Fisheries Division
Federal Aid Job Progress Report

Montana Statewide Fisheries Management

Federal Aid Project Number: F-113-R-6

July 1, 2019 – June 30, 2020

Project Title: Montana Statewide Fisheries Management

Job Title: Havre Area Warm Water Fisheries Management

Abstract: Near average snowfall across Hill, Blaine and Phillips Counties in 2018/2019 resulted in good water conditions throughout most of area. However, prolonged cool conditions and ice jams coupled with high spring flows on the Missouri River made paddlefish netting extremely difficult. Paddlefish tagging was conducted from April 23 to May 10 on the Missouri River upstream of Fort Peck Reservoir. A total of 171 new tags were deployed in 2019. Throughout the sampling period, paddlefish tagging, and harvest records were maintained. Two paddlefish creel stations were operational near the Fred Robinson Bridge, Missouri River, from May 1 - June 15.

In addition, young-of-year paddlefish surveys (visual counts) were conducted on August 8-9 and August 20-21, in the headwaters of Fort Peck Reservoir. Estimated harvest on the Upper Missouri River paddlefish population was 305 in 2019 (3-year average harvest is 300). The average size of adult fish remains stable and observed spawning success has been excellent in recent years due to high spring flows and elevated reservoir levels (2008, 2011, 2018 and 2019). Observed year-classes in 2008 and 2011 have started to recruit into the fishery.

Standardized gill netting and beach seining surveys were conducted at Fresno, Nelson, Dry Fork, and Beaver Creek Reservoirs. Select ponds and streams were sampled throughout Hill, Blaine, and Phillips Counties to assess fish populations, survival and recruitment. Additional wild fish transfers were also completed to re-establish populations where winterkill occurred. 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.

Prairie stream surveys were conducted on Battle Creek and East Fork of Battle Creek, as well as several streams located on Fort Belknap Indian Reservation.

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: (5) 310 and (5) 124 projects were reviewed; attended three Walleye Unlimited meetings and helped with six 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 students. Public presentations were also given on area fisheries in Havre, Great Falls and Malta. Staff also attended Walleye Unlimited meetings in Havre and Malta to provide information.

PROCEDURES, RESULTS, & DISCUSSION

Fort Peck Reservoir and Upper Missouri River Paddlefish Stock

The 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 abundance 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 and survival of young paddlefish from 1999-2007 (Leslie 2007). Reduced size of adults and fecundity of females in the Upper Missouri River have also been observed and documented (Leslie 2007).

The current management strategy is to provide a stable recreational fishery while ensuring a sustainable population size and diverse age structure of the spawning stock exists. 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 from 6 am to 9 pm to 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

restrictions were set, mandatory catch and release and harvest days were eliminated, and immediate release was further defined for paddlefish. From 2008-2015, the harvest season (number of days to obtain 500 fish harvest cap) continually decreased (i.e. in 2014 the harvest cap was obtained in four days). The harvest cap regulations shifted pressure towards the opening weekend and anglers voiced frustrations with the crowding of people at campsites/facilities and fishing areas. In 2016 the Fish, Wildlife, and Parks (FWP) commission passed new regulations that implemented a lottery draw, the number of harvest tags issued in 2019 was 1,000. All paddlefish harvested must be mandatorily reported via phone, MyFWP, or on-site. Anglers who don't draw a harvest tag are able to snag and release.

Data Collection Methods

For more effective management of the Fort Peck stock, a thorough understanding of several key aspects of their life history is necessary. Data collected includes: population estimates, harvest rates, spawning periodicity, age-structure, reproductive success, and recruitment.

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 locations (Figure 1). To gather this information, sampling occurs on the Upper Missouri River during the spawning period when paddlefish are staging around the Fred Robinson Bridge. Sampling 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 150 ft long, 8-feet deep, with 4-inch mesh. Collected paddlefish are weighed, measured (eye-fork length), sexed, and tagged with an individually numbered metal jaw tag.

Beginning in 1996, concern over spawning success 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 year-class strength and recruitment of young-of-year (YOY) paddlefish. Visual counts have been found to be the most effective means to survey YOY paddlefish (Fredericks and Scarnecchia 1997). 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, sub-adult, and adult).

Adult Paddlefish Monitoring and Tagging

In 2019, paddlefish tagging started on April 23rd and continued until May 10th, when crews tagged our 171st paddlefish (Figure 1). River flows in 2019 were high, which greatly reduced our sampling efficiency (Figure 1). Since tagging was initiated in 1977, 9,084 paddlefish have been tagged and 1,231 tagged paddlefish have been recaptured during annual drift netting surveys. On average, approximately 12% of the paddlefish captured in our drift nets is comprised of recaptured fish. In 2019, 26.9% of the paddlefish observed during our netting efforts were recaptured fish (Figure 1). Based on the tagging and recapture data, the reproductive periodicity of male paddlefish is one to two years and for females every two to three years. Since 1973, FWP has monitored the number of female paddlefish weighing greater than 90 pounds captured during our tagging efforts (Figure 2). 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. However, our data has shown a positive response in paddlefish condition and weight when Fort Peck Reservoir fills after several years of low pool conditions (nutrient plume; Figure 2). In 2019, five female paddlefish captured during our tagging efforts weighed more than 90 pounds (Figure 2). Females captured in 2019 averaged 69.9 pounds (n=69).

Since tagging was initiated in 1977, a total of 1,097-tagged paddlefish have been reported as harvested, which is about 12.1% of all tagged paddlefish. While paddlefish anglers are encouraged to

report catches of tagged fish, reporting rates have been low in years when on-site creel surveys are not conducted. In 2019, 32-tagged paddlefish were reported as harvested and 18-tagged paddlefish were reported as snagged and released, anglers harvested 4 paddlefish tagged in 2019.

Figure 1. Number of paddlefish tagged and recaptured during spring gillnetting efforts from 1992-2019.

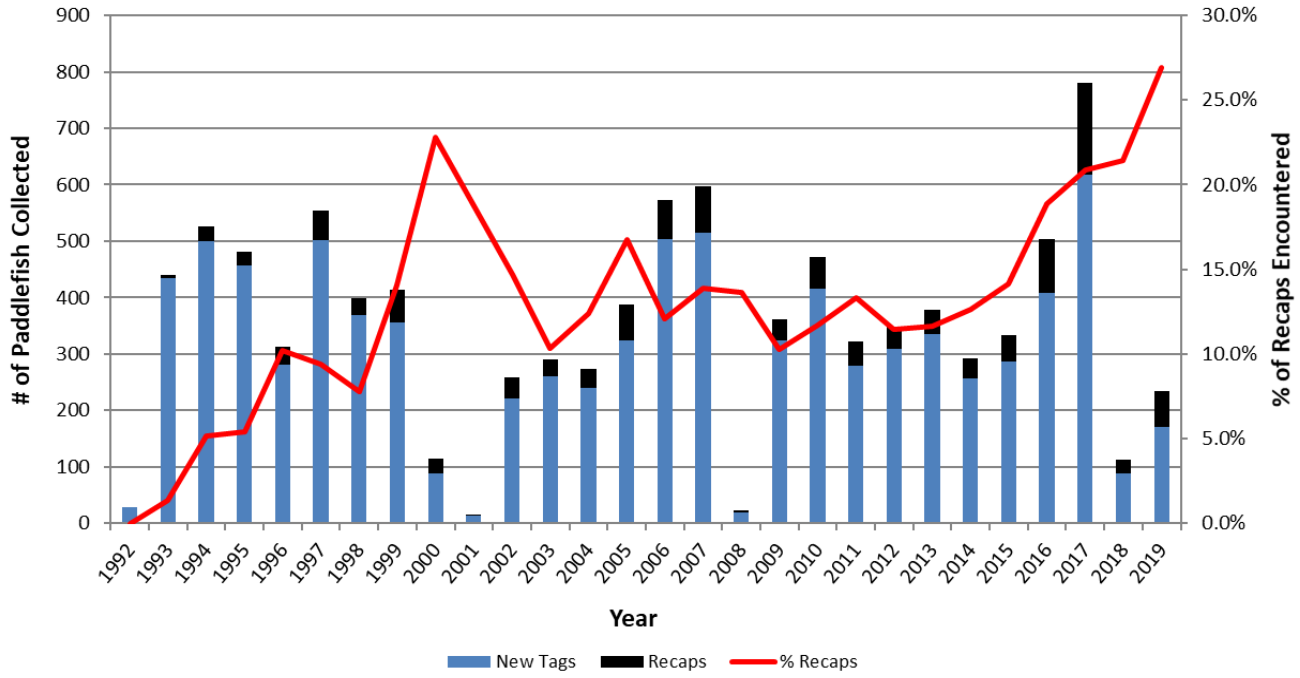
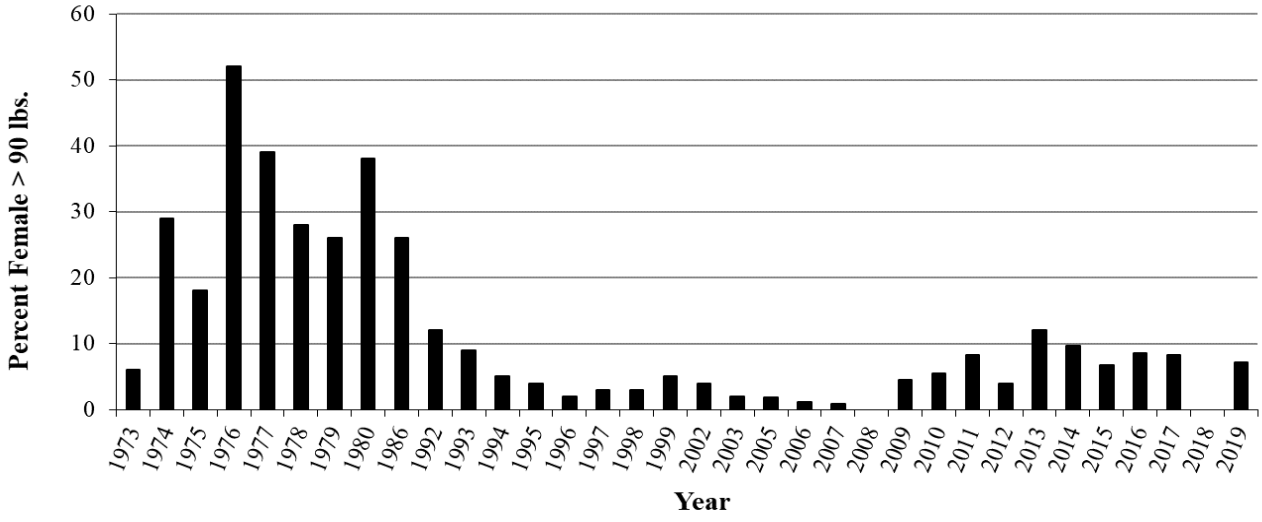


Figure 2. Percent of female paddlefish captured during adult tagging efforts weighing more than 90 pounds from 1973-2019.



Preliminary Population Estimates and Exploitation

Estimates of population size of the recruited portion of the Fort Peck stock were developed from 1993 through 2019 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 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 2019, the four estimates suggest an adult population consisting of approximately 18,000 paddlefish (95% CI 12,000 – 20,000).

Glassic et al. (2019) analyzed 25 years (1993-2017) of FWP mark-recapture data using modified Jolly-Seber (POPAN) models on the Upper Missouri River to estimate survival, recapture, probability of entry, and abundance of adult paddlefish. In summary, the analysis found adult female estimated survival at 0.93 (CI 0.89-0.94) and adult males 0.82 (CI 0.53-0.94). Estimated abundance of adult females was between 4,488 (CI 1,698-11,860) and 10,254 (CI 7,287-14,431) individuals and for adult males abundance was between 4,337 (CI 2,889-6,512) and 22,757 (CI 18,525-27,956).

Glassic et al. (2019) found that maximum exploitation rate was 5.0% (CI 3.9-6.6%) for females in 2006 and 6.7% (CI 5.2-8.7%) for adult males in 2006. Adult female interval fishing mortality was 0.018 (0.012-0.025) and instantaneous fishing mortality was estimated at 0.018 (0.012-0.027) in 2017. Total annual mortality for adult females in 2017 was 0.08 (0.06-0.11).

Spawning and Recruitment

Spawning success 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 upstream to spawning locations. This migratory trigger 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 and YOY sampling. Our data suggests the closer flows resemble those postulated by Berg, the more likely we are to observe higher densities of YOY paddlefish during our summer 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 year-classes observed during high flows.

During the 1990s and early 2000s, 7 of the 20 years met the requirements necessary for successful migration and spawning (Figure 3 and 4). From 2000-2007, flows did not meet the minimum flow and duration requirements (Figure 4). However, since 2008, paddlefish jaws aged from harvested fish contained age classes produced from these "poor" flow years. Flow requirements were met from 2008-2011 and again in 2014 and 2017-2019 (Figure 5; Table 1). The historic spring flows experienced in 2011 on the Upper Missouri River were the fifth highest ever recorded at the USGS Landusky gauging station (peak flow > 72,000 cfs; Figure 5).

In 2019, the Missouri River basin snow water equivalent was 120% of normal on March 1st. The Missouri River at the Fred Robinson Bridge was free of ice cover by the last week of March. Flows rapidly increased and obtained trigger flows in early-April (flows > 20,000 cfs). The high flows created a large ice jam downstream of the Fred Robinson Bridge which caused substantial flooding and ice scouring upstream of Rock Creek. Flows remained high through May (flows > 16,000 cfs) and gradually fell to ~13,000 cfs by mid-June. Peak flow met and exceeded trigger flows for 80 days in 2019.

Hydrograph information (Figures 3, 4, and 5) suggests that good spawning conditions vary among years (Table 1). Poor year-class strength and recruitment due to low river flows and reduced pool elevations on Fort Peck Reservoir from 2000-2007 has been observed 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 efforts. Good recruitment of YOY paddlefish was observed in 1997, 1998, 2008, 2011 and 2018; when flows exceeded the historical hydrograph and Fort Peck Reservoir levels were high.

In 2019, four YOY and six sub-adult paddlefish were observed during the fixed transects between RM 1866.5 and 1881.5 (Table 2). In addition to the standardized counts, we applied a total of nine hours of random search effort on August 9th and August 21st-22nd 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 1863- 1887). Random counts yielded a total of four YOY, 10 sub-adult and 28 adult paddlefish being observed (Table 3).

Table 1. Paddlefish spawning and rearing condition ratings for the years 1974-2019, using trigger flow (> 14,000 cfs) incidence and duration, and Fort Peck pool elevations. Good rating is defined as trigger flow being met and exceeded for a minimum 30 consecutive days, marginal rating is trigger flow was met but didn't exceed 30 days, and poor rating is flow did not meet trigger flow requirement.

	Paddlefish Spawning Rating			Fort Peck Summer Pool Elevations (July Elevation)		
Year	Good	Marginal (#days> TF)	Poor	Decreasing	Neutral	Increasing
1974	X					X (2445.5')
1975	X					X (2251.6')
1976	X				X (2249')	
1977			X	X (2236.7')		
1978	X					X (2249.6)
1979		X (20)			X (2247.2')	
1980	X			X (2242.1')		
1981	X				X (2242.2')	
1982	X				X (2239.7')	
1983		X (29)			X (2241.7)	
1984	X				X (2243.2')	
1985			X	X (2232.8')		
1986		X (19)			X (2235.5')	
1987			X			X (2237.9)
1988			X	X (2230.4')		
1989		X (05)		X (2223.5')		
1990		X (03)		X (2216.2)		
1991	X				X (2220.1')	
1992			X	X (2213.2')		
1993	X					X (2223')
1994		X (06)				X (2238.6')
1995	X					X (2244')
1996	X					X (2247.3')
1997	X					X (2250.3)
1998		X (25)		X (2240.5')		
1999		X (13)			X (2238.3')	
2000			X	X (2233')		
2001			X	X (2222.6')		
2002		X (16)		X (2220.4')		
2003		X (05)		X (2213.6')		
2004			X	X (2203.7)		
2005		X (05)			X (2203.7')	
2006		X (09)			X (2206.3')	
2007			X		X (2203.2')	
2008	X					X (2210.1')
2009	X					X (2220.6')
2010	X					X (2235.8')
2011	X					X (2250.6')
2012		X (15)		X (2237.6')		
2013		X (15)		X (2227.1')		
2014	X				X (2230.3')	
2015		X (09)				X (2236')
2016			X		X	
2017	X				X (2238')	
2018	X					X (2246.5')
2019	X					X (2246.8)

[1]Flows measured at the Landusky Measuring Station

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

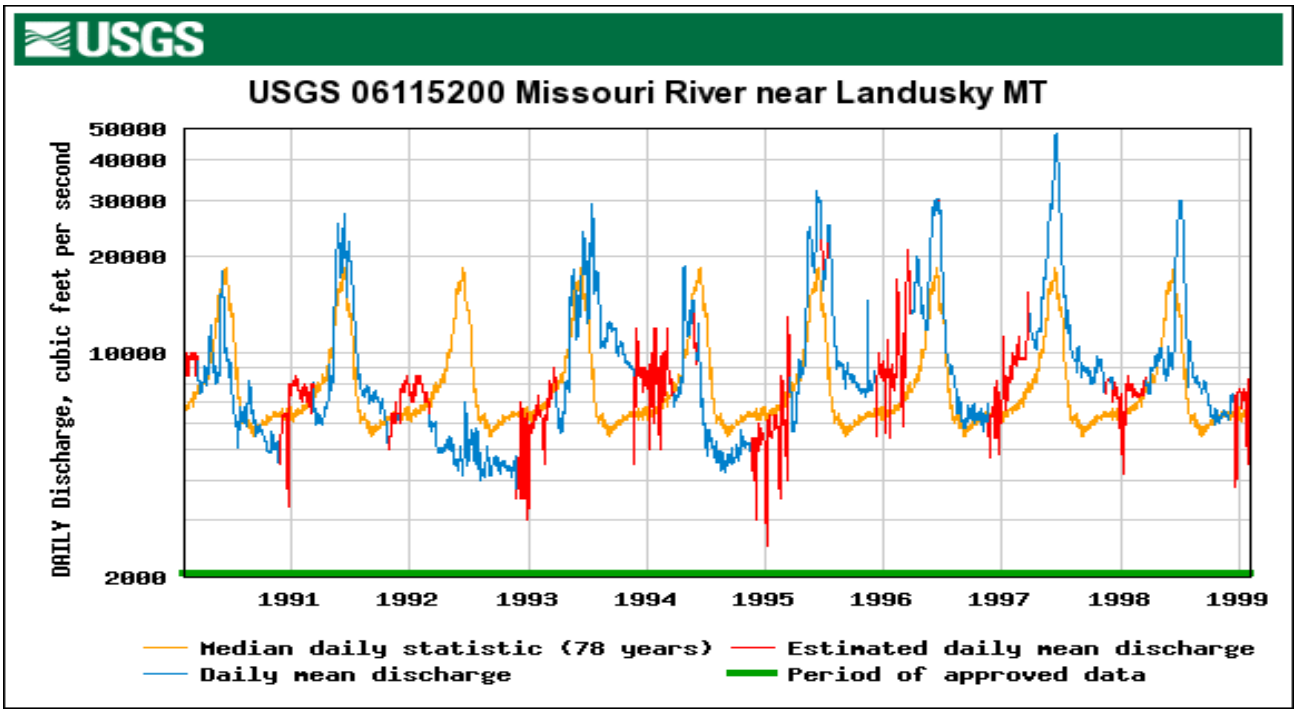


Figure 4. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 2000-2009.

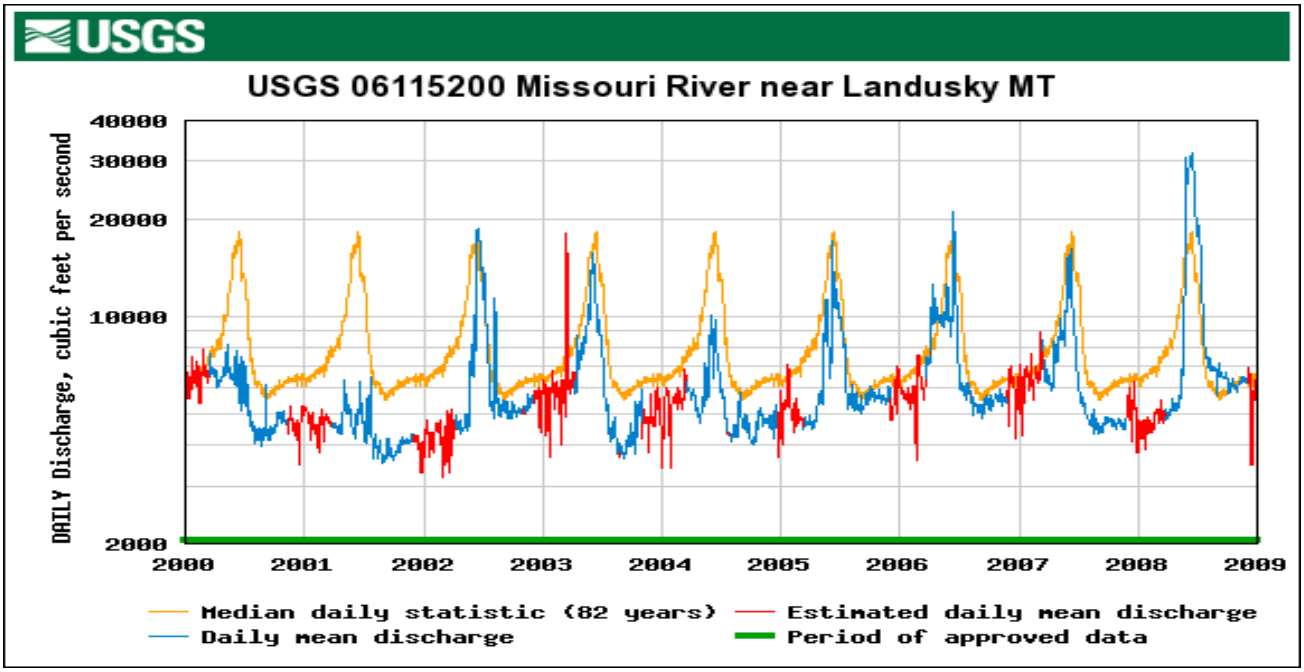


Figure 5. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 2009-2019.

