Fisheries Division
Federal Aid Job Progress Report

Montana Statewide Fisheries Management

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

July 1, 2021 – June 30, 2022

Project Title: Montana Statewide Fisheries Management

Job Title: Havre Area Warm Water Fisheries Management

Abstract: Severe drought conditions persisted in Hill, Blaine and Phillips Counties in 2020/2021 which resulted in marginal to severe water conditions throughout most of area. Paddlefish tagging success was limited due to low flow conditions and snagging success was high. Furthermore, four remote self-creel stations replaced our onsite creel clerks in 2021 to collect harvest information.

In addition, young-of-year paddlefish surveys (visual counts) were conducted on August 4-5 and August 25, in the headwaters of Fort Peck Reservoir, with no YOY paddlefish being observed. Angler reported harvest on the Upper Missouri River paddlefish population was 340 in 2021 (3-year average harvest is 307). The average size of adult fish remains stable and observed spawning success has been good in recent years due to high spring flows and elevated reservoir levels (2008, 2011, 2018-2020). Observed year-classes in 2008 and 2011 have started to recruit into the fishery, based on young male recruits aged.

Standardized gill netting and beach seining surveys were conducted at Fresno, Nelson, 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 or supplement existing populations that winterkill. 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. A weekend creel survey was conducted at Fresno Reservoir.

Seining surveys were conducted on the Milk River downstream of Fresno Reservoir to Zurich to assess the species assemblage in this section. Due to severe drought conditions, flows on the Milk River were significantly reduced and provided an opportunity to efficiently sample. Furthermore, pool elevations were severely impacted at Fresno Reservoir, and to a lesser extent Nelson Reservoir.

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: (2) 310 and (13) 124 projects were reviewed along with one wastewater review with local agencies.

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 and multiple articles and information on local fisheries were provided via Facebook posts and videos, as well as newspaper outlets.

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 (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 2021 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

Effective management of the Fort Peck stock requires a thorough understanding of several key aspects of their life history. 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). Sampling occurs on the Upper Missouri River during the spawning period when paddlefish are staging around the Fred Robinson Bridge. This effort takes place 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 2021, paddlefish tagging started on April 21st and continued until May 17th, with crews tagging 165 paddlefish (Figure 1). Since tagging was initiated in 1977, 9,280 paddlefish have been tagged and 1,268 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 2021, 15.4% 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 2021, five female paddlefish captured during our tagging efforts weighed 90 or more pounds (Figure 2). Females captured in 2021 averaged 71.3 pounds (n=71).

Since tagging was initiated in 1977, a total of 1,198-tagged paddlefish have been reported as harvested, which is about 12.9% 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 2021, 58 tagged paddlefish (all years) were reported as harvested and 13 tagged paddlefish were reported as snagged and released, anglers harvested two paddlefish tagged in 2021.

Figure 1. Number of paddlefish tagged and recaptured during spring gillnetting efforts from 1992-2021.

