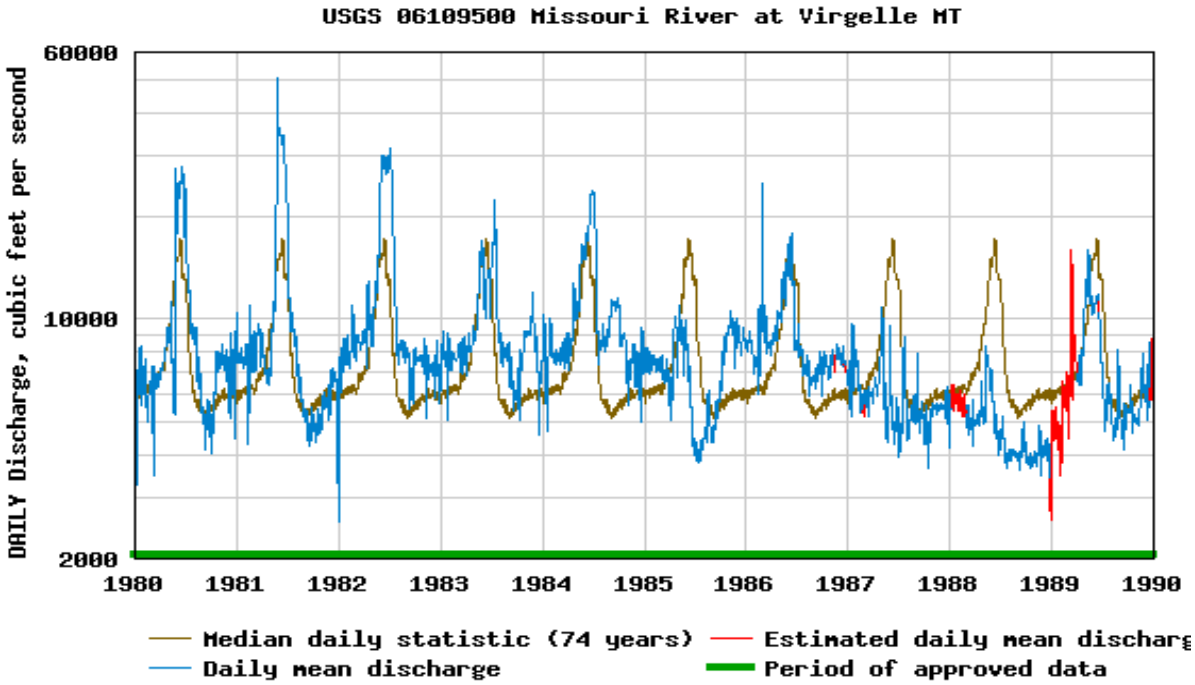


Figure 2. - Historical and observed Missouri River hydrograph at the USGS Virgelle, MT gauging station 1990-1999.

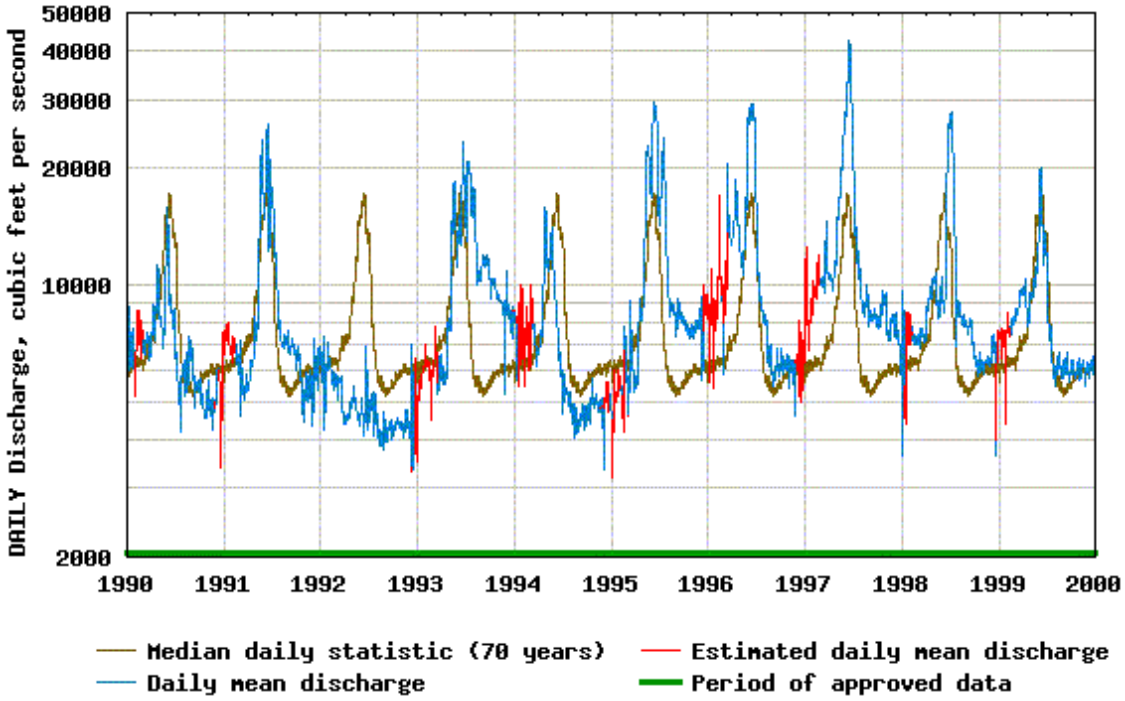


Figure 3. - Historical and observed Missouri River hydrograph at the USGS Virgelle, MT gauging station 2000-2010.

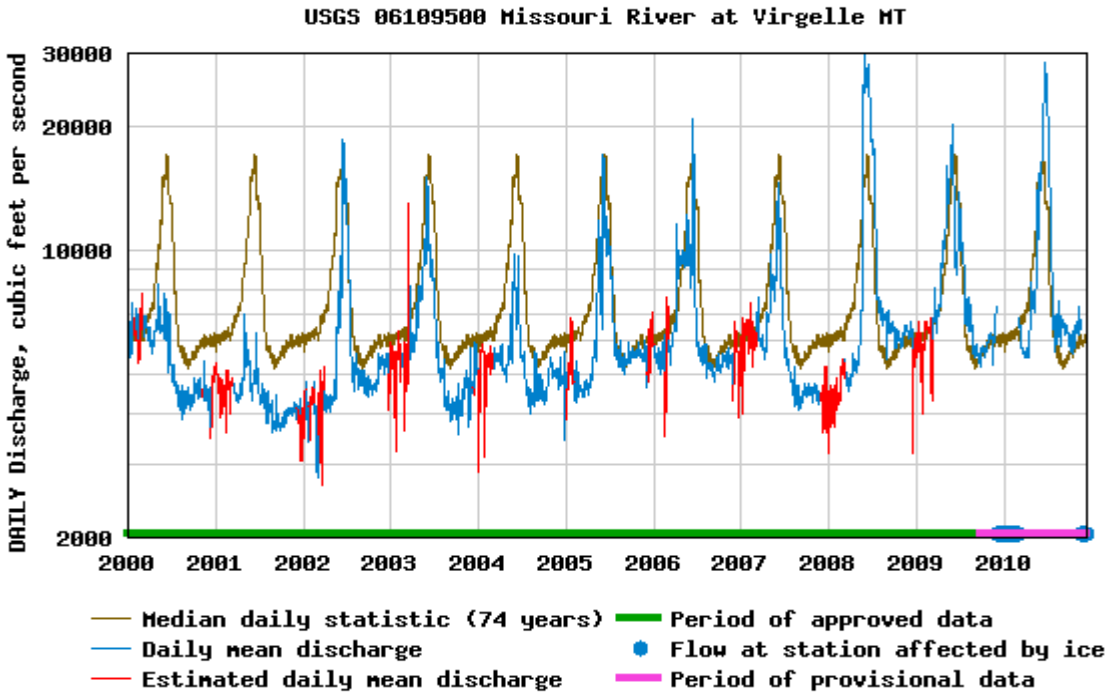


Table 2. - Results of visual count surveys conducted in the upper end of Ft. Peck Reservoir from 1997 to 2010.

	Transect Dates	# Stations	Station Locations (RM)	No. Transects	No. YOY	No. Yearlings	Collector
1997				69	113	3	
1998	7/27 to 9/23	8	1888 to 1866	216	97	54	Kozfkay
1999	8/25 to 9/20	8	1888 to 1866	174	3	10	Kozfkay
2000				90	0	11	
2001				90	1	0	
2002			1862 to 1856 ?				Bowersox ?
2003			1862 to 1856 ?	54	2	4	Bowersox ?
2004			1853 to 1838	54	0	3	
2005	8/8 & 8/16	6	1853 to 1838	36	1	0	Miller
2006	7/24 & 7/30	6	1853 to 1838	36	2	1	Miller
2007	7/31 & 8/6	6	1854 to 1838	6	0	2	Miller
2008	8/6 & 8/12	6	1844 to 1858	12	4	3	Miller
2009	8/11 & 8/11	6	1843 to 1858	12	0	0	Miller
2010	7/27 & 8/3	6	1863.5 to 1878.5	12	0	0	Miller

Harvest: Paddlefish Creel Survey 2010

Methods

A five-year native species creel survey has been ongoing since 2005. In 2010, the roving creel survey was conducted by vehicle and boat from May 1st to June 15th from the Fred Robinson Bridge to Peggy's Bottom and focused solely on paddlefish.

Schedule

A roving creel survey was conducted from May through June from the Fred Robinson Bridge to Peggy's Bottom. Two creel clerks were used to conduct all interviews and pressure counts. Schedules were divided to cover the entire week with overlapping schedules occurring on the weekends when fishing pressure increased.

Effort

Instantaneous pressure counts were performed once a day by vehicle or boat. Starting times were randomly chosen from the fishing day (7:00 to 19:00) to estimate angling pressure from river mile (RM) 1897-1921.

Harvest and Catch

Angler interviews were conducted at all boat ramps and fishing access/camping sites on the north side of the Missouri River between Fred Robinson Bridge (RM 1921) and lower Peggy's Bottom (RM 1987). Interviews were conducted at each site, during each sampling day except when road conditions prevented travel to certain sites. The creel clerks attempted to interview every fisherman on the river each sampling day. When the creel clerk encountered too many anglers at a location, the clerk systematically sub sampled every *k*th fisherman (*k* = interval demanded by the number of fishermen present) to ensure that all locations were sampled. Boat fishermen who launched within the area were interviewed even if they fished out of the study reach. Survey cards were distributed or deposited on windshields of vehicles when boat anglers where not available for interviews.

During interviews one randomly selected actively fishing person per party was interviewed. This individual was asked a series of questions relating to residence, number in party, length of stay, time spent fishing, whether a boat was used, type of gear used, and primary species being sought. Fishermen were asked how many paddlefish were caught, released and/or kept and if any of these fish had tags and if so the type, color,

and number on the tag. When tagged paddlefish were caught, the fisherman was provided with the original tagging location, date, and weight of the fish. In addition, if fishermen released a paddlefish they were asked the reason for the release to determine if size-selective harvest was occurring.

When possible, eye-fork (body) length measurements and weight were taken for harvested paddlefish. Jaws were also taken for ageing purposes (with anglers consent). These samples were then sent to the University of Idaho for aging.

Data Analysis

Fishing effort (angler-hours and total effort), catch rates, and harvest estimates were calculated using the Creel Census Program (McFarland and Roche 1987), which was developed using methods outlined in Neuhold and Lu (1957). To reduce error, the creel survey time was broken down into three periods (April, May, and June), divided out by weekend and weekday effort, and by boat or shore fishing. Effort was not broken down by fishing method or by species because all anglers creeled were snagging and targeting paddlefish.

Results

In 2010, a total of 480 parties from 9 states and 32 of the 56 Montana counties were interviewed from May 1st to June 15th. In 2010, the highest percentage of anglers in Montana came from Yellowstone (15.9%), Fergus (9.8%), Gallatin (9.3%), and Flathead (9.5%) Counties. In 2010, the average party contained 3.7 anglers (range = 1 to 27 anglers), 85% of which were males. In 2010, the average length of stay was 2.0 day/trip (range = 1 to 7 days).

Effort

In 2010, paddlefish snagging effort totaled 3,950 angler days (Table 3) and consisted of 11,890 angler hours (Table 4) during the months of May and June, respectably. In 2010, 82.2% of the angling effort occurred from shore and 95.4% of the angling effort occurred in May, which coincides with the peak of the paddlefish spawning migration.