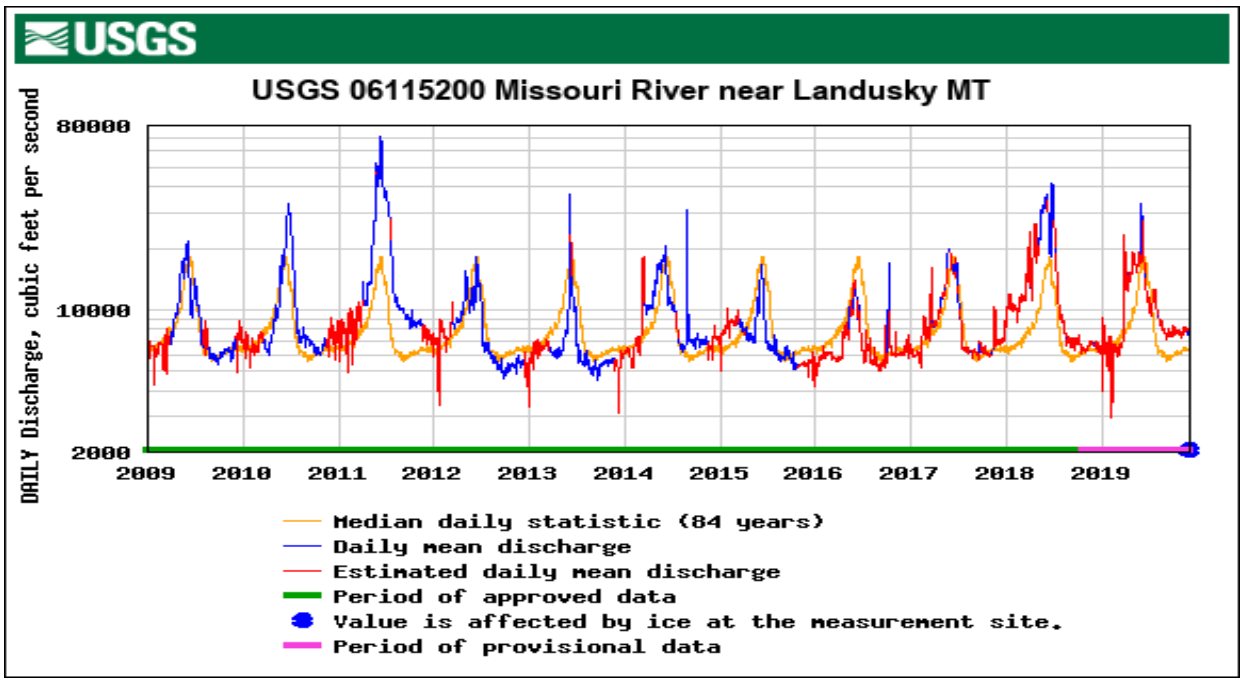


Table 2. - Results of standardized YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 1997 to 2019.

Year	Transect Dates	# Stations	Station Locations (RM)	# Transects	# YOY	# Sub-Adults	Reservoir Elevation (August)	Collector
1997				69	113	3	2248'	
1998	7/27 to 9/23	8	1888 to 1866	216	97	54	2239'	Kozfkay
1999	8/25 to 9/20	8	1888 to 1866	174	3	10	2236'	Kozfkay
2000				90	0	11	2230'	
2001				90	1	0	2221'	
2002			1862 to 1856 ?				2219'	Bowersox
2003			1862 to 1856 ?	54	2	4	2211'	Bowersox
2004			1853 to 1838	54	0	3	2201'	
2005	8/8 & 8/16	6	1853 to 1838	36	1	0	2202'	Miller
2006	7/24 & 7/30	6	1853 to 1838	36	2	1	2204'	Miller
2007	7/31 & 8/6	6	1854 to 1838	6	0	2	2201'	Miller
2008	8/6 & 8/12	6	1844 to 1858	12	4	3	2209'	Miller
2009	8/11 & 8/17	6	1843 to 1858	12	0	0	2220'	Miller
2010	7/27 & 8/3	6	1863.5 to 1878.5	12	0	0	2236'	Miller
2011	7/28 to 9/1	6	1866.5 to 1881.5	30	61	3	2242'	Hemingway
2012	7/30 & 8/9	6	1863.5 to 1878.5	12	1	3	2234'	Hemingway
2013	8/5 & 8/14	6	1855.5 to 1870.5	12	0	14	2226'	Hemingway
2014	7/28, 8/4, & 8/17	6	1859.5 to 1874.5	18	0	0	2230'	Hemingway
2015	8/3, 8/10, & 8/18	6	1866.5 to 1881.5	18	0	0	2236'	Hemingway
2016	8/2 & 8/15	5	1863.5 to 1878.5	12	0	1	2235'	Breen
2017	8/4 & 8/16	6	1867.5 to 1882.5	12	1	0	2239'	Breen
2018	7/29 & 8/14	6	1866.5 to 1881.5	12	1	0	2245'	Breen
2019	8/8 & 8/21	6	1866.5 to 1881.5	12	4	6	2246'	Breen

Table 3. - Results of random YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 2008 to 2019.

Year	Transect Dates	Effort (Hours)	Station Locations (RM)	# YOY	# Sub-Adults	# 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
2014	7/(29-30), 8/(5-6) (18-19)	27.25	1859-1887	0	7*	54	Hemingway
2015	8/4, 8/11, & 8/17	18	1865-1885	1	19*	42	Hemingway
2016	8/1, 8/2, & 8/16	10	1868-1880	0	1*	25	Breen
2017	8/3, 8/4, 8/15-8/17	15.25	1863-1887	1	1*	6	Breen
2018	7/29, 7/30, 8/15	11	1863-1887	11	1*	6	Breen
2019	8/9, 8/21, 8/22	9	1863-1887	4	10*	28	Breen

-- No data collected for observed period of record

* Majority of these fish were classified as sub-adults and most likely age-2 or 3 fish

Harvest: Paddlefish Creel Survey 2019

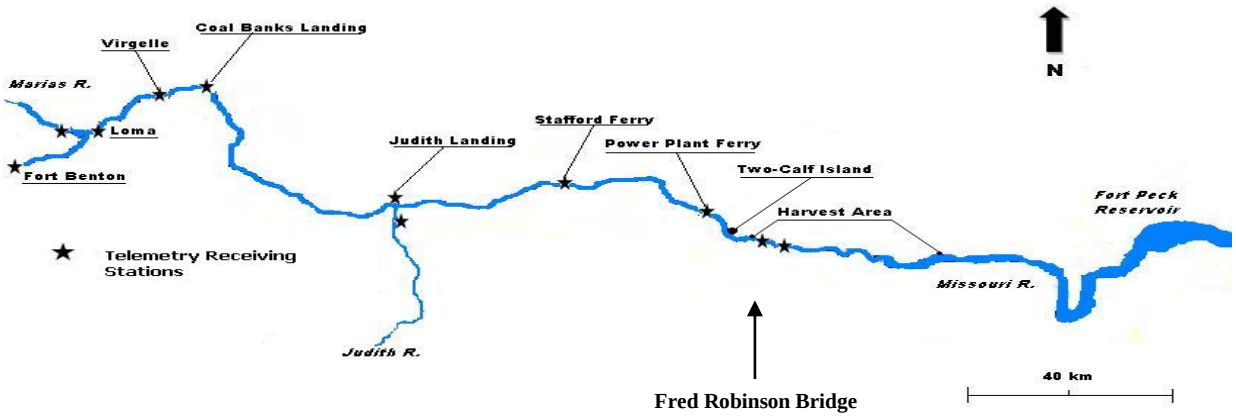
Methods

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 6). From 2010-2015 the creel was conducted annually by vehicle and boat from May 1st to June 15th from the Fred Robinson Bridge to Peggy's Bottom, focusing solely on paddlefish and paddlefish anglers.

New regulations adopted on the Upper Missouri paddlefish fishery were implemented in 2016, changing the protocols surrounding the creel historically conducted during the paddlefish season. Anglers now must mandatorily report a harvested paddlefish on the Upper Missouri. In 2019, creel clerks were stationed at two checkpoints located at the Kipp and Rock Creek campgrounds to provide a location for anglers to report their harvested paddlefish and collect additional harvest data.

Schedules were divided to cover the entire week with overlapping schedules occurring on the weekends, when fishing pressure increased. Anglers were also able to submit harvest information via phone hotline or filling out the harvest collection card which was issued to them when they received their harvest tag. A phone creel was also used to collect participation, angling effort, and success from both harvest and snag and release anglers.

Figure 6. 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.



Paddlefish Phone Creel (2003-2019)

Vic Riggs 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 to: (1) determine the harvest of paddlefish at sites other than the Intake Fishing Access Site, (2) check on the accuracy of the Intake creel survey, (3) possibly replace the Intake creel survey, (4) obtain harvest statistics for the Fort Peck population and (5) assess angler support for changes to regulations.

Phone creel statistics have been obtained for the Fort Peck population since 2003 (Table 4). On average, approximately 2,614 angler's purchase a tag to snag for paddlefish above Fort Peck Reservoir annually, representing approximately 5,124 fishing days. On average, approximately 2,053 paddlefish are caught annually above Fort Peck Reservoir with approximately 74% of the paddlefish being released (Table 4).

In 2019, two separate phone creels were performed based on angler type. The categories were: 1) Harvest angler, 2) Snag and release angler (unsuccessful in lottery draw or over-the-counter purchase after draw concluded). Approximately 75% of the harvest tag holders were contacted (n=750 (of 1,000)), whereas 35% of anglers from the other two categories (over-the-counter (n=245 (of 659)) and unsuccessful in draw (n=818 (of 2,379)) were interviewed. The number of paddlefish tags sold in 2019 were the highest ever documented (Table 4).

Effort

In 2019, 4,038 anglers purchased an Upper Missouri River paddlefish license, via entering the draw or purchasing the over-the-counter snag and release tag.

Estimated paddlefish snagging effort for all three angler types totaled 3,830 angler days (Table 4), harvest effort alone totaled 1,629 angler days. In 2019, approximately 55% of the angling effort occurred from shore with an estimated 305 paddlefish being harvested and an additional 2,238 paddlefish being caught and released (Table 4). Approximately 64% of harvest tag holders fished for paddlefish in 2019, whereas only 37% of catch and release anglers participated in 2019. Participation in 2019 was influenced greatly by extremely high river flows throughout the paddlefish season. On two separate occasions, flows on the Upper Missouri River approached major flood stage, limiting access to many snagging and camping locations.

Table 4. –Summary of estimates for the Fort Peck paddlefish population from the Montana paddlefish telephone creel survey (2003-2019).

Missouri River Above Fort Peck																	
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Number of Tags Sold**	2,545	2,473	2,329	2,605	2,481	2,284	2,118	2,366	2,460	2,439	2,356	2,087	2,410	2,717	3,238	3,488	4,038
Number of Anglers	1,902	2,859	2,705	2,476	--	1,816	1,579	1,729	1,901	1,910	1,911	1,599	2,082	1,549	1,875	1,644	1,750
Total Days Fished*	5,757	9,172	8,385	7,565	-	4,426	2,748	5,789	4,816	3,671	4,716	2,924	4,838	5,354	4,717	3,282	3,830
Total Hours Fished*	27,433	44,400	42,277	39,800	-	-	-	-	-	-	-	-	-	-	-	-	-
Number Caught	2,451	1,889	2,544	3,357	-	845	2,342	1,851	1,411	1,841	1,637	2,048	1,802	2,456	1,829	1,994	2,543
Number Harvested	868	787	1,028	1,067	634	300	564	575	598	381	292	307	334	350	346	199	305
Catch Rate (fish/day)	0.27	0.12	0.18	0.30	-	0.19	0.44	0.32	0.29	0.40	0.48	0.66	0.61	0.5	0.51	0.58	0.79
Harvest Rate (fish/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28	0.18	0.11	0.19
Percent Released	65%	58%	60%	68%	-	65%	76%	69%	58%	80%	82%	85%	82%	86%	81%	90%	88%
Percent Contacted by FWP Creel Clerk/Mandatory Report						85.71%	62.14%	38.61%	60.00%	78.00%	76.00%	78.80%	83.60%	97.80%	90.60%	95.50%	94.70%

* Includes hours spent catch and release fishing

** Includes lottery allocation tags plus over-the-counter snag and release tags

Phone Creel-Supplemental Questions

In 2012, we asked anglers being phone creeled to answer additional questions relating to a possible lottery tag or mandatory report system being implemented on the Upper Missouri paddlefish season. The same questions were asked again during the 2014 phone survey. Anglers surveyed in 2014 weren't as satisfied (68.7%) with the current paddlefish season structure as they were in 2012 (79.7%). When asked about their recent experience on the river during the paddlefish season, 43.4% (67.2% in 2012) said it was a great experience while 61.4% (55.2% in 2012) said their experience was affected by overcrowding, or the harvest season closed too early.

In 2014, 78.8 % (84.9% in 2012) of the anglers surveyed preferred the option to catch and release paddlefish and 83.9% (81.9% in 2012) said they would support mandatory reporting of harvested fish. When asked if they would be in favor of a lottery type draw for paddlefish 38.1% (33.6% in 2012) said yes. When asked if they would still purchase a license to catch and release if they did not draw a harvest tag, 45.8% (64.2% in 2012) said yes. When anglers were asked to provide additional comments, the most common responses related to: catch and release fishing, season closes too soon, and increasing the harvest cap.

The additional survey questions asked in 2012 and 2014 aided in FWP's decision to change the regulations to a lottery draw for harvest tags (750 allocated) on the Upper Missouri River and mandatory reporting requirements for harvested paddlefish throughout Montana.

In 2017, based on compiled responses from all three angler categories, 82% (85% in 2016) of anglers were satisfied with the lottery draw and mandatory reporting requirements established in 2016. When asked about their overall experience, approximately 62% (60% in 2016) of anglers said they were very satisfied. When asked if they would support a bonus point option if unsuccessful in the lottery, approximately 70% (71% in 2016) said they'd be in favor of such a system. If an angler said they did not participate, they were asked a follow up question as to why they didn't participate. Of the lottery tag holders who did not participate the most common reason (81%) for not participating was "didn't have time/too much going on". Of the unsuccessful draw, catch and release anglers, the most common reason (50%) for not participating was "I did not draw a harvest tag". Of the over the counter catch and release anglers, the most common reason (75%) for not participating was "didn't have time/too much going on". Approximately 39% of participating anglers used a boat to access their snagging areas, and 3 fish (suspected paddlefish) were reported as hit by a boat.

In 2018, only two supplemental questions were asked to anglers: 1) Satisfied with paddle fishing experience 2) Did you use boat to access snagging areas. Overall, 96% of respondents said they

were satisfied with their 2019 paddlefish season and approximately 50% of all respondents claimed they used a boat to access snagging areas.

Harvest and Catch

Anglers were required to provide the following information on their harvested paddlefish: angler harvest tag #, angler name, angler ALS #, harvest date, length (eye to fork), sex, jaw tag present, jaw tag color, and jaw tag #. Though not required, anglers could also provide the weight and piece of the lower jaw for aging purposes. These samples were then sent to the University of Idaho for analysis.

Results

In 2019, a total of 1,004 harvest tags were issued via a lottery draw. Non-resident anglers, representing nine states and two Canadian provinces, comprised 3% of the harvest tag holders (Figure 7). Harvest tag holders represented 155 cities; with Billings (n=141), Great Falls (n=135), Bozeman (n=60), Lewistown (n=59), Helena (n=53) and Missoula (n=36) having the highest representation.

Angler's reported harvesting 244-paddlefish during the 2019 season (Figure 8). Angler success and pressure was highest during the first four weeks of the season. Overall success in 2019 was close to average, high river flows and poor access conditions impacted angler's ability to locate concentrations of paddlefish in 2019. Angler's preferred to report their harvest via the on-site reporting stations located at Kipp and Rock Creek campgrounds, 2019 was the first year anglers could report their harvested fish via the MyFWP portal (Figure 9).

Figure 7. State or country of origin of non-resident anglers who successfully drew a paddlefish harvest tag on the Upper Missouri River in 2019 (n=26).

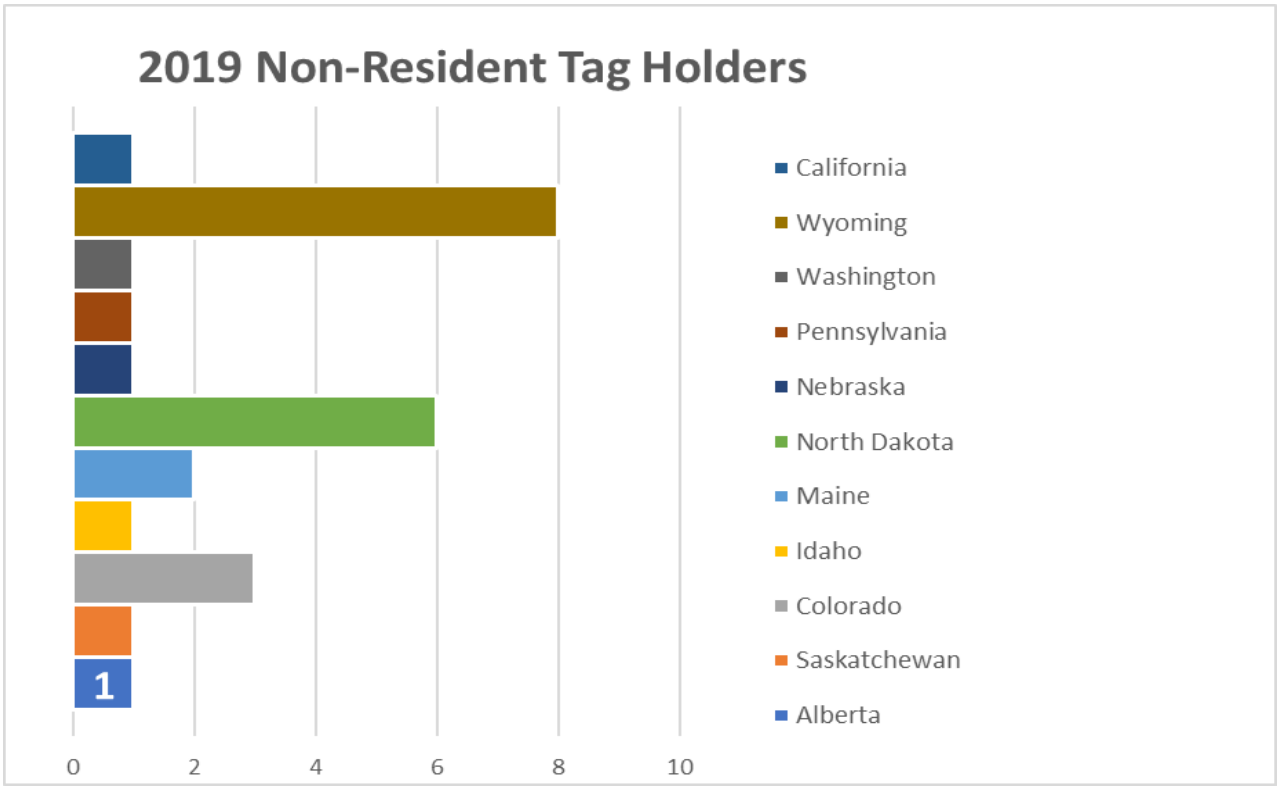


Figure 8. Daily harvest of paddlefish during the Upper Missouri River paddlefish season (May 1-June 15, 2019).

