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, 2012 THROUGH JUNE 30, 2013

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ABSTRACT

Paddlefish tagging was conducted on the Missouri River paddlefish population upstream of Fort Peck Reservoir. Throughout the sampling period paddlefish 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 sixth year on paddlefish in the Missouri River using existing fixed stations. In addition, young-of-year paddlefish surveys (visual counts) were conducted in the headwaters of Fort Peck Reservoir. Overall harvest on this population has been reduced in recent years (regulation changes occurred in 2007 and 2008) to offset a decade of severe drought resulting in poor spawning conditions and recruitment. The average size of adult fish remains stable, and recruitment has been excellent in recent years due to high spring flows and elevated reservoir levels.

Standardized gill netting and beach seining surveys were conducted at Fresno, Nelson, Dry Fork, 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: (17) 310 and (19) 124 projects were reviewed along with one waste water review with state and local agencies; attended seven walleye unlimited meetings and helped with five 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, Malta, and Great Falls to provide information.

PROCEDURES, RESULTS, & DISCUSSION

Fort Peck Reservoir and Upper Missouri River Paddlefish Stock

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

The alteration of flows from upstream dams and low water levels on Fort Peck Reservoir are thought to be a reason for poor reproductive success of paddlefish (1999-2007) along with reduced sizes of adults and 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 current management strategy is to provide a stable recreational fishery while ensuring a sustainable population size and historical age structure of the spawning stock. To meet this goal, regulations were changed during the 2007-snagging season. These regulations limited harvest to one paddlefish per person and required anglers to choose the area they wanted to fish (Missouri River above Fort Peck Reservoir; Fort Peck Dredge Cuts; lower Yellowstone River/Missouri River below Fort 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 implemented. 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 harvest cap 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 Fort 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, recruitment, spawning locations, movements, and habitat use of paddlefish during their spawning migrations.

Baseline data on the paddlefish population above Fort 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 to collect information on movement patterns and identify spawning sites. To gather this information, sampling occurs in the Upper Missouri River during the spawning period 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 cubic feet per second (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.

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

Beginning in 1996, concern over low flows and recruitment prompted the establishment of visual count surveys in the headwaters of Fort Peck Reservoir 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 (YOY, yearling, and adult).

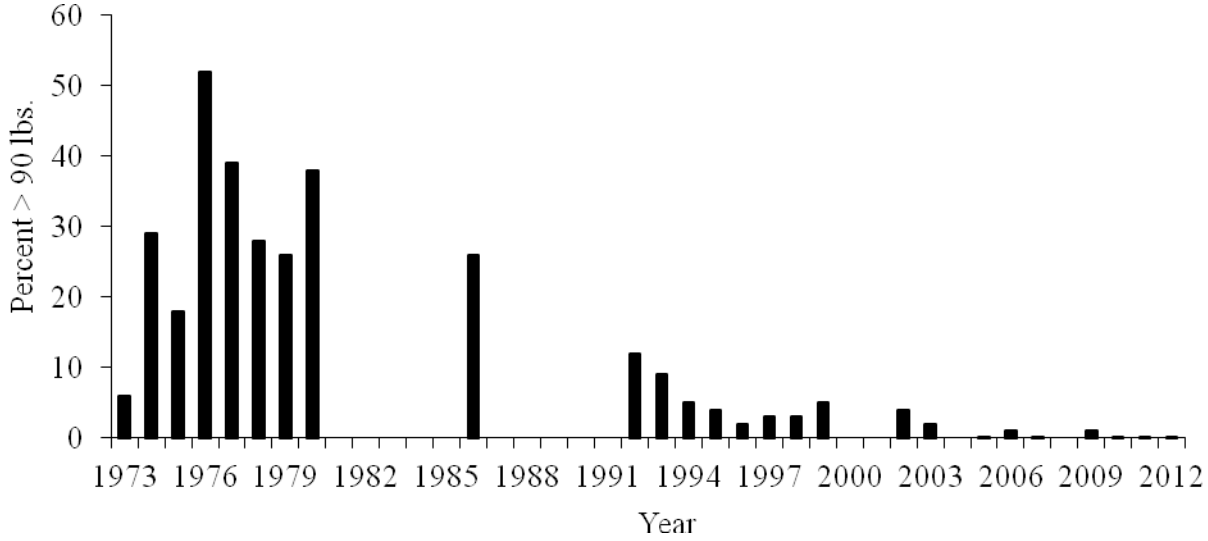
To increase our specific knowledge of the spawning locations, movements, and habitat use of paddlefish above Fort Peck Reservoir, a contract with the University of Idaho was initiated in 2006 to conduct a four-year telemetry and egg sampling study (Miller and Scarnecchia, 2011; Miller et al., 2011). The telemetry study was continued in 2012 using fixed telemetry stations.

Adult Paddlefish Monitoring and Tagging

In 2012, paddlefish tagging started on April 19th. Tagging efforts were continued until May 12th when crews tagged our 309th paddlefish. Since tagging was initiated in 1977, 6,919 paddlefish have been tagged and 760 tagged paddlefish have been recaptured during annual gill netting surveys. On average, approximately 10.9% of the annual catch is comprised of recaptured fish. In 2012, 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 1973, Fish, Wildlife, and Parks (FWP) has monitored the number of female paddlefish weighing greater than 90 pounds captured during our tagging efforts (Figure 1). This data has confirmed a long standing hypothesis that as Fort Peck Reservoir aged, the productivity within the reservoir would gradually decrease, resulting in smaller female paddlefish with lower fecundity. In 2012, less than one percent of all female paddlefish captured during our tagging efforts weighed more than 90 pounds (Figure 1). Females captured in 2012 averaged 65 pounds.

Since tagging was initiated in 1977, a total of 865-tagged paddlefish have been reported as harvested, which is about 12.5% 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 2012, 39-tagged paddlefish were reported as harvested and 1-tagged paddlefish was reported as snagged and released. Anglers harvested 2 paddlefish tagged in 2012.

Figure 1. Percent of female paddlefish captured during adult tagging efforts weighing more than 90 pounds from 1973-2012.



Preliminary Population Estimates

Estimates of population size of the recruited portion of the Ft. Peck stock were developed from 1993 through 2011 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. 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. In 2010, both estimates indicated that the population size of recruited adult fish is approximately 20,000 fish and has changed very little over the last 19 years. 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 (males every 1-2 years and females 2-3 years) approximately 11,700 fish migrate up the Missouri River to spawn and are vulnerable to harvest per year. As a comparison, the Yellowstone-Sakakawea stock has approximately 22,000 adults that migrate up the Yellowstone & Missouri Rivers and are vulnerable to harvest in any given year and their total population size is approximately 48,000 (Dennis Scarnecchia, personal communication, February 14, 2012). Questions have been raised about the viability of these estimate models and more research is being conducted on a number of models/methods to estimate the population sizes of all stocks in the future.

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 Fort Peck stock by monitoring flows (Table 1) and movement patterns, and comparing those to year class strength through aging, as well as with YOY sampling. Our data suggests the closer flows resemble those postulated by Berg, the more likely we are at observing higher densities of YOY paddlefish during our visual counts. However, when flows are marginal to poor our data suggests paddlefish in the Upper Missouri are still producing a year-class, though small (when compared to high flow years).

During the 1980s and 90s, 12 of the 20 years met the requirements necessary for successful migration and spawning (Figure 2 and 3). From 2000-2007, flows did not meet the minimum flow and duration requirements (Figure 4). However, paddlefish jaws aged from harvested fish over the last few years contained age classes produced from these "poor" flow years. Flow requirements were met from 2008-2011(Figure 4; Table 1). The run-off event experienced in 2011 was the fifth highest ever recorded at the USGS Landusky gauging station.

In 2012, flows on the Missouri River gradually rose from 8,720 to 11,700 cfs from April 1st to April 27th and then increased slightly to 15,400 cfs on May 1st, gradually decreasing to 9,560 cfs on May 16th (Figure 4). Flows then fluctuated from 10,000-13,000 cfs before peaking at 18,100 on June 11th. Flows immediately decreased and were less than 10,000 cfs by July 1st. Peak flows met and exceeded trigger flows (14,000 cfs; Berg 1981) for about 15 days, 30 days less than the average of 45 consecutive days (USGS 2012). There were two distinct rises observed in 2012 that occurred separately (April 28th-May 5th and June 7th-June 19th). Variable flows increased paddlefish movement and increased their vulnerability to snagging.

Hydrograph information (Figure 2, 3, and 4) suggests that good spawning conditions vary among years (Table 1). Poor recruitment due to low flows and reduced water levels on Fort Peck Reservoir from 2000-2007 has been identified by YOY visual counts, which have been conducted annually since 1997 (Kozfkay & Scarnecchia 2002; Bowersox 2004; Miller 2005; Miller & Scarnecchia 2006). Effort has varied among years due to scheduling conflicts, limited personnel, and pit tagging effort. Good recruitment of YOY paddlefish was observed in 1997, 1998, and 2011 when flows exceeded the historical hydrograph and Fort Peck Reservoir levels were high.

In 2012, 1 YOY and three 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 a total of 14 hours of random search time during July 31st and August 9th and 10th in hopes of identifying habitats containing YOY paddlefish not sampled during the transect counts (Table 3). These random searches were conducted near the river/reservoir interface (RM 1869.5- 1884.7). Random counts yielded a total of 1 YOY (RM 1872.9), 16 yearling, and 75 adult paddlefish being observed, with the highest counts occurring during July 31st (Table 3). Three yearling paddlefish (TL (mm) 470-517) were collected and sacrificed by the University of Idaho for RNA/DNA analysis and age verification.

Table 1. Paddlefish spawning success ratings for the years 1974-2012 using trigger flow (TF) incidence and duration as the sole criteria.

	Paddlefish Spawning Rating		
Year	Good	Marginal (#days> TF)	Poor
1974	X		
1975	X		
1976	X		
1977			X
1978	X		
1979		X (20)	
1980	X		
1981	X		
1982	X		
1983		X (29)	
1984	X		
1985			X
1986		X (19)	
1987			X
1988			X
1989		X (05)	
1990		X (03)	
1991	X		
1992			X
1993	X		
1994		X (06)	
1995	X		
1996	X		
1997	X		
1998		X (25)	
1999		X (13)	
2000			X
2001			X
2002		X (16)	
2003		X (05)	
2004			X
2005		X (05)	
2006		X (09)	
2007			X
2008	X		
2009	X		
2010	X		
2011	X		
2012		X (15)	

[1]Flows measured at the Landusky Measuring Station

Figure 2. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 1980-1989.

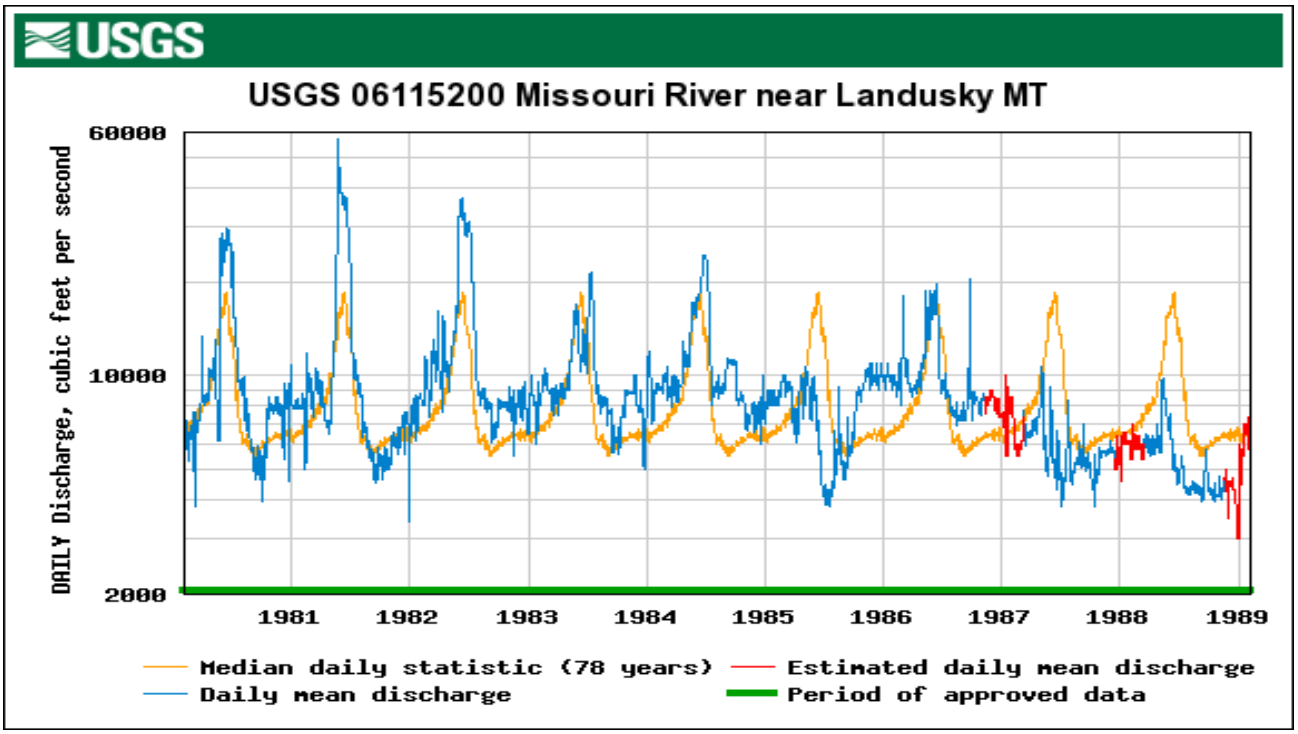


Figure 3. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 1990-1999.

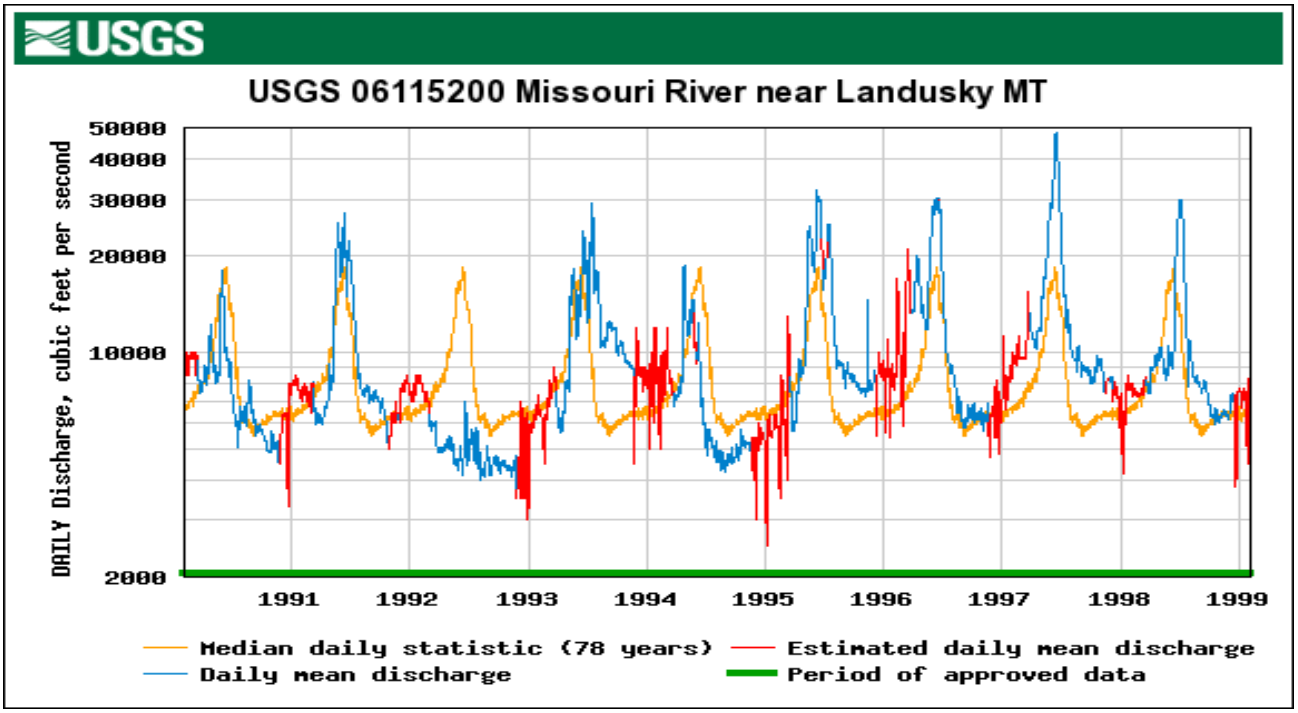


Figure 4. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 2000-2012.