Harvest Statistics- Paddlefish

In 2010, a total of 974 paddlefish were caught and reported to creel clerks with a combined (shore and boat) catch rate of 0.119 paddlefish/hour. Total paddlefish snagged was estimated at 1,481 fish (Table 5) with an estimated harvest of 607 paddlefish (Table 6).

In 2010, harvested paddlefish ranged in length from 28.0 to 60.0 inches (eye-fork length) and weight from 16.0 to 115 pounds (Table 7). Fifty-five percent of the harvested paddlefish sexed were males and 31/300 (10.3 %) of the harvested paddlefish and 10/639 (1.6 %) of the released paddlefish creeled had jaw tags. Harvested paddlefish ranged in age from 12 to 53 years with 53% of the harvested fish being 20 to 56 years old. Twenty-four percent of the harvested fish were less than 16 years old (new recruits).

Table 3. - Estimated snagging effort (angler-days) by month and angler type for the Missouri River (RM 1899 to 1921), May-June 2010.

	Shore	Boat	Overall
May	2,173.76	484.9	2,658.70
June	49.53	0.00	49.53
Overall	3,368.74	580.8	3,949.53

Table 4. - Estimated snagging effort (angler-hours) and standard error (SE) by month and angler type for the Missouri River (RM 1899 to 1921), May-June 2010.

	Shore	SE	Boat	SE	Overall
May	9,232.00	1,570.12	2,112.00	507.06	11,344.00
June	545.45	177.52	0.00	0.00	545.45
Overall	9,777.45		2,112.00		11,889.45

Table 5. Estimated total catch of paddlefish by month and angler type for the Missouri River (RM 1899 to 1921), May-June 2010.

	Shore	Boat	Overall
May	1,174	242	1,416
June	65	0	65
Overall	1,239	242	1,481

Table 6. Estimated harvest of paddlefish by month and angler type for the Missouri River (RM 1899 to 1921), May-June 2010.

	Shore	Boat	Overall
May	396	211	607
June	0	0	0
Overall	396	211	607

Table 7. – Length, weight, and condition indices of harvested paddlefish from anglers creeled in the middle Missouri River creel, May-June 2010.

Species	Sample Size	Length Range (in.)	Length Avg	Length SD	Weight Range (lbs.)	Weight Avg	Weight SD
PF	300	28.0-60.0	42.0	5.5	16.0-115	49.4	21.8

Paddlefish Phone Creel (2003-2010)

Vic Riggs with the Montana Fish, Wildlife & Parks (FWP) and Larry Brooks with the University of North Dakota (Riggs 2005) designed and conducted the paddlefish phone creel survey annually from 2003 to 2005. This survey was continued solely by FWP in 2006. This survey was originally conducted (1) to determine the harvest of paddlefish at sites other than the Intake Fishing Access Site, (2) as a check on the accuracy of the Intake creel survey, (3) as a possible replacement for the Intake creel survey, which would free up technician time for other data collection needs, and (4) to obtain harvest statistics for the Fort Peck population, and in 2005 and 2006, (5) to assess angler support for changes to regulations for the Fort Peck populations.

From 2003 to 2010, harvest statistics were obtained for the Fort Peck population (Table 8). On average approximately 2,193 anglers fish for paddlefish above Ft. Peck Reservoir representing approximately 6,263 fishing days. On average approximately 1,647 paddlefish are caught annually above Ft. Peck Reservoir with approximately 52.7% of the paddlefish being released (Table 8). When anglers were asked in 2005 why they released their paddlefish, 53% said they were catch and release fishing, either because they did not want to harvest a paddlefish or because they wanted to fish for their entire fishing trip and harvest a fish on one of their last days. Seventeen percent of paddlefish were released because they were too big, indicating that these people were releasing the larger females. Twenty-seven percent of paddlefish were released because they were too small, indicating that these people are high grading for the larger females and are trophy fishing.

Table 8. –Summary of estimates for the Fort Peck paddlefish population from the Montana paddlefish telephone creel survey (2003-2010).

Missouri River Above Fort Peck								
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Number of Anglers	1,902	2,859	2,705	2,476	2,481	1,816	1,579	1,729
Total Days Fished*	5,757	9,172	8,385	7,565	-	4,426	2,748	5,789
Total Hours Fished*	27,433	44,400	42,277	39,800	-	-	-	-
Number Caught	1,583	1,102	1,516	2,290	-	845	2,342	1,851
Number Harvested	868	787	1,028	1,067	634	300	564	575
Harvest Rate (fish/day)	0.151	0.086	0.123	0.141	-	0.068	0.205	0.173
Harvest Rate (fish/hour)	0.032	0.018	0.024	0.027	-	-	-	-
Percent Released	45.17%	28.58%	32.19%	53.42%	-	64.50%	75.90%	68.90%
Percent Contacted by FWP Creel Clerk						85.71%	62.14%	38.61%

* Includes hours spent catch and release fishing

Discussion

The paddlefish population above Ft. Peck Reservoir has experienced declines in recruitment, growth, and overall size of adults. Flows in the Missouri River have not been consistently high enough to produce large year classes of paddlefish for the past 10 to 15 years (Leslie 2005, 2006). In addition, the average size of adults has significantly decreased over the last 30 years (Bowersox 2004). These declines, especially in growth, are believed to be the result of decreased productivity due to the aging of Ft. Peck Reservoir (nursery grounds for paddlefish) and lower Ft. Peck Reservoir levels. Paddlefish are not experiencing as high of growth rates while residing in Ft. Peck Reservoir and as a result sexually mature fish are of a smaller size than they were when Ft. Peck Reservoir was initially formed. In addition, natural mortality and fishing mortality are resulting in the decreased proportion of large fish, specifically females. Fishing pressure has nearly doubled from 1977 to 2010, and high grading allows fishermen to increase their chances of catching a fish of a desirable size. The decreased weight of adult females is of concern because it is directly related to fecundity.

The combination of a low number of successful spawning years (based on observed trigger flow occurrence and duration) and decreased size of adults is of concern. The results of reduced recruitment of YOY paddlefish will not be evident in the spawning population for a few years, However it would be prudent to consider the effects of reduced recruitment and reduced fecundity of the adult population. Since 1992, snaggers have been allowed to harvest two paddlefish per year from the upper Missouri River fishery. Snaggers are also allowed to immediately release a snagged paddlefish if they desire. Based on analysis of the fishery and public support, the fishing limit was reduced in 2007 from two paddlefish to one paddlefish annually. In 2008, the paddlefish season was reduced from a 365-day season to a 46-day season (May 1 to June 15), making monitoring total catch more feasible. Furthermore, an annual harvest cap of 500 paddlefish has been implemented since 2008.

Hill County Fishing Waters

Select waters throughout Hill County were sampled to determine fish abundance using sinking multi-filament experimental gill nets mearching125 feet in length and 6 feet deep, consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh unless otherwise specified. Voluntary creel boxes were maintained at many of the ponds to determine fishing pressure, catch rates, and satisfaction.

Bailey Reservoir

Bailey Reservoir is a privately owned reservoir that was constructed in the mid-1960s. At full pool, Bailey Reservoir covers approximately 70 surface acres and has a maximum depth of 28 feet. Bailey was initially managed as a rainbow trout fishery, and rainbow trout thrived within the reservoir until 1980 when northern pike were illegally introduced. In 1984, the remainder of rainbow trout winterkilled due to severe drought. Chemical rehabilitation was considered, but at the request of the landowner a cool/warm water fishery was started. And as a result, yellow perch and black crappie were introduced in 1987, largemouth bass in 1988, and walleye in 1989. Rainbow trout are stocked periodically to supplement the fishery and in 2005, 10,000 four-inch rainbow trout were stocked in late fall. In addition, 10,000 fingerling walleye were stocked in the spring of 2005 and 261 yellow perch were transplanted from the Havre Water District Ponds in Kremlin. In 2006, an additional 4,758 pre-spawn yellow perch were transplanted. Supplement plants of 3,880, 850, and 1,500 yellow perch occurred in 2007, 2008, and 2009.

Adult sport fish populations have been monitored since 1990 with two experimental gill net sets. In addition, trap netting and electrofishing occurs periodically. In 2005, 6 traps nets were set in the spring to capture adult black crappie for transporting to Home Run Pond. In addition a voluntary creel box was erected in the summer of 2005 and maintained through 2010 to determine angler use, catch, and satisfaction.

In 2010, gill net surveys suggest the population of all sport fish (walleye, northern pike, yellow perch, black crappie) remain well below population densities prior to 2000 (pre-drought years; Table 7). From 1999-2007 Bailey's Reservoir was used as donor source for adult yellow perch and black crappie. The extensive removal of spawning adult fish combined with low reservoir levels, and less than ideal spawning conditions could be the most likely explanation for population densities we have today.

Table 9. - Catch rate (CPUE (fish/net)), average length (TL, in.), and average weight (lb.) of northern pike, yellow perch, black crappie, rainbow trout, walleye, and white sucker in Bailey Reservoir, 1985 to 2010.

		Northern pike			Yellow Perch			Black Crappie			Rainbow Trout			Walleye			White Sucker		
Year	Nets	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)
1985	1	17	21.44	1.13	0	--	--	0	--	--	1	12.2	0.9	--	--	--	0	--	--
1990	3	8	18.1	1.23	11.33	7.7	0.26	7	5.7	0.1	0	--	--	--	--	--	0	--	--
1991	2	3.5	24.7	3.21	29	10.1	0.56	2	8.5	0.35	0	--	--	--	--	--	0	--	--
1992	2	3	26.8	4.29	17	8.1	0.29	8	4.7	0.08	0	--	--	--	--	--	0	--	--
1993	2	1	31.8	7.55	10.5	6.6	0.15	63.5	6.7	0.12	0	--	--	--	--	--	0	--	--
1994	2	3.5	20.1	2.59	19	6	0.1	21.5	6.3	0.14	0	--	--	--	--	--	0	--	--
1995										No Netting Conducted									
1996	2	7	23.8	3.54	43	7.2	0.19	7.5	6.8	0.21	0	--	--	--	--	--	0	--	--
1997										No Netting Conducted									
1998	2	1.5	22.2	2.43	66	8	0.26	16	9	0.44	0	--	--	--	--	--	0	--	--
1999										No Netting Conducted									
2000										No Netting Conducted									
2001										No Netting Conducted									
2002	2	0	0	0	16	9.9	0.49	15.5	11.2	0.82	0	--	--	1	25.7	6.79	1	17.9	2.41
2003										No Netting Conducted									
2004										No Netting Conducted									
2005	2	3.5	17.44	1.56	1.5	9.2	0.39	1	4.05	0.03	0	--	--	--	--	--	0	--	--
2006	2	16	17.23	1.2	3.5	7.29	0.28	0	--	--	0	--	--	6.5	9.54	0.31	0	--	--
2007	2	5.5	20.8	2.05	0.5	11.3	0.9	0	--	--	0	--	--	3	12.5	0.65	0	--	--
2008										No Netting Conducted									
2009	2	2	20.6	1.97	1	13	1.38	0	--	--	0	--	--	2	18.2	2.28	1	19	3.07
2010	2	0	--	--	0	--	--	0	--	--	0	--	--	0.5	19	2.22	0	--	--

Beaver Creek Reservoir

Beaver Creek Reservoir, located south of Havre, is a 200-acre reservoir, which has a maximum depth of 90 feet. Its proximity to the city of Havre makes this reservoir a valuable local resource and it has been managed intensively in recent years for a variety of species.

This reservoir was established as a rainbow trout fishery in 1975. However, the illegal introduction of northern pike (1980s) and yellow perch (1980s) has resulted in the rainbow trout fishery having varying success. As a result, the fisheries management plan was expanded to include other warm water species, which were introduced to control undesirable species and enhance the fishing opportunity within the reservoir. Currently this reservoir receives annual plants of 60,000 catchable size Eagle Lake, Erwin and Arlee rainbow trout.

In an effort to maintain the balance between the rainbow trout fishery and the warm water fishery, the use of live minnows for bait has been allowed since March of 2000. The regulation is intended to increase harvest of northern pike and perhaps open up a winter fishery for walleye. Though fishermen use live minnows regularly, a winter fishery for walleye has not developed. The trout daily limit was reduced from 5/day to 3/day in March of 2002 due to increasing fishing pressure.