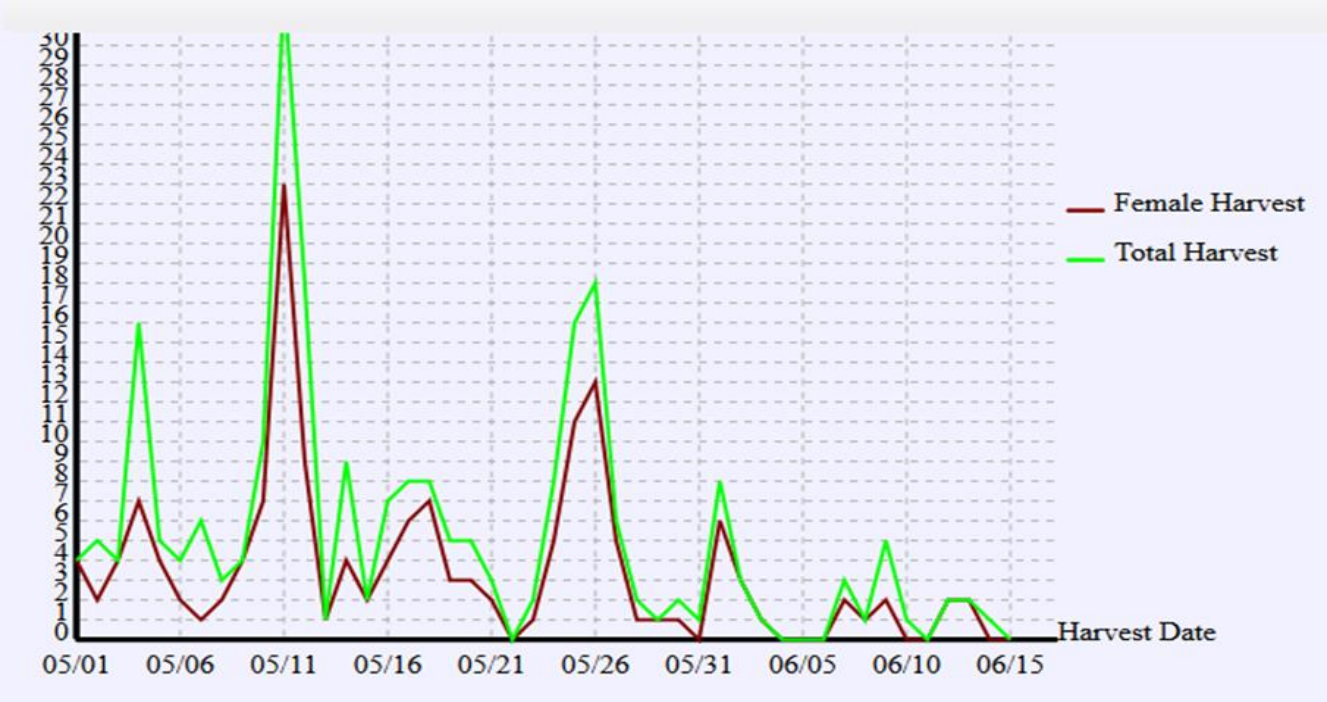
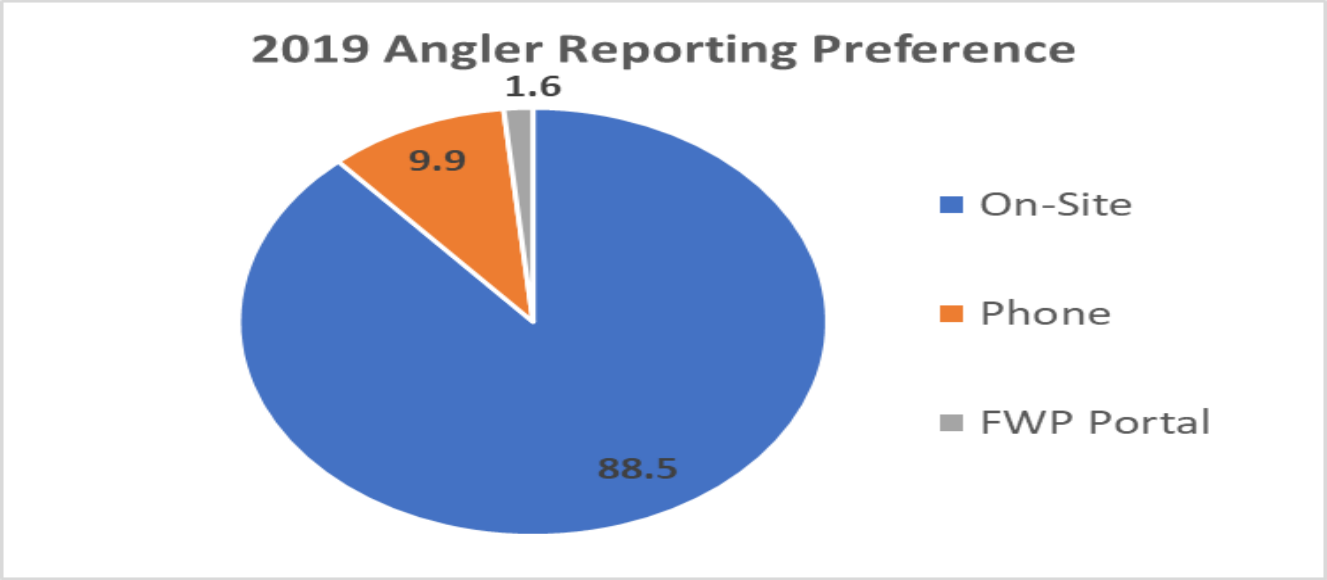


Figure 9. Reporting preference for anglers reporting a harvested paddlefish on the Upper Missouri River in 2019.



Harvest Statistics- Paddlefish

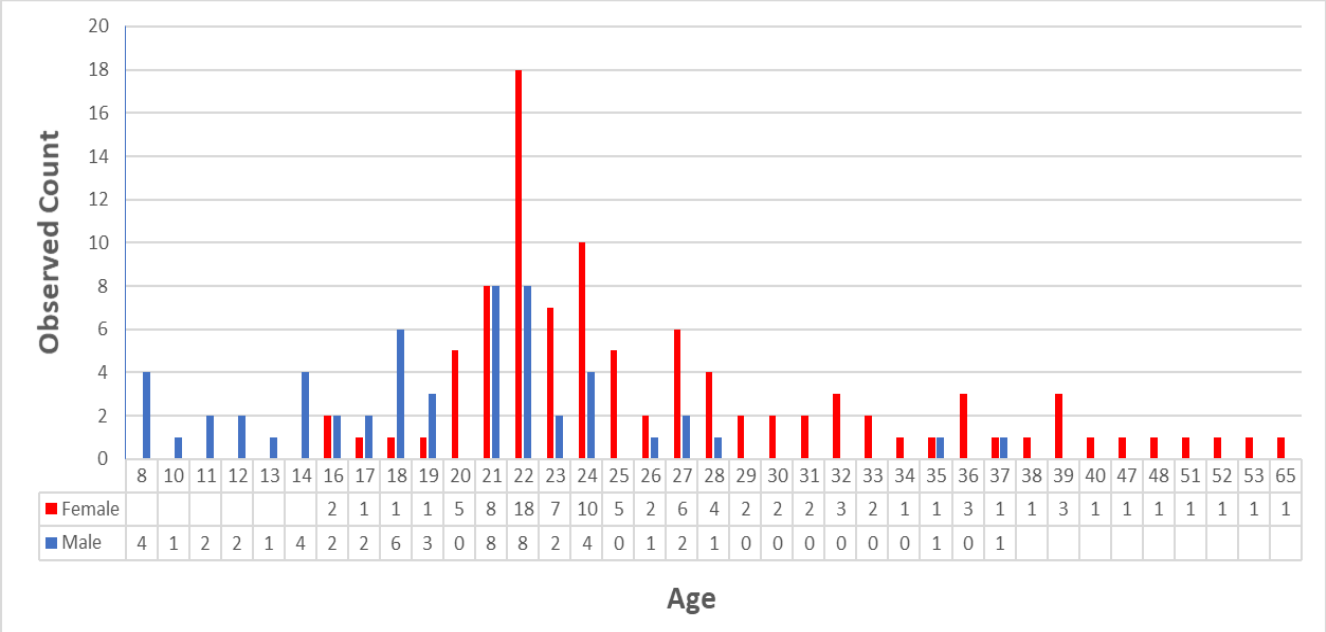
In 2019, anglers mandatorily reported harvesting 244 paddlefish on the Upper Missouri River (Figure 8). Harvested paddlefish ranged in length from 31.0 to 57.0 inches (eye-fork length) and

weight from 16 to 121 pounds (Table 5). Sixty-five percent of the harvested paddlefish were females and 32/244 (13 %) of the harvested paddlefish had jaw tags. Harvested paddlefish ranged in age from 8 to 65 years with 40% of the harvested females (age 25-45) being classified as "prime spawners" and 6.5% of the harvested fish classified as new recruits (Figure 10).

Table 5. – Length, weight, and condition indices of harvested paddlefish from anglers creeled on the Upper Missouri River (RM 1897-1921), May-June 2005-2019.

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	31.5-54.1	44.0	5.9	20.0-131.1	54.7	22.7
PF	2014	203	23.5-56.5	41.8	4.8	21.0-127.0	46.9	20.2
PF	2015	171	30.0-55.4	44.5	6.0	16.0-119.0	55.6	25.1
PF	2016	291	25.0-70.0	43.4	5.9	18.0-119.0	54.2	24.0
PF	2017	300	22.0-57.0	43.3	5.9	16.0-112.0	54.3	23.8
PF	2018	198	27.0-58.1	43.1	5.6	16.0-115.1	53.5	23.7
PF	2019	223	31.0-57.0	44.6	5.6	16.0-121.0	59.3	21.8

Figure 10. Age structure of harvested male (n=55) and female (n=98) paddlefish harvested in the Upper Missouri River (RM 1897-1921) during the 2019 paddlefish season (May and June).



Discussion

Recruitment and growth is highly variable among years for this population (Table 2 and Table 3). Annual Fort Peck Reservoir pool elevations and flows in the Missouri River appear to influence the reproductive success, recruitment, and 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 adult females has decreased (Bowersox 2004). These declines, especially in growth, were believed to be the result of decreased productivity due to the aging of Fort Peck Reservoir (rearing habitats for paddlefish) and extremely low Fort Peck Reservoir levels from 1999-2007 (Figure 2 and Table 1). 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, 2011, 2018 and 2019. In 2011, the spillway located on Fort Peck Dam was running water for the first time since 1997 and the spillway ran once again in 2018 and 2019. Successful paddlefish reproduction has been documented during YOY transects and adult fish captured during spring tagging efforts are in very good condition and new recruits are being observed, based on ageing structures.

Upper Missouri River flows in 2019 were above historical averages from April-late May, suggesting favorable spawning conditions for adult paddlefish. YOY transects suggested decent spawning success when 8 YOY paddlefish were observed during our summer visual counts (Table 2 and Table 3). Drought conditions and altered flow regime from upstream reservoirs in the Upper Missouri River basin have increased the annual variability in pool elevations on Fort Peck. If these conditions persist for an extended period, zooplankton production is reduced and could potentially impact adult condition and recruitment and growth 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 2). Currently, YOY visual counts are the best sampling technique to confirm spawning success and have aided in identifying good year-classes (1997, 1998, 2008, 2011, 2018 and 2019) and year-classes produced under marginal or poor conditions (Table 2 and Table 3).

Anglers can immediately release a snagged paddlefish if they desire. Based on analysis of the fishery and public support, the paddlefish limit was reduced in 2007 from two 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. An annual harvest cap of 500 paddlefish was implemented in 2008, resulting in a shorter season.

In 2015 the FWP Commission passed new regulations on the Upper Missouri River. With the aid of special creel surveys conducted in 2012 and 2014, on-site observations, on-site paddlefish creel survey, as well as face-to-face interactions with anglers during the paddlefish season, FWP concluded a change needed to occur to the season structure of this fishery, and a paddlefish harvest tag was adopted (via a lottery draw). The harvest season was continually becoming shorter, complaints of over-crowding, not having time to attempt to harvest, and the aesthetic atmosphere associated with this season (from an angler's perspective) was reduced. Early observations based on angler responses to our phone creel suggest wide support for these recent changes to the Upper Missouri River paddlefish fishery established in 2016. Since 2016, the average number of annual paddlefish harvest on the Upper Missouri River is 300.

The Upper Missouri River paddlefish population continues to function as a self-sustaining fishery, with no hatchery augmentation ever occurring in this stock. The adult population continues to naturally reproduce and FWP has implemented regulations promoting sustainable harvest is occurring to this population.

Hill County Fishing Waters

Select waters throughout Hill 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 ½" 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 acquired 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, new latrine, concrete boat ramp and pavilion, designated parking areas, fire rings, and signage. The Fresno Chapter of Walleye Unlimited 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, walleye in 1989 and bluegill in 2019. Since 2005, Bailey Reservoir has received alternate year stocking of 10,000 walleye fingerlings and several supplemental plants 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, trap netting and seining occur periodically. In addition, a voluntary creel box was erected in the summer of 2005 and maintained through 2019 to determine angler use, catch rates, and satisfaction. Bailey ranked 25th in the region for angler pressure in 2017/2018 (532 +/- 281 angler days; MTFWP Fisheries Bureau 2018).

From 1990-2002 Bailey Reservoir supported one of the best yellow perch and black crappie fisheries on the Hi-Line (Table 6; Figure 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 are thought to be the most likely explanation for low population densities during that period.

Since 2007, population densities of all species have fluctuated greatly (Table 6). Water levels and spawning conditions have been favorable during this period; however, population densities have remained below long-term averages. Recent seining surveys conducted in 2015, 2016 and 2019 documented successful spawning and rearing conditions exist for all species (Table 7). Due to extensive littoral vegetation, no seining took place in 2017 or 2018. It is unclear why species such as yellow perch, black crappie and northern pike are experiencing population declines and suppression. More research is needed to identify potential bottlenecks and population dynamics at Bailey Reservoir.

Table 6. - 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, 1985-2019.

		Northern pike			Yellow Perch			Black Crappie			Rainbow Trout			Walleye			White Sucker		
Year	Nets	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)	CPUE (#/net)	Len Avg (in.)	Wt Avg (lbs.)
1985	1	17	21.44	1.13	0	--	--	0	--	--	1	12.2	0.9	--	--	--	0	--	--
1990	3	8	18.1	1.23	11.33	7.7	0.26	7	5.7	0.1	0	--	--	--	--	--	0	--	--
1991	2	3.5	24.7	3.21	29	10.1	0.56	2	8.5	0.35	0	--	--	--	--	--	0	--	--
1992	2	3	26.8	4.29	17	8.1	0.29	8	4.7	0.08	0	--	--	--	--	--	0	--	--
1993	2	1	31.8	7.55	10.5	6.6	0.15	63.5	6.7	0.12	0	--	--	--	--	--	0	--	--
1994	2	3.5	20.1	2.59	19	6	0.1	21.5	6.3	0.14	0	--	--	--	--	--	0	--	--
1995										No Netting Conducted									
1996	2	7	23.8	3.54	43	7.2	0.19	7.5	6.8	0.21	0	--	--	--	--	--	0	--	--
1997										No Netting Conducted									
1998	2	1.5	22.2	2.43	66	8	0.26	16	9	0.44	0	--	--	--	--	--	0	--	--
1999										No Netting Conducted									
2000										No Netting Conducted									
2001										No Netting Conducted									
2002	2	0	0	0	16	9.9	0.49	15.5	11.2	0.82	0	--	--	1	25.7	6.79	1	17.9	2.41
2003										No Netting Conducted									
2004										No Netting Conducted									
2005	2	3.5	17.44	1.56	1.5	9.2	0.39	1	4.05	0.03	0	--	--	--	--	--	0	--	--
2006	2	16	17.23	1.2	3.5	7.29	0.28	0	--	--	0	--	--	6.5	9.54	0.31	0	--	--
2007	2	5.5	20.8	2.05	0.5	11.3	0.9	0	--	--	0	--	--	3	12.5	0.65	0	--	--
2008										No Netting Conducted									
2009	2	2	20.6	1.97	1	13	1.38	0	--	--	0	--	--	2	18.2	2.28	1	19	3.07
2010	2	0	--	--	0	--	--	0	--	--	0	--	--	0.5	19	2.22	0	--	--
2011	2	2	19.4	1.67	0.5	7.5	0.22	0	--	--	0	--	--	1.5	20.1	2.84	0	--	--
2012	2	3.5	19.5	1.58	7	7.5	0.26	0	--	--	0	--	--	0.5	22	4.16	0	--	--
2013	2	4	19.25	1.78	24	7.78	0.27	0	--	--	0	--	--	2	15.93	1.88	0	--	--
2014	2	0	--	--	1	9.25	0.42	0.5	6.3	0.16	0	--	--	1.5	12.27	0.67	0	--	--
2015	2	0	--	--	0	--	--	0.5	7.9	0.31	0	--	--	--	0	--	--	0	--	--
2016	2	3	21.15	1.94	5	10.21	0.61	0	--	--	0	--	--	--	1.5	17.47	2.06	0	--	--
2017	2	0	--	--	0	--	--	0	--	--	0	--	--	--	2	19.5	2.78	0	--	--
2018	2	3	19.28	1.71	0	--	--	3.5	10.26	0.7	0	--	--	--	0	--	--	0	--	--
2019	2	1.5	22.3	2.55	0	--	--	0	--	--	0	--	--	--	2	11.63	0.53	0	--	--

Figure 11. Summary of relative abundance for yellow perch, black crappie, northern pike, fathead minnow, walleye, and rainbow trout captured by trap nets in Bailey Reservoir, 1981-2019.

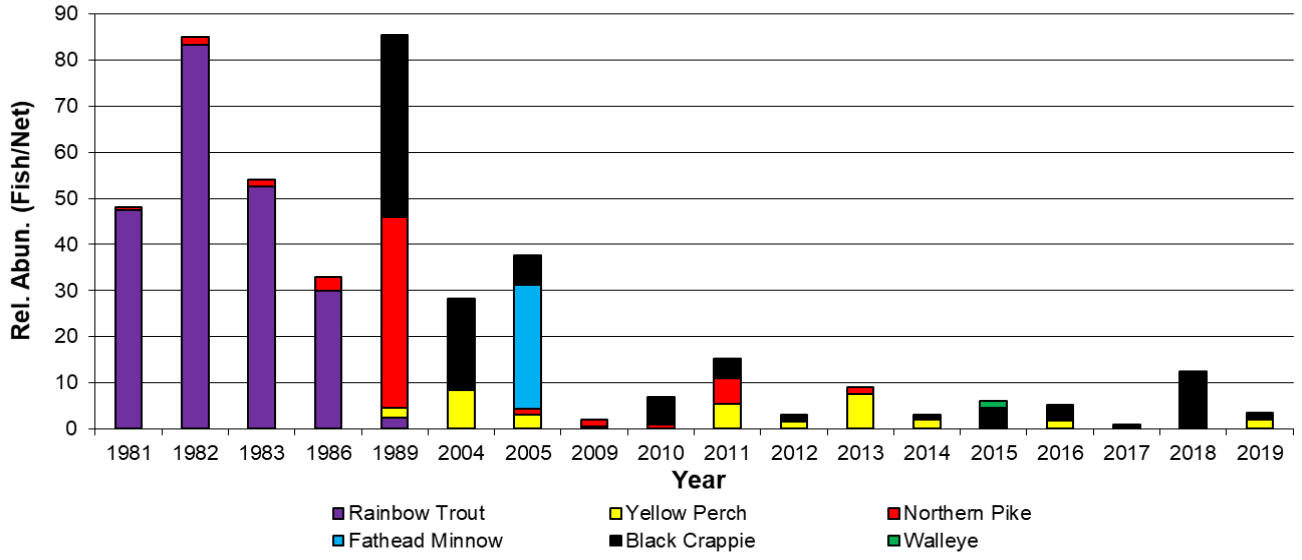


Table 7. Summary of young of year yellow perch (YP), black crappie (BLC), northern pike (NP), fathead minnow (FH MN), largemouth bass (LMB), walleye (WE), and rainbow trout (RB) captured by beach seining in Bailey Reservoir, 1982 to 2019.

Date	Year	Sites	YP (yoy)	YP (adult)	NP (yoy)	NP (adult)	WE (yoy)	WE (adult)	BLC (yoy)	BLC (adult)	RB	LMB	FH MN
9/6/1982	1982	3	--	--	--	--	--	--	--	--	3	--	--
8/6/1986	1986	5	--	--	46		--	--	--	--	66	4	45
8/4/1987	1987	4	--	1	--	44	--	--	76	--	25	--	356
8/11/1988	1988	3	38	--	--	2	--	--	12	2	--	24	24
8/7/1990	1990	4	--	1	1	--	--	--	309	21	--	--	--
9/26/1991	1991	5	68	--	--	--	--	--	--	--	--	9	--
9/10/1993	1993	5	1	70	--	--	--	--	60	--	--	--	--
7/27/1996	1996	4	--	1	1	--	--	--	5	--	--	40	--
7/29/2015	2015	4	809	--	2	1	--	--	39	--	--	--	--
7/26/2016	2016	4	426	3	7	0	3	--	1,322	--	--	--	--
7/31/2019	2019	1	681	1	2	0	0	--	131	--	--	--	--

Beaver Creek Reservoir

Beaver Creek Reservoir, located south of Havre, is a 200-surface-acre reservoir, with a maximum depth of 75 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 11th in the region for angler pressure in 2017/2018 (2,602 +/- 1,017 angler days; MTFWP Fisheries Bureau 2018).

This reservoir was established as a rainbow trout fishery in 1975. However, the illegal introduction of northern pike (1980s) and yellow perch (1980s) resulted in variable rainbow trout stocking success, which continues today. 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.

