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, 2013 THROUGH JUNE 30, 2014

TABLE OF CONTENTS

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. 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 (2008 and 2011).

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 (27) 124 projects were reviewed along with one waste water review with 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 Glasgow 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).

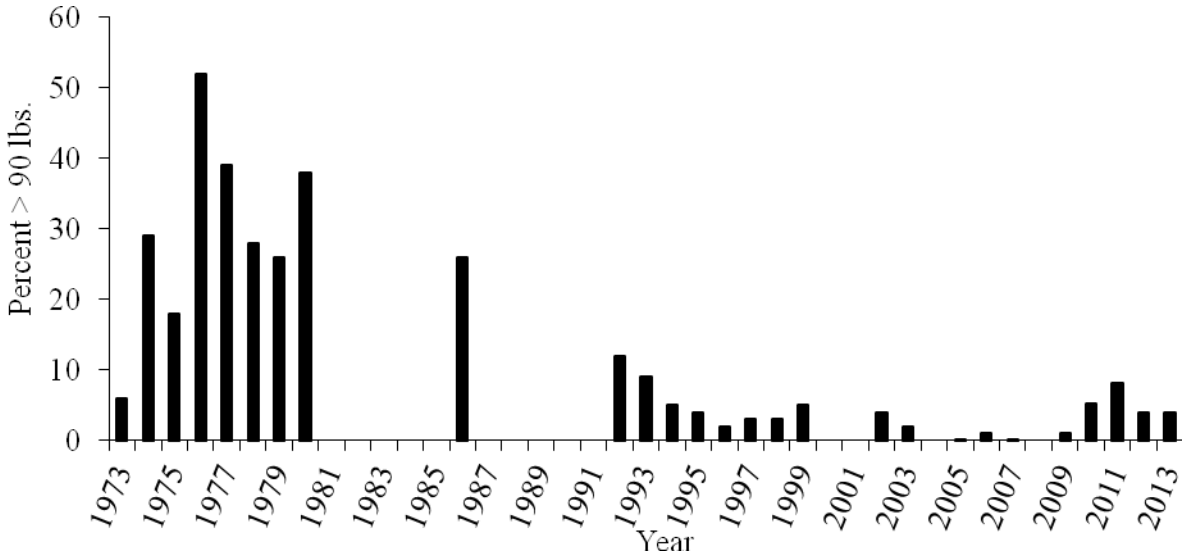
To increase our specific knowledge of the spawning locations, movements, and habitat use of paddlefish above Fort Peck Reservoir, a contract with the University of Idaho was initiated in 2006 to conduct a four-year telemetry and egg sampling study (Miller and Scarnecchia, 2011; Miller et al., 2011). The telemetry study was continued in 2013 using fixed telemetry stations.

Adult Paddlefish Monitoring and Tagging

In 2013, paddlefish tagging started on May 1st. Tagging efforts were continued until May 17th when crews tagged our 381st paddlefish. Since tagging was initiated in 1977, 7,255 paddlefish have been tagged and 804 tagged paddlefish have been recaptured during annual drift netting surveys. On average, approximately 11.1% of the annual catch is comprised of recaptured fish. In 2013, 11.6% 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 2013, less than four percent of all female paddlefish captured during our tagging efforts weighed more than 90 pounds (Figure 1). Females captured in 2013 averaged 70.1 pounds.

Since tagging was initiated in 1977, a total of 890-tagged paddlefish have been reported as harvested, which is about 12.3% 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 2013, 26-tagged paddlefish were reported as harvested and 6-tagged paddlefish were reported as snagged and released. Anglers harvested 5 paddlefish tagged in 2013.

Figure 1. Percent of female paddlefish captured during adult tagging efforts weighing more than 90 pounds from 1973-2013.



Preliminary Population Estimates

Estimates of population size of the recruited portion of the Fort Peck stock were developed from 1993 through 2013 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 migrates upstream in a any given year.

Population estimates were obtained using mark-recapture data and the Peterson-Lincoln estimator (or Peterson estimator). Four separate estimates were performed. Years with no reported harvest (1997, 1999, 2001, 2003, and 2004) and one year with limited tagging effort (i.e. 2008 with only 22 new fish being tagged) were excluded. In 2013, the four estimates suggest an adult population consisting of approximately 18,500 paddlefish (95% CI 11,906 – 35,351). 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 reproducing, though the year-class is 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 2013, flows on the Missouri River stayed below 7,000 cfs from April 26th to May 12th. Flows then began to slowly rise, obtaining 9.000 cfs by May 30th. Several storms systems then impacted the area (with isolated areas receiving over 10 inches of rain) and flow quickly rose and peaked at over 35,000 cfs on June 4$^{th.}$ Flows then quickly receded to under 7,000 cfs on 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 2013).

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, 2008, and 2011; when flows exceeded the historical hydrograph and Fort Peck Reservoir levels were high.

In 2013, no YOY and 14 yearling paddlefish were observed during the fixed transects between RM 1855.5 and 1870.5 (Table 2). In addition to the standardized counts, we applied a total of 28 hours of random search effort in August (6-7, 14-16, and 21-22) to identify habitats containing YOY

paddlefish not sampled during the transect counts (Table 3). These random searches were conducted near the river/reservoir interface and outside of the standard transect area (RM 1859.5- 1886). Random counts yielded a total of 2 YOY, 85 yearling, and 196 adult paddlefish being observed (Table 3).

Table 1. Paddlefish spawning success ratings for the years 1974-2013 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)	
2013		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.

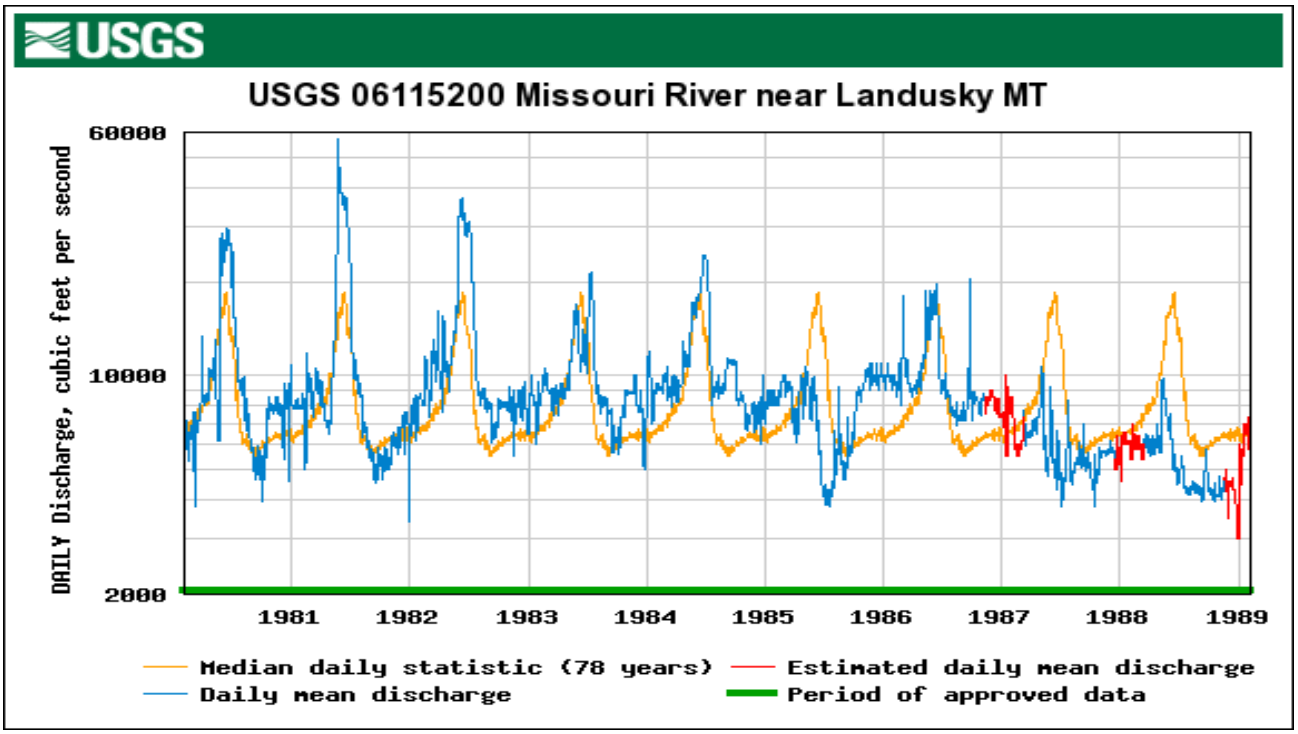


Figure 3. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 1990-1999.