Population Status of Adult and Young-of-Year Fishes

Adult fish populations were monitored at six fixed experimental gillnetting stations, which were established in 1986. Gillnetting was conducted over night utilizing three sinking and three floating experimental gill nets (6 net-days). The sinking and floating experimental gill nets measured 125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh. Fish were measured for total length (TL: inches) and weighed to the nearest 0.01 pound (lb). Prior to 1986, adult fish populations were monitored, however sampling was neither uniform, nor consistent enough to develop useful trend data on game fish population size, or

composition. As a result this data was excluded from analysis and is only included within the tables for reference to the illegal introduction of northern pike and yellow perch.

The abundance and reproductive success of sport and forage fishes were monitored at six predetermined stations. Beach seining was conducted in early August using a 100- x 9-foot x ¼ inch square mesh beach seine. The fish were sorted by species and counted.

Northern pike

Since their illegal introduction in the 1980s, northern pike abundance has maintained manageable levels within Beaver Creek Reservoir (Table 11). Northern pike populations are cyclical within Beaver Creek Reservoir, YOY catch had increased significantly in 2005 and 2006 and these fish have successfully been recruited into the population (Table 10 & 11). In 2007, the YOY catch was greatly reduced and no YOY northern pike were observed in 2008. Spring spawning conditions were favorable in 2009 and 2010 however, YOY catch of northern pike remain below historic averages (Table 10).

Yellow perch

Yellow perch were illegally introduced into Beaver Creek Reservoir in 1987. Since their introduction, yellow perch have thrived within the reservoir (Table 11). As a result Beaver Creek Reservoir is a popular ice fishing destination and has historically been a source of yellow perch for kids fishing ponds, such as Home Run Pond, in Glasgow.

Beaver Creek Reservoir's yellow perch population peaked in the late 1990s and while the relative abundance is good, it is currently at half the late 1990 levels due to drought and reduced spawning success (Table 10 & 11). While yellow perch populations remain low compared to 1990 levels they are steadily increasing and remain at favorable levels. The population still consists of numerous quality and preferred size fish (TL > 8 in.; Table 8). Yellow perch experienced higher spawning success in 2004, 2006, 2009, and 2010 as a result of increased water levels and flooded vegetation, (Table 10).

Walleye

Walleye were initially stocked in 1987 to provide a greater diversity of fishing opportunities within the reservoir. Natural reproduction is very limited within the reservoir and as a result, approximately 10,000 1.4-inch and 5,000 3-inch walleye fingerlings are stocked annually

Walleye within Beaver Creek Reservoir have high growth rates and relative weights (Table 10) due to abundant forage. As a result these walleye can be hard to catch and elude all but the best walleye fishermen. Since their initial introduction, high quality walleye have thrived within Beaver Creek Reservoir and below its dam.

Smallmouth bass

Smallmouth bass were first introduced in 1997 and were stocked annually until 2000. As a result of these efforts there is now a self-sustaining population of smallmouth bass in Beaver Creek Reservoir. While smallmouth bass had a low relative abundance during gill netting surveys (Table 11), due to selectivity of the gear, catches of 8 to 10 inch bass by anglers are common. In addition, several YOY were collected during summer seining surveys (Table 10).

Table 10. – Summary of young of year yellow perch (YP), white sucker (W SU), spottail shiner (SP SH), Iowa Darter (IOWA), fathead minnow (FH MN), largemouth bass (LMB), northern pike (NP), walleye (WE), and other fishes captured by beach seining in Beaver Creek Reservoir, 1980 to 2010.

Date	Sites	YP (yoy)	YP (adult)	W SU	SP SH	IOWA	FH MN	LMB	SMB (yoy)	SMB (adult)	NP (yoy)	NP (adult)	WE (yoy)	WE (adult)	Other Sp.[1]
Jul-80	5	--		650	--	0	42	--	--		--		--		46
Jul-81	5	--		1,671	--	0	75	12	--		--		--		38
Jul-82	5	--		7	--	0	0	54	--		0		--		0
Jun-83	5	--		46	--	0	0	5	--		5		--		0
Aug-84	7	--		189	--	10	0	4	--		0		--		0
Sep-85	5	--		2,648	--	11	0	33	--		3		--		7
May-86	4	--		1,749	0	2	0	0	--		1		--		24
Jun-86	6	--		3,132	0	2	0	0	--		1		--		1
Aug-86	6	--		134	0	8	0	2	--		9		--		0
Sep-86	6	--		1,111	0	34	29	184	--		6		--		11
Jul-87	6	1,968		2,276	1	24	3	0	--		20		11		3
Aug-87	6	2,315		973	0	59	1	16	--		19		19		5
Jun-88	6	20		17	0	6	0	0	--		1		3		0
Aug-88	6	4,973		62	1	4	0	0	--		1		2		0
Aug-89	6	50		48	603	0	0	0	--		2		4		5
Aug-90	6	42		1	93	2	0	0	--		2		0		1
Aug-91	6	8,642		348	835	0	0	0	--		17		0		4
Aug-92	6	1,888		492	156	4	0	0	--		4		0		0
Aug-93	6	42		0	355	11	0	0	--		27		0		0
Aug-94	6	707		49	181	0	0	0	--		11		0		0
Aug-95	6	7,210		6	1,438	0	0	0	--		13		0		0
Aug-96	6	51		261	248	7	0	0	0		5		7		0
Aug-97	6	17		31	193	6	0	0	8		13		2		0
Aug-98	6	872		0	141	0	0	0	41		6		1		0
Aug-99	6	592		4	87	0	0	0	16		7		2		0
Aug-00	6	402		1	190	0	1	0	12		3		23		0
Aug-01	6	357		10	216	0	0	0	8		0		3		0
Aug-02	6	333		0	592	0	0	0	7		0		93		0
Aug-03	6	557		19	2,355	2	0	0	9		15		1		0
Aug-04	6	1,545		0	0	1	0	0	5		2		2		0
Jul-05	6	185		3	1	0	0	0	0		36		12		0
Aug-06	6	1,154		8	608	0	0	0	12		32		11		0
Jul-07	6	253		0	0	0	0	0	13		4		9		0
Jul-08	6	113		0	0	0	0	0	2		0		0		0
Aug-09	6	1,177	135	0	3	0	0	0	1	1	15	1	63	1	0
Aug-10	6	0	491	0	0	0	0	0	6	0	0	0	2	4	0

[1] Consists of emerald shiners, northern redbelly dace, lake chub, western silvery/plains minnow, brassy minnow, and longnose dace

Table 11.- Summary of relative abundance (catch per unit effort (CPUE)), average total length, and relative weights of fishes collected in fall gillnetting surveys in Beaver Creek Reservoir, 1974-2010.

			Rainbow Trout			Yellow Perch			Northern Pike			Smallmouth bass			Walleye			Longnose sucker		White sucker	
Date		Nets	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	CPUE (fish/net)	Ave TL (in.)
Sep-74	1974	3	24.00	10.91	111.26	--	--	--	--	--	--	--	--	--	--	--	--	7.33	10.49	82.33	10.23
Nov-77	1977	3	35.00	10.05	86.31	--	--	--	--	--	--	--	--	--	--	--	--	2.33	9.66	113.00	9.75
Sep-80	1980	3	23.33	10.12	81.04	--	--	--	--	--	--	--	--	--	--	--	--	1.33	6.33	156.00	8.86
Sep-81	1981	3	7.33	10.88	82.77	--	--	--	--	--	--	--	--	--	--	--	--	6.67	8.78	165.33	8.70
Oct-82	1982	3	8.33	11.78	99.67	--	--	--	2.33	15.79	109.67	--	--	--	--	--	--	3.33	9.66	109.67	9.69
Oct-83	1983	3	3.33	11.79	94.66	--	--	--	3.67	25.10	117.07	--	--	--	--	--	--	1.33	--	98.33	--
Sep-84	1984	3	3.00	11.26	95.43	--	--	--	3.67	26.64	111.21	--	--	--	--	--	--	0.67	11.00	58.33	10.50
Sep-86	1986	6	15.00	11.50	98.90	--	--	--	4.17	16.68	109.86	--	--	--	--	--	--	0.00	--	42.00	--
Sep-87	1987	6	11.33	13.61	92.06	0.33	6.30	--	5.17	22.43	91.71	--	--	--	0.00	--	--	0.00	--	18.00	--
Sep-88	1988	6	9.67	14.74	90.40	8.17	5.93	105.50	3.00	27.55	123.61	--	--	--	0.67	10.58	86.48	4.00	--	14.00	--
Sep-89	1989	6	10.67	13.15	93.45	9.17	7.59	96.04	1.17	30.31	94.56	--	--	--	0.00	--	--	2.50	--	14.33	4.13
Sep-90	1990	6	18.50	11.96	88.66	4.00	8.51	95.13	0.67	20.95	100.49	--	--	--	2.67	13.69	81.72	9.17	8.04	9.67	14.12
Sep-91	1991	6	15.50	12.78	93.26	12.00	7.39	103.98	2.33	16.57	95.37	--	--	--	5.67	13.98	90.24	2.83	--	8.17	--
Sep-92	1992	6	13.67	13.74	93.42	6.00	6.37	91.54	3.33	25.64	113.39	--	--	--	2.33	17.84	94.80	1.33	--	7.67	--
Sep-93	1993	6	3.17	16.43	94.48	12.33	7.20	109.06	2.00	27.49	100.01	--	--	--	3.33	16.75	95.36	0.00	--	8.67	--
Sep-94	1994	6	27.67	11.73	99.87	23.83	7.65	101.80	2.83	25.52	114.54	--	--	--	1.67	17.39	103.33	0.00	--	6.00	--
Sep-95	1995	6	20.17	13.42	96.73	20.00	7.71	102.97	3.50	21.66	96.62	--	--	--	2.50	17.96	90.90	0.00	--	12.83	--
Sep-96	1996	6	7.83	12.56	96.59	38.00	7.58	105.79	2.83	24.86	103.02	0.17	10.10	119.26	3.33	16.68	96.53	0.00	--	11.00	3.75
Sep-97	1997	6	6.83	13.00	91.31	39.50	7.22	94.54	4.17	21.70	99.11	0.00	--	--	2.17	17.65	96.90	0.00	--	6.17	--
Sep-98	1998	6	4.50	15.53	86.75	47.17	7.55	93.84	4.83	24.43	94.79	0.33	11.65	114.91	4.33	18.04	96.05	0.00	--	10.17	13.74
Sep-99	1999	5	4.20	12.26	104.04	40.60	8.39	93.18	2.20	24.17	105.00	0.80	8.95	119.90	4.40	15.24	95.74	0.20	17.30	4.60	13.39
Sep-00	2000	6	1.00	15.07	93.40	25.00	7.52	96.67	2.50	25.33	99.20	0.50	7.80	104.56	4.67	16.66	96.31	0.00	--	4.17	0.00
Sep-01	2001	6	14.50	12.09	92.76	30.67	7.39	100.86	1.00	27.73	96.81	0.17	10.40	108.60	4.50	13.93	93.62	0.17	17.10	8.67	14.72
Sep-02	2002	6	3.33	11.98	96.85	21.67	7.98	100.11	1.17	25.76	96.31	0.50	9.43	99.04	7.67	14.90	89.57	0.17	--	5.33	--
Sep-03	2003	5	15.80	11.46	102.26	12.20	7.94	125.10	2.00	13.90	108.18	0.20	10.40	96.53	3.60	14.74	101.16	0.00	--	2.60	--
Sep-04	2004	6	12.83	11.62	93.09	16.17	8.34	99.43	0.67	23.90	103.89	0.33	8.20	103.42	2.50	15.32	68.68	0.17	19.20	5.17	15.99
Sep-05	2005	6	5.50	13.63	97.00	12.33	8.35	102.88	0.50	29.23	104.05	0.00	--	--	3.33	15.29	96.82	0.00	--	6.00	16.57
Sep-06	2006	6	3.00	13.38	143.90	23.00	7.71	101.30	1.50	26.94	97.10	0.00	--	--	3.00	15.08	98.10	0.00	--	3.00	16.89
Sep-07	2007	6	9.00	11.80	95.70	29.33	7.90	107.00	1.67	27.50	101.50	0.17	9.20	107.20	5.17	12.80	103.80	0.00	--	17.00	17.20
Sep-08	2008	6	10.00	12.05	104.30	26.50	8.01	102.48	1.00	28.10	97.53	0.17	14.00	113.20	2.67	19.80	94.20	0.00	--	1.83	16.89
Sep-09	2009	6	4.00	11.80	100.90	20.00	8.20	100.40	2.33	26.40	95.16	0.17	15.70	124.59	3.67	18.26	104.72	0.00	--	0.83	16.90
Sep-10	2010	6	3.67	12.12	110.10	19.20	7.35	106.30	0.83	24.32	92.23	0.17	10.20	113.73	1.33	14.48	87.10	0.00	--	1.17	16.59

Fresno Reservoir

Fresno Reservoir, located 12 miles northwest of Havre, was built in 1939 for irrigation purposes along the Milk River. Fresno is a highly fluctuating mainstem reservoir of 5,757 surface acres with a mean depth of 27 feet, and a maximum depth of 48 feet. Fresno was initially developed as a rainbow trout fishery in the 1940's and 50's, however an illegal introduction of northern pike in the 1940's resulted in a severe decline in the rainbow trout fishery. As a result, Fresno was developed as a warm-water fishery and walleye, yellow perch, crappie, largemouth bass, smallmouth bass, Lake Superior whitefish, emerald shiner, and spottail shiners were introduced. Over the years, kokanee salmon, brown trout, and rainbow trout have been introduced to supplement the fishery when walleye and northern pike populations were low.