Population Status of Adult and Young-of-Year Fishes

Water levels in September were down approximately 8 feet during our sampling effort. Gill netting was conducted overnight with three sinking and three floating experimental gill nets. Prior to 1986, adult fish populations were monitored, however sampling was neither uniform, nor consistent enough to develop useful trend data on sport fish population size or composition. 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 pre-determined stations. Beach seining was conducted in early August using a 75'- x 9' x ¼" 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 9). Northern pike abundance varies within Beaver Creek Reservoir due to water operations and variable spring water conditions. Good northern pike reproduction was documented in 2009, 2012, 2014, 2015 and 2017 (Table 8). The current northern pike population is made up of multiple year-classes and the condition of these fish is great, when compared to other northern pike populations in the area.

Yellow perch

Yellow perch were illegally introduced into Beaver Creek Reservoir in 1987. Since their introduction, yellow perch have thrived within the reservoir (Table 9). 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. Recently, yellow perch abundance has trended upward with the highest adult relative abundance recorded in 13 years in 2012 (Table 9). Since 2014, yellow perch relative abundance had been on the decline until 2019, when a strong year-class from 2018 recruited into the adult population (Table 9). The current perch population consists of stock sized fish (5-8 in.; Table 9). Summer seining efforts indicate that yellow perch reproductive success in 2012 and 2013 were the highest recorded in 17 years and successful reproduction was observed again in 2015 and 2018 (Table 8). Severe drought conditions experienced across the region in 2017 increased the water demands from Beaver Creek Reservoir. Through July and August, reservoir pool elevations dropped approximately 15 feet, creating less than ideal rearing conditions and reduced the presence of YOY yellow perch (Table 8). The reduced pool elevations increased yellow perch spawning habitat and contributed to a strong year-class that has recruited into the population.

Walleye

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

Walleye in Beaver Creek Reservoir have slow growth rates, but the population had remained stable over the years (Table 9). A good forage base consisting of yellow perch and high rainbow stocking rates allow the walleye in Beaver Creek Reservoir to achieve memorable and trophy lengths. Since their initial introduction, 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 9). Since 2011, walleye relative abundance has slowly increased to record high abundances observed in 2019 (13.2 walleye/net; Table 9). The average length of walleye sampled in 2019 was 14.68 inches, these fish will continue to grow and contribute to the fishery (Table 9).

Smallmouth bass

Smallmouth bass were first introduced by FWP in 1997 and were stocked annually until 2000. A self-sustaining population of smallmouth bass now exists in Beaver Creek Reservoir. Smallmouth bass have historically had low relative abundance during gill netting surveys due to the selectivity of the gear (Table 9). Catches of 8 to 16-inch bass by anglers are common. Smallmouth bass reproduction is variable due to reservoir pool levels during the spawning and rearing periods (late spring/summer; Table 8).

Table 8. 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 2019.

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
Aug-14	6	392	20	17	6	0	0	0	1	2	8	5	0	0	0
Aug-15	6	1,342	0	4	16	0	0	0	13	0	7	2	1	0	0
Aug-16	6	499	493	0	5	0	0	0	0	0	0	0	10	0	0
Aug-17	6	75	41	1	0	0	0	0	3	0	8	0	1	0	0
Aug-18	6	981	1	31	8	0	0	0	9	0	1	0	1	0	0
Aug-19	6	2	667	0	13	0	0	0	0	0	2	0	1	0	0

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

Table 9. 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, 1974-2019.

			Rainbow Trout			Yellow Perch			Northern Pike			Smallmouth bass			Walleye			Longnose sucker		White sucker	
Date		Nets	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel. Ab (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
Sep-14	2014	6	14.00	12.22	98.22	8.50	8.34	92.12	1.50	25.46	100.97	0.33	13.50	104.83	1.83	15.25	83.76	0.00	--	2.66	16.31
Sep-15	2015	6	11.83	12.78	96.40	12.33	8.79	95.82	2.00	24.95	101.28	0.66	11.75	108.10	4.66	12.72	94.03	0.00	--	1.83	16.84
Sep-16	2016	6	4.33	13.57	95.91	5.00	8.24	98.79	1.16	23.23	95.79	0.83	13.50	103.27	8.33	13.82	89.11	0.00	--	2.50	17.64
Sep-17	2017	4	23.25	9.21	110.26	7.50	7.64	92.54	1.50	24.62	100.71	--	--	--	8.50	14.04	87.75	0.00	--	1.00	16.60
Sep-18	2018	6	0.67	17.45	107.56	4.67	7.87	98.67	1.67	24.65	103.82	0.33	11.50	105.35	8.67	14.01	89.26	0.00	--	1.67	17.64
Sep-19	2019	6	13.17	8.09	106.75	20.67	5.95	94.81	2.17	21.95	103.71	0.17	14.60	99.95	13.17	14.68	85.71	0.00	--	0.67	18.80

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, black crappie, Lake Superior whitefish, emerald shiner and spottail shiners. Fresno ranked 2nd in the region for angler pressure in 2015/2016 (23,033 +/- 4,575 angler days; MTFWP Fisheries Bureau 2016).

The fishery in Fresno has varied over the years 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 127 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 fishes 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. Since 2011, no walleye fingerlings have been stocked due to high adult relative abundance and the need to decrease the current population to more sustainable levels.

To maintain a favorable forage base under high predator densities, FWP conducted nine supplemental pre-spawn adult yellow perch stockings. From 2011-2019, 55,670 pre-spawn adult yellow perch were stocked in Fresno because water levels were forecasted to obtain and surpass full pool elevations, creating optimal spawning conditions. Yellow perch reproduction in 2011 and 2014 were the highest observed in 18 and 25 years respectively (Table 10). Exceptional water conditions and supplemental stocking of pre-spawn adult perch have influenced recent spawning success. From 2005 to 2019, water levels remained high during spring spawning and early summer rearing periods, allowing sport and forage fish populations to obtain densities never documented. The continued production of this fishery is dependent on maintaining water levels that will allow the successful spawning, recruitment, and overwintering of forage and sport fishes.

Since 2017, FWP has partnered with the Fresno Chapter of Walleyes Unlimited to increase yellow perch spawning habitat utilizing recycled Christmas trees. Approximately 400 trees have been donated and used to construct "spawning reefs" at locations in Kremlin and Keihn's Bay, as well as bays near the dam. All structures were placed in 6-12 feet of water and checked to verify use. All reefs had at least one yellow perch egg skein, suggesting yellow perch will utilize these spawning structures when available and conditions are favorable.

Severe drought conditions persisted along the Hi-Line throughout the spring and summer of 2017. The demands for irrigation water were high and Fresno was drawn down approximately 33 feet (13% of storage capacity) by August 11. At that time irrigation practices were ceased, and Fresno was re-filled approximately 15 feet (45% storage capacity) to full-fill over-winter minimum flow requirements and municipal use designations. Based on the statewide creel survey conducted by FWP in 2017/2018, Fresno received an estimated 4,370 +/- 1,979 angler days (MTFWP Fisheries Bureau 2018). This was lowest observed fishing pressure since 2001/2002, the last time Fresno pool elevations were drastically reduced.

Above average snowpack and good water conditions returned in 2018 and 2019, leading to good production and growth for most species in Fresno.

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 75- 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, 2002 and 2017 due to drought conditions, greatly reduced the reproductive success of most fishes (Table 10).

Excellent water conditions had persisted within the reservoir since 2008. From 2008-2016, 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, all benefited from this rise in water levels with excellent reproduction and survival (Table 10).

The number of walleye, black crappie and spottail shiner observed during summer seining in 2018 and 2019 suggest spawning conditions were favorable for both early and late spawning fishes (Table 10). Although not strongly represented during our seining efforts, a strong black crappie year-class was also produced in 2018, based on fall gill net surveys (Figure 19). Overall, production of key forage fishes was strong in 2018 and 2019. The percentage of empty walleye stomachs in 2018 was the lowest observed since FWP started checking stomach contents in 2012 (Figure 12). This percentage stayed low once again in 2019.

Table 10. – A summary of forage fish and young-of-year forage and sport fish collected using a 75- x 9-foot x ¼ inch square mesh beach seine in Fresno Reservoir, 1998-2019.

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]
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
2014	12	--	47	0	4	6,834[-]	27	0	575	3,011	0	1	0
2015	12	--	12	1	3	926[-]	88	634	332	1,337	0	5	0
2016	12	--	21	0	1	399[-]	5	263	357	641	0	6	0
2017	12	--	16	0	1	115[-]	2	3	88	207	0	15	0
2018	12	--	30	0	4	377[-]	1	0	136	957	1	0	0
2019	12	--	43	0	1	782[-]	2	0	1,214	1,066	0	14	0

[1]Consists of white and longnose sucker

[2]Consists of western silvery minnows, lake chubs, flathead chubs, and fathead minnows

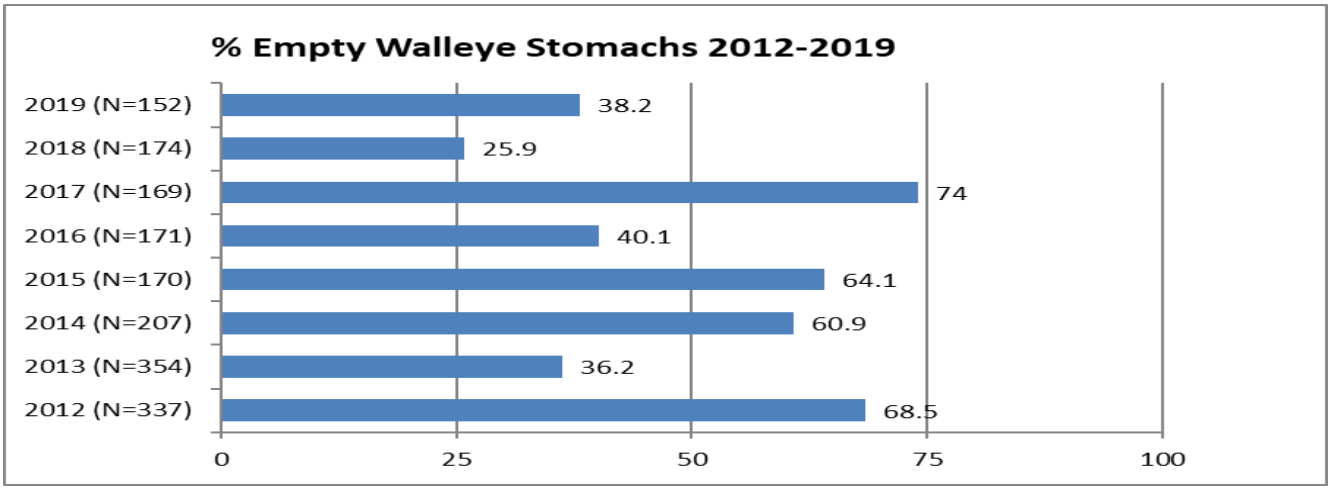
[3]Consists of burbot, smallmouth bass, pumpkinseed sunfish, and brook sticklebacks

[+] Years in which walleye fry or fingerling were stocked

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

* Primarily Sauger

Figure 12. – Percentage of empty walleye stomachs observed during fall netting surveys in Fresno Reservoir, 2012-2019 (N= number of individual stomachs checked).



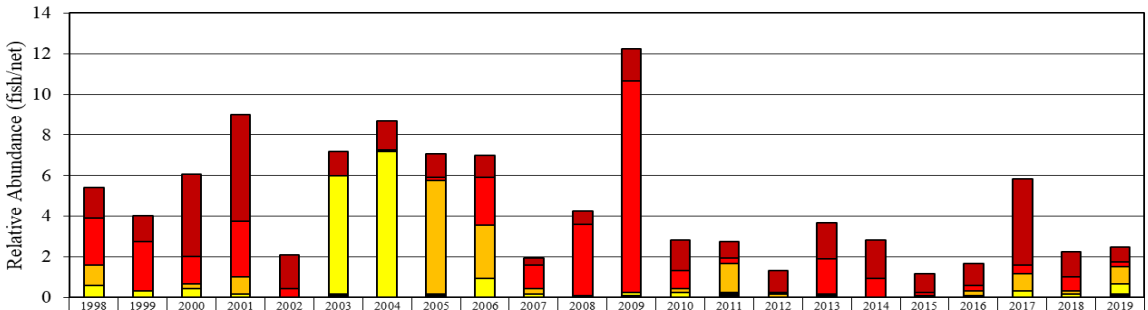
Population Status of Adult Fishes

Adult fish populations were monitored from 1965 to 1974 using systematic gillnetting 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). Prior to 2005, scales were collected from all walleye and sauger for aging purposes. From 2005 to 2019, otoliths were collected from walleye for aging and oxytetracycline (OTC) analysis.

Lake Superior Whitefish

Lake Superior whitefish (whitefish) in Fresno Reservoir have historically comprised a portion of the gill net catch but are rarely targeted by anglers (Figure 13). 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 13. - Relative abundance and size structure of lake whitefish collected with sinking experimental gill nets in Fresno Reservoir, 1998-2019.



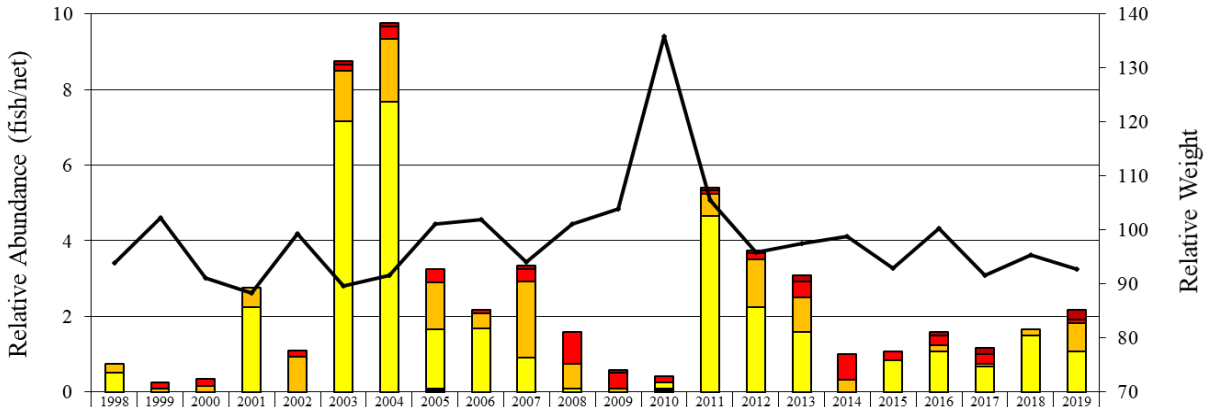
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>18.0 in.)	1.50	1.25	4.08	5.25	1.67	1.17	1.42	1.17	1.08	0.333	0.66	1.583	1.5	0.833	1.083	1.75	1.92	0.917	1.08	4.25	1.25	0.75
Preferred (14.0-17.9 in.)	2.33	2.42	1.33	2.75	0.42	0.00	0.00	0.17	2.33	1.17	3.5	10.42	0.917	0.25	0.083	1.75	0.92	0.167	0.25	0.42	0.67	0.25
Quality (11.0-13.9 in.)	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	0	0	0.25	0.83	0.167	0.83
Stock (6.0-10.9 in.)	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	0	0.083	0.083	0.33	0.167	0.5
Sub Stock (<6.0 in.)	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	0	0	0	0	0	0.167

Yellow Perch

The yellow perch population 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 10) and population levels were reduced (Figure 14). 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 transferred from Lake Mary Ronan. In 2003 and 2004, water levels increased, flooding shoreline vegetation, and successful spawning and recruitment of forage fish was documented (Table 10). From 2011-2019, 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 densities) limited the number of YOY yellow perch that recruit into the population, regardless of spawning conditions and reproductive 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 14). 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, nine good water years (2008-2016) created better overwinter water conditions (average reservoir elevations from October-March were approximately 10 feet higher than average), inundating littoral habitats and creating refuge areas for YOY yellow perch to successfully recruit into the population (Figure 14). The current yellow perch population closely mimics historical population densities and is comprised of multiple age classes (Figure 14).

Figure 14. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Fresno Reservoir, 1998-2019.



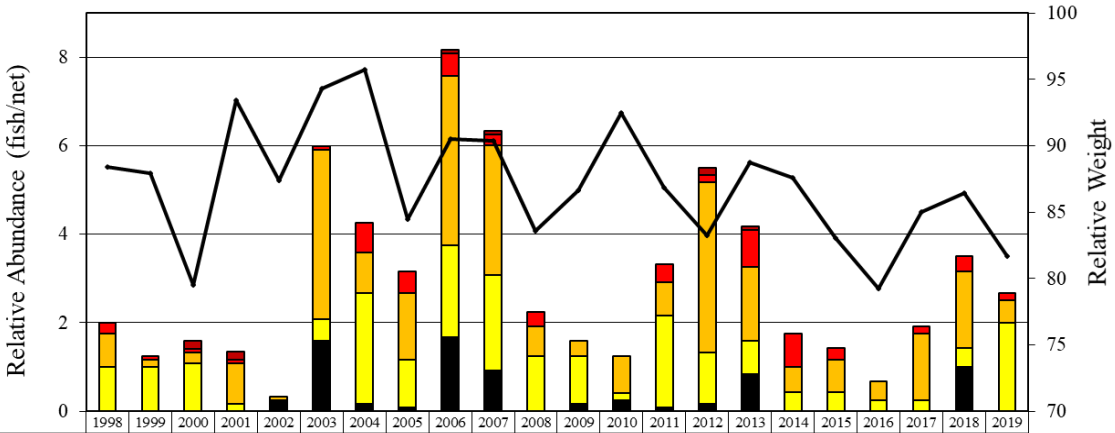
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>12 in.)	0	0	0	0	0	0.08	0.08	0	0	0.0833	0	0.0833	0	0.083	0.083	0.166	0	0	0.083	0.17	0	0.25
Preferred (10-11.9 in.)	0	0.17	0.17	0	0.17	0.17	0.33	0.33	0.08	0.333	0.833	0.4166	0.167	0.083	0.166	0.4166	0.67	0.25	0.25	0.25	0	0.083
Quality (8-9.9 in.)	0.25	0.08	0.17	0.5	0.92	1.33	1.67	1.25	0.42	2	0.6667	0.083	0	0.583	1.25	0.92	0.33	0	0.167	0.08	0.167	0.75
Stock (5-7.9 in.)	0.5	0	0	2.25	0	7.17	7.67	1.58	1.67	0.9167	0.08	0	0.167	4.66	2.25	1.58	0	0.833	1.08	0.67	1.5	1.08
Sub Stock (<5 in.)	0	0	0	0	0	0	0	0.08	0	0	0	0	0.083	0	0	0	0	0	0	0	0	0
Relative weight	93.84	102.26	91.068	88.25	99.305	89.661	91.6	101.12	102.00	94.1	101.1	103.96	135.82	105.61	95.91	97.48	98.74	92.96	100.32	91.6	95.35	92.68

Northern pike

Since the illegal introduction of northern pike in Fresno Reservoir during the 1940s, their population has fluctuated over the years (Figure 15). 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. Good northern pike reproduction resulted in an increased relative abundance of adults following the record water year in 2011 (Figure 15). Northern pike relative abundance and weight dropped below the long-term average in 2014 and continued to

decrease until 2017. Since 2017, northern pike relative abundance and condition (relative weight) have been increasing, the current population is comprised of multiple length and age classes (Figure 15).

Figure 15. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental gill nets in Fresno Reservoir, 1998-2019.



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>34 in.)	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	0	0	0	0	0	0
Preferred (28-33.9 in.)	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	0.75	0.25	0	0.17	0.333	0.167
Quality (21-27.9 in.)	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	0.58	0.75	0.417	1.5	1.75	0.5
Stock (14-20.9 in.)	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	0.42	0.42	0.25	0.25	0.417	2
Sub Stock (<14 in.)	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	0	0	0	0	1	0
Relative weight	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	87.58	83.04	79.26	85.02	86.44	81.68

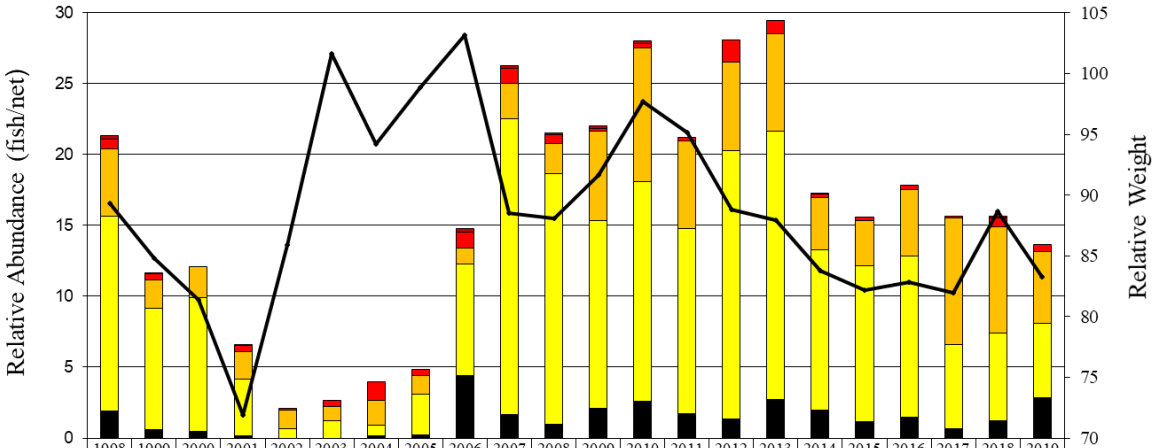
Walleye

From 2003 to 2011 approximately 100,000 fingerling walleye were stocked annually in Fresno Reservoir. Since 1998, seven of the eight highest walleye relative abundances were documented from 2007-2013 (Figure 16). It is evident that stocking walleye fingerlings at a rate of 100,000/year was very successful and based on Oxytetracycline analysis these fish recruited and contributed to the adult population (Figure 17). However, this stocking rate led to concerns of the sustainability and balance with the forage base. A decrease in abundance was observed in 2011 due to increased entrainment of adult walleye over the Fresno spillway, caused by near record spring run-off and precipitation (Figure 16). The walleye population was quickly replenished by 2013, when fall gill net surveys documented the highest walleye relative abundance ever recorded (29.5 walleye/net; Figure 16).