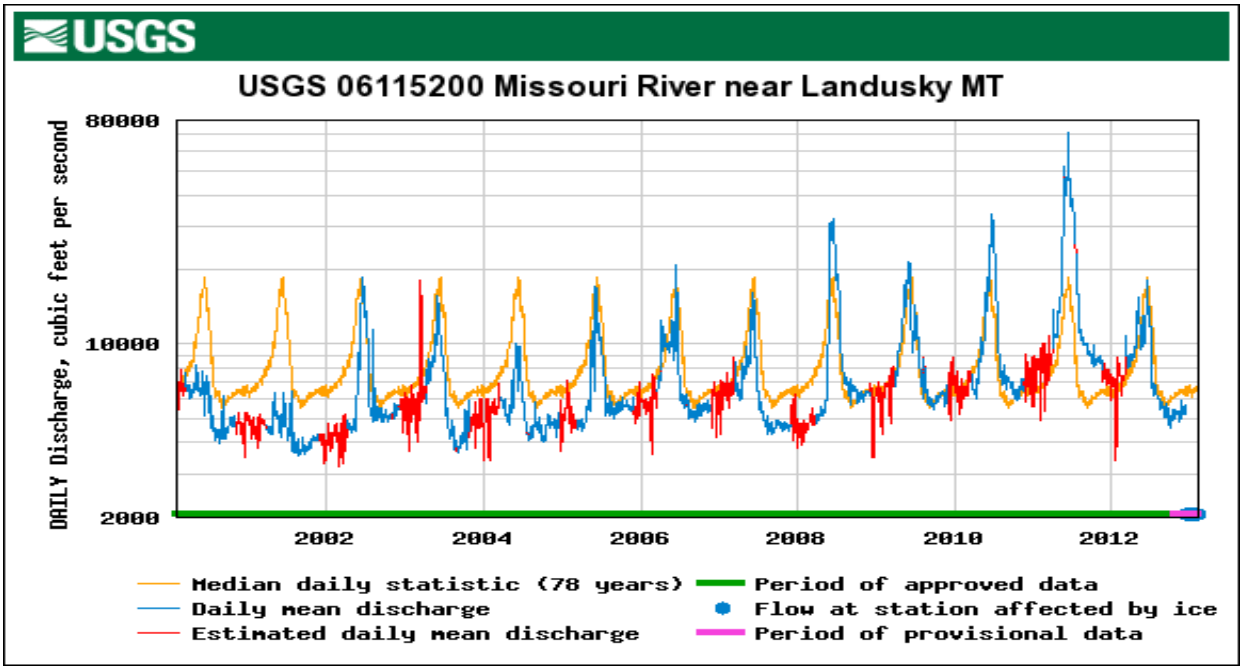


Table 2. - Results of standardized YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 1997 to 2012.

Year	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 & 8/17	6	1843 to 1858	12	0	0	Miller
2010	7/27 & 8/3	6	1863.5 to 1878.5	12	0	0	Miller
2011	7/28 to 9/1	6	1866.5 to 1881.5	30	61	3	Hemingway
2012	7/30 & 8/9	6	1863.5 to 1878.5	12	1	3	Hemingway

Table 3. - Results of random YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 2008 to 2012.

Year	Transect Dates	Effort (Hours)	Station Locations (RM)	No. YOY	No. Yearlings	No. Adults	Collector
2008	8/6-8/13	24	1859-1861	42	0	--	Miller
2009	8/11-8/17	12	1857-1862	2	3	--	Miller
2010	7/26-9/27	75	1874.5-1884	0	26	--	Miller
2011	7/25-8/8	27	1875-1888	205	2	13	Hemingway
2012	7/31/, 8/9-8/10	14	1869.5-1884.7	1	16	75	Hemingway

-- No data collected for observed period of record

Harvest: Paddlefish Creel Survey 2012

Methods

A five-year native species creel survey was conducted by FWP Region 6 personnel from 2005-2009 to better understand catch and harvest rates, age structure of harvested fish, angler pressure, and angler demographics from the Fred Robinson Bridge to Peggy's Bottom (Figure 5). Since 2010 the creel has been conducted annually by vehicle and boat from May 1st to June 15th from the Fred Robinson Bridge to Peggy's Bottom and focuses solely on paddlefish and paddlefish anglers.

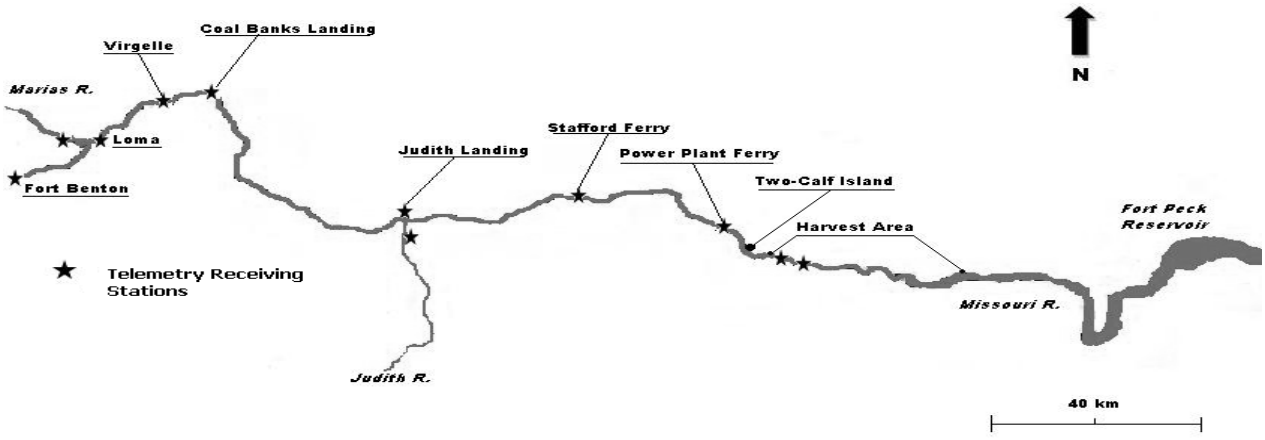
Schedule

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.

Figure 5. Map of the creel area including locations of fixed telemetry receiving stations in the Upper Missouri River above Fort Peck Reservoir. Harvest area encompasses RM 1897-1921.



Harvest and Catch

Angler interviews were conducted at all boat ramps and fishing access/camping sites on both sides 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 were 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 collected for aging purposes (with anglers consent). These samples were then sent to the University of Idaho for analysis.

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 two periods (May and June) 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 2012, a total of 368 parties representing 4 states and 28 of the 56 Montana counties were interviewed from May 1st to June 15th. In 2012, the highest percentage of anglers in Montana came from Yellowstone (17.7%), Fergus (11.6%), and Cascade (9.5%) counties. In 2012, the average party consisted of 3.68 anglers (range= 1 to 27 anglers), 81.8% of which were male. In 2012, the average length of stay was 2.6 days/trip (range = 1 to 10 days).

Effort

In 2012, estimated paddlefish snagging effort during May and June totaled 2,214.68 angler days (Table 4) and consisted of 10,509.55 angler hours (Table 5). In 2012, 93.2% of the angling effort (hours) occurred from shore and 89% of the angling effort occurred in May, which coincides with the peak of the paddlefish spawning migration.

Harvest Statistics- Paddlefish

In 2012, a total of 667 paddlefish were caught and reported to creel clerks with a combined (shore and boat) catch rate of 0.084 paddlefish/hour. Total paddlefish snagged was estimated at 843 fish (Table 6) with an estimated harvest of 475 paddlefish (Table 7).

In 2012, harvested paddlefish ranged in length from 30.0 to 54.0 inches (eye-fork length) and weight from 20.0 to 119 pounds (Table 8 and Figure 7). Fifty-eight percent of the harvested paddlefish sexed were males and 39/408 (9.5 %) of the harvested paddlefish and 1/253 (0.4 %) of the released paddlefish creeled had jaw tags. Harvested paddlefish ranged in age from 9 to 56 years with 65.7% of the harvested fish being 20 to 56 years old, age 15 males comprised the highest percent (11%) of the harvest (Figure 6). Eighteen and a half percent of the harvested fish were less than 16 years old (new recruits).

Table 4. - Estimated snagging effort (angler-days) by month and angler type for the Upper Missouri River (RM 1897 to 1921), May-June 2012.

	Shore	Boat	Overall
May	1,819.57	150.6	1,970.12
June	244.56	0.00	244.56
Overall	2,064.13	150.6	2,214.68

Table 5. - Estimated snagging effort (angler-hours) and standard error (SE) by month and angler type for the Upper Missouri River (RM 1897 to 1921), May-June 2012.

	Shore	SE	Boat	SE	Overall
May	8,370.00	1,948.72	1,014.55	357.63	9,384.55
June	1,125.00	732.55	0.00	0.00	1,125.00
Overall	9,495.00		1,014.55		10,509.55

Table 6. Estimated total catch of paddlefish by month and angler type for the Upper Missouri River (RM 1897 to 1921), May-June 2012.

	Shore	Boat	Overall
May	711	94	805
June	38	0	38
Overall	749	94	843

Table 7. Estimated harvest of paddlefish by month and angler type for the Upper Missouri River (RM 1897 to 1921), May-June 2012.

	Shore	Boat	Overall
May	419	56	475
June	0	0	0
Overall	419	134	475

Figure 6. Age structure of harvested male and female paddlefish collected in the Upper Missouri River (RM 1897-1921) during the 2012 paddlefish creel survey.

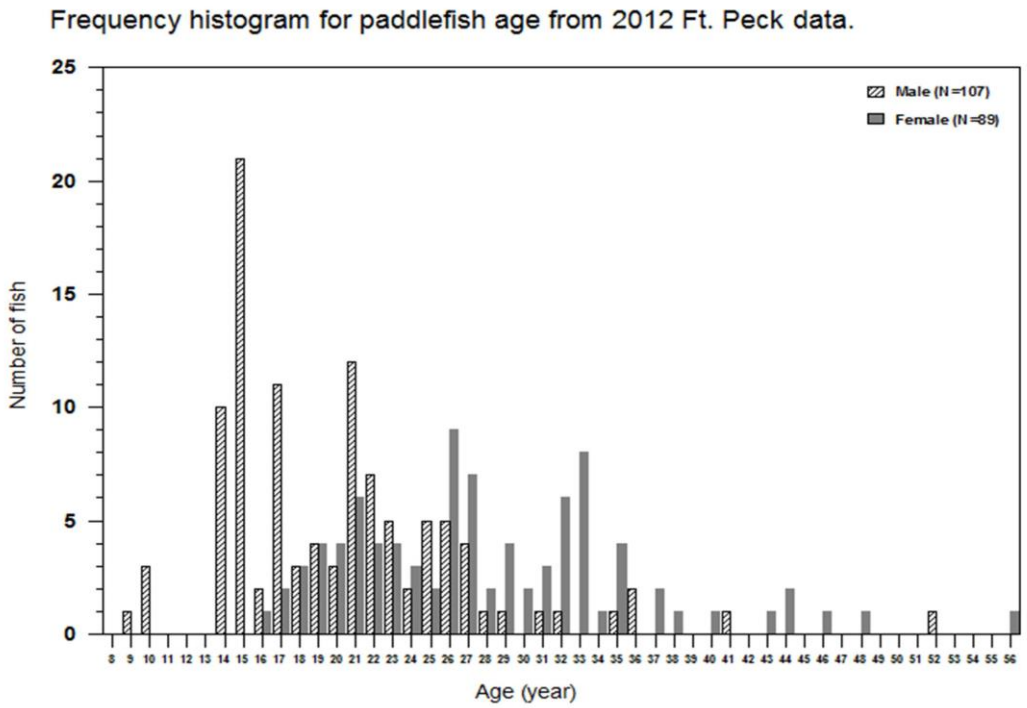


Figure 7. Size structure (weight (kg)) of harvested male and female paddlefish collected in the Upper Missouri River (RM 1897-1921) during the 2012 paddlefish creel survey.

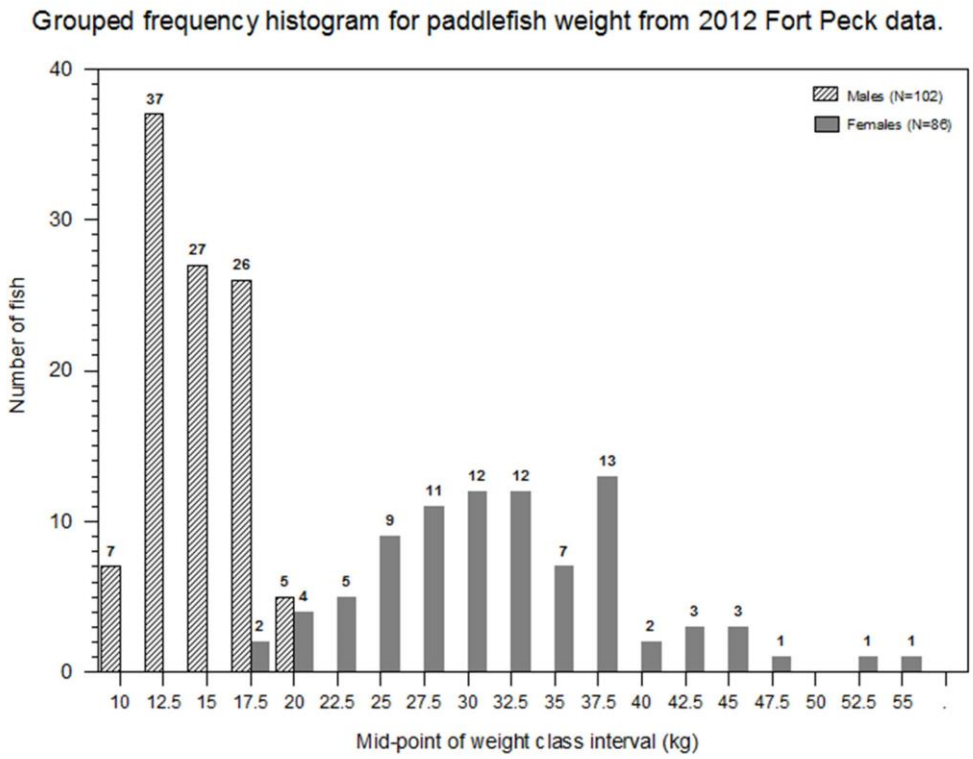


Table 8. – Length, weight, and condition indices of harvested paddlefish from anglers creeled in the Upper Missouri River (RM 1897-1921), May-June 2005-2012.

Species	Year	Sample Size	Length Range (in.)	Length Avg.	Length SD	Weight Range (lbs.)	Weight Avg.	Weight SD
PF	2005	241	33.3-60.5	41.7	1.2	12.0-90.0	40.3	47.6
PF	2006	259	28.1-65.0	42.7	1.3	15.1-112.0	47.0	36.5
PF	2007	179	27.0-72.0	42.3	1.1	24.5-69.0	47.7	97.3
PF	2008	322	26.0-56.8	41.0	5.7	13.0-104.0	43.5	20.8
PF	2009	249	24.0-54	41.7	5.9	16.0-100	47.6	21.2
PF	2010	300	28.0-60.0	42.0	5.5	16.0-115	49.4	21.8
PF	2011	484	32.0-57.0	42.7	5.3	19.0-127.0	50.5	21.4
PF	2012	408	30.0-54.0	42.5	5.2	20.0-119.0	48.8	21.9

Paddlefish Phone Creel (2003-2012)

Vic Riggs (retired-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. The 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 2012, creel statistics were obtained for the Fort Peck population (Table 9). On average approximately 2,136 anglers fish for paddlefish above Fort Peck Reservoir, representing approximately 5,814 fishing days. On average approximately 1,600 paddlefish are caught annually above Fort Peck Reservoir with approximately 55.6% of the paddlefish being released (Table 9).

In 2012, we asked the anglers being phone creeled to answer additional questions relating to a possible lottery tag system being implemented on the Upper Missouri paddlefish season. Overall, most anglers were satisfied (79.7%) with the current paddlefish season structure. When asked about their recent experience on the river during the paddlefish season 67.2% said it was a great experience while 55.2% said their experience was affected by overcrowding or the harvest season closed to early. 84.9% of the anglers liked the option to catch and release paddlefish and 81.9% said they would support mandatory reporting of harvested fish. When asked if they would be in favor of a lottery type draw for paddlefish 33.6% said yes. When asked if they would still purchase a license to catch and release if they did not draw a harvest tag, 64.2% said yes. When anglers were asked to provide additional comments, the most common responses related to: night fishing, season closes too soon, and increasing the harvest cap.

Table 9. –Summary of estimates for the Fort Peck paddlefish population from the Montana paddlefish telephone creel survey (2003-2012).

Missouri River Above Fort Peck										
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Number of Anglers	1,902	2,859	2,705	2,476	2,481	1,816	1,579	1,729	1,901	1,910
Total Days Fished*	5,757	9,172	8,385	7,565	-	4,426	2,748	5,789	4,816	3,671
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	1,411	1,460
Number Harvested	868	787	1,028	1,067	634	300	564	575	598	381
Catch Rate (fish/day)	0.151	0.086	0.123	0.141	-	0.068	0.205	0.173	0.096	0.104
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%	57.62%	73.90%
Percent Contacted by FWP Creel Clerk						85.71%	62.14%	38.61%	14.60%	15.50%

* Includes hours spent catch and release fishing

Discussion

Recruitment and growth is highly variable among years for this population (Table 2). Annual Fort Peck Reservoir pool elevations and flows in the Missouri River appear to influence the reproductive success and adult growth. Flows in the Missouri River from 1998-2007 were not consistently high enough to produce large year-classes of paddlefish due to prolonged drought conditions (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, were believed to be the result of decreased productivity due to the aging of Fort Peck Reservoir (nursery grounds for paddlefish) and extremely low Fort Peck Reservoir levels from 1999-2007. However, since 2008 flows in the Missouri River have closely mimicked the historical hydrograph and in 2011 the fifth highest flow ever recorded at the Landusky gauge (77 years) was documented. In addition, Fort Peck Reservoir water levels increased in 2008, 2009, 2010, and in 2011 the spillway was running water for the first time since 1997. Successful paddlefish reproduction is evident based on YOY transect data and adult fish captured during spring tagging efforts are in very good condition.

Upper Missouri River flows in 2012 mimicked flows similar to those observed from 1999-2007 (Figure 4), suggesting marginal spawning conditions for adult paddlefish. YOY transects confirmed marginal spawning success when only two YOY paddlefish were observed during our summer visual counts (Table 2 and Table 3). The recent drought conditions along the Missouri River basin have reduced Fort Peck water elevations 12 feet below full pool. If these conditions persist for an extended period of time zooplankton production will be reduced and could potentially impact adult condition and recruitment of YOY paddlefish into the existing population.