The fishery in Fresno has fluctuated throughout the years due to high fluctuations in water levels. On average, water levels in Fresno fluctuate 21.1 feet per year. The timing of this fluctuation greatly impacts the reproduction and survival of forage and sport fish. The fishery in Fresno was severely decreased in 2001 and 2002 when severe drought reduced the reservoir to 8% and 4% of storage capacity, respectively. Forage fish populations were drastically reduced and abundance and condition of key sport fish was at an all time low. As a result, 170,000 pre-spawn adult yellow perch were introduced to increase population levels so that when water levels increased, forage fish populations could rebound. In addition, 100,000 walleye fingerlings have been stocked annually since 2003.

In 2004, water levels increased and flooded shoreline vegetation, allowing the successful spawning and recruitment of forage fishes. From 2005 to 2010, water levels remained high during spring spawning and early summer rearing allowing sport and forage fish populations to rebound. The continued recovery of the fishery is dependent on maintaining water levels that will allow the successful spawning, recruitment, and overwintering of forage and sport fishes.

Population Status of Young-of-Year Fishes

The abundance and reproductive success of sport and forage fishes were monitored at 12 fixed sites, which were established in 1968. Beach seining was conducted in late summer using a 100- x 9-foot x ¼ inch square mesh beach seine. Fish were sorted by species and counted.

Historically, the abundance of YOY fishes has been dictated by the timing and annual fluctuations in water levels within Fresno Reservoir. The timing of this fluctuation greatly impacts the reproduction and survival of forage and sport fish. The extreme draw down of Fresno in 2001 and 2002 greatly reduced the population levels of most fishes in Fresno except for sauger, which took advantage of the increased riverine habitat (Table 12).

Since 2002, YOY forage and sport fish populations have been increasing and hopefully will continue to recover. While the reservoir levels were reduced, vegetation regenerated along the shoreline and provided spawning habitat for forage and sport fish when water levels increased in 2003. As a result, forage fish such as yellow perch, emerald shiners, and spottail shiners as well as black crappie and northern pike successfully spawned (Table 12).

The yellow perch population is trying to recover and will only increase if water levels are maintained during spawning and rearing stages (April-September). Northern pike YOY levels have fluctuated throughout the years, however the population appears to be on the upward trend. From 2008-2010, Fresno filled to capacity and flooded a substantial amount of shoreline vegetation creating prime spawning and rearing habitat. Summer seining efforts revealed walleye, northern pike, yellow perch, spottail shiner, and black crappie, have all benefited from this rise in water levels with excellent reproduction and survival, the timing and duration of high water levels directly impacts the spawning success of all species (Table 12).

Table 12. – A summary of forage fish and young-of-year forage and sport fish collected using a 100- x 9-foot x ¼ inch square mesh beach seine in Fresno Reservoir, 1968-2010.

Year	Seine Hauls	*Xyraders*	Walleye	Sauger	Northern Pike	YP (yoy)	YP (adult)	Emerald Shiner	Crappie Sp.	Spottail Shiner	Sucker sp.[1]	Minnow sp.[2]	Other[3]
1968	12	16	--	--	6	2,909	--	147	552	0	0	161	0
1969	12	4	--	--	6	1,140	--	385	67	0	2	380	0
1970	12	27	--	--	45	10,151	--	521	883	0	1	122	0
1972	12	102	--	--	22	1,005	--	205	379	0	0	72	0
1974	12	13	--	--	59	1,583	--	29	1,355	0	0	25	0
1975	11	10	--	--	32	4,154	--	155	59	0	0	0	0
1978	12	22	--	--	42	10,684	--	12	3	0	0	0	0
1979	12	29	--	--	45	8,516	--	340	127	0	1	0	1
1982	12	102	--	--	70	8,993	--	121	166	0	0	0	3
1983	12	23	--	--	0	2,254	--	448	9	0	1	7	0
1984	12	247	--	--	0	197	--	375	0	2	40	55	0
1985	12	64	--	--	0	379	--	684	3	2	0	9	0
1986	12	0	--	--	23	6,077	--	142	2	20	1	5	1
1987†	12	80	--	--	113	6,233	--	1,979	7	3	0	3	0
1988	12	53	--	--	4	3,122	--	182	0	20	0	1	0
1989†	12	56	--	--	32	24,706	--	22	0	16	2	0	0
1990	12	8	--	--	57	2,033	--	7	465	44	1	2	0
1991†	12	8	--	--	36	3,425	--	0	42	53	0	0	0
1992†	12	45	--	--	2	6,550	--	28	0	48	0	1	0
1993†	12	24	--	--	9	5,595	--	12	2	162	0	0	0
1994†	12	19	--	--	19	2,960	--	3	287	1,421	1	0	0
1995	12	5	--	--	2	1,080	--	0	2	129	0	1	0
1996†	12	52	--	--	21	3,576	--	0	1	1,484	42	0	0
1997†	12	46	--	--	15	3,006	--	2	1	887	2	0	0
1998†	12	44	--	--	1	1,413	--	9	0	1,041	1	3	0
1999	12	50	--	--	7	4,271	--	176	12	182	13	0	0
2000	6	29	--	--	0	1,396	--	2	2	30	2	0	1
2001	6	86*	--	--	0	39	--	3	0	3	3	1	0
2002	12	28*	--	--	2	86	--	128	400	154	4	29	0
2003†	12	4	--	--	46	1,871	--	5,539	90	207	0	0	1
2004†	12	--	12	2	10	2,898	--	69	48	56	0	2	1
2005†	12	--	26	2	19	934	--	39	15	39	0	0	0
2006†	12	--	27	0	57	2,283	--	80	5	923	0	0	0
2007†	12	--	7	0	13	769	--	68	54	1,106	2	0	0
2008†	12	--	65	0	1	2,329	--	5	721	287	11	0	0
2009†	12	--	24	0	24	1,427	224	13	25	716	1	0	0
2010†	12	--	10	0	7	1,247	4	6	4,517	849	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, pumpkinseed sunfish, and brook sticklebacks

† Years in which walleye fry or fingerling were stocked

*Primarily Sauger

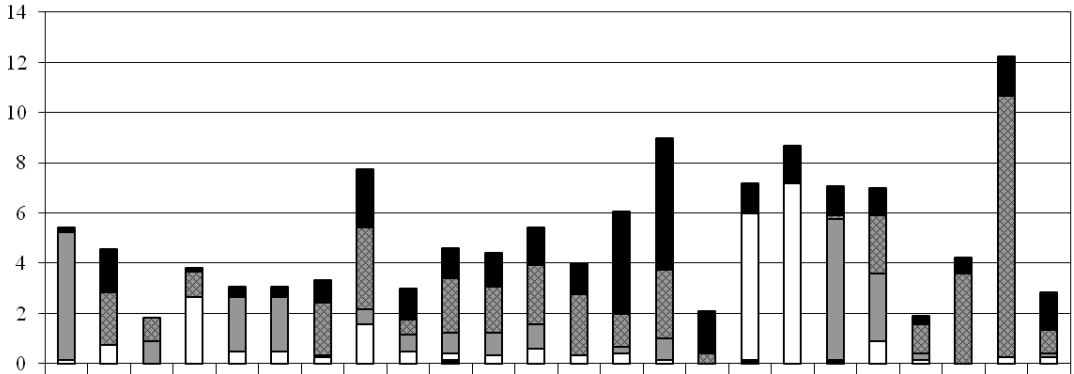
Population Status of Adult Fishes

Adult fish populations were monitored from 1965 to 1974, using systematic gill netting at predetermined stations. Sampling at 12 predetermined stations was resumed in 1987 to determine changes in sport fish abundance and species composition. Samples were collected over two days utilizing six sinking multi-filament experimental gill nets each day (12 net-days). The sinking multi-filament experimental gill nets measuring 125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh. Fish were measured for total length (TL) to the inch and weighed to the nearest 0.01 pound. Prior to 2005, scales were collected for aging from all walleye and sauger. From 2005 to 2010, otoliths were collected from walleye for aging and oxytetracycline (OTC) analysis.

Lake Superior Whitefish

Lake Superior whitefish (whitefish) in Fresno Reservoir historically have comprised a significant portion of the gill net catch (Figure 4), but are rarely utilized by anglers. Whitefish exhibit high growth rates in the reservoir, and thereby escape predation from all but the largest walleye and northern pike. Whitefish appear to reproduce successfully in years of stable over-winter storage.

Figure 4. - Relative abundance and size structure of lake whitefish collected with sinking experimental gill nets in Fresno Reservoir, 1987-2010.



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>18.0 in.)	0.08	1.75	0.00	0.17	0.42	0.42	0.92	2.33	1.25	1.17	1.33	1.50	1.25	4.08	5.25	1.67	1.17	1.42	1.17	1.08	0.333	0.66	1.583	1.5
Preferred (14.0-17.9 in.)	0.08	2.08	0.92	1.00	0.00	0.00	2.08	3.25	0.58	2.17	1.83	2.33	2.42	1.33	2.75	0.42	0.00	0.00	0.17	2.33	1.17	3.5	10.42	0.917
Quality (11.0-13.9 in.)	5.08	0.00	0.92	0.00	2.17	2.17	0.08	0.58	0.67	0.83	0.92	1.00	0.00	0.25	0.83	0.00	0.00	0.08	5.58	2.66	0.25	0.08	0	0.166
Stock (6.0-10.9 in.)	0.08	0.75	0.00	2.67	0.50	0.50	0.25	1.58	0.50	0.25	0.25	0.58	0.33	0.42	0.17	0.00	5.83	7.17	0.00	0.92	0.167	0	0.167	0.25
Sub Stock (<6.0 in.)	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.08	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.17	0.00	0	0	0.083	0

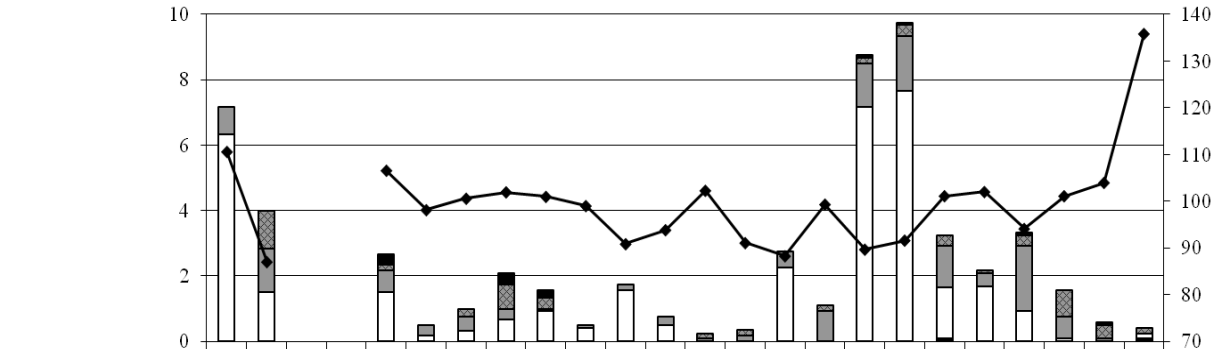
Yellow Perch

The yellow perch fishery in Fresno has been negatively impacted by drought over the last eight years. As a result of extreme draw downs in 2001 and 2002, yellow perch were not able to successfully spawn (Table 12) and population levels were drastically reduced (Figure 5). To remedy this situation, 170,000 pre-spawn adult yellow perch were introduced from 2001 through 2004 to increase population levels so when water levels increased these forage fish populations might rebound. In 2003 and 2004, water levels increased, flooding shoreline vegetation, and allowing the successful spawning and recruitment of forage fish and stocking of pre-spawn perch was discontinued in 2005.