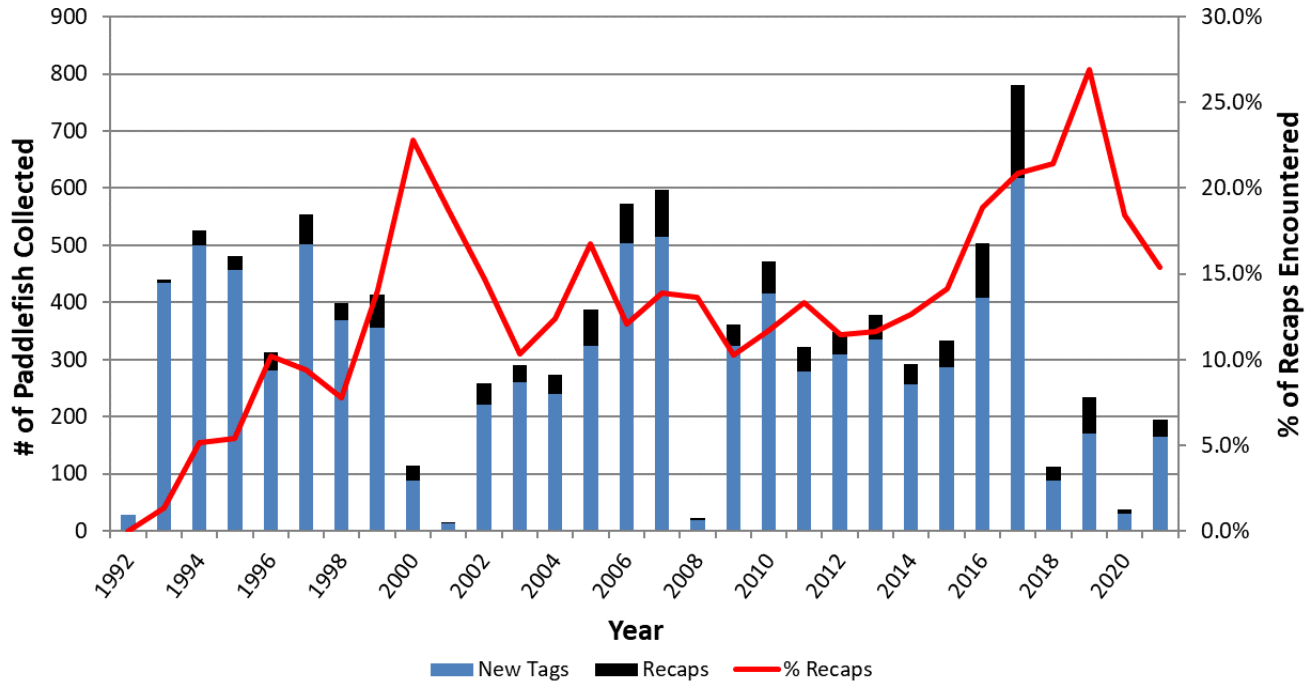
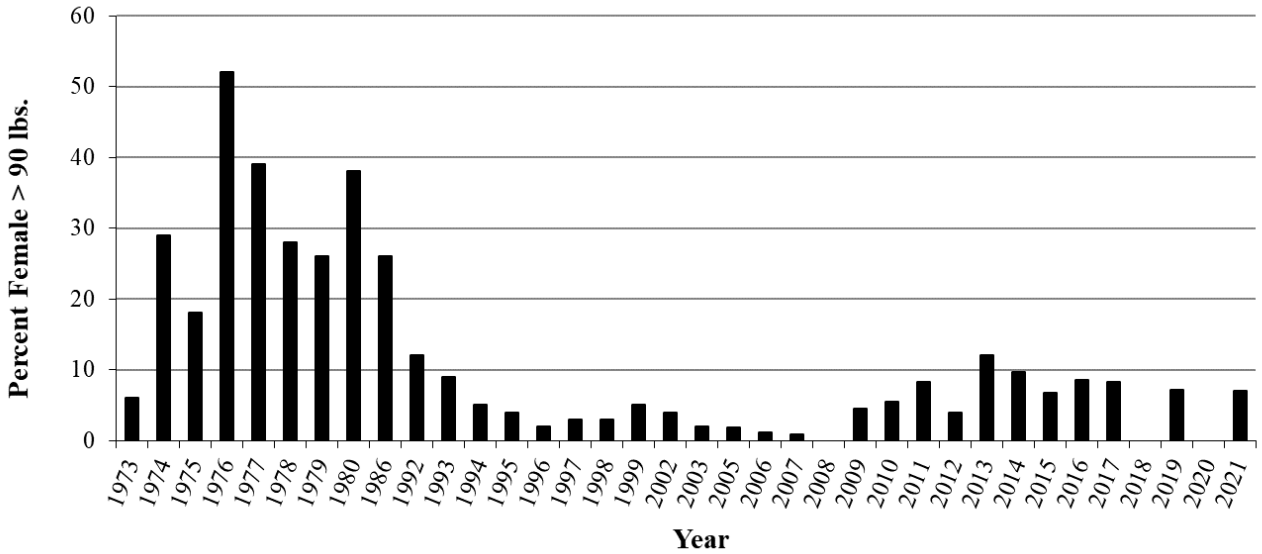


Figure 2. Percent of female paddlefish captured during adult tagging efforts weighing more than 90 pounds from 1973-2021.