The combination of prolonged drought conditions affecting the low number of successful spawning years (based on observed trigger flow occurrence and duration; Table 1) and decreased size of adults has been noted and will continue to be monitored (Figure 1). The results of reduced recruitment of YOY paddlefish will not be evident in the spawning population for a few years. It would be prudent to consider the effects of reduced recruitment and reduced fecundity of the adult population. However, the presence of paddlefish ranging from 8-13 years that are showing up in the harvest questions the specific flow requirements (velocity, duration, and timing) postulated by Berg (1981). These year-classes were produced under extreme drought conditions and minimal flows. Though they are showing up in the creel in small densities, their presence suggests spawning conditions are favorable to produce year-classes regardless of flows. Currently, YOY visual counts are the best sampling technique to confirm spawning success and have aided in identifying good year-classes (1997, 1998, and 2011) and year-classes produced under marginal or poor conditions (Table 2).

Anglers are 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. These regulation changes have resulted in a shorter season and fewer paddlefish being harvested annually (Table 10). Estimated harvest by our current creel census program is highly variable when compared to the number of paddlefish being reported to our on-site creel clerks (Table 10). However, this variability has decreased since the harvest cap was implemented in 2008. Modifications or even changing the program we currently use may further reduce this variability, resulting in improved harvest estimates. FWP continues to refine its paddlefish creel survey to obtain the most accurate information possible over such a broad geographical range, in a short period of time.

The Upper Missouri River paddlefish population continues to function as a self-sustaining fishery. The adult population continues to naturally reproduce and FWP has implemented regulations that reduce the likelihood of overharvest to occur.

Table 10. Summary of data collected during the on-site creel outlining season duration, closure, catch and release days, number reported as caught, number reported as harvested, sex, estimated harvest from creel census, estimated harvest from phone creel, and the three average of estimated harvest by our creel census from 2005-2012.

Year	Season Dates	Harvest Closure (Date)	# of Catch and Release Days after Harvest Closure	# Reported as Caught to Creel Clerks	# Reported as Harvested to Creel Clerks	Reported Males Harvested	Reported Females Harvested	Phone Creel Est. Harvest	On-site Creel Est. Harvest	3-Year Avg. Est. Harvest (On-Site Creel)
2005	4/1-6/14[-]	None	--	995	787	152 (64%)	85 (36%)	1,028	576	--
2006	4/1-6/19[-]	None	--	989	382	160 (61%)	101 (39%)	1,067	1,289	--
2007	4/1-6/19[+]	None	--	400	249	120 (50%)	121 (50%)	634	477	781
2008	5/1-6/15*	None	--	421	322	172 (58%)	127 (42%)	300	355	707
2009	5/1-6/15*	5/22	24	881	249	124 (53%)	112 (47%)	564	594	475
2010	5/1-6/15*	5/16	30	974	301	140 (55%)	116 (45%)	575	607	519
2011	5/1-6/15*	5/14	32	854	484	191 (45%)	230 (55%)	598	608	603
2012	5/1-6/15*	5/10	36	662	403	165 (58%)	120 (42%)	381	475	563

+ Season open year-round with mandatory harvest on Friday, Saturday, Tuesday, and Wednesday and mandatory catch and release on Sunday, Monday, and Thursday. Creel ran from 4/1-6/19.

- Season open year-round with anglers allowed to harvest two paddlefish.

* Season open from May 1-June 15 with a 500 fish harvest cap.

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 covers approximately 70 surface-acres and has a maximum depth of 28 feet. This reservoir was open to public access by the landowners for over 30 years. In 2012, with the help of Montana Walleyes Unlimited, FWP was able to acquire approximately 108 acres surrounding the reservoir for development of a Fishing Access Site. Initial improvements include: maintenance to access road, improvements to existing fishing pier and shelter, new latrine and concrete boat ramp, designated parking areas, fire rings, and signage. The Fresno Chapter of Walleye Unlimited has donated an additional fishing pier that will be utilized as well.

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. 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. The last rainbow trout stocking occurred in 2005 when 10,000 four-inch rainbow trout were stocked in late fall. Since 2005 Bailey Reservoir has received alternate year stocking of 10,000 walleye fingerlings and several supplemental stocking of pre-spawn adult yellow perch from the Kremlin Water Ponds.

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. Bailey ranked 28th in the region for angler pressure in 2009/2010 (365 +/- 200 angler days; McFarland 2010). No statewide creel has been conducted since; however, Bailey Reservoir was one of the most talked about reservoirs on the internet during the winter months with reports of anglers ice fishing daily in 2012.

Gill net surveys suggest the population of all sport fish (walleye, northern pike, yellow perch, black crappie) remain below population densities prior to 2000 (pre-drought years; Table 11). From 1990-2002 Bailey Reservoir supported one of the best yellow perch and black crappie fisheries on the Hi-Line (Table 11), Extensive removal of spawning adult yellow perch and black crappie (from 1999-2007) combined with low reservoir levels, high northern pike densities, and less than ideal spawning conditions could be the most likely explanation for low population densities during that time period. Netting conducted in 2012 suggests this fishery has become more balanced in terms of predator/prey densities. Northern pike and yellow perch densities have increased slightly and anglers have reported catching some really nice black crappie as well.

Table 11. - 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, 1985-2012.

		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	--	--
2011	2	2	19.4	1.67	0.5	7.5	0.22	0	--	--	0	--	--	1.5	20.1	2.84	0	--	--
2012	2	3.5	19.5	1.58	7	7.5	0.26	0	--	--	0	--	--	0.5	22	4.16	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 for a variety of species. Beaver Creek Reservoir ranked 6th in the region for angler pressure in 2009/2010 (8,520 +/- 1,553 angler days; McFarland 2010).

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 30,000 (250/acre) 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 and many anglers have expressed their frustration with this regulation since. FWP has evaluated this regulation and will propose the daily limit be raised to 5/day during the next regulation cycle.

Population Status of Adult and Young-of-Year Fishes

Water levels in September were down approximately 12 feet due to severe drought conditions and increased irrigation demands. Though water levels were low, all six sampling sites were utilized. Gill netting was conducted over night with three sinking and three floating experimental gill nets. The sinking and floating experimental gill nets were 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 stable within Beaver Creek Reservoir (Table 13). 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 12 & 13). In 2007, the YOY catch was greatly reduced and no YOY northern pike were observed in 2008. Spring spawning conditions have been favorable in recent years and YOY catch of northern pike remain close to the long-term average (Table 12).

Yellow perch

Yellow perch were illegally introduced into Beaver Creek Reservoir in 1987. Since their introduction, yellow perch have thrived within the reservoir (Table 13). 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. Current yellow perch abundance is trending upward with the highest adult relative abundance recorded in 13 years during 2012 (Table 13). The population consists of numerous quality and preferred size fish (TL > 8 in) and the average length and relative abundance of yellow perch sampled in 2012 was the highest ever recorded ($\bar{x}$ TL=8.53; Table 13). Summer seining efforts indicate that yellow perch reproductive success was the highest recorded in 17 years (Table 12). Stable to slightly rising spring water levels created excellent spawning conditions for yellow perch. A high abundance of adult yellow perch due to limited angling pressure (no ice) during the 2011/2012 winter may have been a contributing factor as well.

Walleye

Walleye were initially stocked by FWP in 1987 to provide a greater diversity of fishing opportunities within the reservoir. Natural reproduction is limited within the reservoir and as a result, approximately 10,000 fingerling and 5,000 advanced walleye fingerlings are stocked annually.

Walleye within Beaver Creek Reservoir have slow growth rates but the population has remained stable over the years (Table 13). A good forage base consisting of yellow perch and high rainbow stocking rates allows the walleye in Beaver Creek Reservoir to achieve memorable and trophy lengths with high relative weights. As a result these walleye can be hard to catch and elude all but the best walleye anglers. Since their initial introduction, high quality walleye have thrived within Beaver Creek Reservoir and below its dam. Consecutive years (2010 and 2011) of high runoff increased adult walleye (> 15 inches) entrainment which might explain the reduced relative abundance of walleye

during our fall gillnet surveys in 2011 (Table 13). In 2012, walleye relative abundance was a little higher than the long-term average with the majority of walleye sampled < 12 inches, these fish will continue to grow and contribute to the fishery (Table 13).

Smallmouth bass

Smallmouth bass were first introduced by FWP in 1997 and were stocked annually until 2000. There is now a self-sustaining population of smallmouth bass that exists in Beaver Creek Reservoir. Smallmouth bass have historically had a low relative abundance during gill netting surveys due to the selectivity of the gear (Table 13). Catches of 8 to 16 inch bass by anglers are common. In addition, smallmouth bass reproduction has been good in most years due to relatively stable reservoir levels during early summer and good spawning habitat (Table 12).

Table 12. – 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 2012.

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
Aug-11	6	201	66	629	0	0	0	0	1	0	1	2	0	0	0
Aug-12	6	3,206	24	4	0	0	0	0	5	0	12	1	7	0	0

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

Table 13. Summary of relative abundance (catch per unit effort (CPUE)), average total length, and relative weights of fishes collected in fall gill netting surveys in Beaver Creek Reservoir, 1974-2012.

			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
Aug-11	2011	4	3.75	12.93	98.08	26.50	7.76	92.06	1.75	18.10	83.31	0.25	8.20	76.40	0.75	13.63	81.05	0.00	--	6.00	16.07
Sep-12	2012	6	12.33	11.75	105.68	36.33	8.53	157.05	1.00	24.07	106.95	0.33	9.40	111.89	3.83	11.76	99.32	0.00	--	3.20	15.14

Fresno Reservoir

Fresno Reservoir, located 12 miles northwest of Havre is a mainstem reservoir built in 1939 on the Milk River to function as an irrigation storage facility managed by the Bureau of Reclamation (BOR). Fresno is a highly fluctuating 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 supporting walleye, yellow perch, crappie, largemouth bass, smallmouth bass, Lake Superior whitefish, emerald shiner, and spottail shiners. Over the years, kokanee salmon, brown trout, and rainbow trout have been stocked to supplement the fishery when walleye and northern pike populations were low. Fresno ranked 2nd behind Fort Peck Reservoir in the region for angler pressure in 2009/2010 (19,362 +/- 2,392 angler days; McFarland 2010). Fresno continues to build its reputation as one of the premiere walleye reservoirs in Montana.

The fishery in Fresno has fluctuated throughout the years largely due to high fluctuations in surface water levels. On average, water levels in Fresno fluctuate 10-21 feet per year with an annual water retention rate of 4 days (storage capacity (acre-feet)/average annual inflows (acre-feet)). The timing of this fluctuation greatly impacts the reproduction and survival of forage and sport fish.

The fishery was severely impacted 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 the abundance and condition of key sport fish was at an all time low. As a result, a supplemental stocking of 170,000 pre-spawn adult yellow perch from Lake Mary Ronan was conducted from 2001-2004 to increase population levels. This management action was implemented to increase forage populations when water levels increased. In addition, 100,000 walleye fingerlings were stocked annually from 2003-2011. In 2012, no walleye fingerlings were stocked due to extremely high adult relative abundance and the need to decrease the current population to more sustainable levels.

In an effort to maintain a favorable forage base under high predator densities, FWP conducted two supplemental pre-spawn adult yellow perch stockings. In 2011 and 2012, 6,627 and 6,661 pre-spawn adult yellow perch were planted in Fresno because water levels were predicted to reach and surpass full pool elevations, creating optimal spawning conditions. Yellow perch reproduction in 2011 was the highest recorded in 18 years when compared to historic summer seining results (Table 14).

From 2005 to 2012, water levels have remained high during spring spawning and early summer rearing periods, allowing sport and forage fish populations to obtain densities never before documented. The continued production 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 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 is correlated with the magnitude of spring run-off and annual fluctuations in water levels within Fresno Reservoir. Extreme water draw downs in Fresno in 2001 and 2002 due to drought conditions, greatly reduced the population levels of most fishes except for sauger, which took advantage of the increased riverine habitat (Table 14).

Excellent water conditions have persisted within the reservoir since 2008, conditions never before documented over a five year period. The yellow perch population has recovered and will continue to increase if water levels are maintained during spawning and rearing stages (April-September) and adult predator levels are reduced. Northern pike YOY levels have fluctuated throughout the years, however the population appears to be on the upward trend.

From 2008-2012, 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 (Table 14). In 2012, spawning conditions were good for all species. However, water temperatures remained very cool thru June (52° F surface temp recorded on 9th) and may have affected the spawning success and growth of some species. Walleye YOY collected was the highest in five years, despite no fingerling walleye being stocked in 2012. Successful natural reproduction of walleye observed in 2012 indicates good spawning habitat exists within the reservoir when water conditions inundate these habitats.

Table 14. – 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, 1968-2012.

Year	Seine Hauls	*Sanders*	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
2011+	12	--	18	0	4	4,961-	6	5	890	499	0	0	0
2012	12	--	27	0	9	661-	4	2	43	41	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

- Years in which pre-spawn adult yellow perch were supplementally stocked

* Primarily Sauger

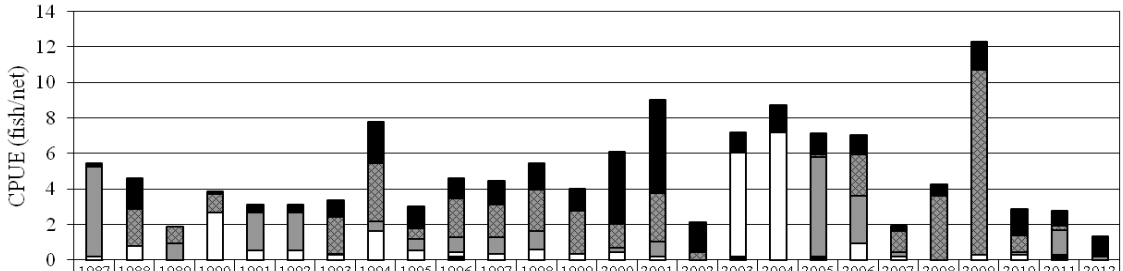
Population Status of Adult Fishes

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, inches)) and weighed to the nearest 0.01 pound. Prior to 2005, scales were collected for aging from all walleye and sauger. From 2005 to 2012, otoliths were collected from walleye for aging and oxytetracycline (OTC) analysis.

Lake Superior Whitefish

Lake Superior whitefish (whitefish) in Fresno Reservoir have historically comprised a significant portion of the gill net catch (Figure 8), but are rarely targeted by anglers. Whitefish exhibit fast growth rates in the reservoir and thereby avoid predation from all but the largest walleye and northern pike. Whitefish appear to reproduce successfully in years of stable over-winter storage.

Figure 8. - Relative abundance and size structure of lake whitefish collected with sinking experimental gill nets in Fresno Reservoir, 1987-2012.



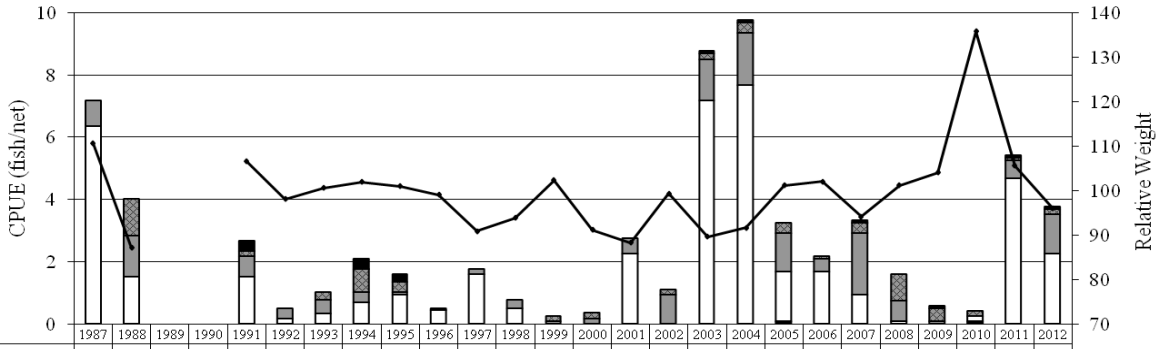
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Memorable (>18.0 in.)	0.08	1.75	0.00	0.17	0.42	0.42	0.92	2.33	1.25	1.17	1.33	1.50	1.25	4.08	5.25	1.67	1.17	1.42	1.17	1.08	0.333	0.66	1.583	1.5	0.833	1.083
Preferred (14.0-17.9 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	0.25	0.083
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	1.42	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	0.083	0
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	0.166	0

Yellow Perch

The yellow perch fishery in Fresno was negatively impacted by drought in the early 2000s due to extreme draw downs in 2001 and 2002. Yellow perch were not able to successfully spawn (Table 14) and population levels were drastically reduced (Figure 9). To remedy this situation, 170,000 pre-spawn adult yellow perch were supplemented from 2001 to 2004 to increase population levels so when water levels increased these forage fish populations could rebound. In 2003 and 2004, water levels increased, flooding shoreline vegetation and successful spawning and recruitment of forage fish was documented (Table 14). Stocking of pre-spawn perch was discontinued in 2005. In 2011 and 2012, pre-spawn yellow perch were once again stocked due to excellent spring water conditions. However, high densities of walleye due to increases in stocking effort have limited the number of YOY yellow perch that actually recruit into the population, regardless of spawning conditions and success.

Since stocking of adult yellow perch was discontinued in Fresno Reservoir, the abundance of yellow perch was decreasing and mimicked pre-drought levels (Figure 9). Low water levels throughout the fall and winter months limit good rearing habitat and increase the vulnerability of YOY yellow perch to walleye and northern pike predation. However, five good water years (2008-2012) have created better overwinter water levels, inundating littoral habitats and creating refuge areas for YOY yellow perch to successfully recruit in to the population (Figure 9). Walleye and northern pike densities remain very high (Figure 10 and Figure 11) and has correlated with declining relative abundance of yellow perch during exceptional water conditions (Figure 9).