Since stocking of adult yellow perch was discontinued in Fresno Reservoir, the abundance of adult yellow perch has decreased and is similar to pre-drought levels (Figure 5). In addition, the proportion of stock size fish in the population indicates that YOY fish have successfully recruited into

the population. However, low water levels throughout the fall and winter months limit good rearing habitat and increase the vulnerability of YOY yellow perch to predation.

Figure 5. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Fresno Reservoir, 1987-2010.

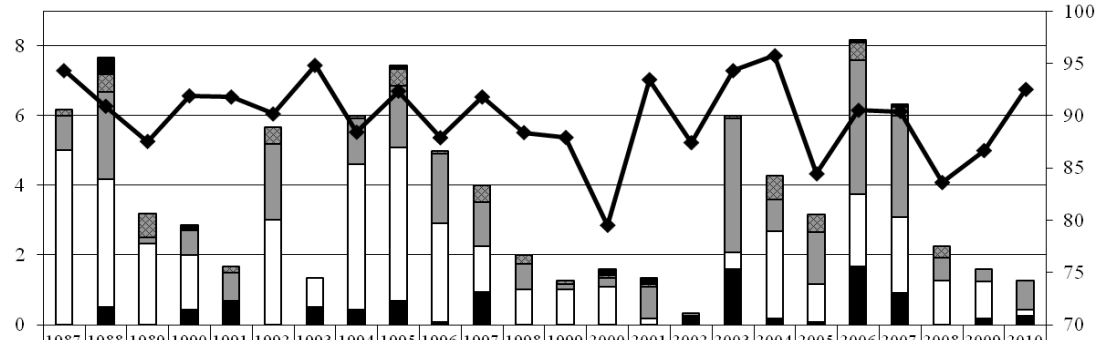


	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>12 in.)	0	0	0	0	0.33	0	0	0.33	0.25	0	0	0	0	0	0	0	0.08	0.08	0	0	0.083	0	0.083	0
Preferred (10-11.9 in.)	0	1.17	0	0	0.17	0	0.25	0.75	0.33	0	0	0	0.17	0.17	0	0.17	0.17	0.33	0.33	0.08	0.333	0.833	0.417	0.167
Quality (8-9.9 in.)	0.83	1.33	0	0	0.67	0.33	0.42	0.33	0.08	0.08	0.17	0.25	0.08	0.17	0.5	0.92	1.33	1.67	1.25	0.42	2	0.667	0.083	0
Stock (5-7.9 in.)	6.33	1.5	0	0	1.5	0.17	0.33	0.67	0.92	0.42	1.58	0.5	0	0	2.25	0	7.17	7.67	1.58	1.67	0.917	0.08	0	0.167
Sub Stock (<5 in.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08	0	0	0	0	0.083
Relative weight	110.6	86.99			106.6	98.12	100.6	101.9	101	98.99	90.84	93.84	102.3	91.07	88.25	99.3	89.66	91.6	101.1	102.0	94.1	101.1	104	135.8

Northern pike

Since the illegal introduction of northern pike in Fresno Reservoir in the 1940s, their population has fluctuated over the years (Figure 6). Extreme drought from 2000 to 2002 reduced the abundance of northern pike however, the population rebounded in 2003 with increased water levels and flooding of shoreline vegetation. Since 2003, reproduction has steadily increased with high numbers of YOY being collected during annual beach seining surveys. However, northern pike recruitment was significantly reduced in 2008 (Table 12).

Figure 6. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental gill nets in Fresno Reservoir, 1987-2010.



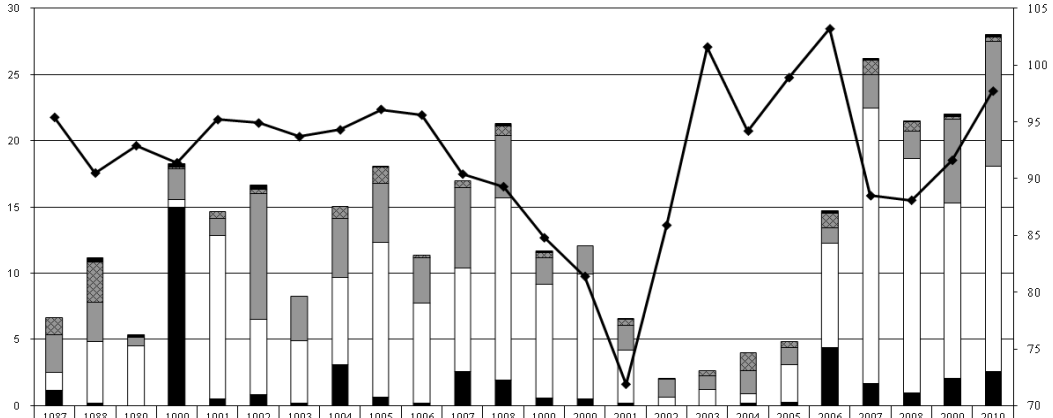
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>34 in.)	0.00	0.50	0.00	0.14	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.17	0.17	0.00	0.00	0.00	0.00	0.08	0.08	0	0	0
Preferred (28-33.9 in.)	0.17	0.50	0.67	0.00	0.17	0.50	0.00	0.08	0.50	0.08	0.50	0.25	0.08	0.08	0.08	0.00	0.08	0.67	0.50	0.5	0.25	0.333	0	0
Quality (21-27.9 in.)	1	2.5	0.17	0.71	0.83	2.17	0	1.33	1.75	2	1.25	0.75	0.17	0.25	0.92	0.08	3.83	0.92	1.5	3.83	2.917	0.667	0.333	0.833
Stock (14-20.9 in.)	5.00	3.67	2.33	1.57	0.00	3.00	0.83	4.17	4.42	2.83	1.33	1.00	1.00	1.08	0.17	0.00	0.50	2.50	1.08	2.08	2.167	1.25	1.08	0.167
Sub Stock (<14 in.)	0.00	0.50	0.00	0.43	0.67	0.00	0.50	0.42	0.67	0.08	0.92	0.00	0.00	0.00	0.00	0.25	1.58	0.17	0.08	1.67	0.917	0	0.167	0.25
Relative weight	94.29	90.89	87.52	91.88	91.77	90.15	94.79	88.41	92.34	87.88	91.78	88.37	87.90	79.51	93.43	87.41	94.29	95.72	84.43	90.50	90.4	83.6	86.65	92.5

Walleye

From 2003 to 2010 approximately 100,000 fingerlings were stocked annually in Fresno Reservoir. In 2006, 200,000 fingerling walleye were stocked due to unallocated productions at the Ft. Peck fish hatchery.

In 2007, walleye were at their highest abundance levels on record (CPUE=26.25 fish/net; Figure 7) indicating excellent survival and recruitment of stocked YOY walleye, especially the 2005 and 2006-year class. In 2008 and 2009, walleye abundance decreased slightly (CPUE=21.5 and 22.05 fish/net; Figure 7), but re-main well above abundances observed in the late 1990s and early 2000s. With several years of excellent water levels to produce abundant forage, walleye abundance was at an all time high in 2010 with CPUE=28 fish/net.

Figure 7. - Relative abundance, size structure, and relative weight of walleye in Fresno Reservoir for the years 1987-2010.



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>25 in.)	0	0.33	0.17	0.29	0	0.33	0	0	0.08	0	0	0.25	0.08	0	0.08	0	0	0	0	0.25	0.17	0.08	0.166	0.166
Preferred (20-24.9 in.)	1.33	3	0	0.14	0.5	0.33	0	0.92	1.25	0.17	0.5	0.67	0.42	0	0.42	0.08	0.42	1.33	0.42	1.08	1.08	0.67	0.166	0.333
Quality (15-19.9 in.)	2.83	3	0.67	2.29	1.33	9.5	3.33	4.5	4.42	3.42	6.08	4.75	2	2.17	1.92	1.33	1	1.75	1.33	1.17	2.5	2.08	6.33	9.42
Stock (10-14.9 in.)	1.33	4.67	4.5	0.57	12.33	5.67	4.75	6.58	11.67	7.58	7.83	13.75	8.58	9.42	4	0.67	1.25	0.75	2.83	7.83	20.83	17.67	13.25	15.5
Sub-stock (<10 in.)	1.17	0.17	0	15	0.5	0.83	0.17	3.08	0.67	0.17	2.58	1.92	0.58	0.5	0.17	0	0	0.17	0.25	4.42	1.67	1	2.083	2.58
Relative weight	95.4	90.5	92.9	91.4	95.2	94.9	93.7	94.3	96.1	95.6	90.4	89.3	84.8	81.4	71.9	85.9	101.6	94.2	98.9	103.2	88.5	88.1	91.62	97.71

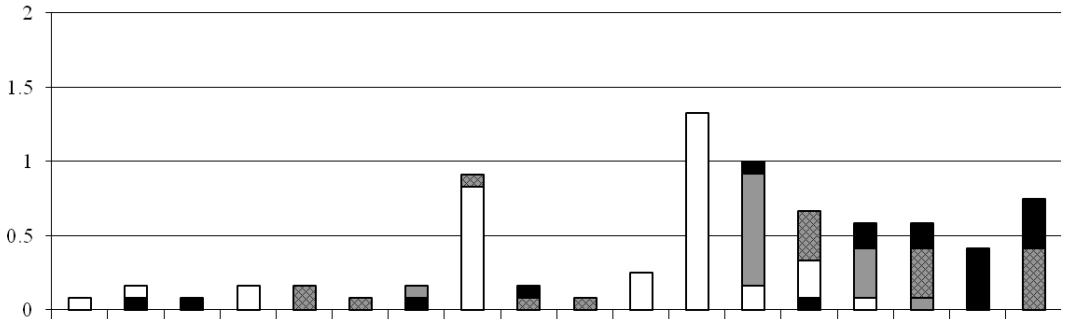
Sauger

Sauger populations have been relatively low in Fresno Reservoir since the construction of the Fresno Dam. Sauger have been captured periodically primarily in the upper reservoir where the Milk River enters Fresno Reservoir. Sauger populations increased in 2001 and 2002 when drought and extreme drawdowns resulted in an increase in riverine habitat (Table 12), however no sauger were collected in 2010.

Black Crappie

Black crappies were most likely introduced into Fresno in the 1950s however the first record of stocking occurred in 1991. Since 1968, YOY crappie numbers have fluctuated. In 2010, YOY black crappie abundance was the highest on record since 1974 (Table 12). However the population of adult black crappie has remained relatively low (CPUE range = 0.17 to 1.33 fish/net; 1999 to 2010) and may be misconstrued due to sampling gear bias.

Figure 8. - Relative abundance and size structure of black crappie collected with sinking experimental gill nets in Fresno Reservoir, 1987-2010.



	1987	1988	1991	1992	1994	1996	1997	1998	1999	2000	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>12.0 in.)	0	0	0	0	0	0	0	0	0.083	0	0	0	0.083	0	0.166	0.166	0.416	0.333
Preferred (10.0-11.9 in.)	0	0	0	0	0.166	0.083	0	0.083	0.083	0.083	0	0	0	0.333	0	0.333	0	0.417
Quality (8.0-9.9 in.)	0	0	0	0	0	0	0.083	0	0	0	0	0	0.75	0	0.333	0.083	0	0
Stock (5.0-7.9 in.)	0.083	0.083	0	0.166	0	0	0	0.83	0	0	0.25	1.33	0.166	0.25	0.083	0	0	0
Sub Stock (<5.0 in.)	0	0.083	0.083	0	0	0	0.083	0	0	0	0	0	0	0.083	0	0	0	0

Blaine County Ponds

Select waters throughout Blaine County were sampled to determine fish abundance using sinking multi-filament experimental gill nets measuring125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh unless otherwise specified. Voluntary creel boxes were maintained at many of the ponds to determine fishing pressure, catch rates, and satisfaction.