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 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 higher flow events.

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 2017-2020 (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 2021, the Missouri River basin snow water equivalent was 102% of normal on April 1st. The Missouri River at the Fred Robinson Bridge was free of ice cover by the middle of March. Flows remained under 10,000 cfs through mid-May and obtained trigger flows for approximately two days on May 29th and 30th (flows > 14,000 cfs). Flows quickly receded to less than 10,000 cfs by mid-June.

Hydrograph information (Figures 3, 4, and 5) suggests 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 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 2021, zero YOY and one sub-adult paddlefish were observed during the fixed transects between RM 1849.5 and 1864.5 (Table 2). In addition to the standardized counts, we applied a total of three hours of random search effort on August 4-5th and August 25th 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 1842-1867). Random counts yielded a total of one sub-adult and one adult paddlefish being observed (Table 3).

Table 1. Paddlefish spawning and rearing condition ratings for the years 1974-2021, 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')	
2020	X			X (2240.3')		
2021			X	X (2230.8')		

[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.

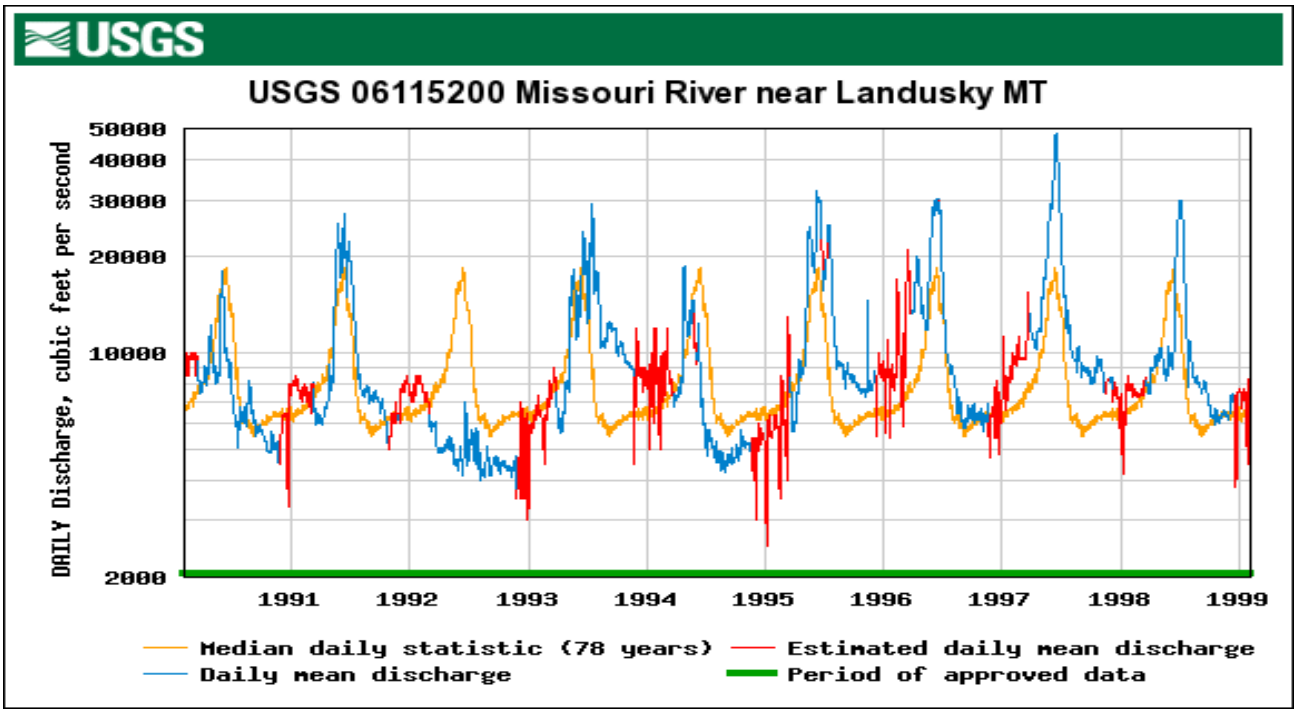


Figure 4. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 2000-2009.

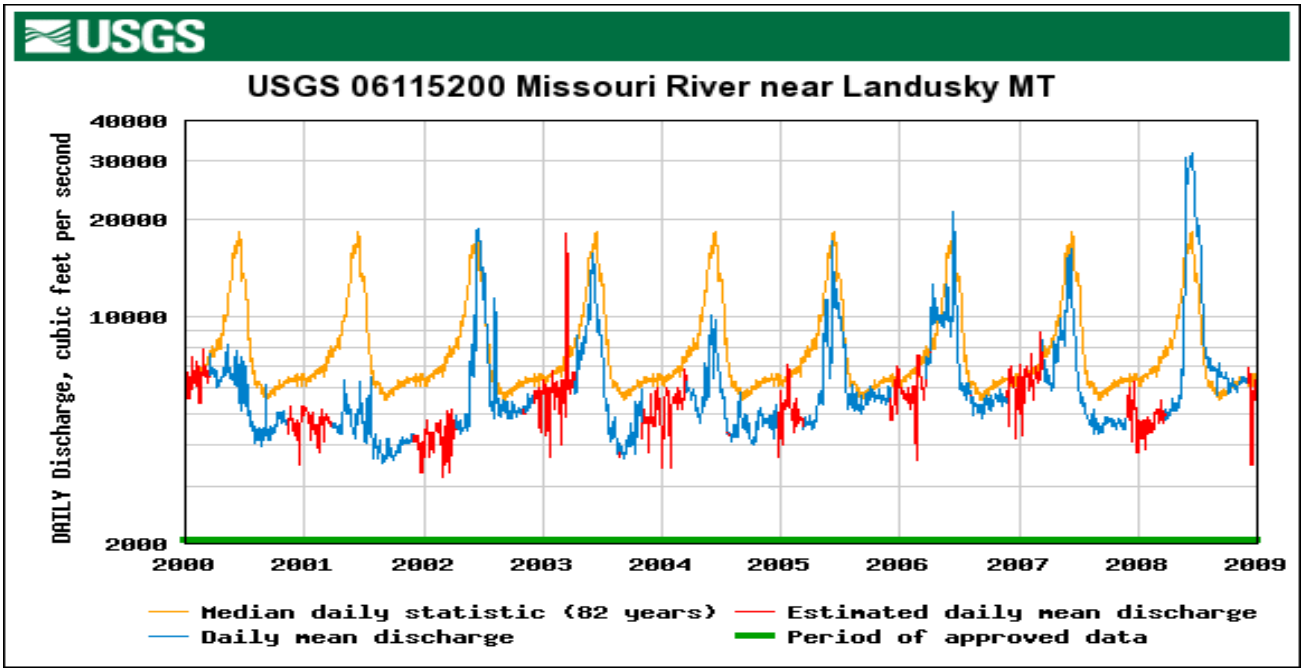


Figure 5. - Historical and observed Missouri River hydrograph at the USGS Landusky, MT gauging station 2009-2021.