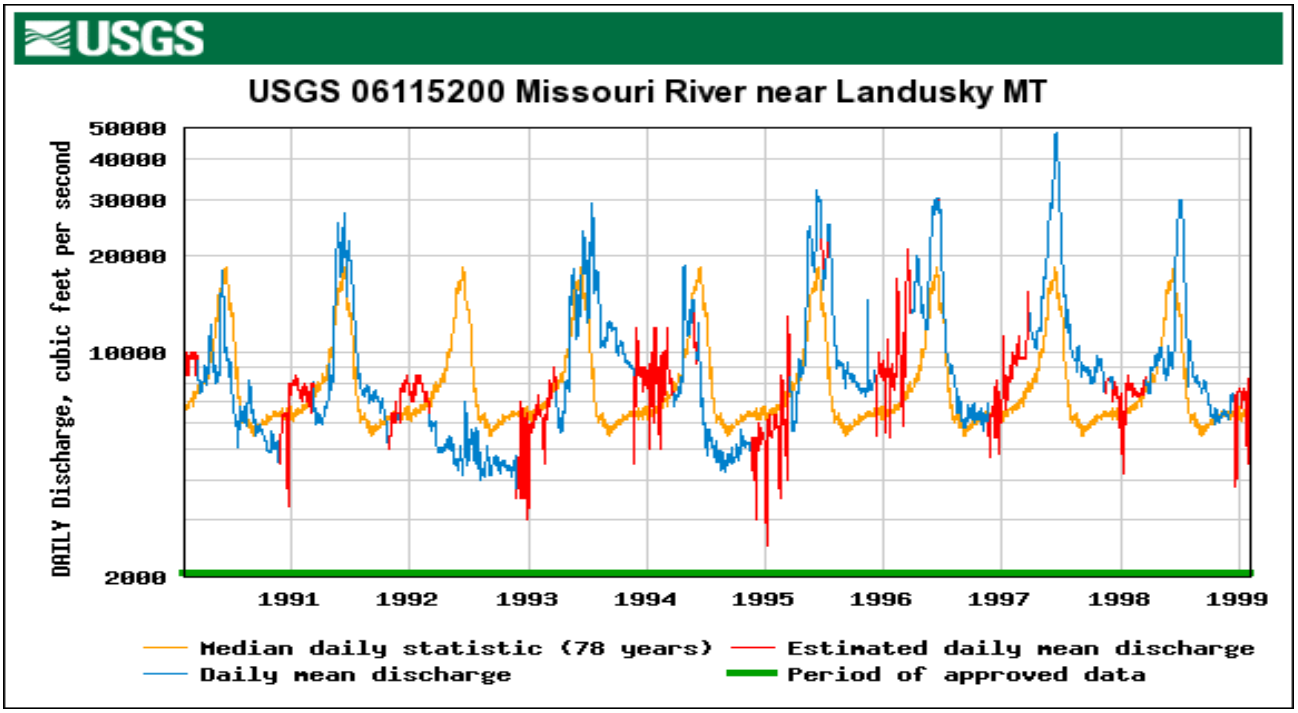


Figure 4. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 2000-2013.

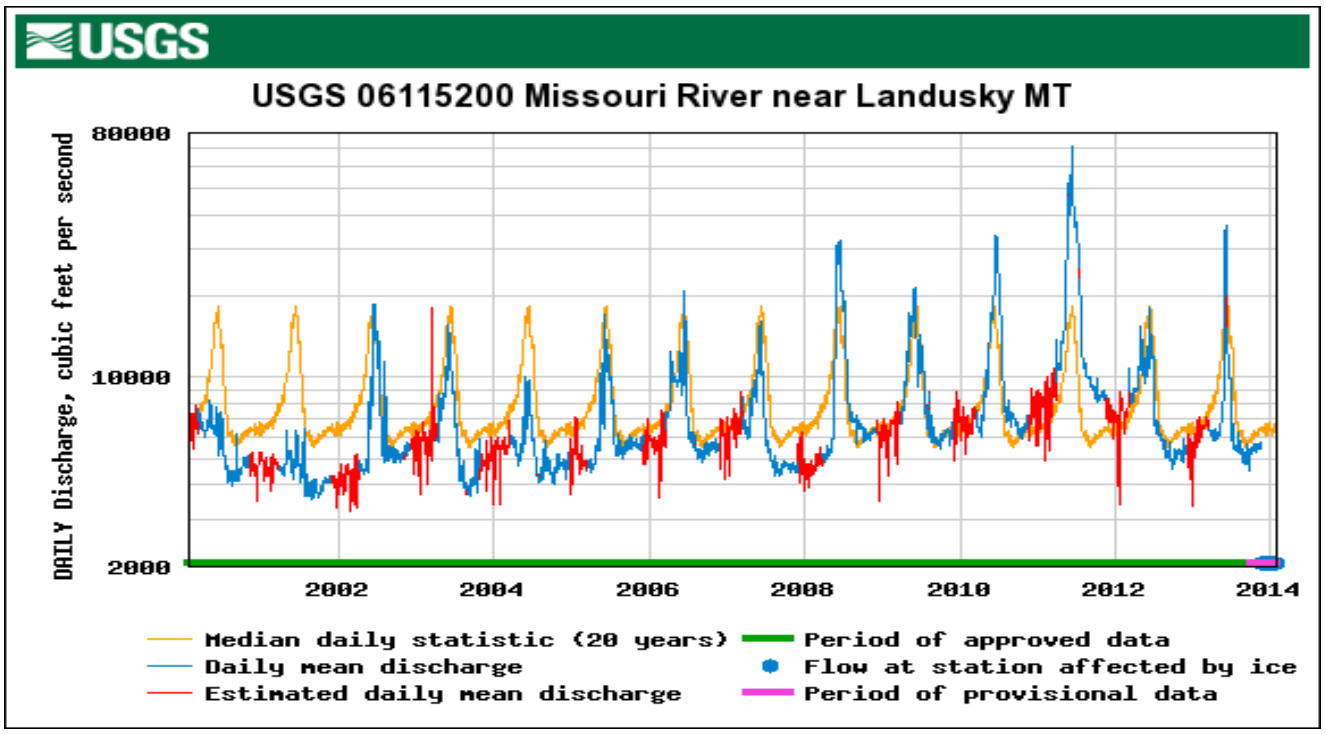


Table 2. - Results of standardized YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 1997 to 2013.

Year	Transect Dates	# Stations	Station Locations (RM)	No. Transects	No. YOY	No. Sub-Adults	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
2013	8/5 & 8/14	6	1855.5 to 1870.5	12	0	14	Hemingway

Table 3. - Results of random YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 2008 to 2013.

Year	Transect Dates	Effort (Hours)	Station Locations (RM)	No. YOY	No. Sub-Adults	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
2013	8/ (6-7) (14-16) (21-22)	28	1859.5-1886	2	85*	196	Hemingway

-- No data collected for observed period of record

* Majority of these fish were classified as sub-adults and most likely age-2 fish

Harvest: Paddlefish Creel Survey 2013

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.

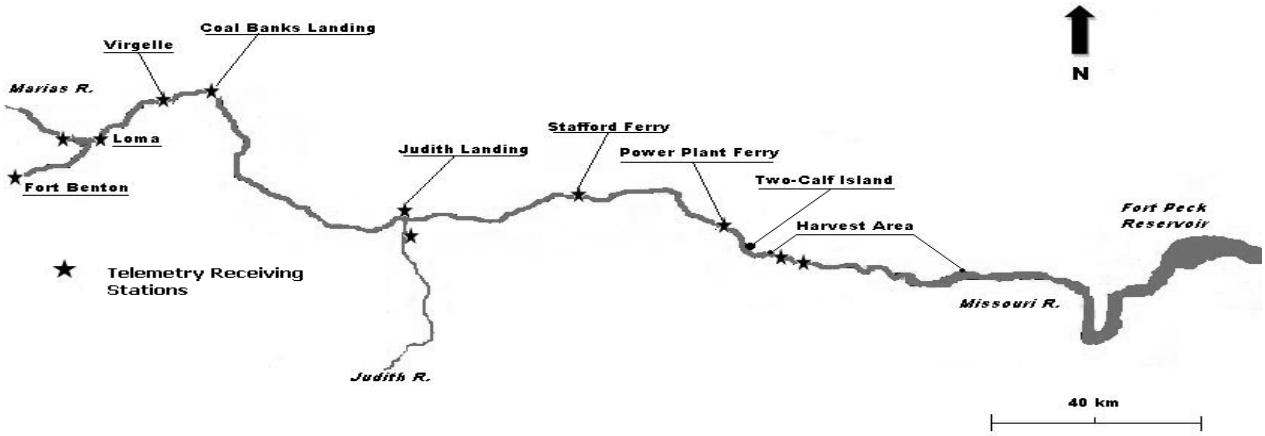
Schedule

A roving creel survey was conducted from May 1st through June 15th 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 2013, a total of 428 parties representing 5 states and 36 of the 56 Montana counties were interviewed from May 1st to June 15th. The highest percentage of anglers in Montana came from Yellowstone (21.8%), Cascade (10.6%), and Fergus (9.5%) counties. The average party consisted of 4.33 anglers (range= 1 to 20 anglers), 88% of which were male. The average length of stay was 2.6 days/trip (range = 1 to 12 days).

Effort

In 2013, 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 2013, 76.8% of the angling effort (hours) occurred from shore and 98% of the angling effort occurred in May, which coincides with the peak of the paddlefish spawning migration.

Harvest Statistics- Paddlefish

In 2013, a total of 855 paddlefish were caught and reported to creel clerks, 354 of the reported fish were harvested (41.4%). The combined (shore and boat) catch rate was 0.062 paddlefish/day. Total paddlefish snagged was estimated at 1,595 fish (Table 6) with an estimated harvest of 642 paddlefish (Table 7).