April Reservoir

April Reservoir is a 2-acre BLM reservoir located approximately 10 miles northeast of Zurich. The dam was constructed in 2001 and BLM personnel notified FWP about the potential for a new fishery. In 2010, one gill and trap net were set overnight to determine if any fishes existed within the reservoir and a thorough depth profile was done to determine if water levels were sufficient enough to sustain a fishery. The nets contained no fish and the depth profile found a max depth of 12 feet. April Reservoir will be stocked in the spring of 2011 with either bluegill or rainbow trout and survival of fish will be monitored closely thereafter.

BR 012

BR 012 is a 68-acre reservoir located on BLM lands 10 miles north of Zurich. The reservoir was first stocked with largemouth bass in 1937. Black bullhead, black crappie, bluegill, channel catfish, and rainbow trout have all been stocked periodically since then. BR 012 has always had a problem with winterkills to the species stocked and in 2008 a windmill aeration system was installed to reduce the chances for winterkill.

In 2010, two gill nets and four trap nets were set overnight to determine the aeration system efficiency at the reservoir. Gill nets contained no fish and the trap nets combined total 1,024 fathead minnows. Water levels on BR 012 rarely fluctuate more than 3 feet/year however, depths within the reservoir are too shallow to sustain any sport fishery and the aeration system was removed and there are no plans to continue any stocking of sport fish. In the future BR 012 should be disease tested for fathead minnows to be used as a donor source for other bodies of water.

BR 013

BR 013 is a 10-acre BLM reservoir located approximately 13 miles northeast of Zurich. In 2010 BLM personnel notified FWP about the potential for a new fishery. One gill and trap net were set overnight to determine if any fishes existed within the reservoir and a thorough depth profile was done to determine if water levels were sufficient enough to sustain a fishery. The nets contained no fish and the depth profile found a max depth of 8 feet. The depth profile suggests there isn't enough depth in BR 013 to overwinter any species of fish and there are no future plans to stock fish in BR 013.

BR 047

BR 047 is a 11-acre BLM reservoir located approximately 6 miles north of Zurich. The reservoir first stocked in 1940 with largemouth bass and black crappie, bluegill were stocked in 1943. Water levels rarely fluctuate more than one foot/year on BR 047 and in 2010 one gill net and two trap nets were set overnight to determine the fish composition and a depth profile was conducted to determine overwinter survival of game species. The gill net contained no fish and the trap nets combined captured 120 fathead minnows. The depth profile found a max depth of 11 feet. BR 047 will be stocked in 2011 with either rainbow trout or largemouth bass and bluegill. A windmill aeration system will be installed to increase likely survival of fish through the winter months.

Cow Creek Reservoir

Cow Creek Reservoir is a privately owned 65-acre pond located in the Bears Paw Mountains. Cow Creek Reservoir has been managed as a warm water fishery since 1994. Since 1994, walleye, channel catfish, black crappie, and tiger muskie have been stocked and yellow perch were illegally introduced in 2001. In 2007, 5,000 walleye, 3,000 channel catfish, and 820 7 inch tiger musky were stocked into Cow Creek Reservoir. Starting in 2008, 5,000 walleye and 1,000 channel catfish will be stocked in alternate years. Tiger Musky will be stocked on an as need basis. In 2010 12,000 pre-spawn yellow perch were transferred and stocked into Cow Creek Reservoir from the Kremlin Water Ponds. The primary food sources for these sport fish are white suckers, fathead minnows, golden shiners, and northern red belly dace.

The dam at Cow Creek Reservoir has been eroding at a rapid rate since 2006 due to small and limited amounts of rip-rap combined with a dam face that is directly hit by prevailing westward winds. In 2010 the landowners along with FWP have agreed to design and fund a dam restoration project to fill, re-slope, and place larger rock rip-rap at Cow Creek Reservoir.

Catch rates for all species were low in 2010 when compared to long-term averages. Walleye average lengths continue to be low and anglers are voicing their dissatisfaction. More yellow perch will be planted in 2011 to establish a self sustain population within the reservoir with hopes of increasing the forage for walleye.

Table 13. Catch rate (CPUE (fish/net)) and average length of yellow perch, channel catfish, white sucker, walleye, and tiger muskie using gill nets in Cow Creek Reservoir (1994-2010).

		Yellow Perch		Channel Catfish			White Sucker		Walleye			Tiger Muskie	
Date	Nets	CPUE	Ave. Length	CPUE	Ave. Length	Rel. Weight	CPUE	Ave. Length	CPUE	Ave. Length	Rel. Weight	CPUE	Ave. Length
Aug-94	2.0		--	0.0	--		2.0	--	23.5	7.2		0.0	--
Sep-95	1.0	0.0	--	0.0	--		2.0	--	15.0	10.0	82.5	0.0	--
Sep-96	2.0	0.0	--	5.0	9.1	116.1	1.0	--	48.0	11.1	82.3	0.0	--
Sep-97	2.0	0.0	--	9.5	10.5	118.1	1.0	--	30.5	11.9	86.9	0.0	--
Sep-98	3.0	0.0	--	6.3	13.9	107.7	7.0	14.6	11.3	13.2	87.1	0.0	--
Sep-01	2.0	0.5	5.6	4.5	17.0	103.7	0.5	--	12.5	13.3	94.7	0.5	15.7
May-03	2.0	0.0	--	11.0	19.5	115.7	8.0	15.9	1.0	13.0	97.0	1.5	19.4
Jul-05	2.0	1.0	9.8	9.0	21.3	104.3	6.0	17.6	8.0	14.7	85.5	0.0	--
Jul-06	2.0	1.5	9.6	9.5	21.5	108.4	7.0	17.6	12.0	13.0	87.1	0.0	--
Jul-07	2.0	0.5	10.3	7.0	23.5	118.8	0.0	--	7.5	11.8	92.2	1.5	21.5
Jul-08	2.0	0.0	0.0	6.0	14.4	120.4	2.5	18.1	4.5	9.3	90.5	0.0	0.0
Jun-09	2.0	0.5	10.4	8.0	22.7	111.3	1.5	15.2	13.0	10.0	96.1	0.5	19.7
Jun-10	2.0	0.5	5.8	0.5	13.4	135.9	2.5	17.1	7.0	9.8	97.3	0.0	0.0

Dunbar Pond

Dunbar pond is a 10-acre reservoir located in the Bear Paws Mountains on private property. The landowner (Judy Dunbar) contacted FWP about the reservoir becoming a possible fishery open to the public. In 2010, one gill net and one trap net were set overnight to inventory the fish community and a depth profile was done to assess summer and winter survival. The gill net contained one white sucker (TL=14.1 inches) and the trap net contained fathead minnows (n=6,004), white sucker (n=5), brassy minnows (n=30), brook stickleback (n=24), red belly dace (n=316), and western silvery/plains minnow (n=33). The depth profile found a maximum depth of 10 feet. Although the depth of the reservoir is borderline for overwinter survival the diversity of species currently present suggests that water quality would be good enough to sustain a population of coldwater species.

Floyd Flynn (Br 06)

Floyd Flynn reservoir is a small pond located on BLM land north of Chinook. This pond is designated by the BLM as a "kid's fishery" and has been managed as such since 2003. In 2003, bluegill, rainbow trout and channel catfish were introduced. In 2004 and 2005, 500 catchable size rainbow trout were stocked.

In 2005, rainbow trout (CPUE=0.21 fish/net hour; $\bar{x}$ TL=15.67 in.), bluegill (CPUE= 0.14 fish/net; $\bar{x}$ =4.0 in.), and channel catfish (0.07 fish/net; $\bar{x}$ =7.4 in.) were collected. Water levels have been marginal the last three years and stocking has since ceased. In 2008, gill netting sampled a total of 10 golden shiners (CPUE=10 fish/net) and one trap net sampled 1,160 golden shiners and one bluegill (TL=6.3 in.). In 2008, the voluntary creel box was maintained, however angler participation was low (n=1) and reported spring catch rates of 0.33 bluegill/hour.

In 2010, Floyd Flynn winterkilled and only golden shiners remain in the reservoir. During the summer Floyd Flynn golden shiners were disease tested and can now be used to transfer to other ponds for forage purposes.

Phillips County Fishing Waters

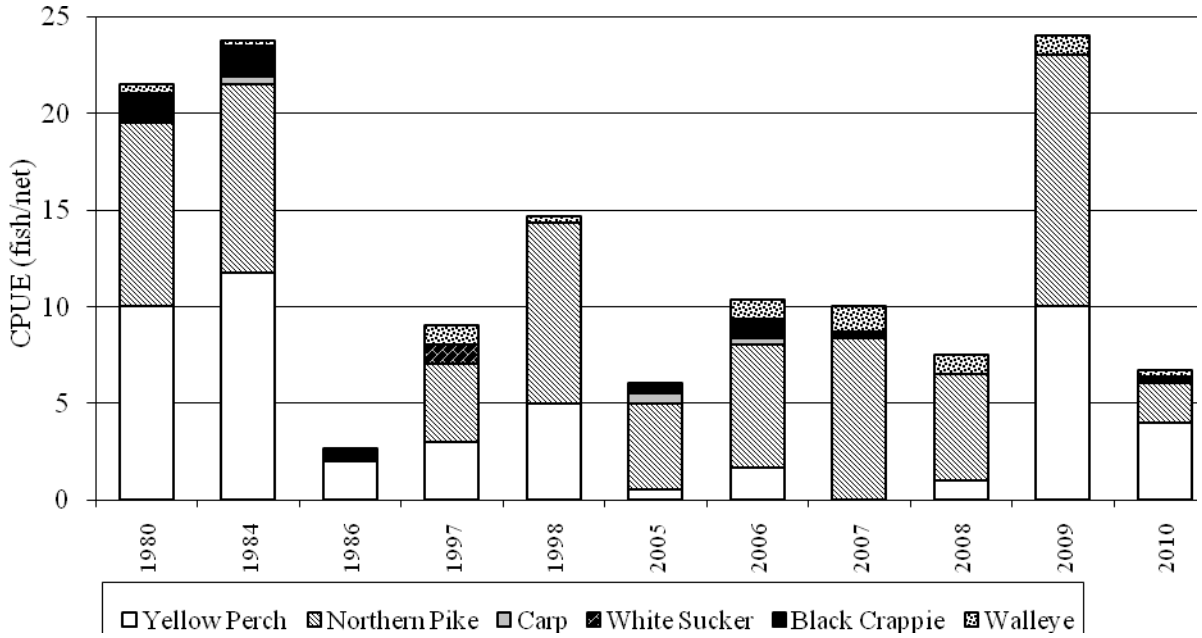
Select waters throughout Phillips County were sampled to determine fish abundance using sinking multi-filament experimental gill nets measuring 125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh. Voluntary creel boxes were maintained at many of the ponds to determine fishing pressure, catch rates, and satisfaction.

Ester Lake

Ester Lake is a 139-acre pond located on state land and has been managed as a fishery since the 1950s. In the 1960's Ester was a productive fishery with high numbers of yellow perch, black crappie, and walleye. Since the 1980s the fishery has been in decline and water levels have been marginal in recent years.

In 2009 and 2010, Ester received 8,000 and 2,600 pre-spawn yellow perch to boost the forage base that has been non-existent since the early 1980s (Figure 9). The supplemental plants of yellow perch have boosted the population and more yellow perch will be planted in 2011 along with fathead minnows or another forage species.

Figure 19. - Relative abundance of yellow perch, northern pike, carp, white sucker, black crappie, and walleye in Ester Lake (periodic sampling 1980 to 2010).



Hart Reservoir

Hart Reservoir is a privately owned reservoir located in Phillips County near Dodson. This reservoir has been stocked with rainbow trout from 2003 to 2006. In 2007 a gill netting survey was conducted and the reservoir was so low and overgrazed by cows that future stockings of rainbow trout were discontinued. In 2007, gill netting sampled a total of 7 rainbow trout, (CPUE=3.5 fish/net; $\bar{x}$ TL=9.5 in.), 42 yellow perch (CPUE=22 fish/net; $\bar{x}$ TL=7.5 in.), and one black crappie (TL=12.5 in.).

In 2010 Hart Reservoir received 1,500 rainbow trout and one gill and one trap net were set overnight to determine the success of stocking. The gill net contained no fish and the trap net had 30

fathead minnows, suggesting the reservoir summer killed due to low water levels (max depth was six feet). Future stockings will be ceased until water levels improve.