No walleye fingerlings have been stocked the last eight years, to decrease adult walleye abundances to a more sustainable level. Summer seining surveys continue to document successful reproduction of walleye, and the population is showing signs of continued growth and stabilization, regardless of increased fishing pressure and harvest. Sampling efforts conducted in 2019 documented walleye relative abundance at 13.7 walleye/net, current densities are slightly below the long-term average of 15.0 walleye/net with a diverse age and size structure (Figures 16 and 18).

The high abundances observed from 2007-2013 coincided with the best water and forage conditions observed since Fresno Dam was built. Our data suggests adult walleye abundances have dropped and stabilized since the record number recorded in 2013 and subsequent ceasing of annual walleye stocking. Continued declines in walleye relative weights was observed from 2011-2017 (Figure 16). Walleye growth was close to average in 2019 for younger walleye, growth was slightly less for older aged fish. (Figure 19).

Figure 16. - Relative abundance, size structure, and relative weight of walleye in Fresno Reservoir for the years 1998-2019.



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>25 in.)	0.25	0.08	0	0.08	0	0	0	0	0.25	0.17	0.08	0.166	0.166	0	0	0	0.08	0	0	0	0.17	0
Preferred (20-24.9 in.)	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	0.25	0.25	0.33	0.17	0.58	0.5
Quality (15-19.9 in.)	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	3.67	3.17	4.67	8.92	7.5	5.08
Stock (10-14.9 in.)	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	11.3	11	11.33	5.92	6.17	5.25
Sub-stock (<10 in.)	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	2	1.17	1.5	0.67	1.25	2.83
Relative weight	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	83.77	82.19	82.8	81.92	88.65	83.27

Figure 17. Observed percentage of walleye marked (POS) and not marked (NEG) with oxytetracycline (OTC) in Fresno Reservoir, 2007-2012. A positive mark indicates the fish was stocked.

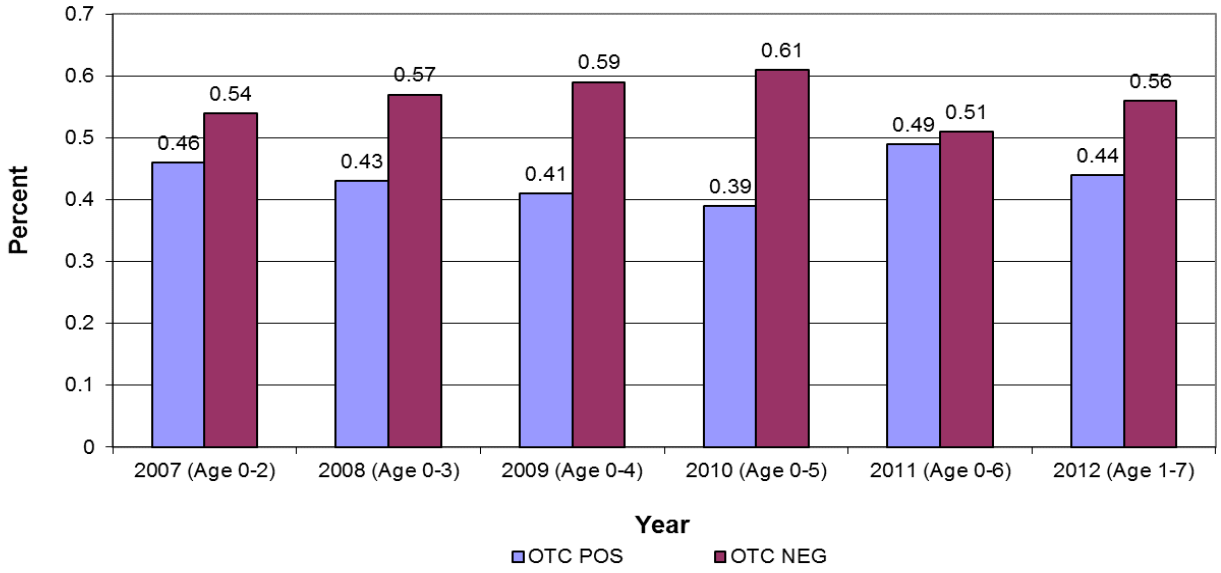


Figure 18. Observed walleye age structure and distribution in Fresno Reservoir, 2019.

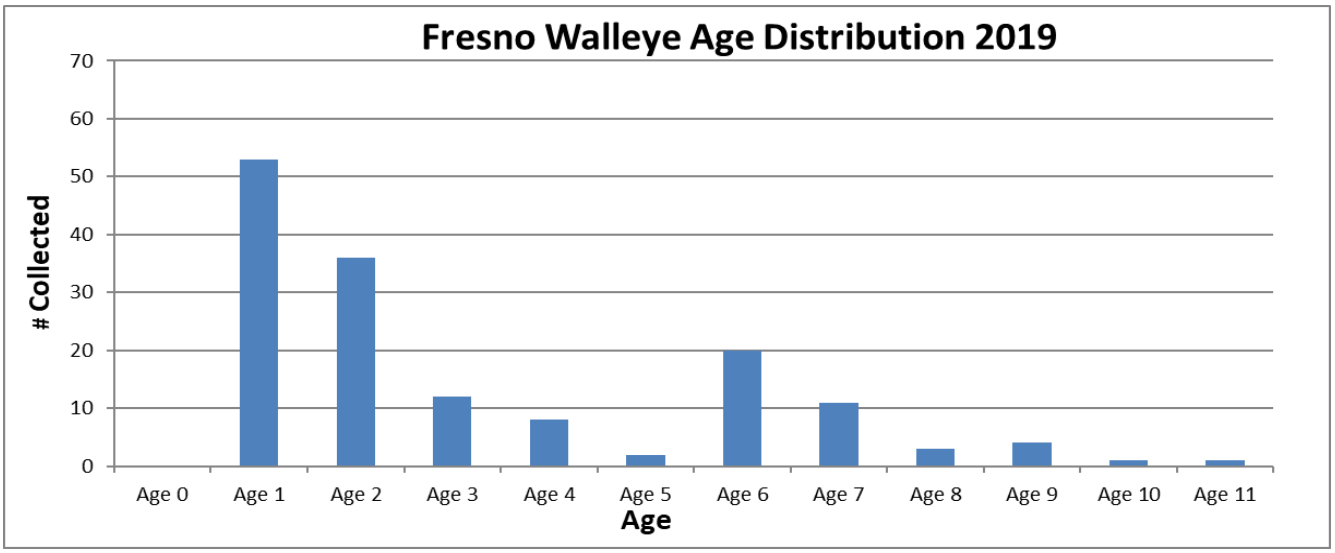
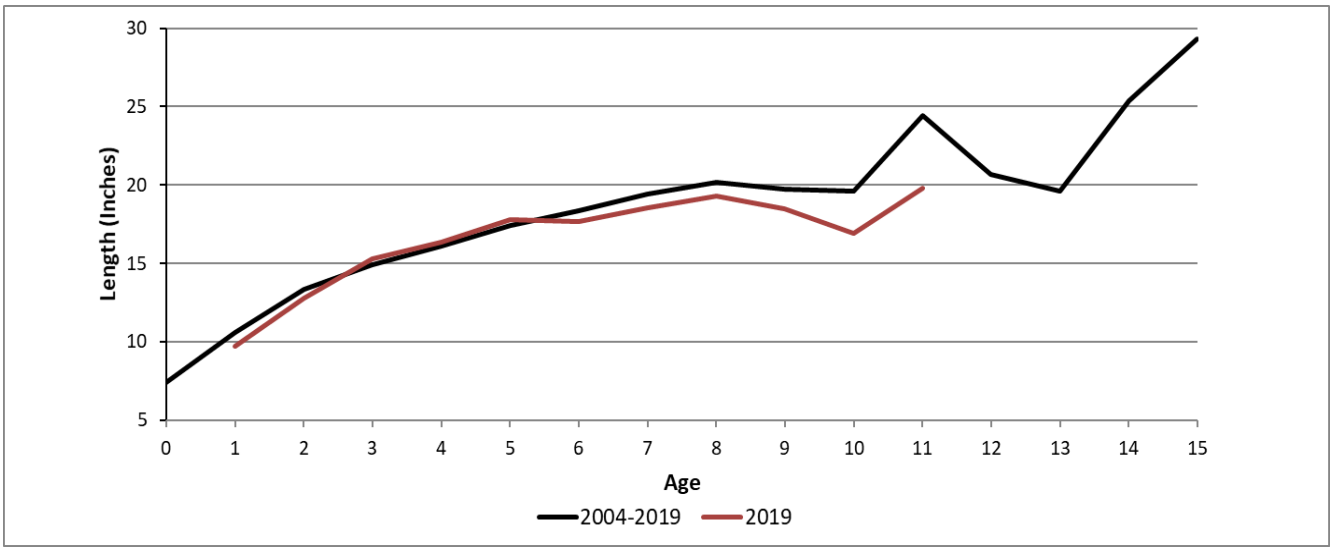


Figure 19. Walleye length at age in Fresno Reservoir, 2004-2019.

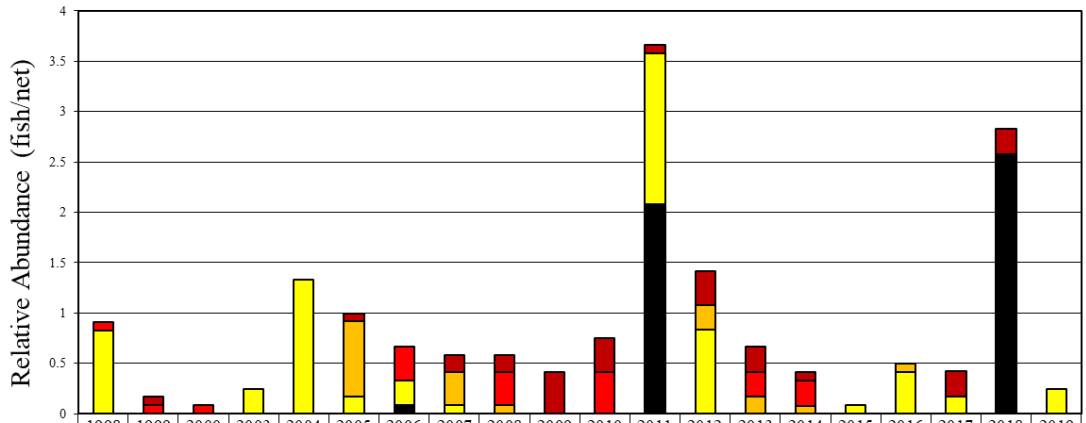


Black Crappie

Black crappie were most likely introduced into Fresno in the 1950s however the first record of stocking by FWP occurred in 1991. In 2010, YOY black crappie abundance was the highest observed since 1974 and good reproduction occurred again in 2011, 2014, 2018 and 2019 (Table 10; Figure 19). The recent spawning success of black crappie is attributed to timely spring rains and good reservoir pool levels during the spawning period (June), with water levels rising or remaining stable during this period. Although several good year-classes of black crappie have been observed since 2008, recruitment to the adult population has been variable (Figure 19). Rapid reductions to Fresno's pool elevations in 2017 impacted black crappie spawning conditions and likely increased entrainment of the few YOY black crappie produced (Table 10).

The adult population of black crappie in Fresno Reservoir was at record highs in 2011 and slowly declined through 2017 (Figure 19). A very good year-class was produced in 2018 and should help re-establish the adult populations size structure (Figure 19).

Figure 20. - Relative abundance and size structure of black crappie collected with sinking experimental gill nets in Fresno Reservoir, 1998-2019.



	1998	1999	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>12.0 in.)	0	0.083	0	0	0	0.083	0	0.166	0.166	0.416	0.333	0.083	0.333	0.25	0.08	0	0	0.25	0.25	0
Preferred (10.0-11.9 in.)	0.083	0.083	0.083	0	0	0	0.333	0	0.333	0	0.417	0	0	0.25	0.25	0	0	0	0	0
Quality (8.0-9.9 in.)	0	0	0	0	0	0.75	0	0.333	0.083	0	0	0	0.25	0.166	0.08	0	0.083	0	0	0
Stock (5.0-7.9 in.)	0.83	0	0	0.25	1.33	0.166	0.25	0.083	0	0	0	1.5	0.833	0	0	0.083	0.417	0.17	0	0.25
Sub Stock (<5.0 in.)	0	0	0	0	0	0	0.083	0	0	0	0	2.08	0	0	0	0	0	0	2.58	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 ½" 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 to establish a forage base within the reservoir. In 2014, walleye fingerlings were stocked, and the reservoir now receives alternate year plants of 5,000 walleye fingerlings. Since 2015, 5,000 fingerling Gerrard rainbow trout have been stocked annually in the fall. A supplemental plant of 1,100 adult black crappie occurred in 2018 to aid in the establishment of black crappie.

Gill net surveys suggest a slow establishment of adult yellow perch and black crappie since their initial introduction in 2011 (Figure 20). Though yellow perch growth has been slow, trap net surveys suggest good reproduction occurs annually (Table 11). Walleye stocking has been successful, with age-2 walleye obtaining 13+ inches and are likely utilizing the abundant yellow perch population as its primary forage (Figure 20; Table 11). Rainbow trout (Gerrard) stocking has also been very

successful and these fish have exhibited good growth rates, rainbow trout from the initial plant in 2015 are exceeding 20 inches in total length (Figure 20; Table 11).

Figure 20. Relative abundance of yellow perch, walleye, black crappie and rainbow trout collected using two sinking gill nets in Anita Reservoir 2013-2019.

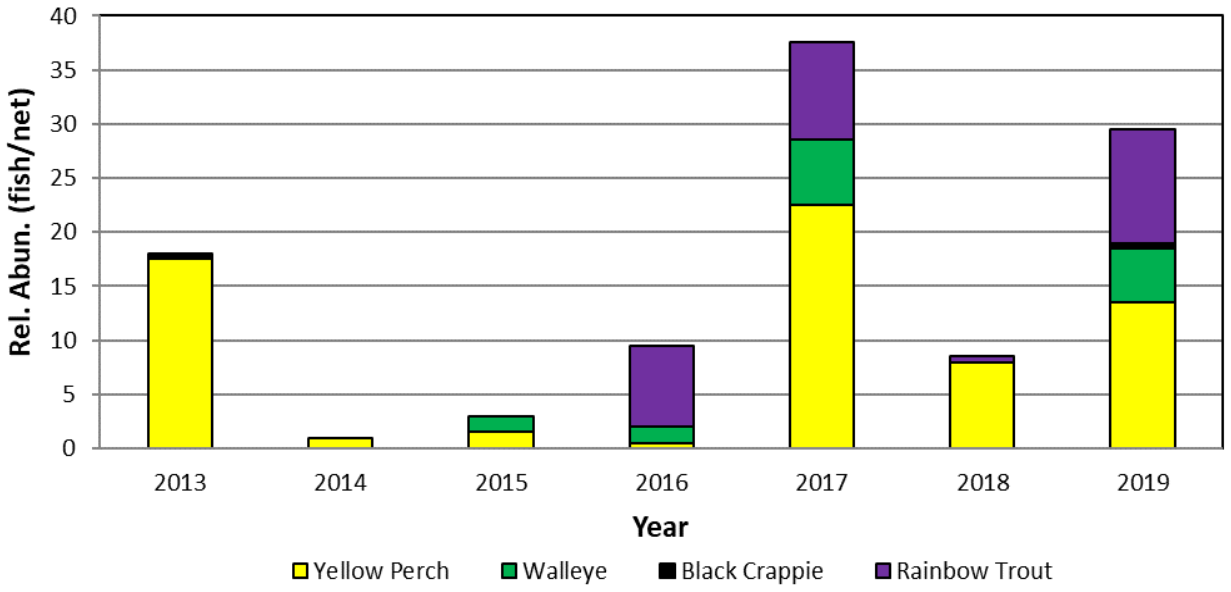


Table 11. Relative abundance (fish/net) and average length of yellow perch, walleye, black crappie, fathead minnow, brook stickleback and rainbow trout using trap nets in Anita Reservoir (2013-2019).

			Yellow Perch		Walleye		Black Crappie		Fathead Minnow	Brook Stickleback	Rainbow Trout	
Year		Net #	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Abun.	Rel. Abun.	Rel. Abun.	Avg. Length
Jun-13	2013	2	47	3	--	--	--	--	1,149	24.5	--	--
Jun-14	2014	2	19.5	4.41	--	--	--	--	367	11	--	--
Jun-15	2015	2	8	4.60	0.5	7.50	--	--	2.5	1.5	--	--
Jun-16	2016	2	101.5	4.10	0.5	13.00	--	--	65	--	0.50	11.6
Jun-17	2017	2	93.5	4.33	2	12.63	--	--	0.5	--	0.50	10.3
Jun-18	2018	2	35.5	2.75	0.5	19.6	--	--	70.5	--	0.50	21.6
Jul-19	2019	2	5	4.67	1.5	7.57	0.50	10.8	--	--	0.00	--

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 and is comprised of walleye, channel catfish, black crappie, tiger muskie, and yellow perch (illegally introduced in 2001). Currently, Cow Creek Reservoir receives 3,000 walleye fingerlings biennially. Channel catfish, yellow perch and tiger muskie are stocked as needed. Cow Creek Reservoir ranked 22nd in the region for angler pressure in 2017/2018 (592 +/- 360 angler days; MTFWP Fisheries Bureau 2018).

In 2010, 12,000 pre-spawn yellow perch were transferred and stocked into Cow Creek Reservoir from the Kremlin Water Ponds, additional plants of adult perch occurred in 2013 (n=3,000) and 2018 (n=4,150). In 2019, 20,000 fingerling yellow perch were stocked, these fish were raised by the Miles City Hatchery. Furthermore, 400 5-inch tiger muskie were stocked in 2015 and an additional 1,000 4-inch tiger muskie were stocked in 2019. The primary food sources for these sport fish are white suckers, fathead minnows, yellow perch, and northern red belly dace. In 2017, four artificial habitat structures were placed near the boat ramp to increase off-shore habitat and potentially increase yellow perch spawning and rearing habitat.

In 2019, water levels remained stable. Gill net surveys suggest yellow perch relative abundance has remained stable and is comprised of larger fish (Table 12). Channel catfish and walleye relative abundance decreased, when compared to historic trends. Walleye average length also decreased slightly (Table 12).

Table 12. Relative abundance (fish/net) and average length of yellow perch, channel catfish, white sucker, walleye, and tiger muskie using gill nets in Cow Creek Reservoir (1994-2019).

			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
Jun-14	2014	2.0	1.0	9.3	3.5	18.1	116.1	17.0	13.5	3.5	13.1	86.0	0.0	0.0
Jun-15	2015	2.0	0.0	0.0	0.0	0.0	0.0	0.5	15.7	2.5	11.3	0.0	0.5	36.5
Jun-16	2016	2.0	0.5	10.5	2.0	20.4	116.2	30.0	13.7	12.5	12.4	87.1	0.0	0.0
Jun-17	2017	2.0	1.0	10.3	5.0	23.3	114.2	16.5	12.8	11.5	13.5	90.3	0.5	14.7
Jun-18	2018	2.0	3.5	10.2	0.5	22.9	112.1	13.0	14.6	7.0	13.7	85.7	0.5	40.0
Jul-19	2019	2.0	3.5	10.6	0.5	27.1	118.2	5.0	13.8	6.5	11.4	92.0	0.0	0.0

Dry Fork Reservoir

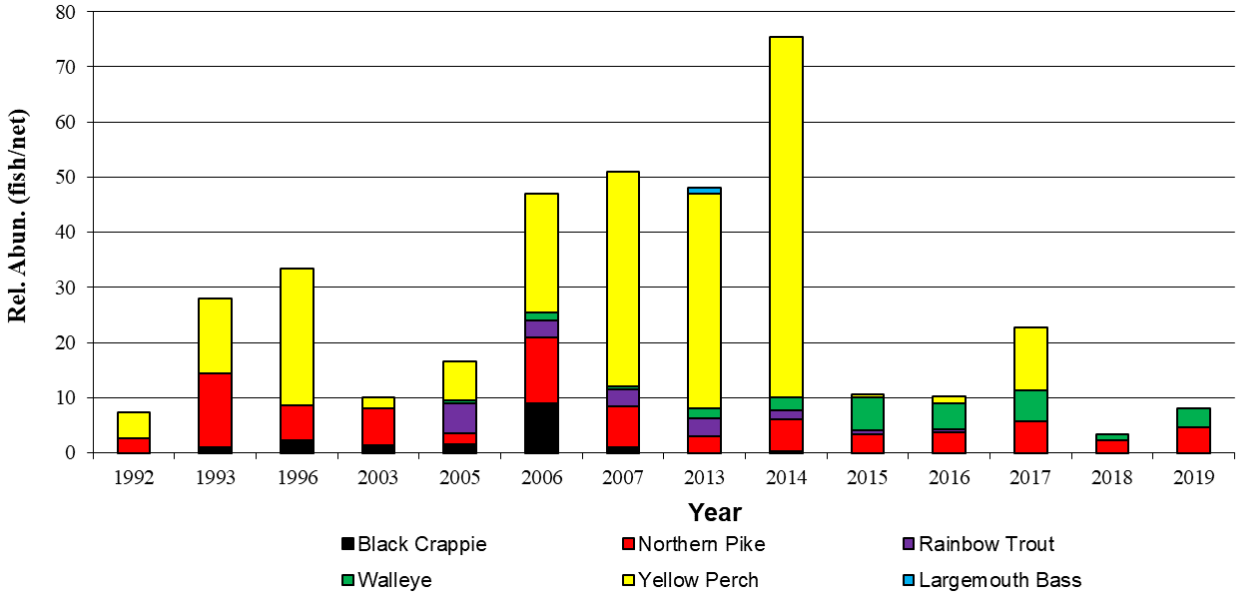
Dry Fork Reservoir is a 300 surface-acre reservoir located seven miles north of Chinook. Historically, Dry Fork has been a popular yellow perch and northern pike fishery, which has been limited by drought and subsequent water demands (irrigation) that severely reduce water levels and have dewatered this reservoir twice (2001 and 2008).