Figure 9. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Fresno Reservoir, 1987-2012.



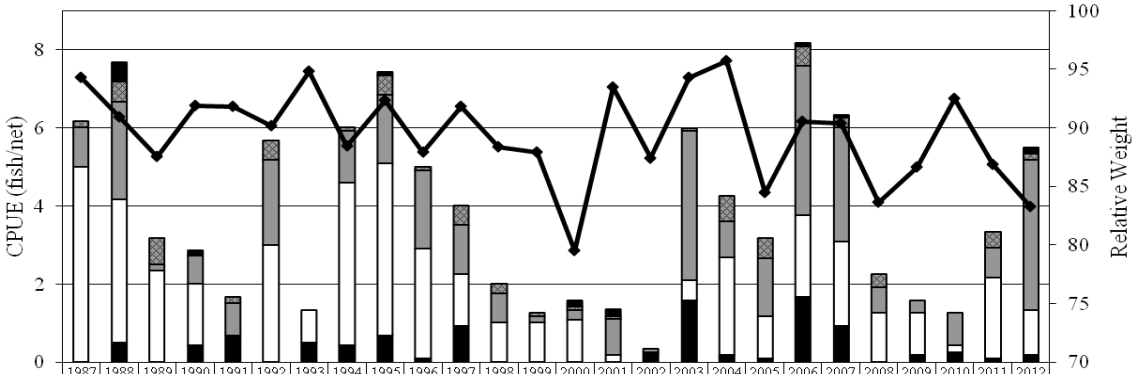
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Memorable (>12 in.)	0	0	0	0	0.33	0	0	0.33	0.25	0	0	0	0	0	0	0	0.08	0.08	0	0	0.083	0	0.083	0	0.083	0.083
Preferred (10-11.9 in.)	0	1.17	0	0	0.17	0	0.25	0.75	0.33	0	0	0	0.17	0.17	0	0.17	0.17	0.33	0.33	0.08	0.333	0.833	0.417	0.167	0.083	0.166
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	0.583	1.25
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	4.66	2.25
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	0	0
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	105.6	95.91

Northern pike

Since the illegal introduction of northern pike in Fresno Reservoir during the 1940s, their population has fluctuated over the years (Figure 10). Extreme drought conditions from 2000 to 2002 reduced the abundance of northern pike. However, the population rebounded in 2003 with increased water levels and inundated shoreline vegetation. Northern pike continue to successfully reproduce, resulting in an increased relative abundance of adults observed over the last two years (Figure 10).

Excellent water and forage conditions are the primary factors contributing to the successful reproduction, growth, and condition of this population.

Figure 10. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental gill nets in Fresno Reservoir, 1987-2012.



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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	0	0.166
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	0.416	0.166
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	0.75	3.833
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	2.08	1.166
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	0.083	0.166
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	86.86	83.27

Walleye

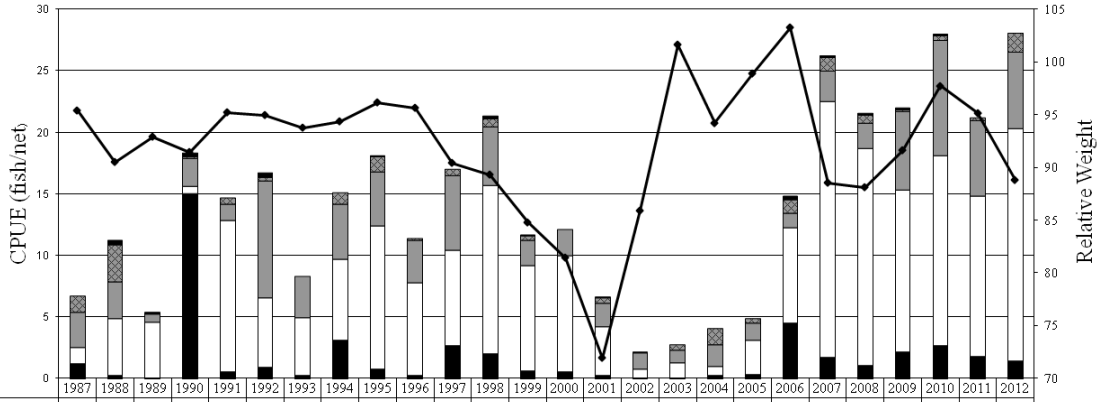
From 2003 to 2011 approximately 100,000 fingerling walleye were stocked annually in Fresno Reservoir. In 2006, 200,000 fingerling walleye were stocked due to unallocated productions at the Fort Peck Hatchery.

Since 1987, six of the seven highest walleye relative abundances have been documented from 2007-2012 (Figure 11). Record relative abundances (28 fish/net) were documented in 2010 and 2012 (Figure 11). It is evident that stocking walleye fingerlings at a rate of 100,000/year is very successful and these fish are recruiting and contributing to adult density levels. The population has continued to grow regardless of increased fishing pressure and harvest. A decrease in abundance levels was observed in 2011 due to increased flushing loss of adult walleye over Fresno spillway caused by near record spring run-off and precipitation (Figure 11). In 2011, anglers were observed catching numerous walleye below the dam from April-October.

The high abundances observed over the last six years have coincided with some of the best water and forage conditions observed since Fresno Dam was built. It is unclear what effects might incur to this population (and the entire fish community) once water conditions revert back to a more normal cycle or worse yet, experience conditions observed in 2001/2002.

Water conditions in Fresno directly benefit/impact this fishery and current walleye densities are not favorable for the long-term health of the fishery. In 2012, no walleye fingerlings were planted in an effort to observe reproductive success of the current adult population and reduce stocking contributions to an already high walleye population. Walleye natural reproduction was observed in 2012, indicating good spawning habit exists when conditions are favorable. Future walleye stocking rates should consider the current spawning adult densities and potential of that population to naturally reproduce.

Figure 11. - Relative abundance, size structure, and relative weight of walleye in Fresno Reservoir for the years 1987-2012.



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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	0	0
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	0.25	1.583
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	6.2	6.25
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	13	18.92
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	1.75	1.33
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	95.15	88.82

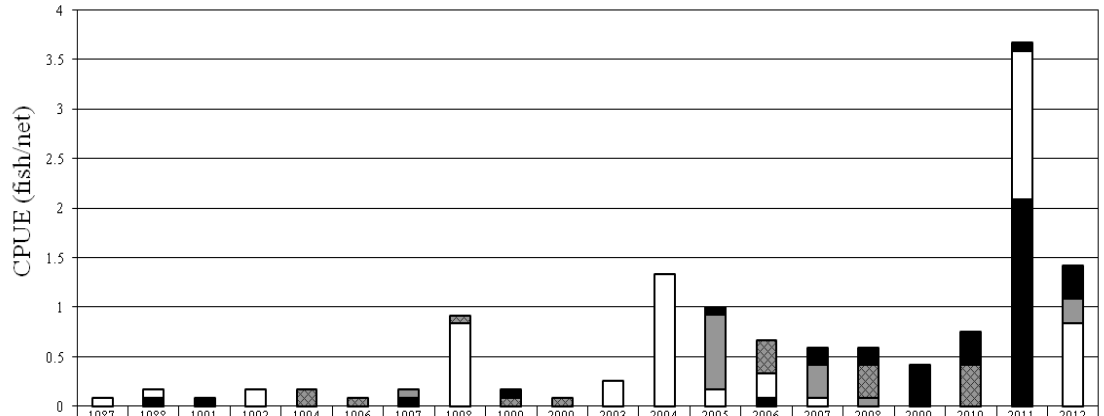
Sauger

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 relative abundance increased in 2001 and 2002 when drought and extreme reservoir drawdowns resulted in an increase in riverine habitat. No sauger were collected in 2012.

Black Crappie

Black crappie were most likely introduced into Fresno in the 1950s however the first record of stocking by FWP occurred in 1991. Since 1968, YOY crappie numbers have fluctuated greatly (Table 14). In 2010, YOY black crappie abundance was the highest on record since 1974 and another good year of reproduction occurred in 2011 (Table 14). The recent spawning success of black crappie is due to good reservoir pool levels during the spawning period (June), with water levels rising or remaining stable during this period. Elevated water levels have also contributed to three good year-classes being produced (2008, 2010, and 2011), with these fish recruiting into the population (Figure 12).
The adult population of black crappie in Fresno Reservoir was at record highs in 2011 and remained good in 2012 (Figure 12). The current population is comprised of 7-10 inch fish.

Figure 12. - Relative abundance and size structure of black crappie collected with sinking experimental gill nets in Fresno Reservoir, 1987-2012.



	1987	1988	1991	1992	1994	1996	1997	1998	1999	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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	0.083	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	0	0
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	0	0.25
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	1.5	0.833
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	2.08	0

Phillips Pond

Phillips pond is a three acre reservoir located on private land approximately 11.5 miles south of Inverness. In the spring of 2009 the landowners contacted FWP about managing the reservoir for warm water species (bluegill and largemouth bass) and allowing public access. In the fall of 2009 approximately 150-adult bluegills were stocked and 1,000 fingerling largemouth bass were stocked in the summer 2010. In 2012, one gill and trap net were set overnight to determine if the stocked fish had established within the reservoir, no fish were collected. It's thought this reservoir experienced a winterkill in 2010/2011 due to prolonged snow cover and relative shallow nature of this reservoir (max depth=12 ft).

Very few public fishing waters exist in western Hill County. Due to the proximity of this pond to nearby towns and easy access off a county road, Phillips Pond will receive 500 fingerling rainbow trout biannually, starting in 2013.

Blaine County Fishing Waters

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.

Cow Creek Reservoir

Cow Creek Reservoir is a privately owned 65 surface-acre reservoir located in the Bearpaw Mountains. Cow Creek Reservoir has been managed as a warm water fishery since 1994. Walleye, channel catfish, black crappie, and tiger muskie have been stocked, whereas yellow perch were illegally introduced in 2001. In 2007, 5,000 walleye, 3,000 channel catfish, and 820 7 inch tiger muskie were stocked into Cow Creek Reservoir. Currently, Cow Creek Reservoir receives 5,000 walleye fingerlings biannually. Channel catfish and tiger muskie are stocked as needed.

In 2010, 12,000 pre-spawn yellow perch were transferred and stocked into Cow Creek Reservoir from the Kremlin Water Ponds and 50 advanced fingerling tiger muskie from South Dakota were stocked in the fall. 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 limited rip-rap and prevailing winds. In 2010 the landowners along with FWP agreed to design and fund a dam restoration project through the Future Fisheries Program to fill, re-slope, and place larger rock rip-rap at Cow Creek Reservoir. This project was completed in the fall of 2012 and reservoir water levels have started to increase.

Relative abundance of all species were low in 2010 when compared to long-term averages (Table 15). Walleye average lengths continue to be low and anglers are voicing their dissatisfaction. No sampling occurred in 2011 due to extremely low reservoir levels created by the owner in fear of the dam breaching due to high flows from Cow Creek. In 2012, water levels remained low to prevent further erosion and expose the dam so necessary re-construction and maintenance to the dam face could occur. Surveys conducted in 2012 suggest reduce water levels have had little affect on the fish community (Table 15). Yellow perch and channel catfish relative abundance was the highest documented since netting was initiated in 1994. Several channel catfish captured in 2012 approached or exceeded 10 lbs. Walleye relative abundance remains good and the average length observed in 2012 was the highest in five years (Table 15). Tiger muskie relative abundance remains low. However, several reports of anglers catching tiger muskie occur annually, some of these fish are exceeding the 40" minimum length limit implemented at this reservoir.

Table 15. 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 (1994-2012).

		Yellow Perch		**Channel Catfish**			**White Sucker**		**Walleye**			**Tiger Muskie**	
Date	Nets	CPUE	Avg. Length	CPUE	Avg. Length	Rel. Weight	CPUE	Avg. Length	CPUE	Avg. Length	Rel. Weight	CPUE	Avg. 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
Jun-11						No Sampling Occurred							
Jun-12	2.0	3.0	8.3	14.5	18.1	136.7	4.0	14.8	6.5	11.3	83.3	0.0	0.0

Dry Fork Reservoir

Dry Fork Reservoir is a 300 surface-acre reservoir located seven miles north of Chinook. Historically, Dry Fork has been a popular yellow perch and northern pike fishery. In 2001, severe drought and water management due to increased irrigation demands resulted in a severe decrease in

water levels. As a result, the fishery was destroyed and black crappie and northern pike were re-introduced in 2002 when the reservoir partially re-filled. Rainbow trout were stocked from 2002 to 2005 to supplement the fishery and walleye were re-introduced in 2004. The fishery fully recovered and angling pressure had increased to 1,028 angler days in 2005 (Regional rank=17th). In 2006, two experimental gill nets were set within Dry Fork Reservoir and the voluntary creel box was maintained. Results of netting in 2006 resulted in the highest fish abundance on record, indicating good growth and recruitment of sport fishes within the reservoir. However, from 2006-2010 water levels once again were reduced to severe levels (max depth = 3ft) due to mild drought conditions and irrigation practices.

In 2011, high spring runoff and rain events refilled Dry Fork. To re-establish the fishery, FWP trap and transported 3,400 pre-spawn yellow perch, 3,000 fathead minnows, and 93 adult black crappie in 2011, 10,000 rainbow trout were stocked as well. In 2012, an additional 10,000 rainbow trout were stocked. Walleye fingerlings were stocked and will continue to be stocked at a rate of 10,000/biannually. FWP continued to trap and transport black crappie (37 adults) and northern pike (47 adults) as well. FWP will attempt to trap and transfer up to an additional 100 adult northern pike in 2013. Anglers have reported catching largemouth bass (TL= 8-12 in.). This species was not stocked by FWP and were likely transported into the reservoir from surrounding waterbodies during the high spring runoff experienced in 2011.

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.

Doll Pond

Doll pond is a 2-acre pond located on private property. Doll pond has been managed as a warm water fishery since largemouth bass and bluegill were introduced in 2006. In 2008, one gill net and one trap net were set overnight. The trap net contained four bluegill ranging in length from 2.5 to 6.1 inches and in weight from 0.02 to 0.27 pounds ($\bar{x}$ TL = 4.2 in.; $\bar{x}$ wt = 0.13 lbs.); the gill net captured no fish. Doll pond received a supplement planting of 350 adult bluegill (transferred from Don's Reservoir) and 500-1,000 fingerling largemouth bass in 2008.

In 2012, one gill and trap net were set overnight to assess the recent introductions of bluegill and largemouth bass. The gill net captured 15 rainbow trout that ranged in length from 14.2-16.3 inches and averaged two pounds. The trap net captured 20 bluegill that ranged from 3.9-7.5 inches and 294 fathead minnows. Excellent water conditions in Doll Pond have resulted in excellent rainbow trout growth. The variable lengths recorded on bluegill suggests these fish are naturally reproducing and recruiting into the population.

Ester Lake

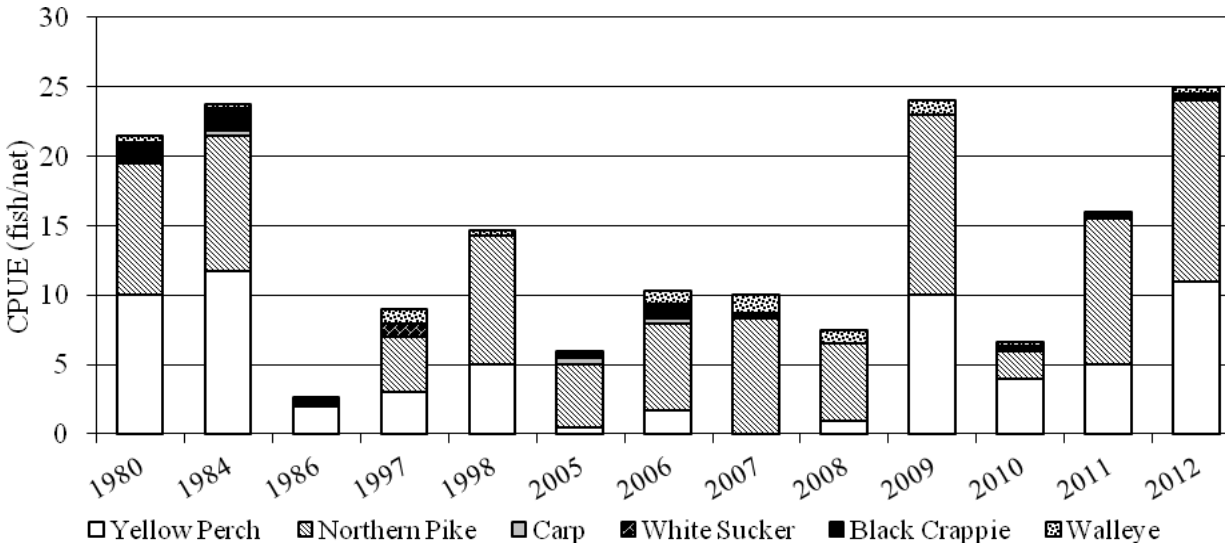
Ester Lake is a 139-acre pond located on state land and has been managed by FWP since the 1950s. In the 1960's Ester was a productive fishery with high numbers of yellow perch, black crappie, and walleye. Since the 1980s the fishery has been in decline due to poor water levels. However, water levels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

In 2009 and 2010, Ester received 8,000 and 2,600 pre-spawn yellow perch to boost the forage base that had been non-existent since the early 1980s (Figure 13). The supplemental plants of yellow perch have boosted the population and in 2011 approximately 3,900 fathead minnows were planted to

establish a secondary forage species. Ester Lake is currently dominated by smaller northern pike (TL < 9.0 in.) suggesting this population is stunted and needs to be reduced.