In 2013, harvested paddlefish ranged in length from 31.5 to 54.0 inches (eye-fork length) and weight from 20.0 to 131 pounds (Table 8 and Figure 7). Fourty-one percent of the harvested paddlefish sexed were males and 26/344 (7.6 %) of the harvested paddlefish and 7/428 (1.6 %) of the released paddlefish creeled had jaw tags. Harvested paddlefish ranged in age from 10 to 65 years with 74.5% of the harvested fish being 20 to 65 years old and 6.7% of the harvested fish were less than 16 years old (new recruits; Figure 6).

Table 4. - Estimated snagging effort (angler-days) by month and angler type for the Upper Missouri River (RM 1897 to 1921), May-June 2013.

	Shore	Boat	Overall
May	1,822.01	388.2	2,210.19
June	35.00	0.00	35.00
Overall	1,857.01	388.2	2,245.19

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 2013.

	Shore	SE	Boat	SE	Overall	SE
May	6,195.00	1,204.76	1,710.00	594.23	7,905.00	1,343.34
June	157.00	283.88	0.00	0.00	157.00	283.88
Overall	6,352.00		1,710.00		8,062.00	

Table 6. Estimated total catch of paddlefish by month and angler type for the Upper Missouri River (RM 1897 to 1921), May-June 2013.

	Shore	Boat	Overall
May	1,294	276	1,570
June	25	0	25
Overall	1,319	94	1,595

Table 7. Estimated harvest of paddlefish by month and angler type for the Upper Missouri River (RM 1897 to 1921), May-June 2013.

	Shore	Boat	Overall
May	537	105	642
June	0	0	0
Overall	537	134	642

Figure 6. Age structure of harvested male and female paddlefish collected in the Upper Missouri River (RM 1897-1921) during the 2013 paddlefish creel survey.

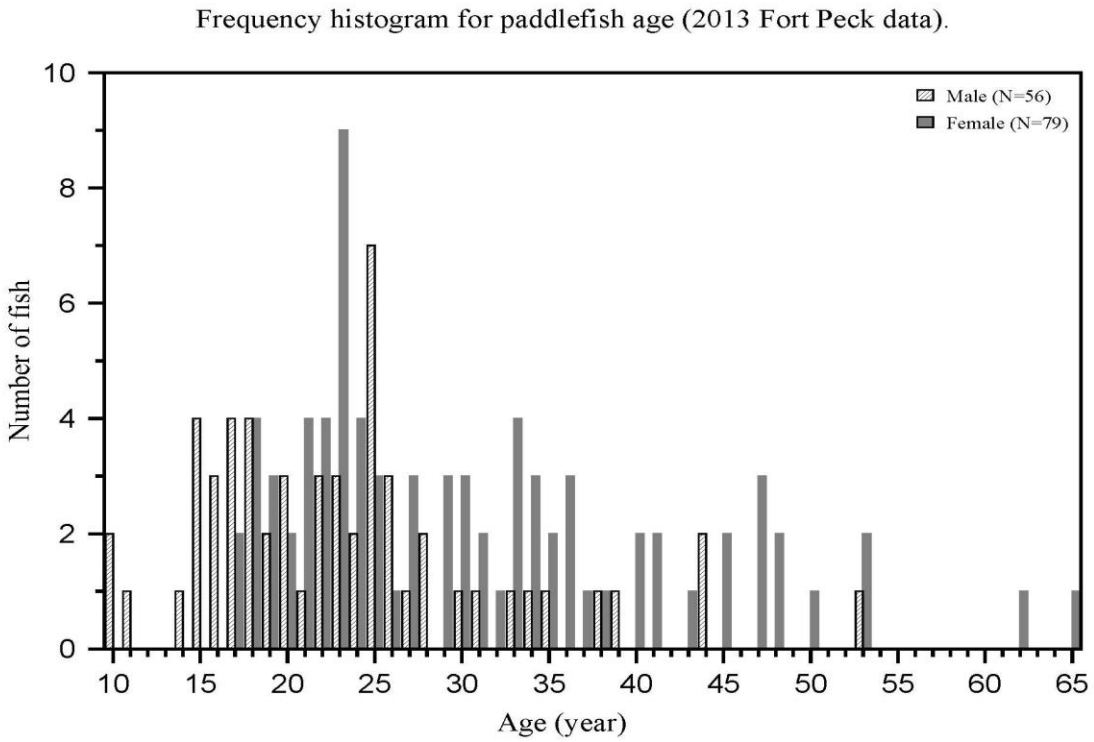


Figure 7. Size structure (weight (kg)) of harvested male and female paddlefish collected in the Upper Missouri River (RM 1897-1921) during the 2013 paddlefish creel survey.

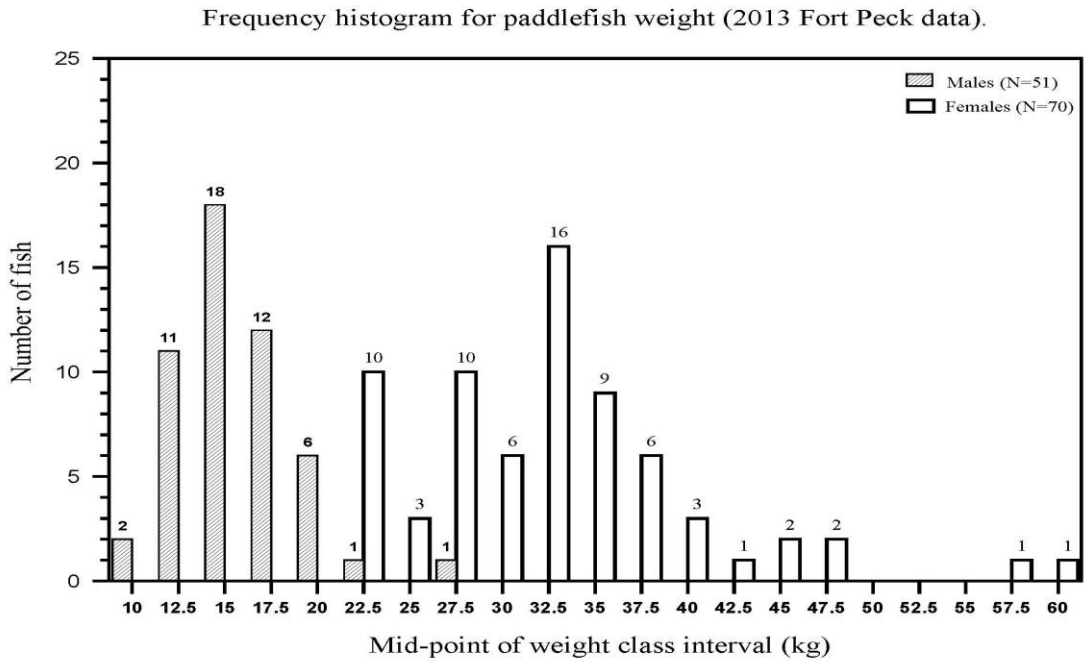


Table 8. – Length, weight, and condition indices of harvested paddlefish from anglers creeled in the Upper Missouri River (RM 1897-1921), May-June 2005-2013.

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	30.0-54.1	42.5	5.2	20.0-119.1	48.8	21.9
PF	2013	255	31.5-54.0	44.0	5.9	20.0-131.0	54.7	22.7

Paddlefish Phone Creel (2003-2013)

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 2013, creel statistics were obtained for the Fort Peck population (Table 9). On average approximately 2,156 anglers fish for paddlefish above Fort Peck Reservoir, representing approximately 5,705 fishing days. On average approximately 1,575 paddlefish are caught annually above Fort Peck Reservoir with approximately 57.9% 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 (2003-2013).

Missouri River Above Fort Peck											
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Number of Anglers	1,902	2,859	2,705	2,476	2,481	1,816	1,579	1,729	1,901	1,910	2,356
Total Days Fished*	5,757	9,172	8,385	7,565	-	4,426	2,748	5,789	4,816	3,671	4,716
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	1,345
Number Harvested	868	787	1,028	1,067	634	300	564	575	598	381	292
Catch Rate (fish/day)	0.151	0.086	0.123	0.141	-	0.068	0.205	0.173	0.096	0.104	0.062
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%	78.30%
Percent Contacted by FWP Creel Clerk						85.71%	62.14%	38.61%	60.00%	78.00%	76.00%

* 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 2013 were extremely low through most of May with a short duration/high pulse flow occurring in June (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 10 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). 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 angler 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). The high density of sub-adult paddlefish (likely 2011 year-class) observed during our YOY visual counts (Table 3) suggests these fish have recruited into the population based on their size (TL= 22-30”).

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 2005-2013.

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	164 (58%)	119 (42%)	381	475	563
2013	5/1-6/15*	5/12	34	855	354	100 (41%)	147 (59%)	292	642	575

+ 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 included: 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 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 2013 to determine angler use, catch, and satisfaction. Bailey ranked 16th in the region for angler pressure in 2011/2012 (916 +/- 345 angler days; MTFWP Fisheries Bureau 2012). 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 2013.

Gill net surveys suggest the population of walleye, northern pike, and yellow perch are recovering from below average densities observed during the pro-longed drought conditions from 2000-2008 (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 2013 suggests this fishery has become more balanced in terms of predator/prey densities. Northern pike and yellow perch densities have increased and anglers have reported catching some really nice black crappie and walleye 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, 1985-2013.