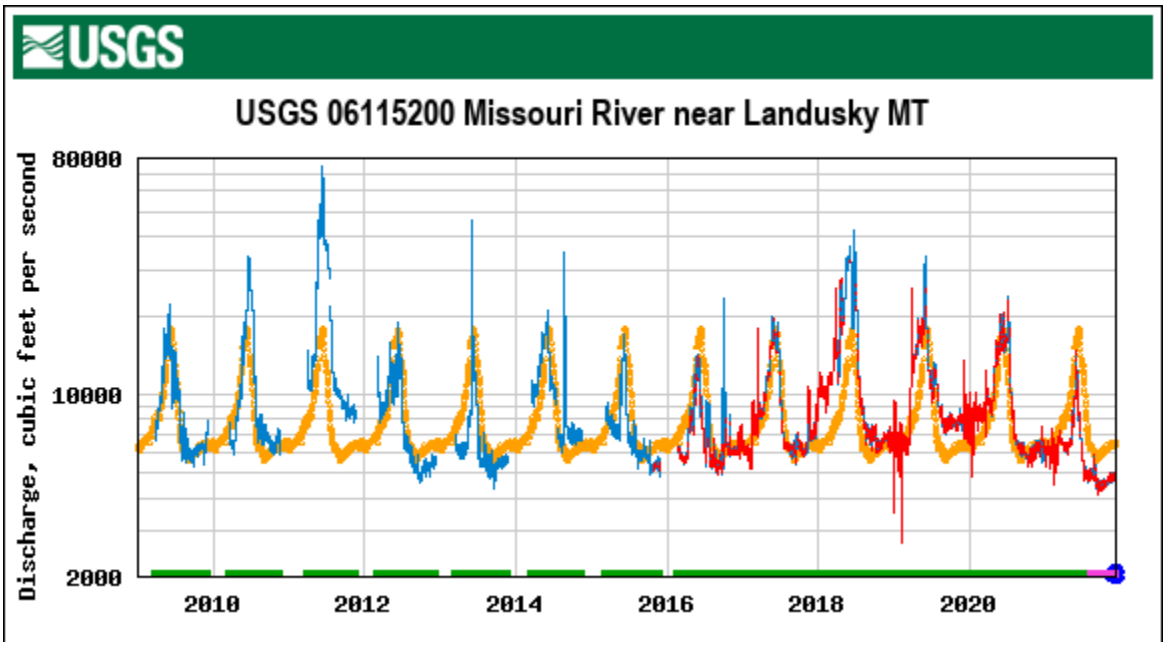


Table 2. - Results of standardized YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 1997 to 2021.

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	36	4	3	2209	Miller
2009	8/11 & 8/17	6	1843 to 1858	36	0	0	2220	Miller
2010	7/27 & 8/3	6	1863.5 to 1878.5	36	0	0	2236	Miller
2011	7/28 to 9/1	6	1866.5 to 1881.5	90	61	3	2242	Hemingway
2012	7/30 & 8/9	6	1863.5 to 1878.5	36	1	3	2234	Hemingway
2013	8/5 & 8/14	6	1855.5 to 1870.5	36	0	14	2226	Hemingway
2014	7/28, 8/4, & 8/17	6	1859.5 to 1874.5	54	0	0	2230	Hemingway
2015	8/3, 8/10, & 8/18	6	1866.5 to 1881.5	54	0	0	2236	Hemingway
2016	8/2 & 8/15	5	1863.5 to 1878.5	36	0	1	2235	Breen
2017	8/4 & 8/16	6	1867.5 to 1882.5	36	1	0	2239	Breen
2018	7/29 & 8/14	6	1866.5 to 1881.5	36	1	0	2245	Breen
2019	8/8 & 8/21	6	1866.5 to 1881.5	36	4	6	2246	Breen
2020	8/5 & 8/18	6	1863.5 to 1878.5	36	0	3	2240	Facer
2021	8/4 & 8/25	6	1849.5 to 1864.5	36	0	1	2230	Facer

Table 3. - Results of random YOY paddlefish visual count surveys conducted in the headwaters of Fort Peck Reservoir from 2008 to 2021.