In 2012, an additional 3,500 yellow perch were stocked to supplement the adult population. Approximately 77 adult northern pike were trapped and transferred to other waters to create other northern pike fisheries and reduce the abundance of northern pike in Ester Lake. Netting surveys conducted in July suggest a balanced fishery with very good abundance of yellow perch and northern pike (Figure 13).

Figure 13. - Relative abundance of yellow perch, northern pike, carp, white sucker, black crappie, and walleye in Ester Lake (periodic sampling 1980 to 2012).



Nelson Reservoir

Nelson Reservoir, located 19 miles east of Malta is a off-channel storage reservoir constructed in 1915 for irrigation along the Milk River. 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 when compared to other regional reservoirs, with an average annual fluctuation of 8.36 feet and average water retention time of 24 days (storage capacity (acre-feet)/average annual inflow (acre-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 fingerlings have been stocked annually since 2003 in order to boost an already good population. This increased stocking effort has had little impact to the walleye population thus far and will be further evaluated in coming years. Spawning shoals were constructed in 1993 at three locations within the reservoir to improve the spawning habitat for walleye and their contribution to the overall spawning success of walleye is unknown.

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 10 predetermined stations. Beach seining was conducted in early August using a 100- x 9-foot x ¼ inch square mesh beach seine. Fish were sorted by species and counted.

Table 16. - 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, 1982-2012.

	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
2011*	750	8	2,404	530	6	34	181	69	0	0	40	0
2012*	750	2	685	312	1	66	49	935	0	7	6	1

*Years in which walleye fry or fingerlings were stocked

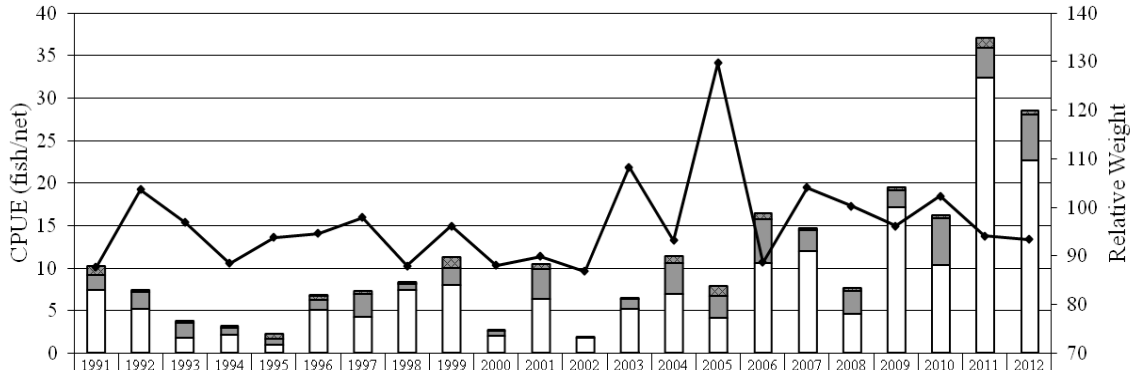
[1] Consists of bigmouth buffalo and smallmouth buffalo

Yellow Perch

The yellow perch fishery in Nelson Reservoir has been cyclic over the last 14 years due to drought, timing of water fluctuations, and quality of available spawning habitat. In the early 1990s and in 2000 and 2002, the relative abundance of yellow perch was significantly reduced due to severe drought conditions. However, since 2003 spring and summer rains have enabled water levels to flood shoreline vegetation and remain stable during crucial spawning and rearing periods (April-October), resulting in the highest yellow perch densities seen in Nelson (Table 16; Figure 14).

In 2011, yellow perch relative abundance was the highest ever recorded averaging 37.1 fish/net and consisted mostly of stock (5-7.9 in.) and quality (8.0-9.9 in.) sized fish. Yellow perch relative abundance remained high in 2012 (28.5 fish/net; Figure 14) with the majority of fish sampled consisting of stock and quality sized yellow perch. The yellow perch population has responded well due to several consecutive exceptional water years. This population will remain stable if the current water conditions persist.

Figure 14. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Nelson Reservoir, 1991-2012.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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	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	1.2	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	3.5	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	32.4	22.7
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	0	0
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	94.08	93.38

Walleye

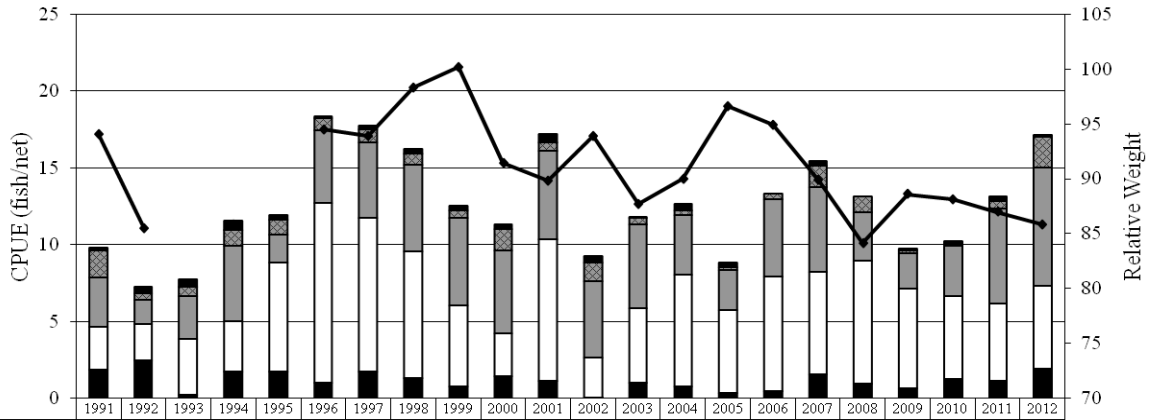
Walleye fingerlings have been periodically stocked into Nelson Reservoir to augment natural reproduction. From 2002 to 2011 (with the exception to 2006), all walleye fingerlings stocked into Nelson Reservoir have been marked with 750 ppm OTC to allow the calculation of survival on stocked fish and to distinguish stocked fish from naturally reproduced fish. There was a miscommunication with the Fort peck Hatchery and no walleye fingerlings stocked in 2012 were marked. 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 16). 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 YOY walleye from 2003 through 2012 (Figure 15). OTC analysis suggests the majority (> 70%) of YOY walleye recruiting into the population are naturally reproduced.

The relative abundance of adult walleye has remained relatively stable over the last five years with relative abundances currently trending upward (Figure 15). In 2012, walleye relative abundance

was the highest recorded since 2001 (17.1 fish/net; Figure 15). Exceptional water and forage conditions are most likely the primary factors contributing to the increase. However we can't overlook the contributions stocked fingerlings have on this population as well, though all of our data and scientific literature suggests otherwise.

Figure 15. - Relative abundance, size structure, and relative weight of walleye collected with sinking experimental gill nets in Nelson Reservoir, 1991-2012.



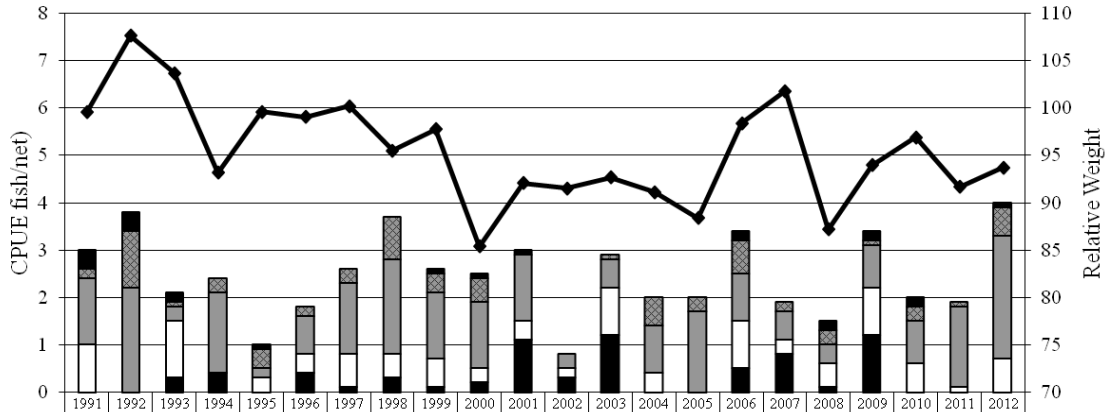
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Memorable (>25 in.)	0.20	0.40	0.50	0.60	0.30	0.10	0.20	0.30	0.30	0.30	0.60	0.40	0.10	0.40	0.30	0.00	0.3	0	0.1	0.2	0.3	0.1
Preferred (20-24.9 in.)	1.80	0.40	0.60	1.00	1.00	0.80	0.90	0.70	0.50	1.40	0.50	1.20	0.40	0.30	0.20	0.40	1.4	1	0.2	0.1	0.5	2
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	6.2	7.7
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	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	1.1	1.9
Relative weight	94.03	85.50		85.80		94.50	93.90	98.33	100.1	91.43	89.83	93.93	87.71	89.98	96.65	94.90	89.9	84.1	88.59	88.1	86.98	85.84

Northern pike

Historically, the abundance of adult northern pike has remained relatively stable, consisting of a high proportion of quality, preferred, and memorable size fish (Figure 16). Northern pike populations were significantly reduced in 2002 due to severe drought conditions, however the population was quickly replenished with the recruitment of YOY fishes in 2003 (Table 16). In 2011, the northern pike population remained stable at 1.9 fish/net and was dominated by quality sized fish (Figure 16).

In 2012, northern pike relative abundance was at its highest level ever documented (4 fish/net; Figure 16) with the majority of the catch consisting of quality sized fish (21-27.9 in.). Exceptional water and forage conditions are most likely the primary factors contributing to the increase and current abundance. Northern pike abundance should remain high if the current water conditions persist.

Figure 16. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental mesh gill nets in Nelson Reservoir, 1991-2012.

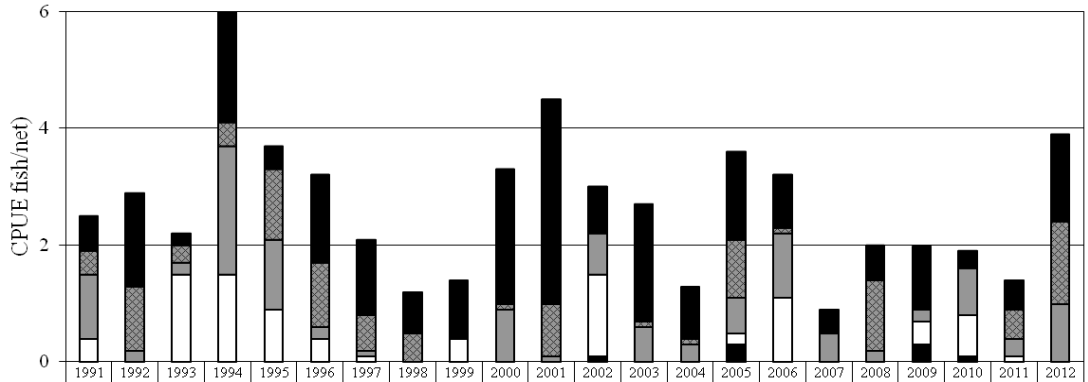


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Memorable (>34 in.)	0.40	0.40	0.20	0.00	0.10	0.00	0.00	0.00	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.20	0	0.2	0.2	0.2	0	0.1
Preferred (28-33.9 in.)	0.20	1.20	0.10	0.30	0.40	0.20	0.30	0.90	0.40	0.50	0.00	0.00	0.10	0.60	0.30	0.70	0.2	0.3	0.1	0.3	0.1	0.6
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	1.7	2.6
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	0.1	0.7
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	0	0
Relative weight	99.55	107.5	103.6	93.18	99.59	99.04	100.2	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	91.67	93.73

Lake whitefish

Lake whitefish populations have fluctuated since 1991 due to fluctuations in water levels and summer water temperature, which have reduced recruitment of YOY fish to the population (Figure 17). In 2007, there was a massive summer kill of lake whitefish reported and fall gill netting surveys indicated a decrease in the abundance of lake whitefish (CPUE = 0.9 fish/net; Figure 17; Leslie 2007). Gill netting surveys conducted in 2012 reveals the population has increased and is comprised of mostly adult fish (Figure 17).

Figure 17. - Relative abundance, size structure, and relative weight of lake whitefish collected with sinking experimental mesh gill nets in Nelson Reservoir, 1991-2012.

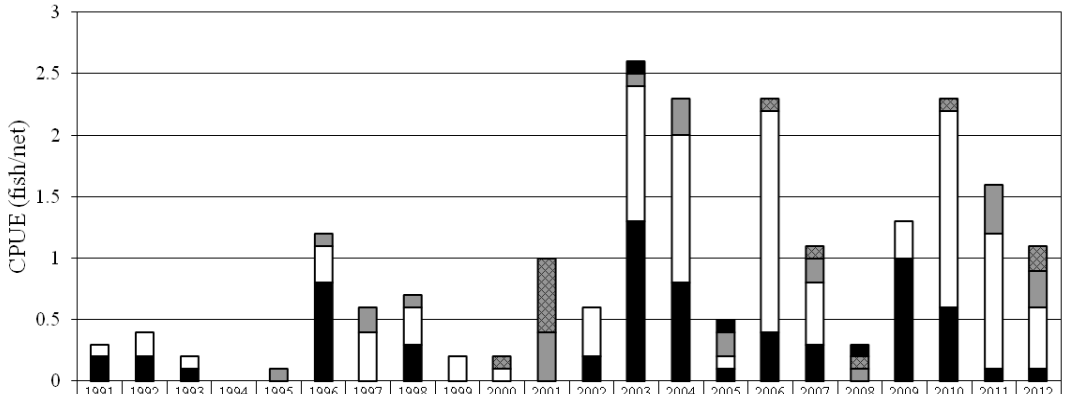


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Memorable (>18.0 in.)	0.6	1.6	0.2	1.9	0.4	1.5	1.3	0.7	1	2.3	3.5	0.8	2	0.9	1.5	0.9	0.4	0.6	1.083	0.3	0.5	1.5
Preferred (14.0-17.9 in.)	0.4	1.1	0.3	0.4	1.2	1.1	0.6	0.5	0	0.1	0.9	0	0.1	0.1	1	0.1	0	1.2	0	0	0.5	1.4
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	0.3	1
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	0.1	0
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	0	0

Black Crappie

Historically there has been a low abundance of black crappie in Nelson Reservoir. In 2003, black crappie reproduction was the highest ever recorded (Table 16) and recruitment of YOY crappie into the population resulted in a high abundance of adult black crappie (Figure 18). High reproductive success over the last seven years indicates the conditions within Nelson Reservoir have been favorable for black crappie, due to rising/stable water conditions during the month of June. If these conditions persist the population will continue to remain at good levels.

Figure 18. - Relative abundance, size structure, and relative weight of black crappie collected with sinking experimental gill nets in Nelson Reservoir, 1991-2012.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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	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	0	0.2
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	0.4	0.3
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	1.1	0.5
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	0.1	0.1

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 16).

It was reported that a channel catfish measuring close to 40 inches was caught and released in May 2012. It was also reported that anglers are starting to figure out that Nelson has a very good adult population of smallmouth bass and the serious bass anglers are starting to target them.

PR 161

PR 161 is an 87-acre reservoir located on BLM land in south Phillips County. PR 161 was first stocked by FWP in 1937 with the introduction of largemouth bass and black bullheads. Northern pike were stocked in 1969 and have provided a self-sustaining fishery ever since. In 2008, PR 161 was sampled for the first time on record. Two sinking gill nets and one trap net were set for approximately 21 hours. The gill net contained one northern pike (TL = 23.5 in.); the trap contained one northern pike (TL = 19.4 in.) and 237 fathead minnows. PR 161 was stocked with 500 fingerling northern pike in 2009 and 2010.

In 2012, two gill nets and two trap nets were set overnight to evaluate the stocking success and detect any changes in northern pike densities. Northern pike relative abundance increased to 30.5 fish/net, ranging in length from 9.6-26.5 inches ($\bar{x}$ TL= 20.9 in.). Stocking of northern pike was very successful and this population is naturally reproducing. The trap nets captured seven northern pike. Failing to capture any fathead minnows may indicate an overpopulated northern pike fishery and increased pressure to the forage base. FWP will encourage anglers to fish PR 161 and harvest northern pike as well as closely monitor the forage base.

Wildhorse Reservoir

Wild Horse is a mid-sized reservoir (255 surface-acres) located on state and BLM land in south Phillips County. Prior to 2008, no stocking or sampling data existed for this reservoir. However, local ranchers informed FWP of a good northern pike population that existed prior to the extensive drought experienced across the region in the early 2000's. In 2008, spring run-off filled Wild Horse to full capacity and two gill nets and one trap net were set overnight to assess the entire fish community. Gill net catch consisted entirely of common carp (CPUE = 42 fish/net) ranging in length from 5 to 19.8 inches and weight from 0.2 to 3.62 pounds ($\bar{x}$ TL = 9.2 in.; $\bar{x}$ wt = 0.60 lbs.). The trap net contained 305 fathead minnows.

In the summer of 2008, 1,350 adult yellow perch were trap and transferred from Bison Bone to establish a fishery and forage base in Wild Horse. In 2009 and 2010 5,000 fingerling northern pike were stocked to re-establish a sport fishery. In 2012, two gill nets and two trap nets were set overnight to evaluate stocking and spawning success of yellow perch and northern pike. Gill nets captured 72 northern pike, 11 yellow perch, and 55 common carp. The trap nets contained 35 fathead minnows, 15 northern pike, and 5 yellow perch. Relative abundance of northern pike was very good (36 fish/net) and indicates very successful survival of stocked northern pike. Northern pike ranged in length from 10.7-41.0 inches ($\bar{x}$ TL= 20.4 in.). Yellow perch captured ranged in length from 3.3-11.1 inches ($\bar{x}$ TL= 8.14 in.) and suggests yellow perch have established and are successfully reproducing within the reservoir. Common carp relative abundance decreased from 42 fish/net to 26 fish/net and ranged in length from 12.3-18.6 inches ($\bar{x}$ TL= 15.5 in.). Decreases in carp abundance and an increase in average total length suggest the northern pike are utilizing them as the primary forage within Wild Horse Reservoir.