		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	--	--	-1	--	--	0.5	22	4.16	0	--	--
2013	2	4	19.25	1.78	24	7.78	0.27	0	--	--	0	--	--	2	15.93	1.88	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 13th in the region for angler pressure in 2011/2012 (1,936 +/- 598 angler days; MTFWP Fisheries Bureau 2012).

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 a variable rainbow trout fishery. 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 was 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 3 feet and were slightly above historic levels for this time of year. 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 remained stable within Beaver Creek Reservoir (Table 13). Northern pike populations are cyclical within Beaver Creek Reservoir due to water operations and variable spring water conditions. Good northern pike reproduction was documented in 2009 and 2012 however, extremely high reservoir pool elevations, which have resulted in both the overflow and emergency spillways running for an extended period, have limited the number of adult northern pike in Beaver Creek Reservoir due to flushing loss (Table 12 & 13).

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 has become a popular ice fishing destination and has also been utilized as a donor 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 has trended upward with the highest adult relative abundance recorded in 13 years during 2012 and dropped slightly in 2013 (Table 13). The population consists of numerous quality and preferred size fish (TL > 8 in) and the average length of yellow perch sampled in 2013 was the highest ever recorded ($\bar{x}$ TL=8.81; Table 13). Summer seining efforts indicate that yellow perch reproductive success in 2012 and 2013 were 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 and 2012/2013 winter and decreases to adult northern pike and walleye abundances due to flushing loss may be 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 and 2013, 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 and rearing 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 2013.

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
Aug-13	6	2,712	55	0	0	0	0	0	10	0	2	0	5	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, 1974-2013.

			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
Sep-13	2013	6	5.33	11.56	104.79	26.00	8.81	104.64	0.33	22.05	92.04	--	--	-- --	2.50	10.18	87.06	0.00	--	5.33	16.28

Fresno Reservoir

Fresno Reservoir, located 12 miles northwest of Havre is a main-stem 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 4th in the region for angler pressure in 2011/2012 (11,928 +/- 2,186 angler days; MTFWP Fisheries Bureau 2012). 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 reservoir water elevations. 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 and 2013, 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 has conducted three supplemental pre-spawn adult yellow perch stockings. From 2011-2013, 21,231 pre-spawn adult yellow perch were stocked 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 2013, 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 six-year period. The yellow perch population has recovered and will continue to mimic current densities if water levels are maintained during spawning and rearing stages (April-September) and predator levels are reduced.

From 2008-2013, 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 2013, spawning conditions were good for all species. Walleye YOY collected was again favorable, despite no fingerling walleye being stocked in 2013. Successful natural reproduction of walleye observed in 2012 and 2013 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, 1968-2013.

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
2013	12	--	16	0	4	1,306[-]	0	12	292	816	0	3	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

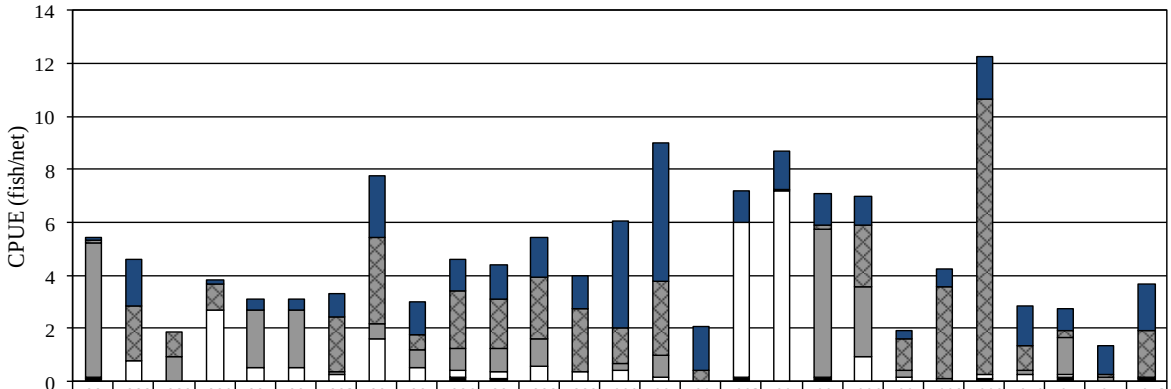
Population Status of Adult Fishes

Adult fish populations were monitored from 1965 to 1974 using systematic gill netting at predetermined sites. Sampling at 12 predetermined sites 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 from all walleye and sauger for ageing purposes. From 2005 to 2013, otoliths were collected from walleye for ageing and oxytetracycline (OTC) analysis.

Lake Superior Whitefish

Lake Superior whitefish (whitefish) in Fresno Reservoir have historically comprised a 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 successfully recruit into the population 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, 1987-2013.



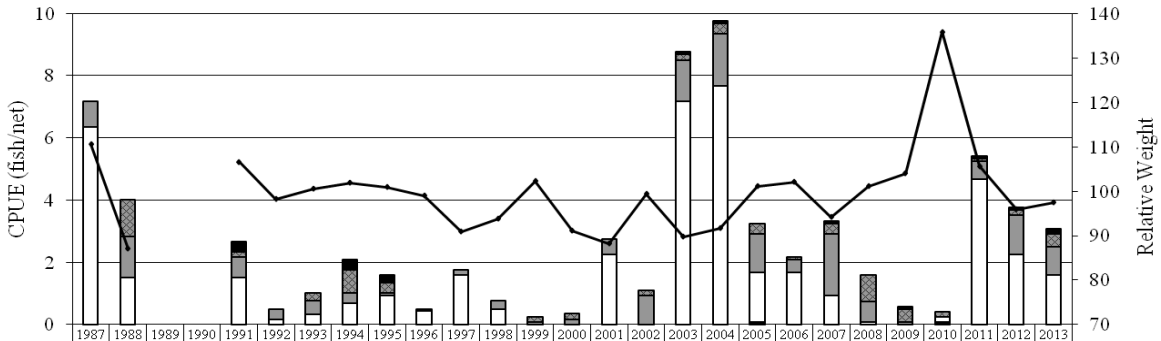
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Memorable (>18.0 in.)	0.08	1.75	0.00	0.17	0.42	0.42	0.92	2.33	1.25	1.17	1.33	1.50	1.25	4.08	5.25	1.67	1.17	1.42	1.17	1.08	0.333	0.66	1.583	1.5	0.833	1.083	1.75
Preferred (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	1.75
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	0
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	0.083
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	0.083

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 reproduce (Table 14) and population levels were drastically reduced (Figure 9). To remedy this situation, supplemental stocking of pre-spawn adult yellow perch occurred from 2001 to 2004 to increase population levels, approximately 170,000 yellow perch were stocked. 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. From 2011-2013, pre-spawn yellow perch were once again stocked due to excellent spring water conditions. However, high densities of adult 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.

As soon as the supplemental stocking of yellow perch was discontinued (2005) in Fresno Reservoir, the abundance of yellow perch started to decrease and mimicked pre-drought levels (Figure 9). Low water levels throughout the fall and winter months limit good rearing habitat and increases the vulnerability of YOY yellow perch to walleye and northern pike predation. However, six good water years (2008-2013) have created better overwinter water conditions (average reservoir elevations from October-March have been approximately 10 feet higher than average), inundating littoral habitats and creating refuge areas for YOY yellow perch to successfully recruit into the population (Figure 9). Walleye and northern pike densities remain very high (Figure 10 and Figure 11) and correlates 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, 1987-2013.



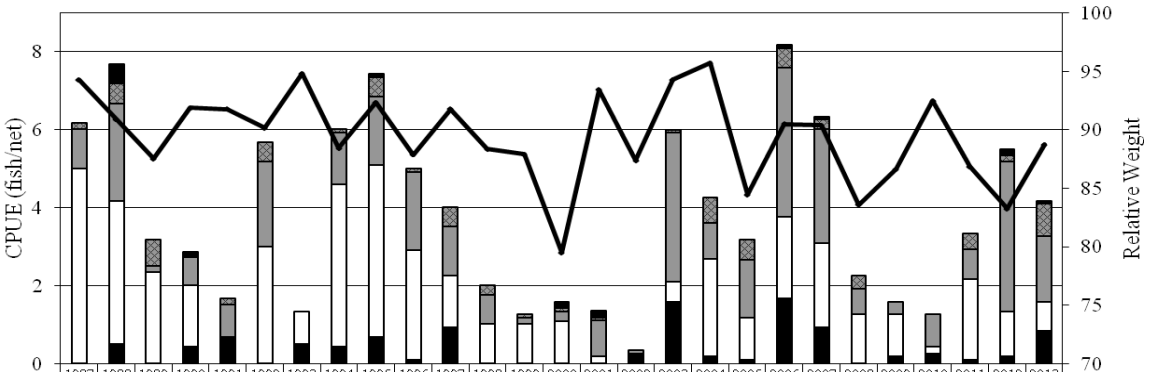
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Memorable (>12 in.)	0	0	0	0	0.33	0	0	0.33	0.25	0	0	0	0	0	0	0	0.08	0.08	0	0	0.083	0	0.083	0	0.083	0.083	0.166
Preferred (10-11.9 in.)	0	1.17	0	0	0.17	0	0.25	0.75	0.33	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	0.417
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	0.92
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	1.58
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	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	97.48

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 three 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, 1987-2013.