Nelson Reservoir

Nelson Reservoir, located 19 miles east of Malta, is an off-channel storage reservoir constructed in 1915 for irrigation purposes. At full storage capacity, Nelson covers approximately 4,320 surface acres, has a mean depth of 14.2 feet, and a maximum depth of 50 feet. Nelson is a relatively stable reservoir, which is not affected by drought as drastically as some reservoirs in the region with an average annual fluctuation of 8.36 feet.

Nelson was established as a fishery in the 1930s & 40s with the introduction of largemouth bass, crappie, bullheads, and rainbow trout. Commercial fishing for carp, buffalo, and goldeye was conducted in the 1920s, 30s, and in the mid 60s. Nelson has approximately 26 fish species and is managed primarily as a walleye fishery. Walleye reproduce naturally in Nelson; however walleye fry are occasionally stocked to augment natural reproduction. Spawning shoals were constructed in 1993 at three locations within the reservoir to improve the spawning habitat for walleye.

Population Status of Adult and Young-of-Year Fishes

Since 1993, adult fish populations were monitored at 10 fixed experimental gill netting stations. Gill netting was conducted over a two-day period utilizing five sinking experimental gill nets each day (10 net-days). The sinking multi-filament experimental gill nets measured 125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh. Fish were measured for total length (TL: inches) and weighed to the nearest 0.01 pound (lb). Otoliths were collected from walleye for aging and oxytetracycline (OTC) analysis.

Prior to 1991, adult fish populations were monitored, however sampling was neither uniform, nor consistent enough to develop useful trend data on game fish population size, or composition. As a result this data was excluded from all analysis.

The abundance and reproductive success of sport and forage fishes were monitored at nine predetermined stations. Beach seining was conducted in late July using a 100- x 9-foot x ¼ inch square mesh beach seine. Fish were sorted by species and counted.

Table 14. - A summary of forage fish and young-of-year forage and sport fish collected conducted at nine fixed sites using a 100- x 9-foot x ¼ inch square mesh beach seine in Nelson Reservoir, 1982-2010.

	Shorline Seined (ft)	Walleye	Yellow Perch	YP (Adult)	Northern Pike	Spottail Shiner	White Sucker	Black Crappie	Goldeye	Buffalo sp[1]	Smallmouth Bass	Longnose Sucker
1982	660	0	4,553	--	3	0	202	245	0	0	0	0
1983	1,420	4	138	--	18	0	543	238	0	0	0	0
1984	1,530	0	133	--	0	0	0	0	0	0	0	0
1985	510	3	2,272	--	16	1	16	67	1	0	0	0
1986*	700	0	3	--	7	0	10	232	0	0	0	0
1987*	495	5	1,987	--	0	4	45	10	7	0	0	0
1988*	520	0	783	--	0	1	0	35	0	0	0	0
1989*	910	10	736	--	4	43	1,503	135	0	0	0	0
1990	1,320	7	2,631	--	1	56	181	21	0	0	0	0
1991*	660	8	77	--	1	54	33	26	0	0	0	0
1992	635	21	140	--	6	387	175	18	0	4	0	0
1993*	520	3	8,287	--	1	520	2,688	62	0	0	0	0
1994*	830	6	1,802	--	10	621	697	49	0	0	0	0
1995*	760	36	232	--	0	3,780	180	163	0	0	0	0
1996*	870	25	4,521	--	13	21	101	0	0	0	0	0
1997*	890	53	2,205	--	0	159	534	1	0	0	0	0
1998*	340	0	126	--	0	33	235	4	0	0	0	0
1999	750	11	1,489	--	2	222	497	1	0	0	0	0
2000*	440	4	449	--	2	189	258	5	6	0	0	0
2001	430	2	72	--	1	27	800	88	0	0	0	0
2002*	415	2	19	--	4	8	38	482	21	62	0	0
2003	530	3	361	--	33	49	235	6,597	0	0	3	0
2004*	443	10	1,781	--	0	19	195	5	1	0	10	0
2005*	754	5	423	--	2	34	155	278	23	5	1	0
2006*	831	3	773	--	8	66	319	89	0	3	1	0
2007*	489	6	586	--	2	75	596	5	0	12	9	0
2008*	500	10	62	--	0	8	272	1,237	11	94	11	0
2009*	750	4	4,522	--	4	3	478	20	8	2	61	14
2010*	750	11	2,914	184	3	98	224	131	0	0	115	2

*Years in which walleye fry or fingerlings were stocked

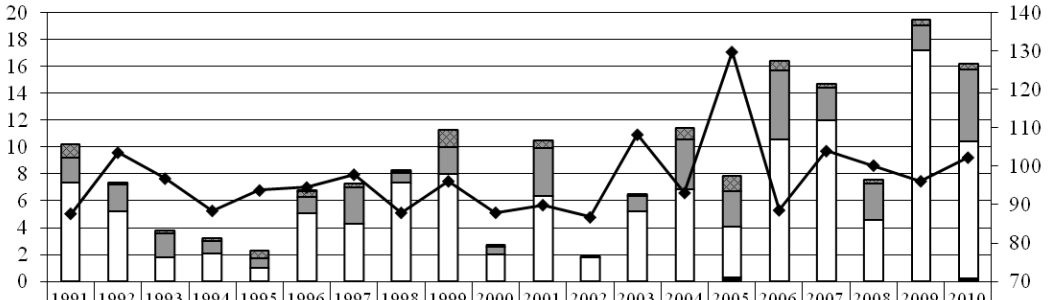
[1] Consists of bigmouth buffalo and smallmouth buffalo

Yellow Perch

The yellow perch fishery in Nelson Reservoir has been cyclic over the last 14 years due to drought and water fluctuations. In the early 1990s and in 2000 and 2002 the relative abundance of yellow perch was significantly reduced. However, since 2003 spring and summer rains and water retention improvements by the Bureau of Reclamation (BOR) have allowed water levels to flood shoreline vegetation and remain stable during crucial spawning and rearing periods.

In 2009, yellow perch numbers increased to their highest levels since 1991 and remained high in 2010 with 16 fish/net. Currently, the population of adult yellow perch consists mostly of stock (5-7.9 in.) and quality (8.0-9.9 in.) sized fish.

Figure 10. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Nelson Reservoir, 1991-2010.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>12 in.)	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0
Preferred (10-11.9 in.)	1.00	0.20	0.20	0.20	0.60	0.40	0.30	0.10	1.30	0.10	0.60	0.00	0.10	0.80	1.20	0.70	0.3	0.3	0.4	0.4
Quality (8-9.9 in.)	1.80	2.00	1.80	0.90	0.70	1.20	2.70	0.70	2.00	0.60	3.50	0.10	1.20	3.70	2.60	5.10	2.4	2.7	1.9	5.4
Stock (5-7.9 in.)	7.40	5.20	1.80	2.10	1.00	5.10	4.30	7.40	8.00	2.00	6.40	1.80	5.10	6.90	3.80	10.60	12	4.6	17.2	10.2
Sub Stock (<5 in.)	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.3	0	0	0	0	0.2
Relative weight	87.70	103.58	96.83	88.45	93.77	94.56	97.87	87.94	96.13	87.97	89.95	86.76	108.25	93.10	129.76	88.60	104	100.23	96.15	102.3

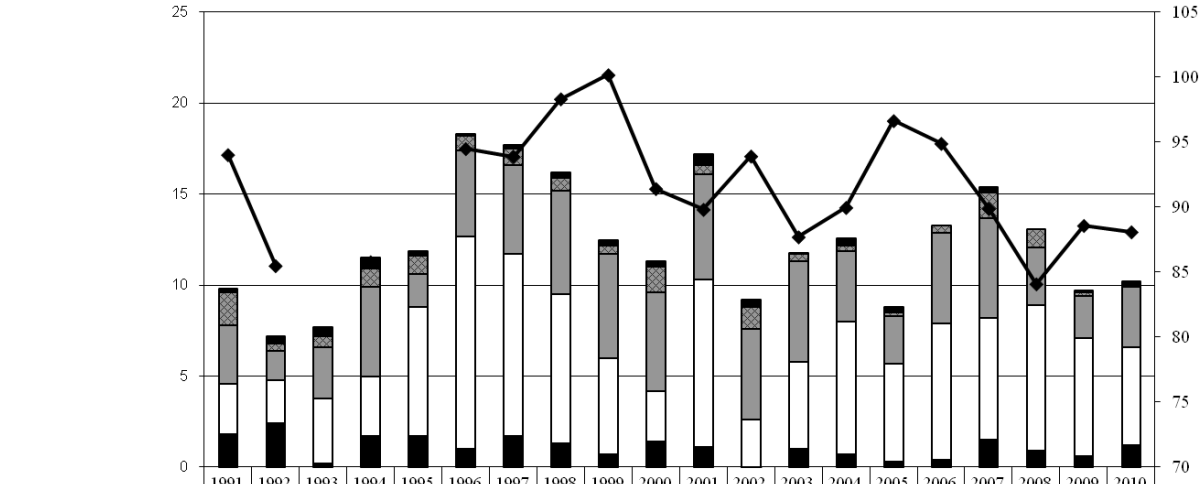
Walleye

Walleye fingerlings have been periodically stocked into Nelson Reservoir to augment natural reproduction. From 2002 to 2010 (with the exception to 2006), all walleye fingerlings stocked into Nelson Reservoir have been marked with 750 ppm OTC to allow the calculation of survival on stocked fish and to distinguish stocked fish from naturally reproduced fish. In 2006, only half of the walleye stocked were marked with OTC due to problems with reaction of the walleye to the chemicals.

Even with the addition of these fish, catch of YOY walleye during seining surveys remained low when compared to pre-drought levels (Table 14). However, the high proportion of stock (10-14.9 in.) and quality size (15.0-19.9 in.) walleye in the population indicates good survival of stocked YOY walleye from 2003 through 2010 (Figure 11).

The relative abundance of adult walleye has remained relatively stable over the last five years with a minor decrease in catch rates in 2005, 2009, and 2010 (Figure 11).

Figure 11. - Relative abundance, size structure, and relative weight of walleye collected with sinking experimental gill nets in Nelson Reservoir, 1991-2009.

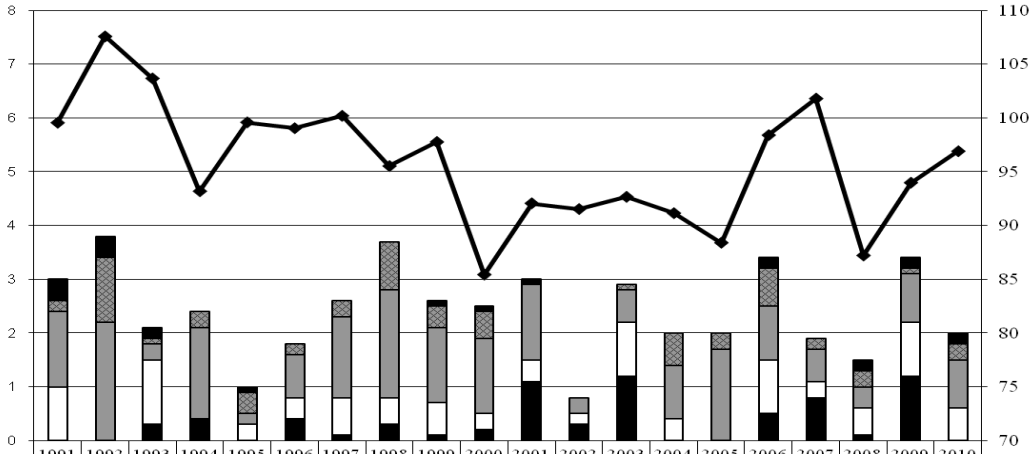


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>25 in.)	0.20	0.40	0.50	0.60	0.30	0.10	0.20	0.30	0.30	0.30	0.60	0.40	0.10	0.40	0.30	0.00	0.3	0	0.1	0.2
Preferred (20-24.9 in.)	1.80	0.40	0.60	1.00	1.00	0.80	0.90	0.70	0.50	1.40	0.50	1.20	0.40	0.30	0.20	0.40	1.4	1	0.2	0.1
Quality (15-19.9 in.)	3.20	1.60	2.80	4.90	1.80	4.70	4.90	5.70	5.70	5.40	5.80	5.00	5.50	3.90	2.60	5.00	5.5	3.2	2.3	3.3
Stock (10-14.9 in.)	2.80	2.40	3.60	3.30	7.10	11.70	10.00	8.20	5.30	2.80	9.20	2.50	4.80	7.30	5.40	7.50	6.7	8	6.5	5.4
Sub-stock (<10 in.)	1.80	2.40	0.20	1.70	1.70	1.00	1.70	1.30	0.70	1.40	1.10	0.10	1.00	0.70	0.30	0.40	1.5	0.9	0.6	1.2
Relative weight	94.03	85.50		85.80		94.50	93.90	98.33	100.18	91.43	89.83	93.93	87.71	89.98	96.65	94.90	89.9	84.1	88.59	88.1

Northern pike

Historically, the abundance of adult northern pike has remained relatively low and stable consisting of a high proportion of quality, preferred, and memorable size fish (Figure 12). Northern pike populations were significantly reduced in 2002, however the population was quickly replenished with the recruitment of YOY fishes in 2003 (Figure 12). In 2010, the northern pike population remained stable at 2 (fish/net) and has a good balance of size and year classes (Figure 12).