In 2011, high spring runoff and rain events re-filled 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 established via entrainment from up-stream impoundments. Walleye fingerlings have been stocked since 2012 at a rate of 10,000/biennially. In 2013, FWP continued to trap and transport adult northern pike (n=33) and the reservoir received 4,000 catchable rainbow trout. Dry Fork continues to receive supplemental rainbow trout stocking and an additional 1,052 adult black crappie were trap and transferred to Dry Fork in 2018 to help boost the population. In 2017/2018 this reservoir received 489 (± 489) angler days which ranked 26th in regional use (MTFWP Fisheries Bureau 2018).

Water levels had dropped approximately ten feet since the reservoir re-filled in 2011. However, good snowpack and run-off in early 2018 re-filled Dry Fork to capacity. Gill net surveys suggests relative abundances for all species have remained low following the initial re-fill of this reservoir (Figure 21).

Figure 21. Relative abundance of yellow perch, northern pike, black crappie, rainbow trout, largemouth bass, and walleye in Dry Fork Reservoir (periodic sampling 1992 to 2019).



Lyons Reservoir

Lyons reservoir is a privately-owned reservoir and was managed by MFWP from 1969-2005. During that time FWP attempted to establish several gamefish to increase angler opportunity. Species stocked included the following: walleye, smallmouth bass, largemouth bass, crappie, rainbow trout and northern pike. The reservoir was closed in 2005 to public fishing due to disrespect of the land and the landowner by the public.

Lyon's Reservoir is located near the headwaters of Snake Creek. Snake Creek is one of a handful of prairie streams that still contains a viable population of pearl dace (Stringer 2018). In 2019, FWP was granted access by the landowners to evaluate the current fish population, more specifically to gauge the risk of potential entrainment and impacts of northern pike to downstream pearl dace populations. Two gill and three trap nets were set overnight, the gill nets captured 29 northern pike and the trap nets captured four northern pike. No other species of fish were observed in either gear type and northern pike stomachs analyzed contained mostly invertebrates and leeches, suggesting northern pike abundances have impacted the overall fish assemblage within the reservoir.

Prairie Stream Sampling- Fort Belknap Streams

In late May 2019, FWP partnered with Fort Belknap Agency Fish and Wildlife staff to conduct prairie stream sampling on several streams located within the Fort Belknap Reservation. The primary objective of this assessment was to identify the presence of pearl dace populations within Fort Belknap. Secondary objectives were to document species composition, presence/absence of northern pike and general fish distribution/abundance.

Historically, only three documented stream sampling events were identified within Fort Belknap. Two sampling events occurred in 1979 on Lodgepole and Little Peoples Creeks, identifying the presence of brook trout, white sucker and longnose dace in both streams. Additionally, Lake chub, northern redbelly dace and mountain sucker were observed in Lodgepole Creek. People's Creek (near Boxelder Coulee) was sampled in 2000 and black bullhead and northern pike were observed.

Surveys conducted in 2019 occurred on Fifteen-Mile Creek, Little Peoples Cree, Lodgepole Creek, Peoples Creek, South Fork Peoples Creek, Three-Mile Creek and White Bear Creek (Figure 22). Sample sites were identified based on proximity to access roads. The number of hauls varied among sites and was based on the number of species observed and sampling efficiency, total haul length ranged from 30-100 feet (Table 13). A 25-foot x 6-foot x 1/8-inch mesh drag seine was pulled through the pools and beached on a low gradient shoreline. Fish were sorted by species and were either counted or categorized into the following: abundant (> 50 individuals), common (10-50 individuals) or rare (< 5 individuals; Table 14).

Fifteen-Mile Creek

This site was surrounded by native prairie and consisted of three separate pools that contained vegetation, rock and silt/muck. Fathead minnow was the only species observed but densities were high (Table 14).

Little Peoples Creek

This site was surrounded by native prairie and consisted of mixed rock/cobble and silt/muck. White sucker and lake chub were common, longnose dace (n=2) and one adult northern pike (20") were also observed (Table 14). Several large rocks made sampling efficiency difficult at this site.

Lodgepole Creek

This site was located approximately 0.5 miles south of Three Buttes Road and was surrounded by native prairie and cultivated crop lands. The stream was clear, with 100% visibility and we observed the presence of a brown moss that coated all the rock/cobble and bottom of the stream in this location. No sampling occurred at this site, but we did walk approximately 0.25 miles of the stream to determine the presence (visually) of any fish species. We did observed six northern pike (4-6") but no other species were visually observed (Table 14). Additional water quality work should be conducted to determine the source of the moss we observed, this wasn't observed at any other site we visited. Water temps were higher at this site when compared to other sites within close proximity (Table 14).

Peoples Creek

This site was surrounded by native prairie and consisted of cobble, gravels and fine sand. The stream at this site was moving fast through a series of riffles and runs. White sucker, fathead minnow and lake chub were common, we also captured five crayfish at this site (Table 14).

South Fork Peoples Creek

This site was located immediately upstream of Highway 129 East and was surrounded by native prairie and consisted of cobble, gravel and sand. White sucker, lake chub and longnose dace were common at this site, we also observed five crayfish (Table 14).

Three-Mile Creek
This site was located just upstream of Snake Butte Road and is surrounded by native prairie. This site was heavily vegetated, and the pools contained a mix of rush and cattails, the bottom was mud/muck and water clarity was poor. Fathead minnow, brassy minnow, white sucker and lake chub were observed this site (Table 14).

White Bear Creek
Two sites were sampled on this stream. The first site was located just upstream of the US Highway 66 crossing and the second site was just below the diversion dam on US Highway 2. Site one consisted of a series of several large deep pools containing rock, cobble, gravel, sand and silt. White sucker, lake chub and fathead minnow were common. Northern redbelly dace (n=3) and Iowa darter (n=1) were also observed (Table 14). Northern redbelly dace and Iowa darter are classified as native fish and are also species of concern in Montana due to declining abundances, distribution and habitat. The presence of these two species in White Bear Creek suggest good habitat and water quality persist in this stream. Furthermore, additional sampling should occur in this stream to better understand the species composition and presence of pearl dace.

Site two consisted of larger rock with muck and vegetation. Due to the location of this site being directly below a dam it's assumed flows are highly variable based on water demands and rain events, at the time of sampling flows were low. White sucker and fathead minnow were common at this site and we also observed golden shiner (n=10), black bullhead (n=5), bluegill (n=1), yellow perch (n=10), lake chub (n=5), Iowa darter (n=1) and brassy minnow (n=10; Table 14). This site was approximately two stream miles from the confluence with the Milk River, which likely explains the increased diversity of species here.

Figure 22. Locations of sampling sites within Fort Belknap boundaries, May 2019.

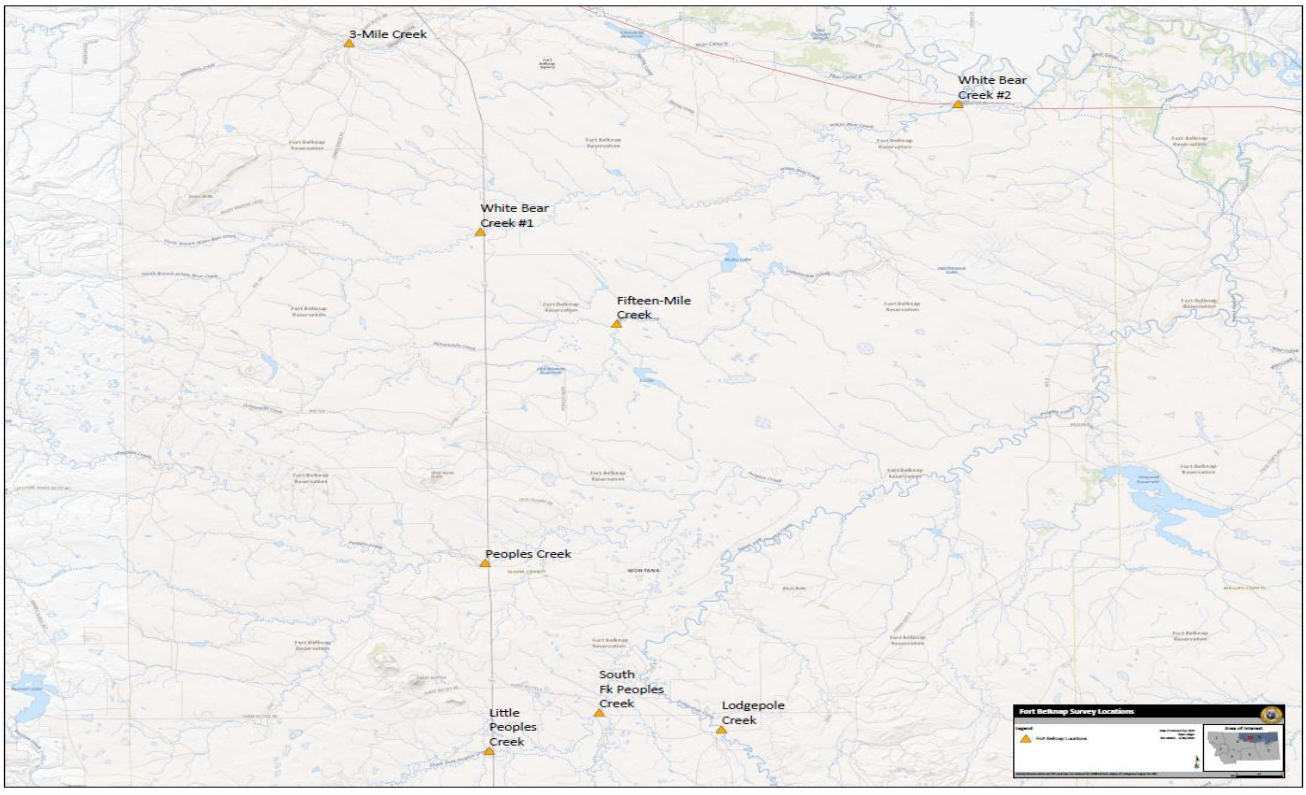


Table 13. Parameters of eight sampling sites within Fort Belknap boundaries, May 2019.

Sampling Site	Haul Length (ft)	River Mile	Latitude	Longitude	Township	Range	Section
Three-Mile Creek	100	19.5	48.4367	108.77834	31N	23E	20
Little Peoples Creek	70	25.2	48.14686	108.71519	28N	23E	26
Peoples Creek	100	48.8	48.22372	108.71595	29N	23E	34
South Fk Peoples Creek	70	19.8	48.16208	108.66229	28N	24E	20
Lodgepole Creek	--	5.2	48.15477	108.60383	28N	24E	26
White Bear Creek #1	50	29.1	48.35914	108.71632	30N	23E	15
White Bear Creek #2	30	1.7	48.40966	108.48563	31N	25E	28
Fifteen-Mile Creek	100	14.2	48.32101	108.65134	30N	24E	31

Table 14. Water temperature, species composition, longitudinal distribution and observed abundance of fishes in streams sampled within Fort Belknap, May 2019. (*=none observed; (--) no sampling occurred).

	Sampling Sites							
Species (N depicts native fish)	3-Mile	Little Peoples	Peoples Creek	South Fk Peoples	Lodgepole	White Bear #1	White Bear #2	Fifteen-Mile
Water Temperature (F)	60	63	59	63	67	57	66	64
fathead minnow (N)- *Pimephales promelas*	Abundant	*	Common	*	--	Common	Common	Abundant
white sucker (N)- *Catostomus commersoni*	Common	Common	Common	Common	--	Common	Common	*
lake chub (N)- *Couesius plumbeus*	Rare	Common	Common	Common	--	Common	5	*
longnose dace (N)- *Rhinichthys cataractae*	*	2	*	Common	--	*	*	*
brassy minnow (N)- *Hybognathus bankinsoni*	Common	*	*	*	--	*	10	*
northern pike- *Esox lucius*	*	1	*	*	6 (visual)	*	*	*
Northern redbelly dace (N)- *Chrosomus eos*	*	*	*	*	--	3	*	*
Iowa darter (N)- *Etheostoma exile*	*	*	*	*	--	1	1	*
golden shiner- *Notemigonus crysoleucas*	*	*	*	*	--	*	10	*
black bullhead- *Ameiurus melas*	*	*	*	*	--	*	5	*
bluegill- *Lepomis macrochirus*	*	*	*	*	--	*	1	*
yellow perch- *Perca flavescens*	*	*	*	*	--	*	10	*

Battle Creek

Battle Creek originates in the Cypress Hills of Saskatchewan, Canada. The drainage area exceeds 1,500 square miles and is comprised mostly of prairie rangeland, though water is pumped and diverted to irrigate hay meadows throughout the narrow stream corridor. Land ownership is almost entirely private, crossing occasional tracts of land administered by the U.S. Bureau of Land Management.

The riparian zone contains an intermittent overstory of mature cottonwoods. Sagebrush, wild rose, snowberry, buffaloberry and native grasses are present upon the usually high banks. Willows and cottonwoods predominate in the lower 10 miles. Stream channel substrate is indicative of a low gradient stream winding through glaciated deposits. Gravel riffles and silty, long pools are present throughout. Water clarity is excellent with the exception of the extreme lower end, which is most affected by irrigation return flows. Flows typically peak with snow melt in April. Occasionally, no measurable flow is present in late summer. Recharge by springs and fall showers usually provide good fall and winter flows. A mainstem impoundment was considered back in the early 1990's near the border to provide reliable flows throughout the irrigation season, so far no structure has been built.

As far back as the 1990's northern pike were considered widespread throughout the drainage, occasionally occurring in isolated pools of small tributaries. Walleye and sauger were considered confined to the lower 10 miles of Battle Creek. Catches of burbot were reported by anglers using setlines near the confluence of the Milk River as well. Non-game species observed pre-1990 included: common carp, white and longnose sucker, lake chub, fathead minnow, flathead chub, brook stickleback, silvery/plains minnow, emerald shiner, yellow perch, black bullhead, northern redbelly dace, longnose dace, stonecat, Iowa darter and brassy minnow.

In 2019, sampling occurred on Battle Creek between RM 69.5 and 0 from and the East Fork of Battle Creek between RM 21.9 and 2.7 from July 22nd-24th. Ten sampling locations were identified based on the previous surveys conducted (Figure 23). Six sites were located on Battle Creek, consisting of seining (n=3), trap (n=3) and gill nets (n=1; Figure 23 and Table 15). Four sampling locations were located on the East Fork of Battle Creek and consisted of seining (n=3) and trap nets (n=1). Battle Creek was flowing at 10 cfs during our survey. Water clarity was excellent at upstream locations (sites 1-4; Table 15), upstream locations were dominated by cobble, gravel and sand substrates. Water clarity decreased as we moved downstream, these sites contained some rock/gravel substrates, but fine sediments and vegetation were more prominent. Stream conditions ranged from dry/mostly dry to intermittent pools and plunge holes on East Fork of Battle Creek. A 25-foot x 6-foot x 1/8-inch mesh drag seine was pulled through the pools and beached on a low gradient shoreline. Multiple hauls were conducted at each location seined and ranged from 90 feet to 200 feet in haul length, depending on the size of the pool (Table 15). Experimental gillnets (125') and trap nets (3x4') were also used (Table 15). All fish captured were sorted by species and counted.

Ten species of fish were observed on Battle Creek and six species were observed on East Fork of Battle Creek (Table 16). Both game and non-game species were observed in Battle Creek, with northern pike being observed from RM 35 to 69.4 and walleye from RM 35 to 0 (Table 16). Non-game fish were observed in low numbers on Battle Creek when compared to observations made on East Fork Battle Creek (Table 16). Fathead minnow densities observed on East Fork Battle Creek suggest predatory fish such as northern pike and walleye are restricted from accessing upstream locations within this tributary. Northern pike were observed at the farthest downstream site, near the confluence with Battle Creek.

Figure 23. Locations of sampling sites on Battle Creek and East Fork of Battle Creek, July 2019.

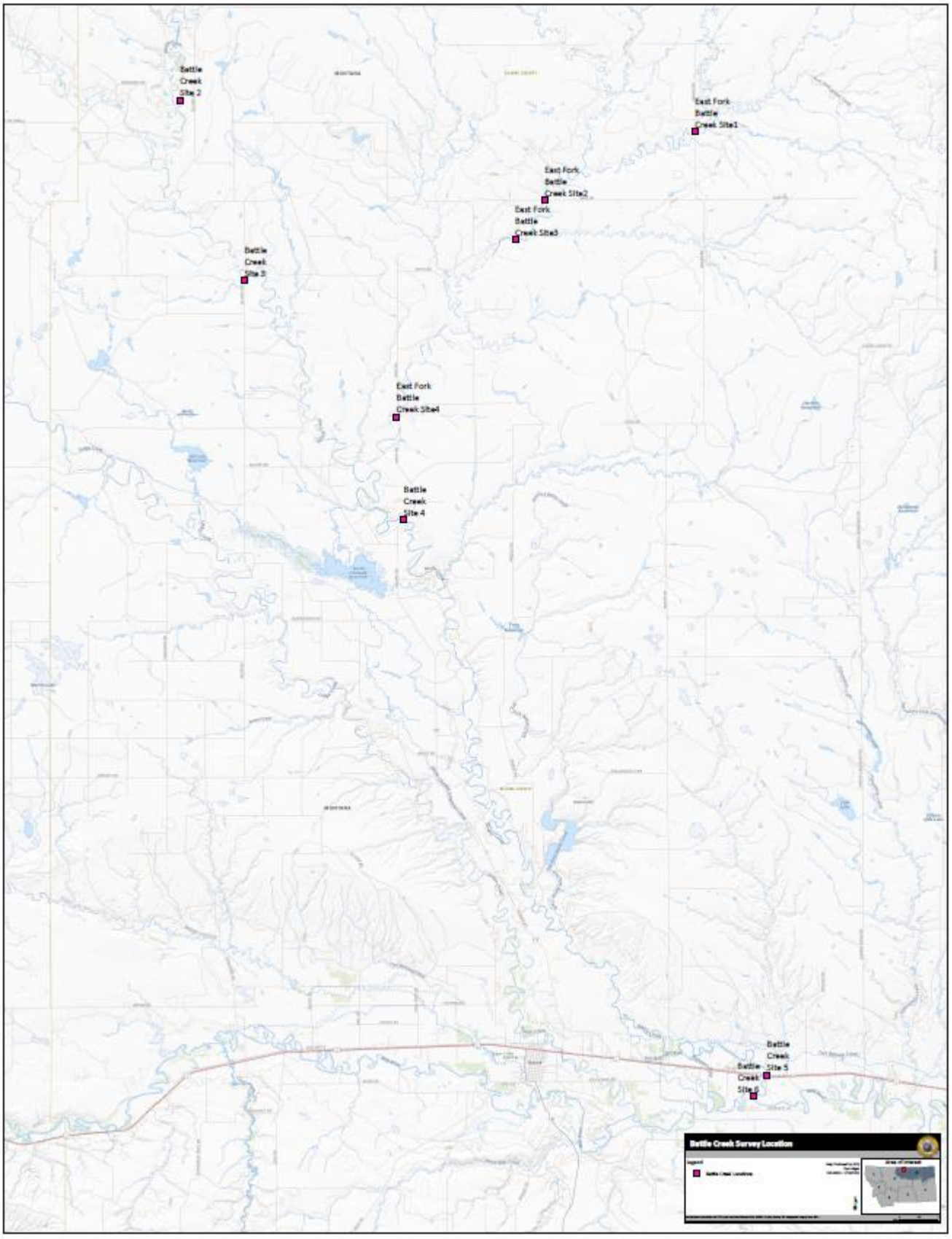


Table 15. Parameters of ten sampling sites Battle Creek and East Fork of Battle Creek, July 2019.