	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	2013
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	0.083
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	0.833
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	1.67
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	0.75
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	0.833
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	88.75

Walleye

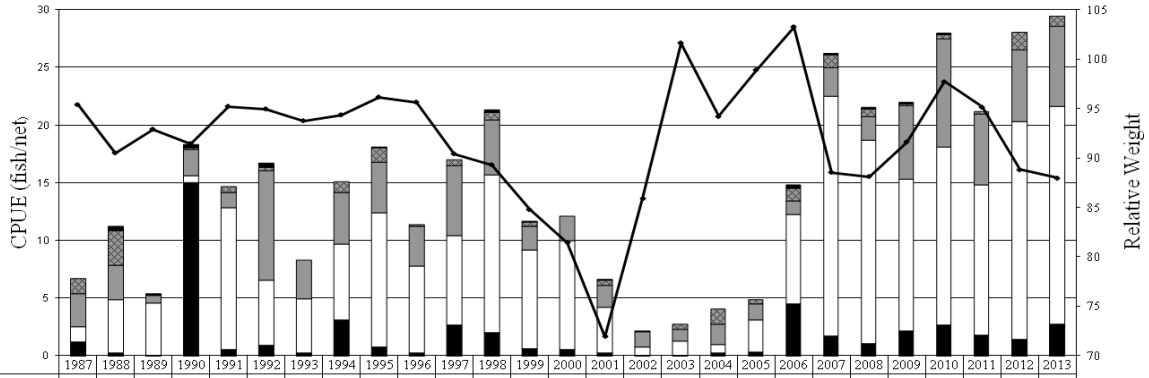
From 2003 to 2011 approximately 100,000 fingerling walleye were stocked annually in Fresno Reservoir. In 2006, 200,000 fingerling walleye were stocked due to unallocated productions at the Fort Peck Hatchery.

Since 1987, seven of the eight highest walleye relative abundances have been documented from 2007-2013 (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 the adult population. 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. In 2013, fall gill net surveys documented the highest walleye relative abundance ever recorded (29.1 walleye/net; Figure 11). No walleye fingerlings have been stocked the last two years and the adult population continues to grow. Summer seining surveys continue to document successful reproduction of walleye and the population has continued to grow regardless of increased fishing pressure and harvest.

Water conditions and operations in Fresno directly benefit/impact this fishery and current walleye densities are not favorable for the long-term health of the fishery. In 2012 and 2013, no walleye fingerlings were stocked in an effort to observe reproductive success of the current adult population and to reduce stocking contributions to an already high walleye population. Walleye natural reproduction was observed, indicating good spawning habit exists when water conditions are favorable. Future walleye stocking rates should consider the current spawning adult density and potential of that population to naturally reproduce.

The high abundances observed over the last seven years have coincided with 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.

Figure 11. - Relative abundance, size structure, and relative weight of walleye in Fresno Reservoir for the years 1987-2013.



	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	2013
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	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	0.92
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	6.92
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	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	2.7
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	87.96

Sauger

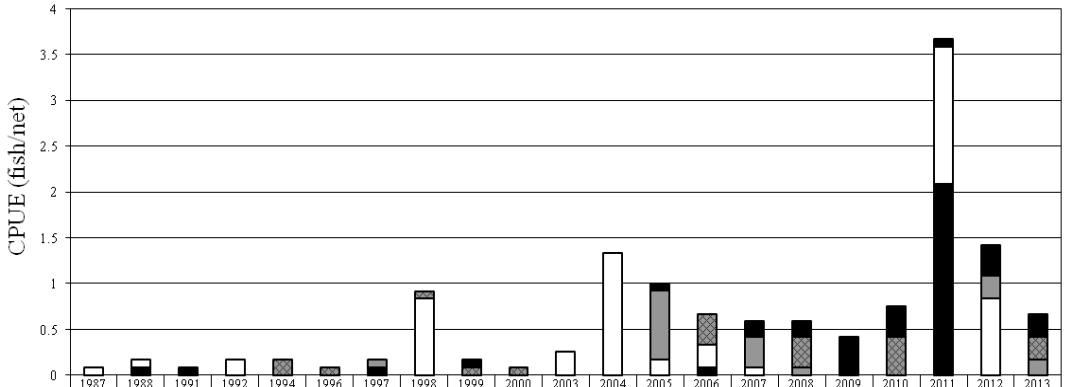
Sauger populations have stayed relatively low in Fresno Reservoir since the construction of the Fresno Dam. Sauger have been captured periodically, primarily in the upper reservoir where the Milk River enters Fresno Reservoir. Sauger relative abundance increased in 2001 and 2002 when drought and extreme reservoir draw-downs resulted in an increase in riverine habitat. No sauger were collected in 2013.

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 attributed 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). Fall surveys conducted in 2013 suggests the population has reverted back to population dynamics observed from 2008-2010 (low density of larger fish >10 inches; Figure 12). Although successful reproduction and recruitment of black crappie has been documented in recent years, high predator densities have consumed a majority of the smaller black crappie (< 8 inches) and this has resulted in an unbalanced age and size structure on the current black crappie population.

Figure 12. - Relative abundance and size structure of black crappie collected with sinking experimental gill nets in Fresno Reservoir, 1987-2013.



	1987	1988	1991	1992	1994	1996	1997	1998	1999	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
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	0.25
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	0.25
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	0.166
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	0
Sub Stock (<5.0 in.)	0	0.083	0.083	0	0	0	0.083	0	0	0	0	0	0	0.083	0	0	0	0	2.08	0	0

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.

Anita Reservoir

Anita Reservoir is a 50-acre reservoir located on BLM land in Northern Blaine County. The reservoir was originally constructed in 1996 to increase waterfowl habitat and create a fishery. Not long after construction, torrential rains quickly filled the reservoir. The dam's integrity was jeopardized and needed to be breeched. The reservoir was reconstructed and never re-filled. In 2011, the reservoir filled and FWP trap and transferred pre-spawn yellow perch, black crappie, and fathead minnows in order to establish a forage base within the reservoir. In 2012, walleye fingerlings were planted and the reservoir now receives alternate year plants of 5,000 walleye fingerlings.

In 2013, two gillnets captured one black crappie and 35 yellow perch. The black crappie was 8.3 inches and the yellow perch averaged 8.06 inches. Two trap nets were also utilized and captured 49 brook stickleback, 2,297 fathead minnows, and 94 yellow perch, which averaged < 3 inches. Indicating natural reproduction is occurring within the reservoir.

Burns Reservoir/ BR 045

Burns reservoir is a 17-acre pond located on BLM land in Blaine County. This reservoir has historically been a popular fishery and was last sampled in 2005; no fish were caught during gill net surveys. Water levels were very low since 2001, which is most likely the cause of the failure of the 2001 fish stocking. However, high water levels prompted another attempt to re-establish a fishery following the 2010/2011 winter. Approximately 2,000 rainbow trout were stocked into Burns Reservoir.

In 2013, one gill net and one trap net were set overnight to verify the success of this stocking effort. No fish were sampled and depth readings taken recorded a maximum depth of 14.5 feet. Though

this reservoir has sufficient depth, the area was very small and the majority of the reservoir was 4-8 feet in depth. The failure to establish a fishery within Burns, under ideal water conditions, will eliminate future stocking efforts on this reservoir.

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 another 3,600 were transferred in the spring of 2013. Furthermore, 50 advanced fingerling tiger muskie from South Dakota were stocked in the fall 2010. 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 returned to full capacity.

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).

In 2013, water levels returned to full-pool. Gill net surveys suggest walleye densities remain high (Table 15). Walleye average length continues to increase but the relative weights observed in 2013 were the lowest ever recorded (Table 15). Yellow perch and channel catfish densities also dropped, this may be due to increased reservoir capacity and dispersal of these two species. To document the response of spawning success (under ideal spawning conditions) of transferred yellow perch and other forage species within Cow Creek Reservoir, summer seining surveys were also conducted. Four seine hauls were conducted in late July and spawning success was recorded for yellow perch, white sucker, and fathead minnow. Several YOY walleye and one adult tiger muskie were also captured. 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 (1994-2013).