Year	Transect Dates	Effort (Hours)	Station Locations (RM)	# YOY	# Sub-Adults	# Adults	August Pool Elevation	Collector
2008	8/6-8/13	24	1859-1861	42	0	--	2209	Miller
2009	8/11-8/17	12	1857-1862	2	3	--	2220	Miller
2010	7/26-9/27	75	1874.5-1884	0	26	--	2236	Miller
2011	7/25-8/8	27	1875-1888	205	2	13	2242	Hemingway
2012	7/31/, 8/9-8/10	14	1869.5-1884.7	1	16	75	2234	Hemingway
2013	8/ (6-7) (14-16) (21-22)	28	1859.5-1886	2	85	196	2226	Hemingway
2014	7/(29-30), 8/(5-6) (18-19)	27.25	1859-1887	0	7	54	2230	Hemingway
2015	8/4, 8/11, & 8/17	18	1865-1885	1	19	42	2236	Hemingway
2016	8/1, 8/2, & 8/16	10	1868-1880	0	1	25	2235	Breen
2017	8/3, 8/4, 8/15-8/17	15.25	1863-1887	1	1	6	2239	Breen
2018	7/29, 7/30, 8/15	11	1863-1887	11	1	6	2245	Breen
2019	8/9, 8/21, 8/22	9	1863-1887	4	10	28	2246	Breen
2020	8/4, 8/18, 8/19	8	1863-1881	3	20	40	2240	Facer
2021	8/4, 8/5, 8/25	3	1842-1867	0	1	1	2230	Facer

-- No data collected for observed period of record

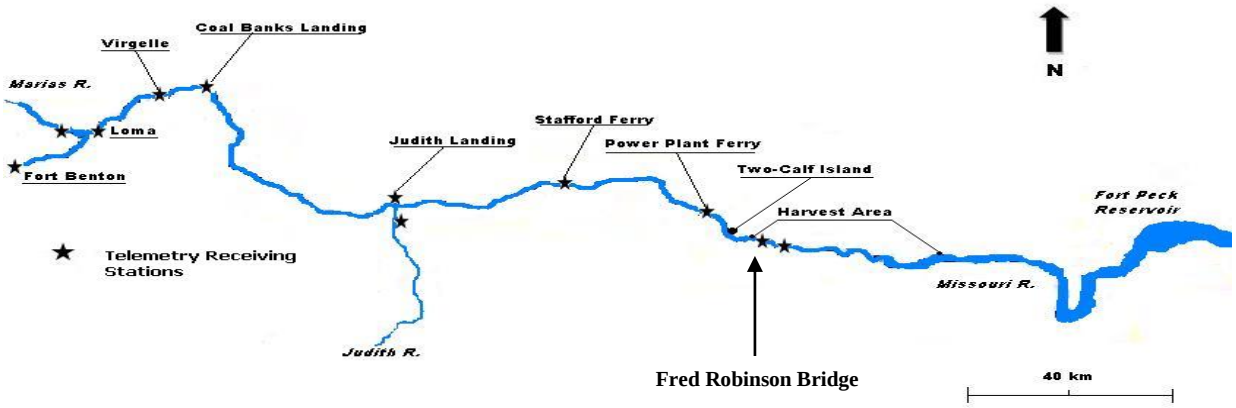
Harvest: Paddlefish Creel Survey 2021

Methods

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 River. Due to the Covid-19 pandemic, no creel clerks were stationed at the two checkpoints located at the Kipp and Rock Creek campgrounds in 2020 and 2021. To accommodate anglers, four self-creel boxes were constructed to provide a location to report harvested paddlefish and collect additional harvest data. The boxes were located at Kipp, Jones Island, Slippery Ann and Rock Creek campgrounds. Boxes were checked and sanitized twice a week for the duration of the paddlefish season. Anglers who provided harvest information along with a jaw sample of their harvested paddlefish received a paddlefish hat.