RECOMMENDATIONS

Paddlefish: Fort Peck Stock

Annual tagging efforts should continue with over 300 new paddlefish being tagged annually. An on-site paddlefish creel survey should be conducted in 2013 to monitor the 500 fish harvest cap 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 2013, using the database of anglers who purchased tags to assess angler harvest of paddlefish. YOY visual counts should be conducted to assess reproductive success and year-class strength. 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 continue to be evaluated to determine best stocking strategy for each reservoir. Creel surveys should be considered at both reservoirs, each survey should be conducted for a full year to assess both open water and ice fishing pressure, catch, and harvest rates of all species present.

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, Dry Fork, 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, new self-creel survey boxes will be distributed throughout each county 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 Bison Bone Reservoir and transferred to Ester, Cow Creek, and Fresno in the spring of 2013.

References

Berg, R. K. 1981. Fish populations of the wild and scenic Missouri River, Montana, Montana Department of Fish, Wildlife, and Parks. 242pp.

Bowersox, B. J. 2004. An investigation of paddlefish, *Polyodon spathula*, and their prey in Fort Peck Reservoir, Montana. Master's Thesis, University of Idaho, Moscow, 95 p.

Kozfkay, J. R. and D. L. Scarnecchia. 2002. Year-class strength and feeding ecology of age-0 and age-1 paddlefish (*Polyodon spathula*) in Fort Peck Lake, Montana, USA. Journal of Applied Ichthyology **18**: 601-607.

Leslie, L. 2005. Statewide Fisheries Investigations, Northeast Montana warm water ecosystems investigations, survey and inventory of coldwater and warm water ecosystems. Montana Fish, Wildlife, and Parks. Project F-11-R-4. Helena. 20 pp.

Leslie, L. 2006. Statewide Fisheries Investigations, Northeast Montana warm water ecosystems investigations, survey and inventory of coldwater and warm water ecosystems. Montana Fish, Wildlife, and Parks. Project F-11-R-4. Helena. 44 pp.

Leslie, L. 2007. Statewide Fisheries Investigations, Northeast Montana warm water ecosystems investigations, survey and inventory of coldwater and warm water ecosystems. Montana Fish, Wildlife, and Parks. Project F-11-R-4. Helena. 55 pp.

McFarland, B. and R. Roche. 1987. Creel Census Program. Vers. 1. Computer Software. Montana Fish, Wildlife, & Park, 1987.

McFarland, B. 2010. 2009 Statewide Angling Pressure Use Report. Montana Fish, Wildlife, & Parks, Helena, MT. Pp. 170.

Miller, S. E. 2005. Protocol for juvenile paddlefish visual counts and zooplankton sampling on Fort Peck Reservoir, Montana. Moscow, University of Idaho**:** 6.

Miller, S. E. and D. E. Scarnecchia. 2006. Juvenile paddlefish visual counts and zooplankton sampling on Fort Peck Reservoir, Montana: Report for 2005. University of Idaho, Moscow. 5p.

Miller, S. E., D. E. Scarnecchia, and L. Leslie. 2006. Spring migrations of adult paddlefish in the Missouri River above Fort Peck Reservoir: Progress report for 2006. University of Idaho, Moscow. 27p.

Miller, S.E. and D.E. Scarnecchia. 2011. Sex-specific differences in migratory movements of adult paddlefish above Fort Peck Reservoir, Montana, USA. Folia Zool. 60 (3): pp. 181-188.

Miller, S.E., D.E., Scarnecchia, and S.R. Fain. 2011. Timing of paddlefish spawning in the Upper Missouri River, Montana, USA in relation to river conditions. Journal of Applied Ichthyology. 27 (2011), pp. 1291-1297.

Neuhold, J. M. and H. L. Kuo. 1957. Creel Census Method. Utah State Department of Fish and Game. 36pp.

Riggs, V. 2005. Montana Paddlefish Telephone Creel Survey 2003 and 2004. Miles City, Montana Fish, Wildlife & Parks**:** 20.

US Congress. 1975a. Hearings on Senate Bill 1506, a bill to amend the wild and scenic rivers act, part 2- Missouri River, Montana. US Government Printing Office, Washington, D. C. 444pp.

US Congress. 1975b. Designating a segment of the Missouri River in the state of Montana as a component of the national wild and scenic river system. Senate Report No. 94-502. 16pp.

USFWS (U.S. Fish and Wildlife Service). 1999. Endangered and threatened wildlife. United States Code of Federal Regulations, Title 50, Sections 17.11 and 17.12.

United States Geological Survey. 2010 Water resources data for Missouri River near Virgelle MT. Retrieved: January 5, 2011, from http://waterdata.usgs.gov/ mt/.

Upper Missouri Creel Survey 2005-2009

ABSTRACT

A creel survey was conducted on a 28-mile reach of the Upper Missouri River during the months of April, May, and June from 2005-2009 to assess fishing pressure, catch and harvest rates, and angler trends. During the creel survey paddlefish regulations were changed in 2007 and again restructured in 2008 to reduce the number of paddlefish being harvested annually and maintain a self-sustaining snag fishery. On average 29,584 angler hours were spent targeting various fish species found in the Upper Missouri River from April-June. Anglers represented a number of Montana Counties and surrounding states. Angler's primarily targeted paddlefish, channel catfish, walleye, and sauger during this time of the year. Other species such as freshwater drum, shovelnose sturgeon, and stonecats were frequently caught as well.

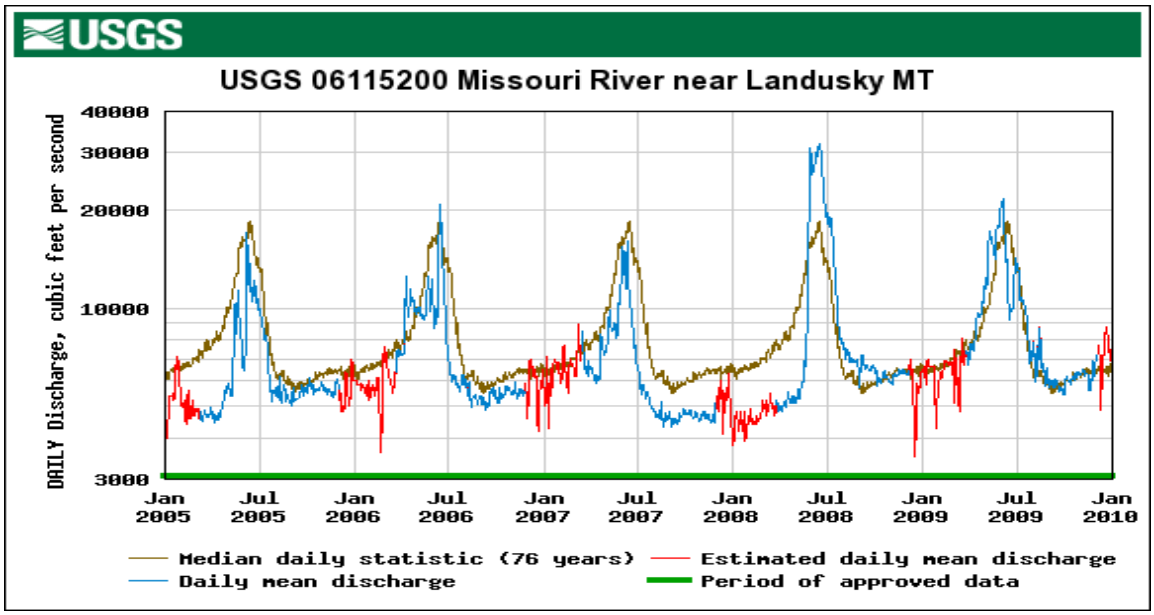
PROCEDURES, RESULTS, & DISCUSSION

Flows

During the five-year creel, flows met or exceeded the 76-year median flow in three of the five years (2006, 2008, and 2009; Figure 1). Flows ranged from 5,500-9,500 cubic-feet per second (cfs) during the month of April and either gradually or abruptly increased in May and June. In 2008, flows increased and fluctuated between 5,000 and 7,000 cfs from the end of April through mid May (Figure 1). Flow increased and peaked at 30,000 cfs at the end of May and declined steadily to 10,000 cfs by mid July (Figure 1). The peak flow experienced in 2008 was the highest recorded in over a decade and was heavily influenced by a low pressure system which dumped over 9 inches of rain in a four day span.

In 2009, flows increased steadily to 10,000 cfs through April. Flow increased and peaked at 20,000 cfs on June 4th and declined to 10,000 cfs by early July (Figure 1). The peak flow experienced in 2009 was the third highest recorded in over a decade.

Figure 1. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 2005-2009.

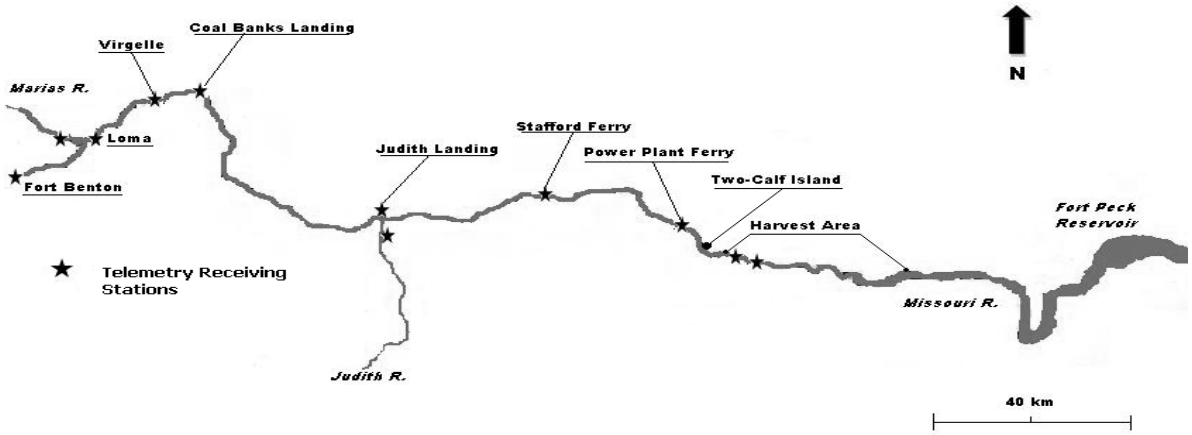


Methods and Schedule

A five-year creel survey was conducted from 2005-2009 in April-June on a 28-mile reach of the Upper Missouri River from the Fred Robinson Bridge (river mile 1921.5) to Peggy's Bottom (river mile 1899; Figure 2). In 2005, the roving creel survey was conducted by vehicle from April 1st to June 10th. In 2006, the roving creel survey was repeated from April 3rd to June 18th. In 2007, the roving creel survey was conducted from April 1st to June 19th. In 2008, the creel was conducted by vehicle and boat from April 1st-June 15th. In 2009, the creel was conducted by vehicle from April 4th to June 15th.

For the first half of April and the last half of June, fishing pressure was lower and one creel clerk was employed. During this time a stratified random sampling design was used to select survey dates from two strata, weekends and weekdays. All weekends were surveyed due to the high fishing pressure and two randomly selected weekdays were surveyed. From mid April to mid June, two creel clerks were employed and all days were surveyed. During high-pressure times (Memorial Day weekend), two extra creel clerks were employed and two teams surveyed anglers.

Figure 2. Map of the creel area including locations of fixed telemetry receiving stations in the Upper Missouri River above Fort Peck Reservoir. Harvest area encompasses RM 1897-1921.



Effort

Instantaneous pressure counts were performed once a day by vehicle due to travel distance and time. Start times were calculated at random, using times generated from a typical fishing day (8:00 to 21:00 in 2005 & 2006) and counts were performed from ten pre-determined vantage points and access areas. Counts were performed at all sites except when road conditions prevented travel to some of the sites. In 2006, the accuracy of the vantage point counts were double checked on three occasions by conducting simultaneous counts from vantage points and by boat for the entire creel area. In 2007, the creel survey and counts were conducted by boat for the entire creel area. In 2008, the creel survey and counts were conducted by boat and vehicle and in 2009 counts were conducted entirely by vehicle.

Harvest and Catch

Angler interviews were conducted at all boat ramps (3) and fishing access/camping sites (16) on both the north and south shore of the Missouri River between Fred Robinson Bridge (RM 1921) and lower Peggy's Bottom (RM 1988). 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 were not available for interviews.

During interviews, one randomly selected angler (actively fishing) 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 targeted. Fishermen were asked how many of each species were caught, released and/or kept and if any of these fish had tags. Tag type, color, and number were recorded on all tagged fish reported. 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, harvested fish were measured to the nearest 0.1-inch and 0.01-pound. Eye-fork (body) length measurements were taken for paddlefish and fork-length measurements for sturgeon. Age samples consisting of jaws, spines, scales, or otoliths were collected from all harvested fish. These samples were then sent to the University of Idaho for aging.

In 2005 and 2006, the creel clerks also carried Passive Integrated Transponder (PIT) tag readers to identify any previously tagged pallid sturgeon and were prepared to PIT tag any new fish they encountered. Pamphlets and brochures developed for sturgeon, sauger, and paddlefish were distributed freely to fishermen.

Data Analysis

Fishing effort (angler-hours and total effort), catch rates, and harvest estimates were calculated using methods outlined in Pollock et al. (1994) in 2005. From 2006-2009 the Creel Census Program (McFarland and Roche 1987) which was developed using methods outlined in Neuhold and Lu (1957) was used for all pressure and harvest analysis. 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 in 2005 and 2006.

In 2007, the analysis for all species except paddlefish was conducted as in 2005 and 2006. In 2007, paddlefish regulations were changed to include mandatory harvest and mandatory release days. As a result, the creel survey time for paddlefish was broken down into three periods (April, May, and June), divided out by harvest and release day effort, and by boat or shore fishing. In 2008 and 2009, paddlefish regulations changed again and the creel analysis was conducted similar to 2005 and 2006. Effort was not broken down by fishing method or by species because anglers were usually fishing for more than one species during a day.

Results

Creel clerks averaged 694 party interviews (range=536-861) during the five-year creel census (Table. 1). The average party size was 4 people (range=1-32) with 82% being males (range=78-83.8%) and the average trip lasting 3.9 days (range=3.4-4.5; Table. 1). Fishing parties represented several states (range=7-13) and Montana counties (range=32-45; Table1) during the five-year creel and reflects the popular and diverse fisheries resources located in this reach of the Upper Missouri River.

Table 1. Demographic breakdown of anglers interviewed during the native creel survey 2005-2009.

Year	# Parties Interviewed	Avg. # of anglers per party	% Male	Avg. Length of Stay	# of States Represented	# of MT Counties Represented
2005	861	3.9	82.3	3.9	13	45
2006	611	4	83.8	3.8	10	39
2007	628	4	78	4.5	7	38
2008	834	3.9	83	3.9	13	41
2009	536	4.1	82	3.4	10	32

Angling Effort

Angler hours varied among the five years (range=24,289.90-36,757.31) with the most effort occurring from shore and during the month of May, which is the peak of the paddlefish spawning migration from Fort Peck Reservoir (Table. 2). This corresponds with the primary target species over the five year creel census, with paddlefish being the most commonly sought species (average=75%), followed by channel catfish (12.6%), walleye (7.1%), and sauger (3.2%; Table. 3).

Table 2. Estimated fishing effort (angler-hours and standard error (SE)) by month and angler type for the Missouri River (RM 1899 to 1921), April-June 2005-2009.

Year/Month	Shore	SE	Boat	SE	Overall
2005					
April	5,428.2	900.2	1,068.0	209.1	6,496.2
May	14,285.5	1,308.0	3,745.3	693.7	18,030.8
June	6,535.4	1,091.5	689.2	199.4	7,224.6
Overall	**26,249.1**		**5,502.5**		**31,751.6**
2006					
April	6,057.7	1,888.0	1,779.6	734.2	7,837.3
May	18,810.0	3,078.0	3,945.0	937.4	22,755.0
June	5,286.0	1,168.4	879.0	395.3	6,165.0
Overall	**30,153.7**		**6,603.6**		**36,757.3**
2007					
April	2,624.0	716.0	803.0	358.8	3,427.1
May	9,056.0	2,080.7	8,032.0	752.1	17,088.0
June	2,969.0	711.1	805.8	594.8	3,774.8
Overall	**14,649.1**		**9,640.9**		**24,289.9**
2008					
April	2,100.0	550.8	581.5	226.0	2,681.5
May	17,411.3	3,465.0	4,464.0	897.1	21,875.3
June	3,582.9	922.5	137.1	65.2	3,720.0
Overall	**23,094.2**		**5,182.7**		**28,276.9**
2009					
April	1,965.6	550.8	588.0	226.0	2,553.6
May	17,531.0	3,465.0	4,378.5	897.1	21,909.5
June	3,565.7	922.5	137.2	65.2	3,702.9
Overall	**23,062.4**		**5,103.6**		**28,166.0**

Table 3. Most common species targeted by spring anglers (%) on the Missouri River (RM 1899-1921) from 2005-2009.