			Yellow Perch		Channel Catfish			White Sucker		Walleye			Tiger Muskie	
Date	Year	Nets	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Weight	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Weight	Rel. Abun.	Avg. Length
Aug-94	1994	2.0		--	0.0	--		2.0	--	23.5	7.2		0.0	--
Sep-95	1995	1.0	0.0	--	0.0	--		2.0	--	15.0	10.0	82.5	0.0	--
Sep-96	1996	2.0	0.0	--	5.0	9.1	116.1	1.0	--	48.0	11.1	82.3	0.0	--
Sep-97	1997	2.0	0.0	--	9.5	10.5	118.1	1.0	--	30.5	11.9	86.9	0.0	--
Sep-98	1998	3.0	0.0	--	6.3	13.9	107.7	7.0	14.6	11.3	13.2	87.1	0.0	--
Sep-01	2001	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	2003	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	2005	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	2006	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	2007	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	2008	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	2009	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	2010	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	2011	No Sampling Occurred												
Jun-12	2012	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
Jun-13	2013	2.0	0.5	7.0	2.0	16.5	118.4	7.0	14.1	10.0	11.8	77.8	0.0	0.0

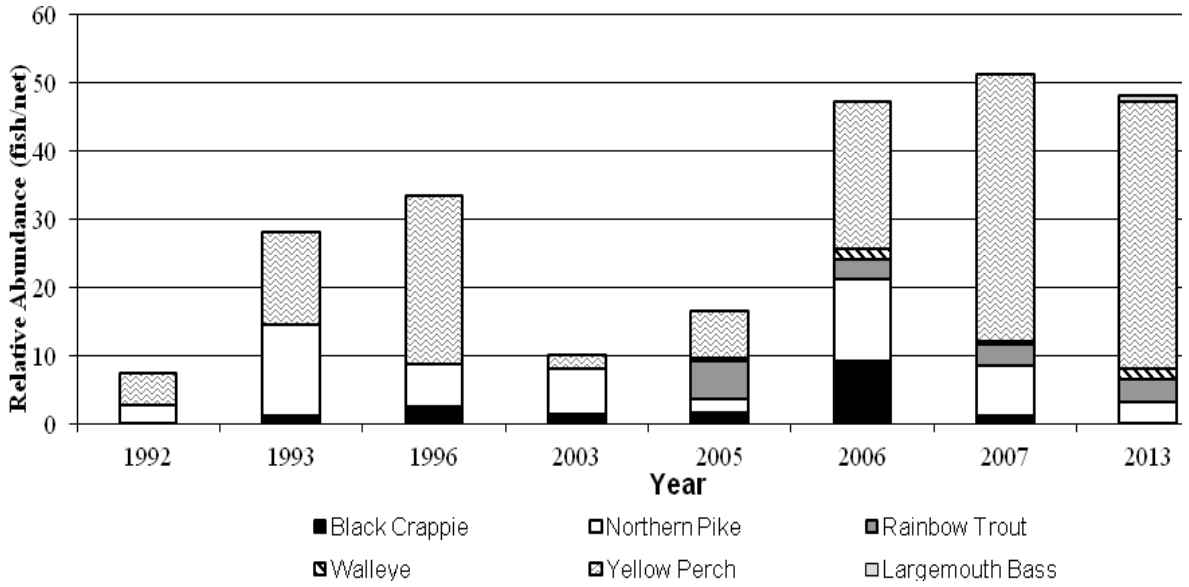
Dry Fork Reservoir

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 and largemouth bass were transferred via over-flow water from surrounding impoundments up-stream. 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. In 2013, FWP continued to trap and transport adult northern pike (33) and the reservoir received 4,000 catchable rainbow trout.

Water conditions remained excellent on Dry Fork in 2013 and summer seining surveys (four sites) suggest spawning conditions were favorable for all species. Seining efforts captured 238 yoy yellow perch, one yoy walleye, 13 yoy black crappie, 115 yoy largemouth bass, and 109 fathead minnows. Summer gill net surveys suggest yellow perch age-classes are establishing and the population is growing ($\bar{x}$ TL= 8.21 in.; Figure 13) Several year-classes of rainbow trout were also evident ($\bar{x}$ TL= 17.22 in) and northern pike, walleye and largemouth bass showed up in smaller densities but these species are still establishing within the reservoir (Figure 13).

Figure 13. Relative abundance of yellow perch, northern pike, black crappie, rainbow trout, largemouth bass, and walleye in Dry Fork Reservoir (periodic sampling 1992 to 2013).



Phillips County Fishing Waters

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

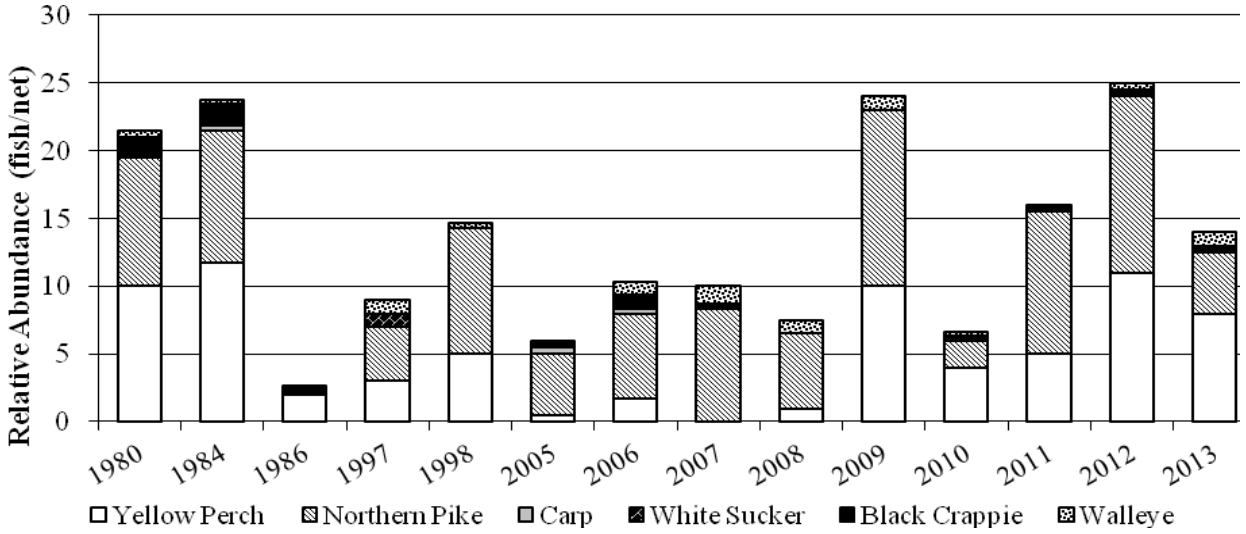
Ester Lake

Ester Lake is a 139-acre reservoir 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.

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 14). 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 2013 suggest a balanced fishery with very good abundance of yellow perch and northern pike (Figure 14). Two trap nets were also set overnight and captured six yoy yellow perch, six northern pike, and 110 black crappie that ranged from age-0 to adult. This was the highest abundance observed for black crappie since 1989.

Figure 14. - Relative abundance of yellow perch, northern pike, carp, white sucker, black crappie, and walleye in Ester Lake (periodic gill net sets 1980 to 2013).



Karsten Coulee

Karsten Coulee reservoir is located on BLM land in south Phillips County. Similar to many ponds on BLM land in south Phillips County, livestock grazing has reduced water quality and eliminated shoreline vegetation. In 2000 an aerator was installed on Karsten Coulee and largemouth bass were stocked in 1999 and 2004. Prior to restocking in the spring of 2004, a winterkill was reported. Low water levels and poor water quality were most likely responsible. In 2009, one gill net was overnight. Largemouth bass ranging in size from 6.6 to 9.6 inches in length were collected (CPUE = 11 fish/net). Hook and line sampling was also conducted yielding catch rates of 15 fish/hour with several bass over 14 inches in total length.

In 2013, one gill net and one trap net were set overnight. No fish were captured in the gill net and the trap net contained 29 bluegill ($\bar{x}$ TL= 3.14) and confirms the introductions of bluegill were successful and these fish are spawning. This reservoir would benefit from fencing of at least a portion of the shoreline to allow the pond to regenerate riparian vegetation and recover from a chronic overgrazing problem.

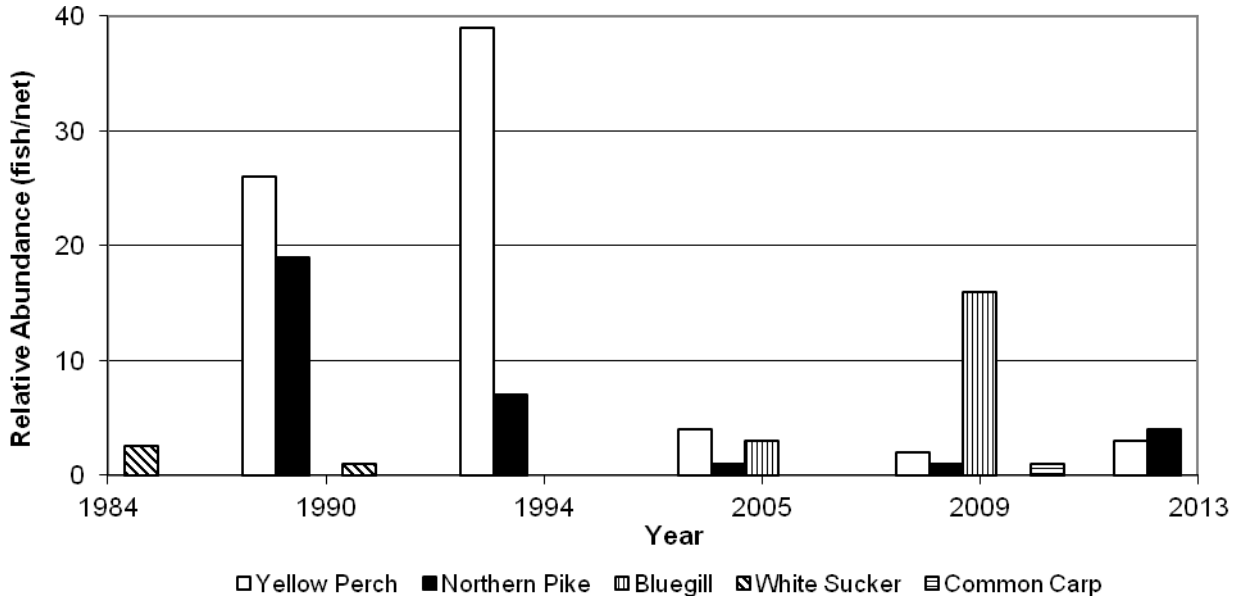
McChesney Reservoir

McChesney Reservoir is a privately owned reservoir in south Phillips County. This reservoir has been managed as a northern pike, yellow perch, and black crappie fishery since the 1960s. There were also stockings of bluegill, however stocking records are not complete. In 2010/2011, this reservoir received 460 angler days and remains one of the more popular reservoirs in Phillips County (MTFWP Fisheries Bureau 2012).