Sampling Site	Haul Length (ft)	River Mile	Latitude	Longitude	Township	Range	Section
Battle Creek Site 1	170	69.4	48.99406	109.41782	37N	18E	6
Battle Creek Site 2	140	61.7	48.95153	109.43213	37N	17E	24
Battle Creek Site 3	160	51.3	48.88375	109.39545	36N	18E	16
Battle Creek Site 4	Trap/Gill	35	48.7939	109.30502	35N	19E	18
Battle Creek Site 5	Trap	0.9	48.58503	109.10029	33N	20E	27
Battle Creek Site 6	Trap	0	48.57714	109.10787	33N	20E	34
East Fork Battle Creek Site1	200	21.9	48.93917	109.13859	37N	20E	30
East Fork Battle Creek Site2	100	14	48.91376	109.22444	36N	19E	3
East Fork Battle Creek Site3	90	11.9	48.89897	109.24128	36N	19E	10
East Fork Battle Creek Site4	Trap	2.7	48.8326	109.30902	36N	18E	36

Table 16. Water temperature, species composition, longitudinal distribution and observed abundance of fishes in Battle Creek (BC) and East Fork Battle Creek (EFBC), July 2019. (*=none observed).

	Sampling Sites									
Species (N depicts native fish)	BC Site 1	BC Site 2	BC Site 3	BC Site 4	BC Site 5	BC Site 6	EFBC Site1	EFBC Site2	EFBC Site3	EFBC Site4
Water Temperature (F)	70	72	73	72	71	74	69	69	72	72
fathead minnow (N)- *Pimephales promelas*	1	*	*	*	*	*	1,241	331	85	*
white sucker (N)- *Catostomus commersoni*	10	4	1	*	*	*	*	10	15	1
lake chub (N)- *Couesius plumbeus*	1	*	*	*	*	*	*	*	*	*
spottail shiner- *Notropis hudsonius*	14	*	12	*	*	2	*	*	*	*
brook stickleback (N)- *Culaea inconstans*	*	*	*	*	*	*	13	1	*	*
northern pike- *Esox lucius*	2 (observed)	*	1	10	*	*	*	*	*	1
golden shiner- *Notemigonus crysoleucas*	16	*	*	*	*	*	*	4	*	*
black bullhead- *Ameiurus melas*	*	*	*	*	*	*	*	*	*	43
bluegill- *Lepomis macrochirus*	*	*	*	*	*	2	*	*	*	*
yellow perch- *Perca flavescens*	*	*	1 (observed)	5	*	*	*	*	*	*
walleye- *Sander vitreus*	*	*	*	10	*	1	*	*	*	*
pumpkinseed- *Lepomis gibbosus*	*	*	*	14	*	3	*	*	*	*

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.

Cole Ponds

The Cole Ponds are a state fishing access site consisting of three ponds that are approximately 9 acres each. These ponds are old gravel pits and are very deep, clear ponds. The ponds contain self-sustaining populations of largemouth bass, yellow perch, northern pike, pumpkinseed sunfish, and

black crappie. Rainbow trout are also stocked to increase angling opportunity. In 2015/2016 these ponds received 172 (± 172) angler days (MTFWP Fisheries Bureau 2016).

In 2019, three gill nets and three trap nets were set overnight to assess the fish community. Yellow perch (3.3/net) and northern pike (4.3/net) comprised a majority of fish captured with gill nets. Pumpkinseed (1.7/net) and rainbow trout (0.3/net) were also captured. The trap nets captured yellow perch (56/net), pumpkinseed (48/net) and northern pike (5.67/net).

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.

Since 2009, approximately 19,370 pre-spawn yellow perch have been trap and transferred into Ester Lake to boost the forage base that had been non-existent since the early 1980s (Figures 24 and 25). The supplemental stockings occurred in 2009, 2010, 2012, 2014 and 2018. Additionally, in 2011 approximately 3,900 fathead minnows were stocked to establish a secondary forage species. These efforts have increased yellow perch densities, providing both additional forage to the northern pike and walleye populations and establishing another angling opportunity during the winter months (Figure 24 and 25).

Netting surveys conducted since initiating the supplemental yellow perch stocking in 2009 suggest a more balanced fishery with very good abundance of yellow perch and northern pike (Figures 24 and 25). Abundance, growth, and condition of all species have been very good, and the status of this fishery is the best we've documented in 30 years. In 2015/2016 Ester received 270 (± 202) angler days (MTFWP Fisheries Bureau 2016).

Severe drought conditions in 2017 increased the water demands from Ester Lake and in late September it had been drawn down approximately 5 feet. Work was also done to the canal that diverts water into Ester from Big Warm Creek, as well as the outlet works on the dam. All work was completed in October and water was being diverted back into Ester to increase the pool elevation through the winter months. Surveys conducted in 2018 suggest the drawdown of Ester in 2017 did impact population abundances of most species, especially adult pike and perch (Figure 24). Another significant drawdown occurred in late summer 2019, after the 2019 sampling effort. Impacts of this drawdown will be evaluated in 2020.

Figure 24. - Relative abundance of yellow perch, northern pike, black crappie, and walleye in Ester Lake (periodic gill net sets 1980 to 2019).

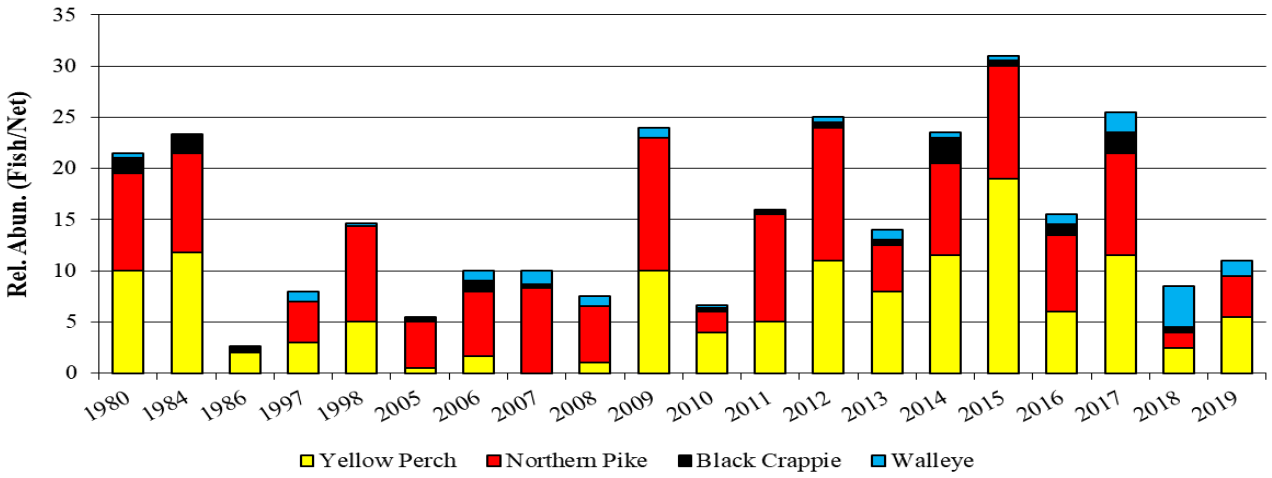
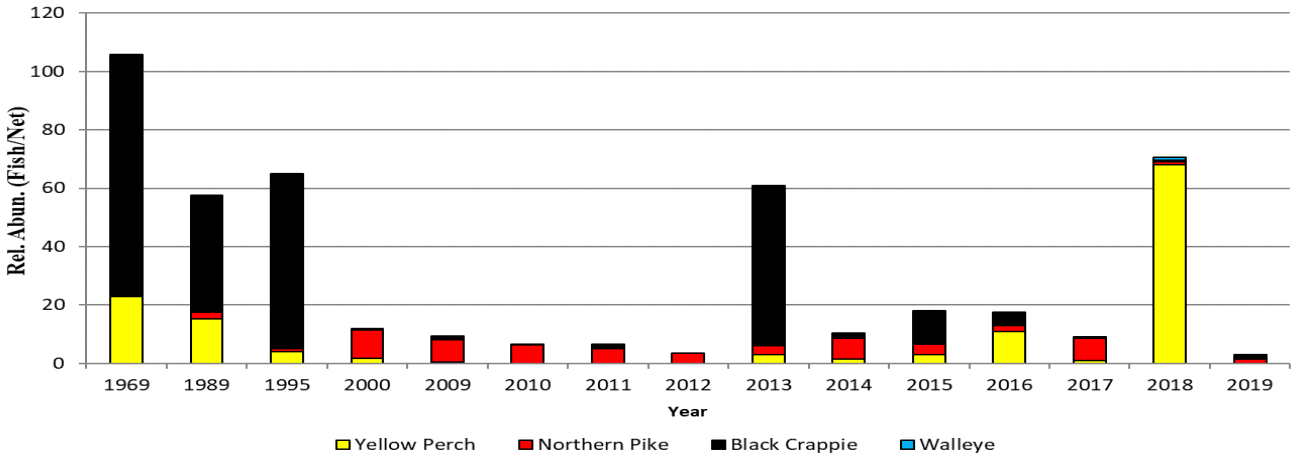


Figure 25. - Relative abundance of yellow perch, northern pike, black crappie, and walleye in Ester Lake (periodic trap net sets 1969 to 2019).



Nelson Reservoir

Nelson Reservoir, located 19 miles northeast of Malta is an off-stream 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 conditions, when compared to other regional reservoirs, with an average annual fluctuation of 8.36 feet and an average water retention time of 610 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. 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 to supplement an already good population. Increased stocking frequency has had little impact to the walleye population thus far and the stocking strategy has been monitored since 2007. 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.

In 2016, Bureau of Reclamation commenced work on a safety of dam's project at Nelson Reservoir to repair the outlet structures and dikes. To complete the work, reservoir pool elevations were drawn down approximately 17.5 feet (elevation 2204'). The draw down was initiated in July and was completed by the end of August. Reservoir pool elevations remained below 2206' throughout the winter of 2016/2017. Excellent water conditions at Sherburn Reservoir in the spring of 2017 allowed BOR the opportunity to fill Nelson Reservoir to capacity by late April. The area then experienced severe drought conditions and Nelson was drawn down approximately 12 feet, the second time this reservoir experienced a major draw down in as many years.

Water conditions in 2018 and 2019 were above average and the majority of littoral vegetation that had established during the two previous drawdown years was inundated and benefitted the entire Nelson fish assemblage.

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). In 2016, due to reduced pool elevations, only five gill nets were used over a one day period (five 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 ½" 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.

The abundance and reproductive success of sport and forage fishes were monitored at 10 predetermined sites. Beach seining was conducted in early August using a 75'- x 9' x ¼" square mesh beach seine. Fish were sorted by species and counted.

Table 17. - A summary of young-of-year forage and sport fish collected at ten fixed sites using a beach seine in Nelson Reservoir, 1982-2019.

	Shorline Seined (ft)	Walleye	Yellow Perch	YP (Adult)	Northern Pike	Spottail Shiner	White Sucker	Black Crappie	Goldeye	Carp	Smallmouth Bass	Longnose Sucker
1982	660	0	4,553	--	3	0	202	245	0	0	0	0
1983	1,420	4	138	--	18	0	543	238	0	0	0	0
1984	1,530	0	133	--	0	0	0	0	0	0	0	0
1985	510	3	2,272	--	16	1	16	67	1	0	0	0
1986*	700	0	3	--	7	0	10	232	0	0	0	0
1987*	495	5	1,987	--	0	4	45	10	7	0	0	0
1988*	520	0	783	--	0	1	0	35	0	0	0	0
1989*	910	10	736	--	4	43	1,503	135	0	0	0	0
1990	1,320	7	2,631	--	1	56	181	21	0	0	0	0
1991*	660	8	77	--	1	54	33	26	0	0	0	0
1992	635	21	140	--	6	387	175	18	0	4	0	0
1993*	520	3	8,287	--	1	520	2,688	62	0	0	0	0
1994*	830	6	1,802	--	10	621	697	49	0	0	0	0
1995*	760	36	232	--	0	3,780	180	163	0	0	0	0
1996*	870	25	4,521	--	13	21	101	0	0	0	0	0
1997*	890	53	2,205	--	0	159	534	1	0	0	0	0
1998*	340	0	126	--	0	33	235	4	0	0	0	0
1999	750	11	1,489	--	2	222	497	1	0	0	0	0
2000*	440	4	449	--	2	189	258	5	6	0	0	0
2001	430	2	72	--	1	27	800	88	0	0	0	0
2002*	415	2	19	--	4	8	38	482	21	62	0	0
2003	530	3	361	--	33	49	235	6,597	0	0	3	0
2004*	443	10	1,781	--	0	19	195	5	1	0	10	0
2005*	754	5	423	--	2	34	155	278	23	5	1	0
2006*	831	3	773	--	8	66	319	89	0	3	1	0
2007*	489	6	586	--	2	75	596	5	0	12	9	0
2008*	500	10	62	--	0	8	272	1,237	11	94	11	0
2009*	750	4	4,522	--	4	3	478	20	8	2	61	14
2010*	750	11	2,914	184	3	98	224	131	0	0	115	2
2011*	750	8	2,404	530	6	34	181	69	0	0	40	0
2012*	750	2	685	312	1	66	49	935	0	7	6	1
2013*	750	1	362	2	6	48	24	261	0	7	8	0
2014*	750	6	345	280	4	36	38	2,564	6	112	7	0
2015*	750	1	883	8	5	6	26	80	0	2	60	0
2016*	750	11	126	16	0	108	213	1,362	0	1	2	0
2017	750	14	952	0	6	311	191	639	0	4	33	0
2018*	750	8	1,196	0	0	251	75	12	0	25	24	0
2019*	750	0	5	14	1	253	95	100	0	0	22	1

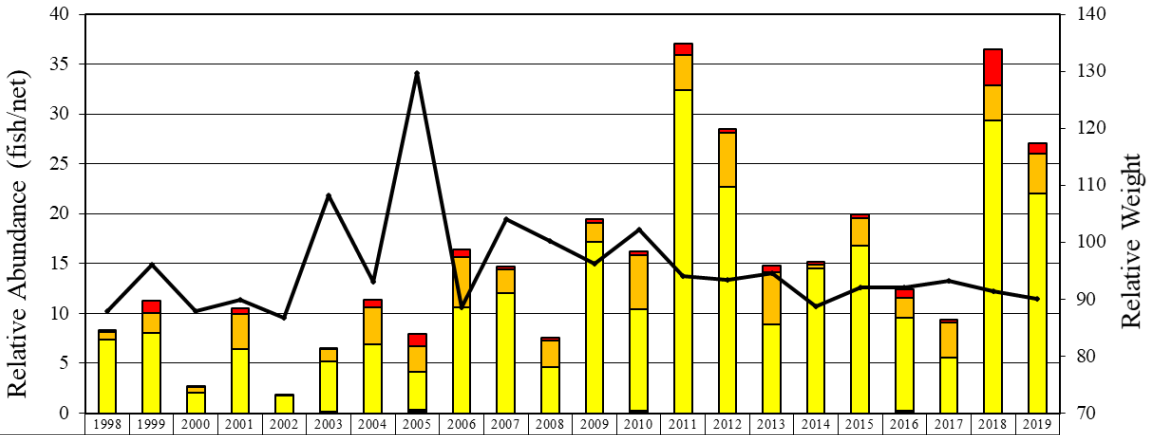
*Years in which walleye fry or fingerlings were stocked

Yellow Perch

The yellow perch population in Nelson Reservoir has been in excellent shape over the last 10 years due to good water conditions and the quality of available spawning habitat. In 2000 and 2002, the relative abundance of yellow perch was significantly reduced due to severe drought conditions and reduced pool elevations (Figure 26). 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 high yellow perch densities in Nelson (Table 17; Figure 26).

In 2011, yellow perch relative abundance was the highest ever recorded (37.1 perch/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 perch/net) and densities then dropped and stabilized (Figure 26). In 2017, relative abundance of yellow perch fell below the long-term average of 11.8 perch/net to 9.4 perch/net. The yellow perch population responded well to exceptional water and habitat conditions at Nelson in 2018. Yellow perch relative abundance was the second highest on record at 36.5 yellow perch/net and remained above 25/yellow perch/net in 2019 (Figure 26).

Figure 26. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Nelson Reservoir, 1998-2019.



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>12 in.)	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	0	0	0	0	0	0
Preferred (10-11.9 in.)	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	0.3	0.3	0.8	0.3	3.6	1.1
Quality (8-9.9 in.)	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	0.4	2.8	2	3.5	3.5	4
Stock (5-7.9 in.)	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	14.5	16.8	9.4	5.6	29.4	22
Sub Stock (<5 in.)	0	0	0	0	0	0.1	0	0.3	0	0	0	0	0.2	0	0	0	0	0	0.2			
Relative weight	87.94	96.13	87.97	89.95	86.76	108.25	93.10	129.76	88.60	104	100.23	96.15	102.3	94.08	93.38	94.6	88.69	92.1	92.02	93.28	91.41	90.01

Walleye

Historically, walleye fingerlings and fry were periodically stocked into Nelson Reservoir to supplement natural reproduction. From 2002 to 2011 (except for 2006), all walleye fingerlings stocked into Nelson Reservoir were marked with 750 ppm OTC to calculate survival of stocked walleye and to distinguish stocked fish from naturally reproduced fish. There was a miscommunication with the Fort Peck Hatchery and no walleye fingerlings in 2012 were marked, but OTC markings were completed from 2013-2016 and 2018-2019. In 2006, only half of the walleye stocked were marked with OTC due to problems with reaction of the walleye to the chemicals. No walleye were stocked in Nelson in 2017 due to extremely low reservoir pool elevations.

Even with the addition of these fish, catch of YOY walleye during seining surveys remain low when compared to pre-drought levels (Table 17). However, the high proportion of stock (10-14.9 in.) and quality sized (15.0-19.9 in.) walleye in the population indicates good survival of YOY walleye

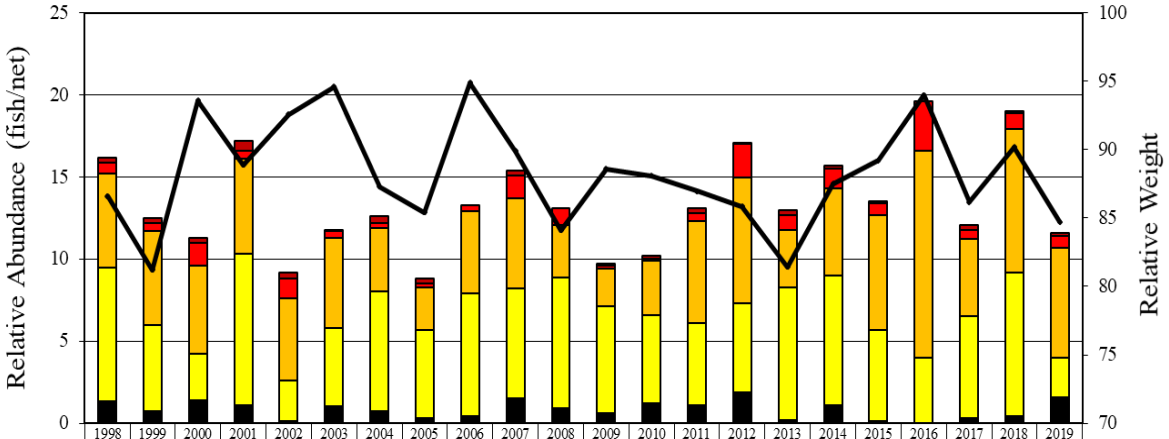
from 2003 through 2019 (Figure 27). OTC analysis suggests the majority (~75%) of YOY walleye recruiting into the population are naturally reproduced (Figure 28).

The relative abundance of adult walleye has historically remained stable over the years, regardless of walleye stocking densities and size (Figure 27). In 2016, walleye relative abundance was the highest documented since 1991 (19.6 walleye/net), with good age and size structure (Figure 27). Since 2017, walleye relative abundance has fluctuated, falling to 12.1 walleye/net in 2017, rebounding back to 19 walleye/net in 2018 and then dropping to 11.6 walleye/net in 2019 (Figure 27).

Water and forage conditions are most likely the primary factors contributing to the increase in walleye densities observed since 2010. The walleye population in Nelson Reservoir has remained stable, and trend data suggests the contributions from supplemental stocking efforts aren't directly increasing walleye densities. Li et al. (1996(b)) suggests stocked fish may compete and subsequently replace naturally reproduced walleye that would otherwise recruit into the population if no stocking would occur. The current age structure of walleye in Nelson suggests strong year-classes were produced in 2016, 2017 and 2018 (Figure 29). In these years good water conditions persisted in the spring but pool elevations were severely impacted in the summer/fall. No walleye fingerlings were stocked in 2017 and the current age two year-class was produced solely by natural reproduction.

Walleye condition and growth were excellent in 2019, suggesting the near shore habitats and growth during the previous drawdown years injected some good productivity within Nelson Reservoir (Figures 27 and 30).

Figure 27. - Relative abundance, size structure, and relative weight of walleye collected with sinking experimental gill nets in Nelson Reservoir, 1998-2019.