Year	Paddlefish	Channel Catfish	Sauger	Walleye	Shovelnose Sturgeon	Northern Pike
2005	77%	7.20%	4.40%	6.20%	0.60%	0.10%
2006	82.10%	8.90%	0.68%	6.40%	0.46%	-
2007	66.60%	22.70%	1.90%	7.30%	-	-
2008	70.50%	9.30%	7.50%	11%	-	-
2009	77.10%	15.10%	1.70%	4.70%	-	-

Species

Paddlefish

The number of paddlefish caught and reported, catch rates, and percent harvested during the five year creel survey varied greatly among years (Table 4, Table 5, and Table 6). These differences were due to variable flow conditions in May and June, and new regulation changes implemented in both 2007 and 2008. The highest catch rates occurred when flows ranged between 9,500 and 15,000 cfs. Flows at this rate concentrate adult paddlefish between RM 1899-1921, where the majority of the snagging pressure occurs. Higher variability in day-to-day flows increases up/down-stream migration and further intensified snagging vulnerability.

Estimated hourly catch rates averaged 0.188 fish/hour over the five year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 875-3,070 paddlefish with a total estimated catch of 8,505 paddlefish during the creel study (Table 5). On average anglers harvested 66.2% of all paddlefish caught (Table 6).

Harvested paddlefish ranged in length from 24.0 to 72.0 inches (eye-fork length) and weight from 13.0 to 112.0 pounds (Table 7). Fifty-five percent of the harvested paddlefish sexed were males. 263 (14%) of the creeled paddlefish harvested had jaw tags whereas 28 (1.5 %) of the creeled paddlefish had jaw tags and were released. Harvested paddlefish ranged in age from 9 to 59 years old with 60% of the harvested fish being 20 to 45 years old (optimal spawning stock). Twenty-four percent of the harvested fish were less than 16 years old (new recruits).

Channel Catfish

The number of channel catfish caught and reported, estimated catch rates, and total estimated catch during the five year creel survey varied greatly among years (Table 4 and Table 5). These differences were due to variable flow conditions in May and June, water temperatures, timing of the catfish spawn, and angling pressure. The majority of anglers use setlines for channel catfish in this reach of the Missouri River, checking the lines during the morning and evening hours and in-between paddlefish snagging.

Estimated hourly catch-rates averaged 0.193 fish/hour over the five-year creel survey with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 899-4,773 channel catfish, with a total estimated catch of 14,563 channel catfish during the creel study (Table 5). On average anglers harvest 77% of the channel catfish caught (range= 75%-82%; Table 6).

Harvested channel catfish ranged in length from 7.5 to 39.5 inches and in weight from 0.25 to 29 pounds (Table 7). Thirty-eight percent of the harvested channel catfish sexed (n=443) were females.

Harvested channel catfish ranged in age from 3 to 19 years old with 66.1% of the harvested channel catfish ranging from 11-15 years old (Table 9).

Sauger

The number of sauger caught and reported, estimated catch rates, and total estimated catch during the five-year creel survey varied greatly among years (Table 4 and Table 5). These differences were due to variable flow conditions in April with the highest densities of sauger being caught in years with low April flows (< 8,000 cfs). Low flow reduced turbidity and sauger tended to congregate in the deeper pools near spawning habitats, becoming susceptible to angling.

Estimated hourly catch rates averaged 0.132 fish/hour over the five-year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 524-2,288 sauger with a total estimated catch of 7,391 sauger during the creel study (Table 5). On average anglers harvest 45.4% of sauger caught (range= 17%-68%; Table 6).

Harvested sauger ranged in length from 10.3-28 inches and in weight from 0.11-7.1 pounds (Table 7). Thirty-five percent of the harvested sauger sexed (n=110) were females. Harvested sauger ranged in age from 2-14 years old with 81.4% of the harvested sauger ranging from 5-9 years old (Table 10).

In 2005 and 2006, 41.9% of anglers released their sauger because they were too small, 32.3% because anglers were complying with the regulations, 12.9% because anglers were catch and release fishing, and 11.3% released sauger for other reasons such as the fish was tagged, the angler thought sauger were endangered, or because they were not the species being targeted.

Walleye

The number of walleye caught and reported, estimated catch rates, and total estimated catch during the five-year creel survey varied among years (Table 4 and Table 5). These differences were due to variable flow conditions in April, density of adult walleye spawning in the area, and angling pressure.

Estimated hourly catch rates averaged 0.092 fish/hour over the five-year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 291-2,743 walleye with a total estimated catch of 5,267 walleye during the creel study (Table 5). On average anglers harvest 67.6% of walleye caught (range= 56%-86%; Table 6).

Harvested walleye ranged in length from 11.5-33 inches and in weight from 0.10-13.5 pounds (Table 7). Seventeen percent of the harvested walleye sexed (n=64) were females. Harvested walleye ranged in age from 3-15 years old with 89% of the harvested walleye ranging from 3-9 years old (Table 11).

Stonecats

The number of stonecats caught and reported, estimated catch rates, and total estimated catch during the five-year creel survey were very high in 2005 when compared to the other years (Table 4 and Table 5). Stonecats were rarely targeted by anglers but made up a good portion of the angler by-catch.

Estimated hourly catch rates averaged 0.185 fish/hour over the five-year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 93-5,839 stonecats with a total estimated catch of 7,317 stonecats during the creel study (Table 5). On average anglers harvested 3% of stonecats caught (Table 6).

Harvested stonecats ranged in length from 5.5-7.6 inches and in weight from 0.06-0.66 pounds (Table 7). Harvested stonecats ranged in age from 3-8 years old (Table 12).

Shovelnose Sturgeon

The number of shovelnose sturgeon caught and reported, estimated catch rates, and total estimated catch during the five-year creel survey were very low when compared to 2005 (Table 4 and Table 5). Shovelnose sturgeon were only targeted by a few anglers, with the majority of caught shovelnose sturgeon being by-catch while targeting other species.

Estimated hourly catch rates averaged 0.111 fish/hour over the five-year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 11-7,831 shovelnose sturgeon with a total estimated catch of 8,815 shovelnose sturgeon during the creel study (Table 5). On average anglers harvest 34.3% of shovelnose sturgeon caught (range= 8.3%-52%; Table 6).

Harvested shovelnose sturgeon ranged in length from 23-37.5 inches and in weight from 1.6-13.5 pounds (Table 7). Harvested shovelnose sturgeon ranged in age from 11-36 years old (Table 13).

Freshwater Drum

The number of drum caught and reported, estimated catch rates, and total estimated catch during the five-year creel survey were very low, outside of 2005 (Table 4 and Table 5). Drum were not targeted by anglers, with the majority of caught drum being by-catch while targeting other species.

Estimated hourly catch rates averaged 0.034 fish/hour over the five-year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 60-698 drum with a total estimated catch of 2,157 drum during the creel study (Table 5). On average anglers harvest 62.2% of the drum caught (range= 46%-75%; Table 6).

Harvested drum ranged in length from 9.3-19.5 inches and in weight from 0.2-4.0 pounds (Table 7). Harvested drum ranged in age from 3-15 years old (Table 14).

Goldeye

The number of goldeye caught and reported, estimated catch rates, and total estimated catch during the five-year creel survey were very low, outside of 2005 (Table 4 and Table 5). Goldeye were not targeted by anglers, with the majority of caught goldeye being by-catch while targeting other species and for use as cut-bait for channel catfish.

Estimated hourly catch rates averaged 0.193 fish/hour over the five-year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 294-3,573 goldeye with a total estimated catch of 5,467 goldeye during the creel study (Table 5). On average anglers harvest 29.2% of the goldeye caught (range= 9.8%-40%; Table 6).

Harvested goldeye ranged in length from 10.1-14.6 inches and in weight from 0.1-2.9 pounds (Table 7). Harvested goldeye ranged in age from 4-13 years old (Table 15).

Pallid Sturgeon

Pallid sturgeon are a protected species under the federal Endangered Species Act. Federal protection prohibits anglers from harvesting pallid sturgeon however, a few pallid sturgeon are caught each year by anglers targeting other species. During the five-year creel pallid sturgeon catch rates averaged 0.032 fish/hour, with the highest catch rates occurring in 2005 (Table 4). Estimated catch ranged from 0-664 pallid sturgeon with a total estimated catch of 930 pallid sturgeon during the five-year creel period (Table 5).

Burbot

The number of burbot caught and reported, estimated catch rates, and total estimated catch during the five-year creel survey were very low (Table 4 and Table 5). Burbot were not targeted by anglers, with the majority of caught burbot being by-catch while targeting other species.

Estimated hourly catch rates averaged 0.005 fish/hour over the five-year creel with the highest catch rates occurring in 2005 (Table 4). Estimated annual catch ranged from 12-137 burbot with a total

estimated catch of 277 burbot during the creel study (Table 5). On average anglers harvest 81.2% of the burbot caught (range= 50%-100%; Table 6).
Harvested burbot ranged in length from 18.8-31.0 inches and in weight from 1.5-5.8 pounds (Table 7). Harvested burbot ranged in age from 8-11 years old (Table 16).

Other Species

Other species caught included, bigmouth buffalo, smallmouth buffalo, flathead chubs, shorthead redhorse, northern pike, rainbow trout, and common carp. The specific hourly catch rates, estimated total catch, length, weight, and age structure for these species are reported in Tables 4-7 and Table 16.

Table 4. Estimated hourly catch rate (fish/angler hour) by strata of paddlefish (PF), channel catfish (C CAT), stonecat (S CAT), sauger (SGR), walleye (WE), pallid sturgeon (PSTG), shovelnose sturgeon (SSTG), burbot (LING), freshwater goldeye (GE), drum (DRUM), bigmouth buffalo (B BUF), smallmouth buffalo (S BUF), flathead chub (FH CH), shorthead redhorse (SH RH), common carp (CARP), northern pike (NP), and rainbow trout (RB) in the Missouri River (RM 1899 to 1921), April-June from 2005-2009.

Species	2005	2006	2007	2008	2009	5-Year Avg.
PF	0.506	0.056	*	0.031	0.161	**0.188**
C CAT	0.726	0.053	0.038	0.034	0.115	**0.193**
S CAT	0.889	0.009	0.023	0.003	0.003	**0.185**
SGR	0.534	0.018	0.004	0.084	0.019	**0.132**
WE	0.397	0.009	0.002	0.019	0.033	**0.092**
PSTG	0.154	0.001	< 0.001	0.003	0.000	**0.032**
SSTG	0.550	0.002	0.001	0.002	< 0.001	**0.111**
LING	0.019	< 0.001	< 0.001	< 0.001	< 0.001	**0.005**
GE	0.935	0.004	0.002	0.012	0.011	**0.193**
DRUM	0.139	0.002	0.008	0.002	0.019	**0.034**
B BUF	0.024	< 0.001	0.000	0.000	0.000	**0.005**
S BUF	0.006	< 0.001	0.000	0.000	0.000	**0.001**
FH CH	0.401	0.000	0.000	0.000	0.000	**0.080**
SH RH	0.047	0.000	0.000	0.000	0.000	**0.009**
CARP	0.342	0.001	0.003	0.002	0.000	**0.070**
NP	0.023	0.000	0.000	0.001	0.000	**0.005**
RB	0.016	0.000	0.000	0.000	0.000	**0.003**

* No accurate estimate obtained due to regulation change

Table 5. Estimated catch by strata of paddlefish (PF), channel catfish (C CAT), stonecat (S CAT), sauger (SGR), walleye (WE), pallid sturgeon (PSTG), shovelnose sturgeon (SSTG), burbot (LING), freshwater goldeye (GE), drum (DRUM), bigmouth buffalo (B BUF), smallmouth buffalo (S BUF), flathead chub (FH CH), shorthead redhorse (SH RH), common carp (CARP), northern pike (NP), and rainbow trout (RB) in the Missouri River (RM 1899 to 1921), April-June from 2005-2009.

Species	2005	2006	2007	2008	2009	Total
PF	3,070	2,218	*	875	2,342	**8,505**
C CAT	4,773	4,227	1,416	899	3,248	**14,563**
S CAT	5,839	481	808	93	96	**7,317**
SGR	2,288	2,000	671	1,908	524	**7,391**
WE	2,743	847	291	468	918	**5,267**
PSTG	664	64	116	86	--	**930**
SSTG	7,831	634	277	62	11	**8,815**
LING	137	85	23	20	12	**277**
GE	3,573	949	294	352	299	**5,467**
DRUM	698	551	327	60	521	**2,157**
B BUF	76	1	--	--	--	**77**
S BUF	85	20	--	--	--	**105**
FH CH	2,696	--	--	--	--	**2,696**
SH RH	395	--	--	--	--	**395**
CARP	2,179	129	275	64	--	**2,647**
NP	90	--	--	37	--	**127**
RB	61	--	--	--	--	**61**

* No accurate estimate obtained due to regulation change

Table 6. Total number of paddlefish (PF), channel catfish (C CAT), stonecat (S CAT), sauger (SGR), walleye (WE), shovelnose sturgeon (SSTG), burbot (LING), goldeye (GE), and freshwater drum (DRUM) reported to creel clerks with reported harvest (%) in the Missouri River (RM 1899 to 1921), April-June from 2005-2009.

Species	2005	2006	2007	2008	2009	5-Year Avg.
PF	416 (74%)	989 (65%)	400 (58%)^	421 (84%)*	442 (50.2%)*	**66.2%**
C CAT	439 (76%)	904 (76%)	373 (76%)	431 (75%)	403 (82%)	**77.0%**
S CAT	15 (0%)	105 (0.8%)	200 (7.5 %)	46 (6.5%)	10 (0%)	**3.0%**
SGR	331 (62%)	265 (34%)	160 (46%)	961 (17%)	78 (68%)	**45.4%**
WE	114 (56%)	154 (57%)	86 (72%)	217 (67%)	104 (86%)	**67.6%**
SSTG	59 (52%)	139 (47%)	67 (24%)	30 (40%)	12 (8.3%)	**34.3%**
LING	3 (100%)	13 (70%)	6 (86%)	8 (100%)	2 (50%)	**81.2%**
GE	24 (29%)	190 (9.8%)	82 (40%)	153 (40%)	56 (27%)	**29.2%**
DRUM	5 (62%)	126 (46%)	71 (58%)	28 (75%)	66 (70%)	**62.2%**

* Harvest was regulated with a 500 fish harvest cap.

^ Harvest was regulated with mandatory catch and release and mandatory harvest days.

Table 7. Length, weight, and condition indicies of paddlefish (PF), channel catfish (C CAT), stonecat (S CAT), sauger (SGR), walleye (WE), shovelnose sturgeon (S STG), burbot (LING), drum (DRUM), freshwater goldeye (GE), common carp (CARP), rainbow trout (RB), bigmouth buffalo (B BUF), smallmouth buffalo (S BUF), shorthead redhorse (SHRH), river carpsucker (RCSU), flathead chub (FH CH), and northern pike (NP) reported to creel clerks on the Missouri River (RM 1899 to 1921), April-June from 2005-2009 (all years combined).

Species	Sample Size	Length Range (in.)	Length Avg	Length SD	Weight Range (lbs.)	Weight Avg	Weight SD
PF	1,250	24-72.0	41.9	3.0	13.0-112.0	45.2	44.7
C CAT	1,017	7.5-39.5	25.5	3.2	0.25-29.0	8.1	12.4
S CAT	25	5.5-7.6	6.4	0.2	0.06-0.66	0.4	0.1
SGR	302	10.3-28.0	17.2	1.6	0.11-7.1	1.5	0.9
WE	238	11.5-33.0	16.5	2.2	0.1-13.5	1.8	5.8
S STG	62	23.0-37.5	32.2	1.2	1.6-13.5	5.4	5.2
LING	18	18.8-31.0	25.2	2.2	1.5-5.8	2.9	0.6
DRUM	62	9.3-19.5	13.4	1.0	0.2-4.0	0.9	0.8
GE	98	10.1-14.6	12.2	0.6	0.1-2.9	0.7	1.0
CARP	19	17.7-31.8	22.4	0.2	0.6-23.0	4.7	0.4
RB	2	19.3-21.9	20.6	0.0	2.0-2.7	2.4	0.0
B BUF	2	35.0-36.5	35.8	0.0	30.0-32.0	31.0	0.0
S BUF	1	17.00	17.0	0.0	1.9	1.9	0.0
SHRH	2	17.0-25.8	21.4	0.0	0.98-2.0	1.5	0.0
RCSU	1	17.00	17.0	0.0	1.5	1.5	0.0
FH CH	4	4.7-9.0	8.0	0.0	0.2-0.22	0.2	0.0
NP	13	27.0-41.0	34.4	1.4	6.7-13.8	8.9	1.4

Table 8. Age distribution, length, weight, and sex of harvested paddlefish caught during the five-year creel survey in May and June (2005-2009).