Yellow perch and northern pike were the most abundant species captured during netting surveys in the early and mid 1990's (Figure 15). Several years passed before netting surveys were once again initiated in 2005. In the time between sampling events the area surrounding the reservoir experienced severe drought conditions, which may explain the significant drop in yellow perch and northern pike abundances. The population dynamics also changed, with the introduction of bluegill,

black crappie, and common carp. In 2013, yellow perch and northern pike were the only species captured during gill net surveys (Figure 15). One trap net was also set overnight and captured one yoy yellow perch, one adult northern pike, 53 yoy bluegill, two adult black crappie, and one adult carp.

Figure 15. - Relative abundance of yellow perch, northern pike, carp, white sucker, black crappie, and walleye in Ester Lake (periodic gill net sets 1980 to 2013).



Nelson Reservoir

Nelson Reservoir, located 19 miles east of Malta is an 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, black crappie, bullheads, and rainbow trout. Commercial fishing for carp, buffalo, and goldeye was conducted in the 1920s, 30s, and again 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 supplement an already good population. 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. Their contribution to the overall spawning success of walleye is unknown and may function more as rearing habitat.

Population Status of Adult and Young-of-Year Fishes

Since 1993, adult fish populations have been monitored at 10 fixed experimental gill netting stations. Gill netting is conducted over a two-day period utilizing five sinking experimental gill nets each day (10 net-days). The sinking multi-filament experimental gill nets measure 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, 1982-2013.

	Shorline Seined (ft)	Walleye	Yellow Perch	YP (Adult)	Northern Pike	Spottail Shiner	White Sucker	Black Crappie	Goldeye	Buffalo sp[1]	Smallmouth Bass
1982	660	0	4,553	--	3	0	202	245	0	0	0
1983	1,420	4	138	--	18	0	543	238	0	0	0
1984	1,530	0	133	--	0	0	0	0	0	0	0
1985	510	3	2,272	--	16	1	16	67	1	0	0
1986*	700	0	3	--	7	0	10	232	0	0	0
1987*	495	5	1,987	--	0	4	45	10	7	0	0
1988*	520	0	783	--	0	1	0	35	0	0	0
1989*	910	10	736	--	4	43	1,503	135	0	0	0
1990	1,320	7	2,631	--	1	56	181	21	0	0	0
1991*	660	8	77	--	1	54	33	26	0	0	0
1992	635	21	140	--	6	387	175	18	0	4	0
1993*	520	3	8,287	--	1	520	2,688	62	0	0	0
1994*	830	6	1,802	--	10	621	697	49	0	0	0
1995*	760	36	232	--	0	3,780	180	163	0	0	0
1996*	870	25	4,521	--	13	21	101	0	0	0	0
1997*	890	53	2,205	--	0	159	534	1	0	0	0
1998*	340	0	126	--	0	33	235	4	0	0	0
1999	750	11	1,489	--	2	222	497	1	0	0	0
2000*	440	4	449	--	2	189	258	5	6	0	0
2001	430	2	72	--	1	27	800	88	0	0	0
2002*	415	2	19	--	4	8	38	482	21	62	0
2003	530	3	361	--	33	49	235	6,597	0	0	3
2004*	443	10	1,781	--	0	19	195	5	1	0	10
2005*	754	5	423	--	2	34	155	278	23	5	1
2006*	831	3	773	--	8	66	319	89	0	3	1
2007*	489	6	586	--	2	75	596	5	0	12	9
2008*	500	10	62	--	0	8	272	1,237	11	94	11
2009*	750	4	4,522	--	4	3	478	20	8	2	61
2010*	750	11	2,914	184	3	98	224	131	0	0	115
2011*	750	8	2,404	530	6	34	181	69	0	0	40
2012*	750	2	685	312	1	66	49	935	0	7	6
2013*	750	1	362	2	6	48	24	261	0	7	8

*Years in which walleye fry or fingerlings were stocked

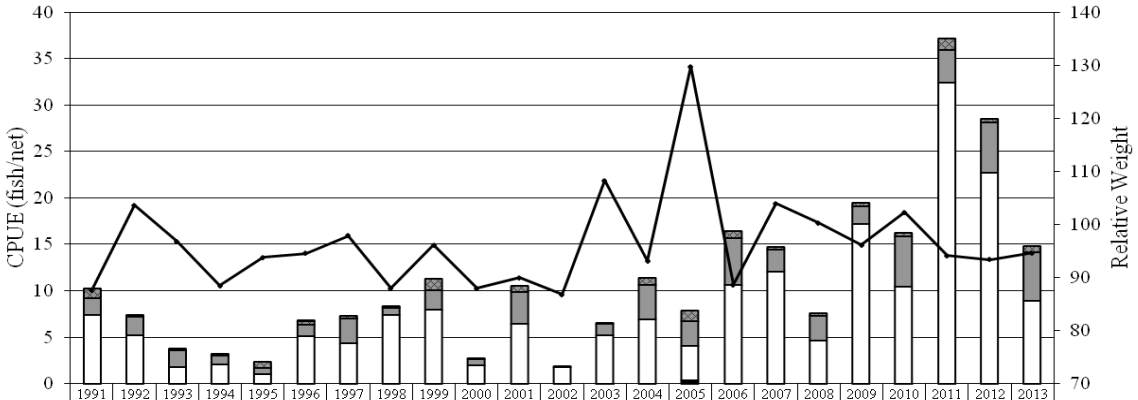
[1] Consists of bigmouth buffalo and smallmouth buffalo

Yellow Perch

The yellow perch fishery in Nelson Reservoir has been cyclic over the last 15 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 and reduced pool elevations. 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 16).

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) and dropped significantly in 2013 (15 fish/net; Figure 16) but remain above average. The majority of fish sampled consisted of stock and quality sized yellow perch. The yellow perch population has responded well due to several consecutive exceptional water years and will remain stable if the current water conditions persist.

Figure 16. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Nelson Reservoir, 1991-2013.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
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	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	0.7
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	5.2
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	8.9
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	0
Relative weight	87.70	103.5	96.83	88.45	93.77	94.56	97.87	87.94	96.13	87.97	89.95	86.76	108.2	93.10	129.7	88.60	104	100.2	96.15	102.3	94.08	93.38	94.6

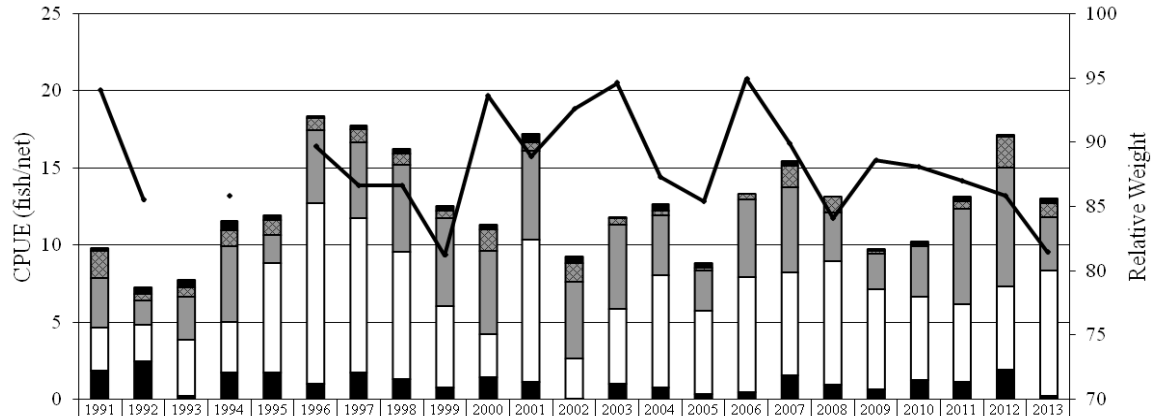
Walleye

Historically, walleye fingerlings and fry 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, but OTC markings were completed in 2013. 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 2013 (Figure 17). OTC analysis suggests the majority (> 70%) of YOY walleye recruiting into the population are naturally reproduced.