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>25 in.)	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	0.2	0.1	0	0.3	0.1	0.2
Preferred (20-24.9 in.)	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	1.2	0.7	3	0.6	1	0.7
Quality (15-19.9 in.)	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	5.3	7	12.6	4.7	8.7	6.7
Stock (10-14.9 in.)	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	7.9	5.6	4	6.2	8.8	2.4
Sub-stock (<10 in.)	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	1.1	0.1	0	0.3	0.4	1.6
Relative weight	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	87.51	89.2	93.99	86.17	90.19	84.72

Figure 28. Observed percentage of walleye marked (POS) and not marked (NEG) with oxytetracycline (OTC) in Nelson Reservoir, 2007-2019. A positive mark indicates the fish was stocked.

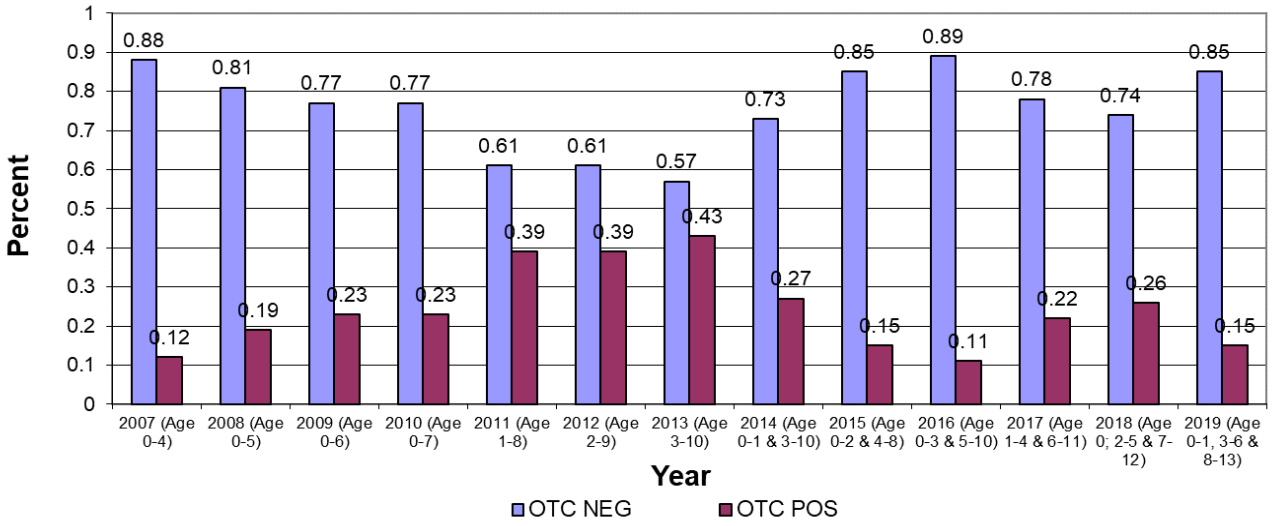


Figure 29. Observed walleye age structure and distribution in Nelson Reservoir, 2019.

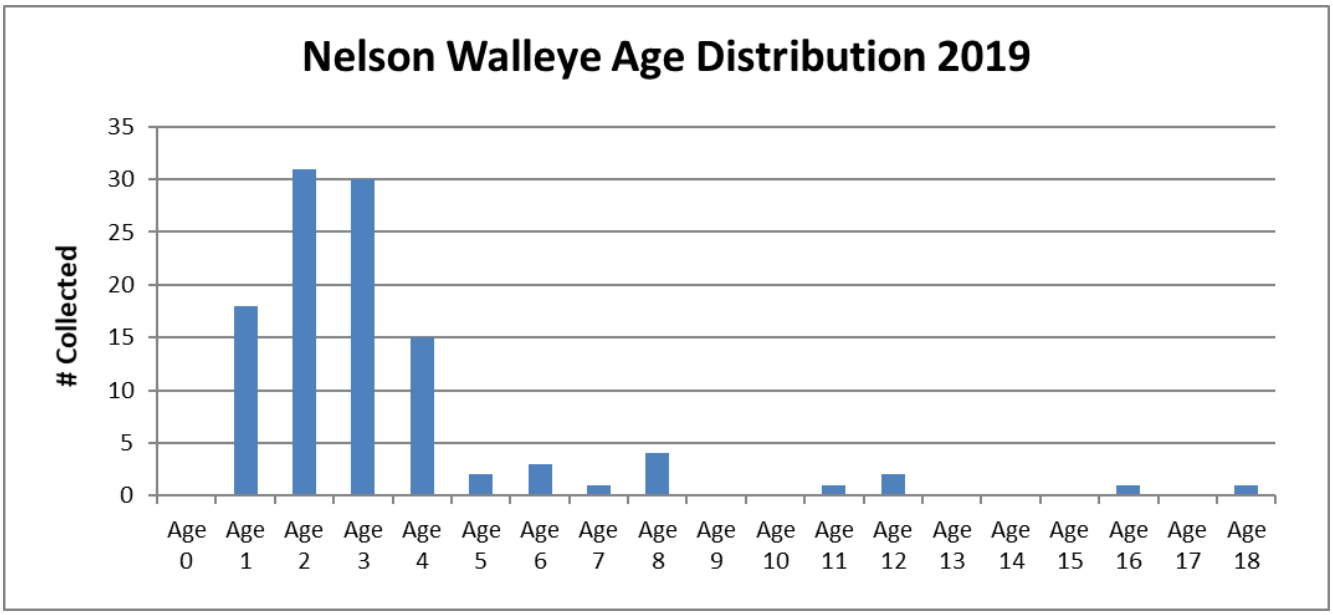
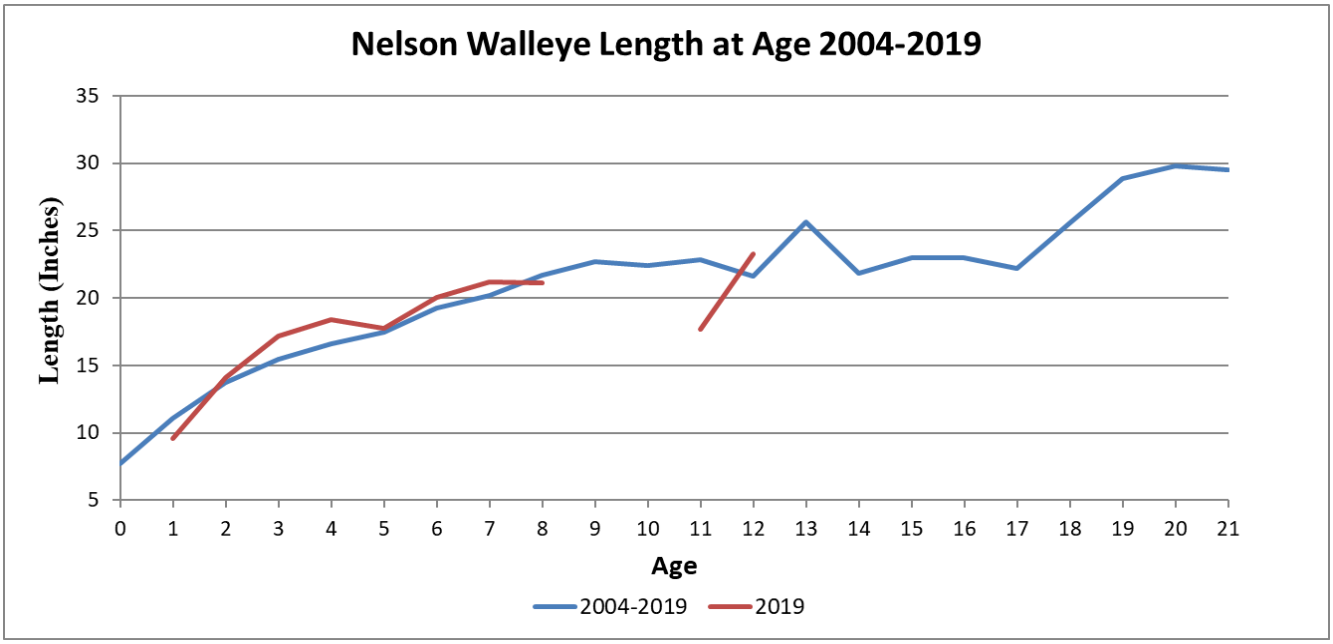


Figure 30. Walleye length at age in Nelson Reservoir, 2004-2019.

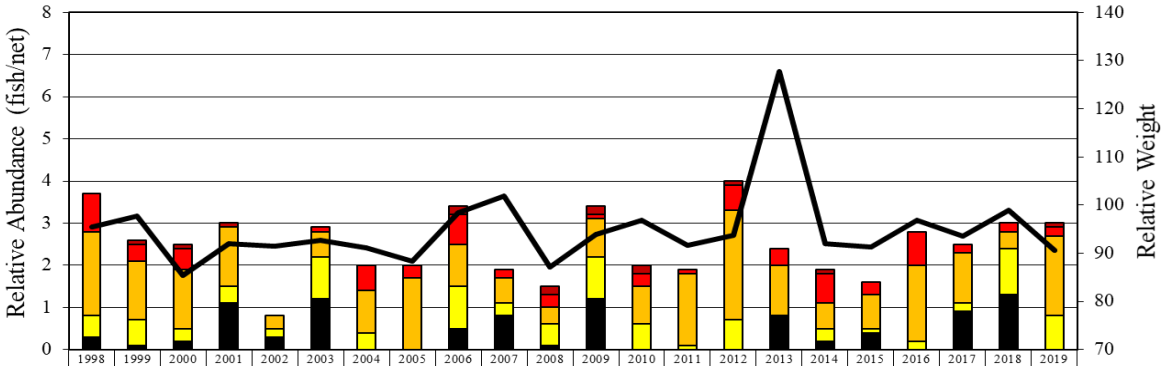


Northern Pike

Historically, the relative abundance of adult northern pike has remained stable, consisting of a high proportion of quality and preferred sized fish (Figure 31). The northern pike population in Nelson remains stable, despite two significant drawdowns. Low reservoir pool elevations have allowed terrestrial vegetation growth in the littoral areas surrounding Nelson and young (sub-stock) northern pike have comprised nearly half the catch during fall netting surveys conducted in 2017 and 2018 (Figure 31).

These year-classes have exhibited good growth and the current pike population is dominated by quality sized northern pike (Figure 31).

Figure 31. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental mesh gill nets in Nelson Reservoir, 1998-2019.

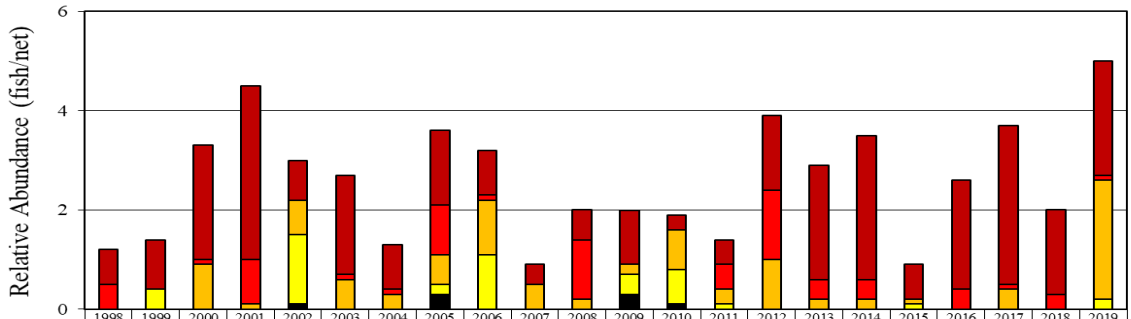


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>34 in.)	0.00	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.20	0	0.2	0.2	0.2	0	0.1	0	0.1	0	0	0	0	0.1
Preferred (28-33.9 in.)	0.90	0.40	0.50	0.00	0.00	0.10	0.60	0.30	0.70	0.2	0.3	0.1	0.3	0.1	0.6	0.4	0.7	0.3	0.8	0.2	0.2	0.2
Quality (21-27.9 in.)	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	0.6	0.8	1.8	1.2	0.4	1.9
Stock (14-20.9 in.)	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	0.3	0.1	0.2	0.2	1.1	0.8
Sub Stock (<14 in.)	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	0.2	0.4	0	0.9	1.3	0
Relative weight	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	127.73	92.07	91.31	96.91	93.57	98.91	90.63

Lake Whitefish

The lake whitefish population has fluctuated since 1998 due to variable water levels and summer water temperature, which have reduced recruitment of YOY fish to the population (Figure 32). 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 (0.9 fish/net; Figure 32; Leslie 2007). Gill netting surveys conducted in 2012-2014 revealed increased relative abundance and size. Relative abundance observed in 2015 reflected those numbers observed in 2007 and has since increased to above average abundance in 2019, the current population is comprised mostly of memorable and quality fish (Figure 32).

Figure 32. - Relative abundance and size structure of lake whitefish collected with sinking experimental gill nets in Nelson Reservoir, 1998-2019.



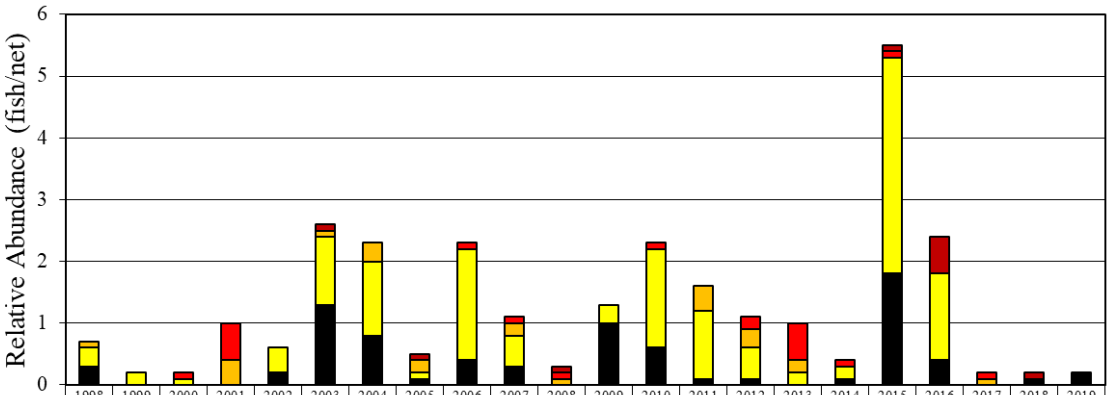
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>18.0 in.)	0.7	1	2.3	3.5	0.8	2	0.9	1.5	0.9	0.4	0.6	1.083	0.3	0.5	1.5	2.3	2.9	0.7	2.2	3.2	1.7	2.3
Preferred (14.0-17.9 in.)	0.5	0	0.1	0.9	0	0.1	0.1	1	0.1	0	1.2	0	0	0.5	1.4	0.4	0.4	0	0.4	0.1	0.3	0.1
Quality (11.0-13.9 in.)	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	0.2	0.1	0	0.4	0	2.4
Stock (6.0-10.9 in.)	0	0.4	0	0	1.4	0	0	0.2	1.1	0	0	0.4	0.7	0.1	0	0	0	0.1	0	0	0	0.2
Sub Stock (<6.0 in.)	0	0	0	0	0.1	0	0	0.3	0	0	0	0.3	0.1	0	0	0	0	0	0	0	0	0

Black Crappie

Historically, black crappie persisted at low densities in Nelson Reservoir. Since 2003, some of the highest (2003, 2008, 2012, 2014, 2016 and 2017) and most consistent year-classes of black crappie have been observed during annual seining surveys (Table 17). Recruitment of YOY crappie into the adult population has resulted in higher relative abundances of adult black crappie during that same timeframe (Figure 33). High reproductive success over the last ten years indicates the early summer spawning conditions within Nelson Reservoir have been favorable for black crappie, due to rising/stable water conditions during the month of June.

Significant reductions in adult black crappie relative abundance was observed during fall gill net surveys in 2017-2019 (Figure 33). It is unknown whether this is directly correlated with reductions in pool elevations for two straight years or whether the reductions in pool elevations increased predation and/or entrainment of black crappie.

Figure 33. - Relative abundance and size structure of black crappie collected with sinking experimental gill nets in Nelson Reservoir, 1998-2019.



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Memorable (>12.0 in.)	0	0	0	0	0	0.1	0	0.1	0	0	0.1	0	0	0	0	0	0	0.1	0.6	0	0.1	0
Preferred (10.0-11.9 in.)	0	0	0.1	0.6	0	0	0	0	0.1	0.1	0.1	0	0.1	0	0.2	0.6	0.1	0.1	0	0.1	0	0
Quality (8.0-9.9 in.)	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	0	0	0	0.1	0	0
Stock (5.0-7.9 in.)	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	0.2	3.5	1.4	0	0	0
Sub Stock (<5.0 in.)	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	0.1	1.8	0.4	0	0.1	0.2

Other Fishes

A variety of other fishes are found within Nelson Reservoir; however, they are rarely utilized as sport fish due to low abundances or their non-game status. Channel catfish, stonecats, bigmouth buffalo, smallmouth buffalo, goldeye, white sucker, shorthead redhorse, and smallmouth bass are all present at low levels within Nelson Reservoir

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 17) and will continue to recruit and supplement the adult population. In 2019, nine smallmouth bass were captured during fall surveys and ranged in length from 6.5-15.9 inches.

Nelson Reservoir (Off Regina Road)

Nelson Reservoir is a 175-surface acre reservoir located south of Malta on both private and public lands (BLM). The reservoir is primarily used for irrigation however, water levels have remained high for several years. In 2014, two gill and two trap nets were set overnight to identify the species composition of this reservoir and to also identify maximum depths and the potential to establish a public fishery. The gill nets captured one yellow perch and 34 white suckers. The trap nets captured white suckers, fathead minnows, brassy minnows, and Iowa darters. A depth profile identified a maximum depth of 18-20 feet.

With consent from the landowner, FWP trap and transferred approximately 400 adult black crappie during the fall of 2015 and 5,000 walleye fingerlings were stocked in June 2016. In 2017, two gill and two trap nets were set overnight to assess the recent stocking of black crappie and walleye. The gill net contained walleye (relative abundance 11 walleye/net), white sucker (2 white sucker/net), black crappie (5 black crappie/net), and common carp (70 common carp/net). The trap nets contained white sucker, black crappie, fathead minnows, brassy minnows, and common carp.

Black crappie ranged in length from 3-5 inches, indicating this species is successfully spawning and recruiting. Walleye ranged from 9-11 inches; 5,000 walleye fingerlings will be stocked biennially. The presence of common carp is a concern and it's unknown how this species established itself in

Nelson Reservoir. One hypothesis is that an established population in an upstream location was entrained during the historic flooding that occurred in this area during October 2016.

Netting conducted in 2019 indicate a strong black crappie population has been established, black crappie were the most abundant species observed at 118 black crappie/net. Common carp (36 carp/net), white sucker (9 white sucker/net) and walleye (5.5 walleye/net) were also present. Walleye averaged 19.3 inches with several fish exceeding 20 inches observed.

Nelson Reservoir has the potential to produce a robust and diverse fishery for anglers. The public lands surrounding this reservoir are mostly undeveloped and access is limited to the county road and two-track road that leads to the dam, near the private property boundary. FWP will work with the BLM on identifying options for angling access at this reservoir.

RECOMMENDATIONS

Paddlefish: Fort Peck Stock

Annual tagging efforts should continue with a target of tagging 300 or more new paddlefish annually. An on-site paddlefish creel survey should be conducted in 2020 to provide on-site mandatory reporting stations to collect harvest data such as length, weight, sex, and jaw samples to assist in determining the age structure of the Fort Peck Reservoir paddlefish stock. A phone survey should be conducted in 2020, using the database of anglers who drew harvest tags, as well as anglers participating in snag and release, to assess angler demographics, effort, and success during the paddlefish season. YOY visual counts should be conducted to assess reproductive success and year-class strength.

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 Nelson should continue to be evaluated to determine the best stocking strategy.

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, Anita and Cow Creek Reservoirs. 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 and/or maintained 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.

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Water Codes of Waters Referred To

164303 Anita Reservoir
154535 Bailey Reservoir
150200 Battle Creek
154570 Beaver Creek Reservoir
154762 Cole Ponds
164789 Cow Creek Reservoir
155083 Dry Fork Reservoir
East Fork Battle Creek
155120 Ester Lake
151520 Fifteen Mile Creek
165140 Fort Peck Reservoir
155240 Fresno Reservoir
152120 Little People's Creek
152280 Lodgepole Creek
156095 Lyon's Reservoir
162500 Missouri River Sec. 05
162520 Missouri River Sec. 06
156480 Nelson Reservoir
Nelson Reservoir (Off Regina Road)
153240 People's Creek
153720 South Fork People's Creek
154120 Three Mile Creek
154320 White Bear Creek

Key words:
Region 6, prairie ponds, warm water species, Fresno Reservoir, Nelson Reservoir, Beaver Creek Reservoir, Bearpaw Lake, Blaine County, Hill County, Phillips County, paddlefish, walleye, Lake Superior whitefish, northern pike, black crappie, yellow perch, largemouth bass, bluegill, rainbow trout.
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Date: April 1, 2020