Figure 12. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental mesh gill nets in Nelson Reservoir, 1991-2010.

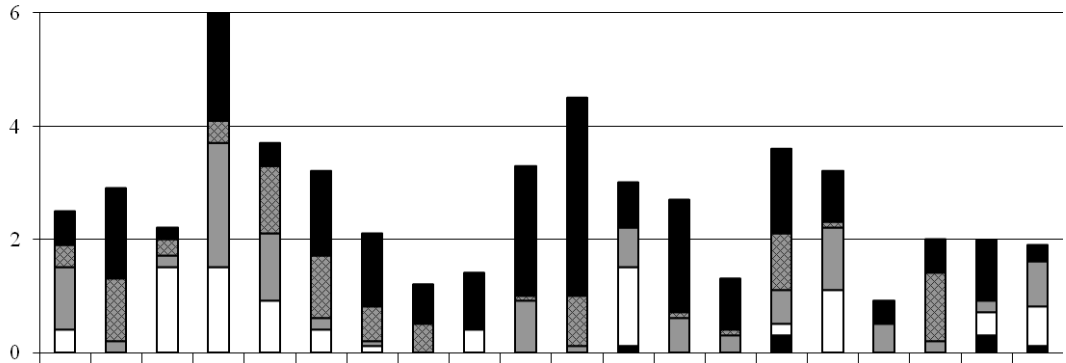


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>34 in.)	0.40	0.40	0.20	0.00	0.10	0.00	0.00	0.00	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.20	0	0.2	0.2	0.2
Preferred (28-33.9 in.)	0.20	1.20	0.10	0.30	0.40	0.20	0.30	0.90	0.40	0.50	0.00	0.00	0.10	0.60	0.30	0.70	0.2	0.3	0.1	0.3
Quality (21-27.9 in.)	1.40	2.20	0.30	1.70	0.20	0.80	1.50	2.00	1.40	1.40	1.40	0.30	0.60	1.00	1.70	1.00	0.6	0.4	0.9	0.9
Stock (14-20.9 in.)	1.00	0.00	1.20	0.00	0.30	0.40	0.70	0.50	0.60	0.30	0.40	0.20	1.00	0.40	0.00	1.00	0.3	0.5	1	0.6
Sub Stock (<14 in.)	0.00	0.00	0.30	0.40	0.00	0.40	0.10	0.30	0.10	0.20	1.10	0.30	1.20	0.00	0.00	0.50	0.8	0.1	1.2	0
Relative weight	99.55	107.59	103.68	93.18	99.59	99.04	100.20	95.52	97.76	85.42	92.05	91.52	92.65	91.13	88.38	98.40	101.8	87.2	93.97	96.9

Lake whitefish

Lake whitefish populations have fluctuated since 1991 due to fluctuations in water levels and temperature, which have reduced recruitment of YOY fish to the population (Figure 13). In 2007, there was a massive summer kill of lake whitefish and fall gill netting surveys indicated a decrease in the abundance of lake whitefish (CPUE = 0.8 fish/net; Figure 13). Gill netting surveys conducted in 2010 reveals the population has stabilized and is reproducing (CPUE = 2 fish/net; Figure 13).

Figure 13. - Relative abundance, size structure, and relative weight of lake whitefish collected with sinking experimental mesh gill nets in Nelson Reservoir, 1991-2010.

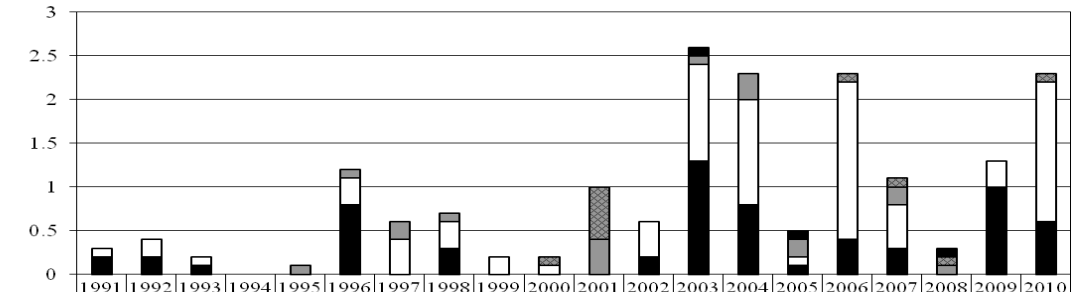


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>18.0 in.)	0.6	1.6	0.2	1.9	0.4	1.5	1.3	0.7	1	2.3	3.5	0.8	2	0.9	1.5	0.9	0.4	0.6	1.083	0.3
Preferred (14.0-17.9 in.)	0.4	1.1	0.3	0.4	1.2	1.1	0.6	0.5	0	0.1	0.9	0	0.1	0.1	1	0.1	0	1.2	0	0
Quality (11.0-13.9 in.)	1.1	0.2	0.2	2.2	1.2	0.2	0.1	0	0	0.9	0.1	0.7	0.6	0.3	0.6	1.1	0.5	0.2	0.2	0.8
Stock (6.0-10.9 in.)	0.4	0	1.5	1.5	0.9	0.4	0.1	0	0.4	0	0	1.4	0	0	0.2	1.1	0	0	0.4	0.7
Sub Stock (<6.0 in.)	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.3	0	0	0	0.3	0.1

Black Crappie

Historically there has been a low abundance of black crappie in Nelson Reservoir. In 2003, black crappie reproduction was the highest on record (Table 14) and recruitment of YOY crappie into the population resulted in a high abundance of adult black crappie (Figure 14). High reproductive success over the last seven years indicates the conditions within Nelson Reservoir have been favorable for black crappie, and if conditions remain stable the population will continue to remain at good levels.

Figure 14. - Relative abundance, size structure, and relative weight of black crappie collected with sinking experimental gill nets in Nelson Reservoir, 1991-2010.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Memorable (>12.0 in.)	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0.1	0	0
Preferred (10.0-11.9 in.)	0	0	0	0	0	0	0	0	0	0.1	0.6	0	0	0	0	0.1	0.1	0.1	0	0.1
Quality (8.0-9.9 in.)	0	0	0	0	0.1	0.1	0.2	0.1	0	0	0.4	0	0.1	0.3	0.2	0	0.2	0.1	0	0
Stock (5.0-7.9 in.)	0.1	0.2	0.1	0	0	0.3	0.4	0.3	0.2	0.1	0	0.4	1.1	1.2	0.1	1.8	0.5	0	0.3	1.6
Sub Stock (<5.0 in.)	0.2	0.2	0.1	0	0	0.8	0	0.3	0	0	0	0.2	1.3	0.8	0.1	0.4	0.3	0	1	0.6

Other fishes

A variety of other fishes are found within Nelson Reservoir, however they are rarely utilized as a sport fishery due to low abundances or their non-game status. Channel catfish, stonecats, bigmouth buffalo, smallmouth buffalo, and smallmouth bass are all present at low levels within Nelson Reservoir. Spottail shiners are also present and provide an important forage base, however in recent years their populations have been reduced and adult spottail shiners have not been present in high numbers within the annual seining surveys (Table 14).

Sagebrush

Sagebrush reservoir is a 5.2-acre BLM pond located in south Phillips County. Sagebrush was historically managed as a rainbow trout fishery until largemouth bass were introduced in 1989, followed by bluegill in 2001 and channel catfish in 2001. Rainbow trout are stocked periodically, with the last stocking occurring in 2002. A windmill aerator system was installed in 2000 or 2001 and this reservoir is currently full. Bluegill and largemouth bass populations are self-sustaining and rainbow trout have exhibited excellent growth and survival. In 2009, one gill net and one trap net were set overnight. The gill net contained one largemouth bass (TL= 13.2 in.) and the trap net had 163 bluegill and one largemouth bass. In 2010 Sagebrush Reservoir was utilized as a donor source for bluegill, approximately 400 bluegill were removed and planted in Karsten Coulee and Lark Reservoirs.

Taint Reservoir

Taint reservoir is a 5.7-acre reservoir located on BLM land in south Phillips County. This reservoir is a popular bluegill fishery with high catch rates and good lengths of fish. In 2010 Taint Reservoir was utilized as a donor source for bluegill, approximately 400 bluegill were removed and planted in Karsten Coulee and Lark Reservoirs.

RECOMMENDATIONS

Paddlefish: Fort Peck Stock

Annual tagging efforts should continue with over 300 paddlefish being tagged annually. An on-site paddlefish creel survey should be conducted in 2011 to verify 500 fish quota and to collect jaw samples to assist in determining the age structure of the Fort Peck Reservoir paddlefish stock. A phone survey should be conducted in 2011, using database of anglers who purchased tags to assess angler harvest of paddlefish. Telemetry study will be continued in 2011 with all data being collected from the fixed stations only. Additionally, harvest rates should be closely monitored and the harvest cap will be implemented.

Fresno and Nelson Reservoir

Standardized late-summer seining should continue to assess sport fish reproduction and forage fish abundance in Fresno and Nelson Reservoirs. Standardized sampling of adult sport fishes should be continued utilizing fall gill netting to gather recruitment information relating to walleye and other key sport and forage fish year-class strength and winter reservoir water levels. Walleye fingerling stocking program on Fresno and Nelson should be re-evaluated to determine best stocking strategy for each reservoir.

Beaver Creek Reservoir

Standardized late-summer seining should continue to assess sport fish reproduction and forage fish abundance at Beaver Creek Reservoir. Standardized sampling of adult sport fishes should be

continued utilizing fall gill netting to gather recruitment information relating to sport and forage fish year-class strength and to monitor growth and survival of stocked walleye, rainbow trout, and forage availability. Spring and fall plants of walleye fingerlings and advanced fingerlings should be continued.

Hill, Blaine & Phillips Co. Ponds

Sampling of adult sport fish populations should continue annually at Bailey Reservoir, Ester Reservoir, and Cow Creek Reservoir. All other ponds should be sampled every two to three years to assess adult fish populations, growth, and recruitment. In addition, self-creel survey boxes that still remain will be maintained to assess the fishing pressure at these ponds. This information will allow us to tailor our management and stocking efforts to meet the needs of the public. Yellow perch should be collected from the Kremlin Water District Ponds and transferred to Ester and Fresno in the spring of 2011. Bluegill will be trapped from Don's, Taint, and Sagebrush and transferred to BR 047, April, PR 018, Lark, and Karsten Coulee. Trap and transport golden shiners from Floyd Flynn and stock into Wapiti and transfer fathead minnows from Compton to Plutz and Ester Lake.

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Water Codes of Waters Referred To

154531 April Reservoir
154535 Bailey Reservoir
154570 Beaver Creek Reservoir
156940 BR 012
154724 BR 013
157445 BR 047
164789 Cow Creek Reservoir
155085 Dunbar Pond
155120 Ester Lake
156740 Floyd Flynn Reservoir
165140 Fort Peck Reservoir
155240 Fresno Reservoir
165670 Hart Reservoir
162500 Missouri River Sec. 05
162520 Missouri River Sec. 06
156480 Nelson Reservoir
168047 Sagebrush Reservoir
168475 Taint Reservoir

Key words:
Paddlefish, harvest, walleye, Lake Superior whitefish, northern pike, black crappie, yellow perch, goldeye, channel catfish, sauger, shovelnose sturgeon, pallid sturgeon, burbot, smallmouth buffalo, largemouth buffalo, age, water levels, creel census, population estimates, recruitment, tiger musky, stocking, Cisco, smelt

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