The relative abundance of adult walleye has historically remained stable over the years, regardless of walleye stocking densities and size (Figure 17). In 2012, walleye relative abundance was the highest recorded since 2001 (17.1 fish/net) but fell closer to average densities in 2013 (13 fish/net; Figure 17). Exceptional water and forage conditions are most likely the primary factors contributing to the increase in walleye densities observed in 2012. The walleye population on Nelson Reservoir has remained consistent and trend data suggests the contributions from supplemental stocking efforts aren't increasing walleye densities, and stocked fish may actually be replacing naturally reproduced walleye that would otherwise recruit into the population if no stocking would occur. Further evaluation on this species and subsequent stocking efforts are needed to better understand the current population trends.

Figure 17. - Relative abundance, size structure, and relative weight of walleye collected with sinking experimental gill nets in Nelson Reservoir, 1991-2013.



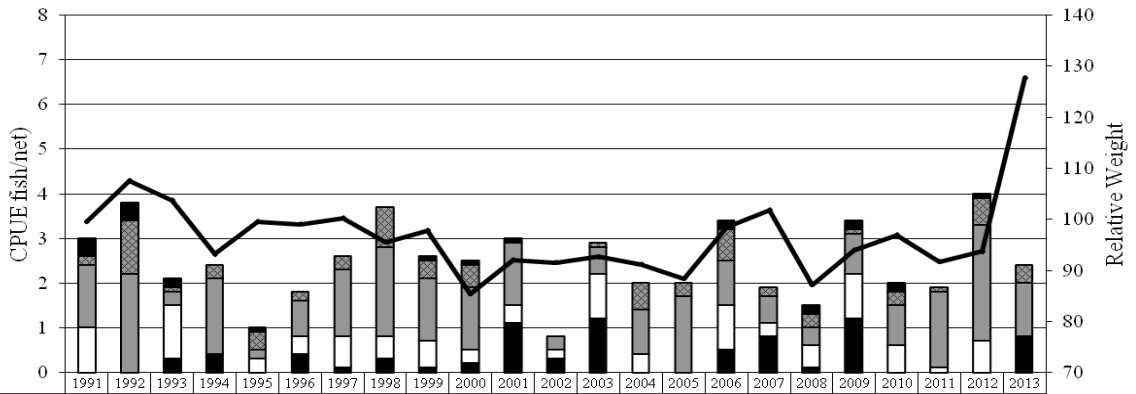
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Memorable (>25 in.)	0.20	0.40	0.50	0.60	0.30	0.10	0.20	0.30	0.30	0.30	0.60	0.40	0.10	0.40	0.30	0.00	0.3	0	0.1	0.2	0.3	0.1	0.3
Preferred (20-24.9 in.)	1.80	0.40	0.60	1.00	1.00	0.80	0.90	0.70	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	0.9
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	3.5
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	8.1
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	0.2
Relative weight	94.03	85.50		85.80		89.70	86.60	86.60	81.20	93.60	88.90	92.60	94.60	87.30	85.40	94.90	89.9	84.1	88.59	88.1	86.98	85.84	81.42

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 18). 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 18).

In 2012, northern pike relative abundance was at its highest level ever documented (4 fish/net) but dropped in 2013 (2.4 fish/net; Figure 18). The majority of the catch consisted of sub-stock and quality sized fish. Exceptional water and forage conditions are most likely the primary factors contributing to the increase in sub-stock northern pike. Northern pike abundance should remain stable if the current water conditions persist.

Figure 18. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental mesh gill nets in Nelson Reservoir, 1991-2013.

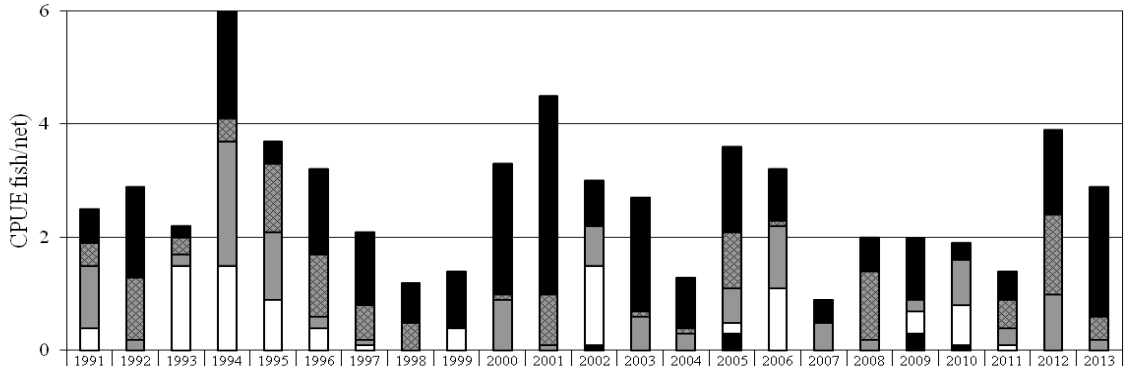


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Memorable (>34 in.)	0.40	0.40	0.20	0.00	0.10	0.00	0.00	0.00	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.20	0	0.2	0.2	0.2	0	0.1	0
Preferred (28-33.9 in.)	0.20	1.20	0.10	0.30	0.40	0.20	0.30	0.90	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	0.4
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	1.2
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	0
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	0.8
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	127.7

Lake whitefish

Lake whitefish population has fluctuated since 1991 due to fluctuations in water levels and summer water temperature, which have reduced recruitment of YOY fish to the population (Figure 19). 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 19; Leslie 2007). Gill netting surveys conducted in 2012 and 2013 reveals the population has increased and is comprised of mostly adult fish (Figure 19).

Figure 19. - Relative abundance, size structure, and relative weight of lake whitefish collected with sinking experimental mesh gill nets in Nelson Reservoir, 1991-2013.

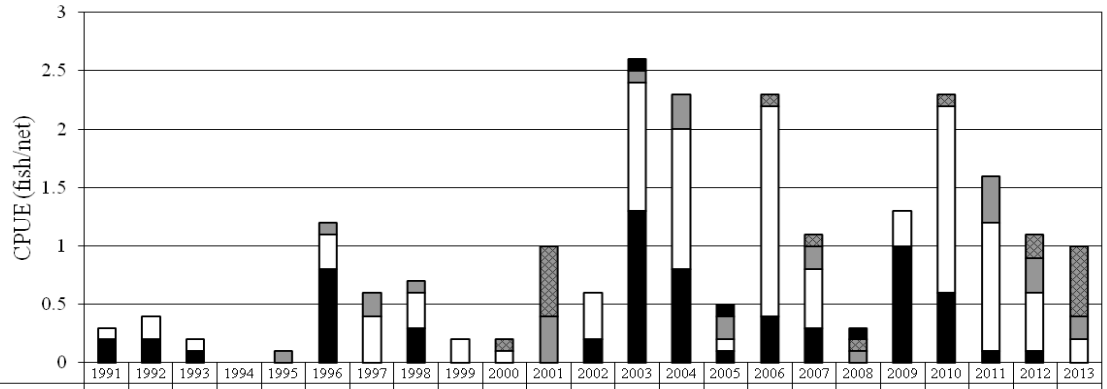


	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Memorable (>18.0 in.)	0.6	1.6	0.2	1.9	0.4	1.5	1.3	0.7	1	2.3	3.5	0.8	2	0.9	1.5	0.9	0.4	0.6	1.083	0.3	0.5	1.5	2.3
Preferred (14.0-17.9 in.)	0.4	1.1	0.3	0.4	1.2	1.1	0.6	0.5	0	0.1	0.9	0	0.1	0.1	1	0.1	0	1.2	0	0	0.5	1.4	0.4
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	0.2
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	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	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 19). High reproductive success over the last eight 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 20. - Relative abundance, size structure, and relative weight of black crappie collected with sinking experimental gill nets in Nelson Reservoir, 1991-2013.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
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	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	0.6
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	0.2
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	0.2
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	0

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 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. Good smallmouth bass reproduction has been documented in recent years (Table 16) and will continue to recruit and supplement the adult population.

PR 018

PR 018 is a 6-acre pond located on BLM land in south Phillips County. PR 018 has a windmill aeration system and was historically a warm water fishery consisting primarily of largemouth bass. In 2004, a winterkill occurred and surplus rainbow trout were stocked in the spring of 2004. Gill netting surveys indicated excellent growth and survival of rainbow trout with a catch rate of 74 fish/net. Rainbow trout ranged in size from 7.7 to 12.2 inches TL (TL=9.92 in.) and 0.07 to 0.63 lbs. (wt=0.35 in.). Population estimates in 2009 captured no fish. Re-introduction of largemouth bass occurred in 2009 (n=3,000) and 250 adult bluegill were introduced in 2011.

In 2013, one gill net and one trap net were set overnight to evaluate the previous introductions. The gill net contained no fish and the trap net captured three bluegill.

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 2014 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 2014, 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.

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Water Codes of Waters Referred To

164303 Anita Reservoir
154535 Bailey Reservoir
154570 Beaver Creek Reservoir
157400 BR 045/Burns Reservoir
164789 Cow Creek Reservoir
155083 Dry Fork Reservoir
155120 Ester Lake
165140 Fort Peck Reservoir
155240 Fresno Reservoir
166155 Karsten Coulee Reservoir
166921 McChesney Reservoir
162500 Missouri River Sec. 05
162520 Missouri River Sec. 06
156480 Nelson Reservoir
157040 PR 018

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

Prepared by: Cody Nagel
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