Age Class	E-F Length Range (in.)	Number Sampled	Sex (% Male)	E-F Length Avg (in.)	Weight Range (lbs.)	Weight Avg (lbs.)
9	31.25 - 47.5	7	100.0	33.0	18.0-25.0	21.0
10	32.5-38.0	14	100.0	34.1	18.0-35.0	25.0
11	25.5-39.8	48	100.0	34.7	16.0-33.0	24.1
12	31.0 - 42.5	36	100.0	36.1	18.0-40.0	27.1
13	32.5-39.0	35	100.0	35.7	17.0-35.0	24.4
14	31.0 - 44.4	41	92.7	35.4	19.0-36.0	27.2
15	34.0 - 47.6	36	88.9	38.0	20.0-57.0	32.4
16	34.0 - 51.0	57	86.0	39.5	19.0-80.0	35.1
17	26.0-49.5	82	75.6	40.2	19.0-77.0	40.5
18	32.0-47.0	44	70.5	39.6	20.0-77.0	39.3
19	27.0-47.0	42	71.4	39.8	17.0-71.0	42.4
20	33.0-47.5	47	72.3	40.6	19.0-70.0	40.9
21	35.3 - 52.0	66	65.2	42.1	28.0-73.0	43.2
22	36.5 - 49.3	65	55.4	42.5	25.0-73.0	46.2
23	36.0 - 50.0	57	43.9	43.6	22.0-70.0	49.6
24	35.5-50.0	56	46.4	43.8	24.0-78.0	52.9
25	36.0 - 50.5	62	45.2	43.2	24.5-92.0	50.9
26	35.0-51.0	40	50.0	44.4	20.1-83.0	56.5
27	37.0 - 56.8	51	29.4	46.1	25.0-77.0	60.2
28	38.8 - 51.0	30	56.7	44.6	28.0-85.0	56.5
29	36.5-54.0	20	50.0	45.1	23.0-84.0	58.9
30	35.0-50.0	25	48.0	42.1	26.0-94.0	45.6
31	39.5-49.0	17	11.8	45.4	34.0-81.0	61.8
32	36.0-55.5	28	46.4	46.5	28.0-88.0	63.8
33	39.0 - 55.0	19	47.4	45.9	33.0-95.0	62.2
34	42.0 - 52.5	9	66.7	49.5	70.0-104.0	83.0
35	37.5 - 49.5	10	50.0	44.4	29.0-80.0	55.8
36	41.2 - 52.3	9	33.3	48.5	64.0-75.0	68.0
37	37.0-54.0	12	58.3	48.7	36.0-96.0	69.4
38	39.0 - 53.2	13	30.8	48.7	34.0-85.0	71.1
39	42.0 - 50.0	12	16.7	47.6	34.0-73.0	64.3
40	45.5-53.5	4	0.0	51.2	63.0-100.0	86.0
41	41-42.0	3	33.3	41.5	48.0-60.0	54.0
42	38.0-50.5	9	44.4	45.4	31.0-90.0	59.5
43	49.0-51.0	4	0.0	50.8	72.0-101.0	90.3
44	40.0 - 52.0	9	11.1	46.3	41.0-83.0	62.3
45	41.0 - 57.0	5	20.0	52.4	40.0-105.0	74.0
46	43.5-51.8	3	33.3	47.7	55.0-85.0	70.2
47	49.0-52.5	3	0.0	50.8	83.0-85.0	84.0
48	48.3-51.1	2	0.0	48.3	81.0-90.0	85.5
49	49	1	0.0	49.0	72.0	72.0
50	41.5-53.0	3	0.0	48.6	65.0-89.0	70.4
51	48.3-50.0	3	0.0	49.2	82.0-90.0	86.0
52	46.9-50.5	3	0.0	49.0	73.0-104.0	88.5
54	54	1	0.0	54.0	95.0	95.0
55	50.5	1	0.0	51.0	85.0	85.0
56	51.0-52.6	2	0.0	51.8	91.0-100.0	95.5
59	39.8	1	100.0	39.8	42.0	42.0
	Totals:	**1,147**	**61.8**	**44.5**		**58.3**

Table 9. Age distribution, length, and weight of harvested channel catfish caught during the five-year creel survey in April-June (2005-2009).

Age Class	Length Range (in.)	Number Sampled	Length Avg (in.)	Weight Range (lbs.)	Weight Avg (lbs.)
3	11.0-29.0	7	14.1	0.38-8.25	1.9
4	7.5 - 14.2	16	12.2	0.25-0.79	0.5
5	10.5 - 16.2	53	14.5	0.1-1.25	0.8
6	10.5-25.3	68	15.4	0.14-2.0	1.0
7	10.0 - 33.0	49	17.1	0.56-18.0	1.7
8	14.0-22.0	28	18.8	1.15-4.0	2.2
9	16.0-31.0	17	23.5	0.5-6.0	4.2
10	18.1-34.0	22	26.2	2.5-11.0	6.0
11	15.5 - 35.5	72	27.5	0.25-20.0	8.9
12	18.5-39.5	134	29.1	2.25-18.0	9.7
13	22.0-37.0	154	29.9	3.0-20.25	11.3
14	16.0-37.0	161	29.8	0.75-23.8	11.1
15	14.4-36.0	93	29.7	0.6-26.0	11.4
16	21.5-37.0	40	30.0	4.75-24.5	12.3
17	26.0-36.0	10	29.8	6.75-28.0	11.5
18	27.0-36.0	4	30.8	8.75-24.0	15.4
19	29.5	1	29.5	11.5	11.5
	Totals	**929**	**24.0**		**7.1**

Table 10. Age distribution, length, and weight of harvested sauger caught during the five-year creel survey in April-June (2005-2009).

Age Class	Length Range (inches)	Number Sampled	Length Avg (in.)	Weight Range (lbs.)	Weight Avg (lbs)
2	12.5	1	12.5	0.8	0.8
3	11.3-16.25	7	14.3	0.35-1.25	0.8
4	10.25 - 19.6	17	14.3	0.11-1.3	0.7
5	12.0 - 20.5	49	17.1	0.77-2.75	1.4
6	12.9 - 20.4	47	17.3	0.5-2.25	1.4
7	13.0 - 22.0	43	18.6	1.0-2.5	1.6
8	14.1 - 20.75	35	18.8	1.0-2.7	1.9
9	13.3 - 22.0	23	19.4	0.72-2.8	1.8
10	15.3 - 27.0	10	19.2	0.93-7.13	2.3
11	15.8 - 22.1	6	21.5	1.25-2.4	1.9
12	15.5 - 24.8	3	21.3	3.5	3.5
14	18.3	1	18.3	1.4	1.4
	Totals:	**242**	**17.7**		**1.6**

Table 11. Age distribution, length, and weight of harvested walleye caught during the five-year creel survey in April-June (2005-2009).

Age Class	Length Range (in.)	Number Sampled	Length Avg (in.)	Weight Range (lbs.)	Weight Avg (lbs.)
3	11.8-15.0	9	13.4	0.44-1.25	0.8
4	13.25-18.0	8	14.9	0.39-1.79	1.0
5	11.0 - 19.0	22	16.2	0.55-2.5	1.4
6	12.0 - 16.4	22	15.6	0.55-1.75	1.1
7	13.1 - 19.0	23	16.4	0.55-2.0	1.2
8	12.8 - 17.2	13	14.9	0.55-1.38	0.9
9	14.3 - 20.3	12	17.4	1.32-1.68	1.6
10	23.8-24.5	2	24.1	5.0-5.4	5.2
11	14.5-25.0	3	21.1	0.9-5.2	3.5
12	22.0 - 29.4	5	26.6	3.5-9.4	6.2
13	17.5	1	17.5	1.5	1.5
14	27	1	27.0	6.4	6.4
15	28.5	1	28.5	8.5	8.5
	Totals:	**122**	**19.5**		**3.0**

Table 12. Age distribution, length, and weight of harvested stonecat caught during the five-year creel survey in April-June (2005-2009).

Age Class	Length Range (in.)	Nbr Sampled	Length Avg (in.)	Weight Range (lbs.)	Weight Avg
3	5.5-5.75	2	5.6	0.04-0.06	0.05
4	5.6 - 6.25	4	5.8	0.04-0.06	0.05
5	5.0 - 7.8	5	5.8	0.2	0.2
6	5.5 - 6.8	6	6.0	0.2	0.1
7	6.3 - 7.5	4	6.7	0.12-0.21	0.1
8	7.4	1	7.4	--	--
	Totals:	**22**	**6.2**		**0.09**

Table 13. Age distribution, length, and weight of harvested shovelnose sturgeon caught during the five-year creel survey in April-June (2005-2009).

Age	Length Range (in.)	Number Sampled	Length Avg (in.)	Weight Range (lbs.)	Weight Avg (lbs.)
11	31.0	1	31.0	4.6	4.6
12	27.0	1	27.0	3.9	3.9
13	25.5	1	25.5	2.1	2.1
14	31.0-33.5	2	32.25	5.4-7.0	6.2
19	29.0	1	29.0	3.75	3.75
22	27.0	1	27.0	3.4	3.4
24	32.0	1	32.0	6.4	6.4
26	35.5	1	35.5	9.8	9.8
31	31.5	1	31.5	4.14	4.14
32	35.5	1	35.5	5	5
33	27.0-32.0	3	30.3	3.6-5.6	4.5
35	25.5-34.5	2	30	2.75-6.5	4.6
36	29.0	1	29.0	3.6	3.6
	Totals:	**17**	**30.40**		**4.80**

Table 14. Age distribution, length, and weight of harvested freshwater drum caught during the five-year creel survey in April-June (2005-2009).

Age Class	Length Range (in.)	Number Sampled	Length Avg (in.)	Weight Range (lbs.)	Weight Avg (lbs.)
3	10.2	2	10.20	0.30-0.37	0.34
5	12.1	2	12.20	0.66	0.66
6	11.5 - 16.2	3	13.70	0.55-1.95	1.02
7	10.9-12.5	3	11.90	0.4-0.77	0.60
8	13.0 - 17.6	4	15.50	0.75-1.9	1.66
9	11.9 - 13.3	4	12.60	0.68-1.0	0.80
10	13.7	1	13.70	0.82	0.82
11	10.5-15.0	4	12.50	0.44-0.7	0.60
12	12.5-14.0	2	13.3	0.6	0.6
13	13.5-13.8	2	13.7	0.70-0.77	0.7
14	13.0-15.5	3	14.40	0.83-1.23	1.00
15	13.1-17.0	3	15.4	0.77-2.5	1.6
	Totals:	**33**	**13.30**		**0.87**

Table 15. Age distribution, length, and weight of harvested goldeye caught during the five-year creel survey in April-June (2005-2009).

Age Class	Length Range (in.)	Nbr Sampled	Length Avg (in.)	Weight Range (lbs.)	Weight Avg (lbs.)
4	12.0-14.0	2	13.0	0.5	0.5
5	11.1-12.8	7	12.1	0.44-0.55	0.5
6	11.0 - 13.5	12	12.4	0.5-0.79	0.6
7	11.3 - 13.0	10	12.6	0.55-0.77	0.7
8	11.6 - 14.3	6	12.8	0.60-0.85	0.7
9	11.5 - 13.3	3	12.8	0.50-0.60	0.6
10	11.0-11.6	2	11.3	1.0	1.0
13	13.9	1	13.9	0.7	0.7
	Totals:	**43**	**12.6**		**0.7**

Table 16. Age distribution, length, and weight of other species caught and harvested during the five-year creel survey in April-June (2005-2009).

Species	Age	Number Sampled	Length (in.)	Weight (lbs.)
Burbot	8	1	21	1.12
Burbot	10	1	25.3	2.2
Burbot	11	1	21.5	1.85
Northern Pike	8	1	30.7	6.7
Northern Pike	9	1	31	7
Northern Pike	10	1	35.9	9.1
Common Carp	6	1	18.8	3.1
Common Carp	10	1	17.6	2.3
Common Carp	11	1	17.8	3
Common Carp	13	1	20	3.4
Common Carp	21	1	31.8	23
Rainbow Trout	10	1	21.9	2.7
Flatthead Chub	4	1	8.5	0.19

Discussion

The Upper Missouri River is a popular destination for both Montana residents and non-residents. High angling pressure coincides with the spring paddlefish migration and subsequent snagging season. Furthermore, multiple regulation changes were implemented during the creel study: reduced the number of paddlefish an angler can harvest from two to one (2007), created mandatory harvest and mandatory catch and release days (2007), eliminated mandatory release and harvest days and a harvest cap of 500 fish was established (2008), year-round paddlefish harvest was eliminated and a season was set (May 1st to June 15th), hook size restriction were set (2008), mandatory catch and release and harvest days were eliminated (2008), and immediate release was further defined for paddlefish (2008).

Our data suggests these regulation changes slightly reduced angling pressure for a short period of time, 2007 paddlefish season. Angling pressure increased slightly in 2008 and 2009 but never obtained the pressure estimated prior to the regulation changes. Weather and flows may also explain the reduced pressure from 2007-2009.

The variable catch rates and estimated total catch for all species reflect the unpredictable and highly variable flow and weather conditions in this portion of the Missouri River. Paddlefish migrations are directly influenced by the variability and magnitude of flows in the Upper Missouri River (Miller and Scarnecchia 2011). Rising flows trigger paddlefish to migrate upstream whereas receding flows trigger paddlefish to move back downstream. In those years in which flows were variable, fluctuating constantly and not exceeding 20,000 cfs, paddlefish catch rates and estimated harvest were good (2005-2007 and 2009). In 2008, flows stayed relatively low through the first two weeks of May which concentrated the majority of paddlefish downstream of the creel area. Heavy rains abruptly increased the flows over 21,000 cfs, triggering paddlefish to migrate quickly through the creel area and move well upstream. When flows obtain velocities greater than 20,000 cfs and maintain that velocity for an extended period of time, it greatly reduced angler catch rates and estimated harvest on paddlefish within the creel area.

The age distribution and sex of harvested paddlefish collected during the creel study suggests this population is stable. Providing a self-sustaining fishery with good age distribution and relatively stable recruitment, given the amount of variables that influence paddlefish spawning success (Miller et al. 2011; Kozfkay & Scarnecchia 2002; Bowersox 2004; Miller 2005; Miller & Scarnecchia 2006).).

Channel catfish are a very popular species anglers target in the spring and based on the size distribution of channel catfish reported to the creel clerks, one could argue it's world-class. The state record channel catfish was caught near the Fred Robinson Bridge (RM 1921) on 5/8/2009, the fish measured 37.6 inches and weighed 30.12 pounds. The majority of anglers target channel catfish using setlines, sporadically checking their lines in-between snagging efforts targeting paddlefish. Channel catfish catch rates and estimated harvest is influenced by angler pressure and water temperatures (timing of migration into spawning areas). The age distribution of harvested channel catfish portrayed good distribution over the fiver-year period. However, anglers did voice their concern to the creeler's about certain anglers who were really efficient at targeting and harvesting larger fish (> 25 inches). Our data suggests channel catfish harvest is widely distributed among age and size classes with very little impact occurring to the population during the limited time period most anglers are targeting and harvesting them within the creel area in the Upper Missouri River.

Sauger and walleye catch rates and estimated harvest was influenced by flows and turbidity. Low flows (< 8,000 cfs) during the month of April created good water clarity and concentrated sauger and walleye into smaller pools adjacent to spawning habitat. These conditions made it ideal for anglers to target both species and word quickly spread throughout the region, increasing pressure, catch rates, and harvest estimates. These conditions only occurred once during the five-year creel (2008). The creel data suggests many anglers that target sauger practice selective harvest and actually release many of

the sauger caught. However, the majority of caught walleye are harvested and anglers are trying to target the trophy females migrating into the river from Fort Peck Reservoir. However, low walleye densities and water conditions in this reach of the Upper Missouri River limit angler success.

Other species catch rates and estimated harvest was relatively low when compared to the aforementioned species. Many of these species either occur in low densities during the months of April, May, and June or they were not specifically targeted by anglers.

Catch rates and estimated catch were highly skewed in 2005 when compared to the other four years. This may be due to the different methods used to analysis the creel data collected. In 2005, methods used in Pollock et al. (1994) were implemented for analysis whereas methods used in Neuhold and Kuo (1957) were implemented for analysis in the remaining four years. The discrete differences in 2005 directly impacted the average hourly catch rates and total estimated catch over the five-year creel period for all species. Estimated hourly catch rates and estimated harvest statistics calculated from 2006-2009 likely reflect a more realistic catch and harvest over the fiver-year creel when compared to 2005 data. The creel data collected in 2005 should be re-analyzed with methods used from 2006-2009 in order to accurately portray the creel trends and maintain consistency over the five-year period.

References

Bowersox, B. J. 2004. An investigation of paddlefish, *Polyodon spathula*, and their prey in Fort Peck Reservoir, Montana. Master's Thesis, University of Idaho, Moscow, 95 p.

Kozfkay, J. R. and D. L. Scarnecchia. 2002. Year-class strength and feeding ecology of age-0 and age-1 paddlefish (*Polyodon spathula*) in Fort Peck Lake, Montana, USA. Journal of Applied Ichthyology 18:601-607.

McFarland, B. and R. Roche. 1987. Creel Census Program. Vers. 1. Computer Software. Montana Fish, Wildlife, & Park, 1987.

Miller, S. E. 2005. Protocol for juvenile paddlefish visual counts and zooplankton sampling on Fort Peck Reservoir, Montana. Moscow, University of Idaho**:** 6.

Miller, S. E. and D. E. Scarnecchia. 2006. Juvenile paddlefish visual counts and zooplankton sampling on Fort Peck Reservoir, Montana: Report for 2005. University of Idaho, Moscow. 5p.

Miller, S.E. and D.E. Scarnecchia. 2011. Sex-specific differences in migratory movements of adult paddlefish above Fort Peck Reservoir, Montana, USA. Folia Zool. 60 (3): pp. 181-188.

Miller, S.E., D.E., Scarnecchia, and S.R. Fain. 2011. Timing of paddlefish spawning in the Upper Missouri River, Montana, USA in relation to river conditions. Journal of Applied Ichthyology. 27 (2011), pp. 1291-1297

Neuhold, J. M. and H. L. Kuo. 1957. Creel Census Method. Utah State Department of Fish and Game. 36pp.

Pollock, K. H., C. M. Jones, and T. L. Brown. 1994. Angler survey methods and their applications in fisheries management. American Fisheries Society, Special Publication 25, Bethesda, Maryland.

Water Codes of Waters Referred To

154535 Bailey Reservoir
154570 Beaver Creek Reservoir
164789 Cow Creek Reservoir
155083 Dry Fork Reservoir
156573 Doll Pond
155120 Ester Lake
165140 Fort Peck Reservoir
155240 Fresno Reservoir
162500 Missouri River Sec. 05
162520 Missouri River Sec. 06
156480 Nelson Reservoir
158760 PR 161
159770 Wild Horse Reservoir

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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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