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 (2003-2021)

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 2,680 angler's purchase a tag to snag for paddlefish above Fort Peck Reservoir annually, representing approximately 4,973 fishing days. On average, approximately 1,854 paddlefish are caught annually above Fort Peck Reservoir with approximately 69% of the paddlefish being released (Table 4).

In 2021, phone creels were performed for harvest tag holders, snag and release (unsuccessful), and snag and release OTC. Approximately 75% of the harvest tag holders (n=750 (of 1,000)) and 25% of snag and release anglers were contacted in 2021.

Effort

In 2021, 4,231 anglers applied for an Upper Missouri River paddlefish harvest tag, via entering the lottery draw. A total of 1,000 harvest tags were issued and an additional 1,250 over-the-counter snag and release licenses were sold. The sale of 5,480 Upper Missouri River paddlefish licenses was the highest ever documented.

Estimated paddlefish snagging effort was 4,665 angler days, with an estimated 415 paddlefish being harvested and an additional 2,792 paddlefish being caught and released (Table 4). Approximately 73% of harvest tag holders fished for paddlefish in 2021 while nearly 50% of OTC snag and release holders and 28% of snag and release holders (unsuccessful draw) fished, respectively.

Table 4. –Summary of estimates for the Fort Peck paddlefish population from the Montana paddlefish telephone creel survey (2003-2021).

Missouri River Above Fort Peck																			
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
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	1,001	5,480
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	763	2,238
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	2,862	4,665
Total Hours Fished*	27,433	44,400	42,277	39,800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number Caught	1,583	1,102	1,516	2,290	-	845	2,342	1,851	1,411	1,841	1,637	2,048	1,802	2,456	1,829	1,994	2,543	1,078	3,207
Number Harvested	868	787	1,028	1,067	634	300	564	575	598	381	292	307	334	350	346	199	305	452	415
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	0.44	0.68
Harvest Rate (fish/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28	0.18	0.11	0.19	0.2	0.21
Percent Released	45%	29%	32%	53%	-	65%	76%	69%	58%	80%	82%	85%	82%	86%	81%	90%	88%	58%	87%
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%	93.90%	96.50%

* Includes hours spent catch and release fishing

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

Phone Creel-Supplemental Questions

In 2021, three supplemental questions were asked to anglers: 1) Satisfied with paddle fishing experience? Overall, 98% of respondents said they were satisfied with their 2021 paddlefish season. 2) Was a boat used to access snagging areas? Overall, 40.7% of respondents said they used a boat to access snagging areas. 3) Did you release at least one fish prior to harvesting a paddlefish? Overall, 26.4% of respondents said they released at least one paddlefish prior to harvest. Several reasons for release were stated but the most common response was either the fish was too small (n=24), or the fish was too big (n=12).

Harvest and Catch

Anglers are 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 (Y/N), 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 2021, a total of 1,000 harvest tags were issued via a lottery draw. Non-resident anglers, representing thirteen states comprised 3% of the harvest tag holders (Figure 7). Harvest tag holders represented 125 Montana cities; with Billings (n=130), Great Falls (n=117), Bozeman (n=61), Helena (n=41), Havre (n=41) and Missoula (n=40) having the highest representation.

Angler's reported harvesting 340-paddlefish during the 2021 season (Figure 8). Angler success was highest during the last three weeks of the season. When flows increased slightly and triggered a small upstream movement of paddlefish. Overall success in 2021 was above average, good access conditions aided angler's ability to locate concentrations of paddlefish. Historically, 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). However, a noticeable shift in reporting preference occurred in 2020 due to Covid-19 precautions (Figure 10). Reporting preference was similar to historic reporting in 2021 even though on-site creel clerks were not present (Figure 10).

Figure 7. State of origin for non-resident anglers who successfully drew a paddlefish harvest tag on the Upper Missouri River in 2021 (n=31).

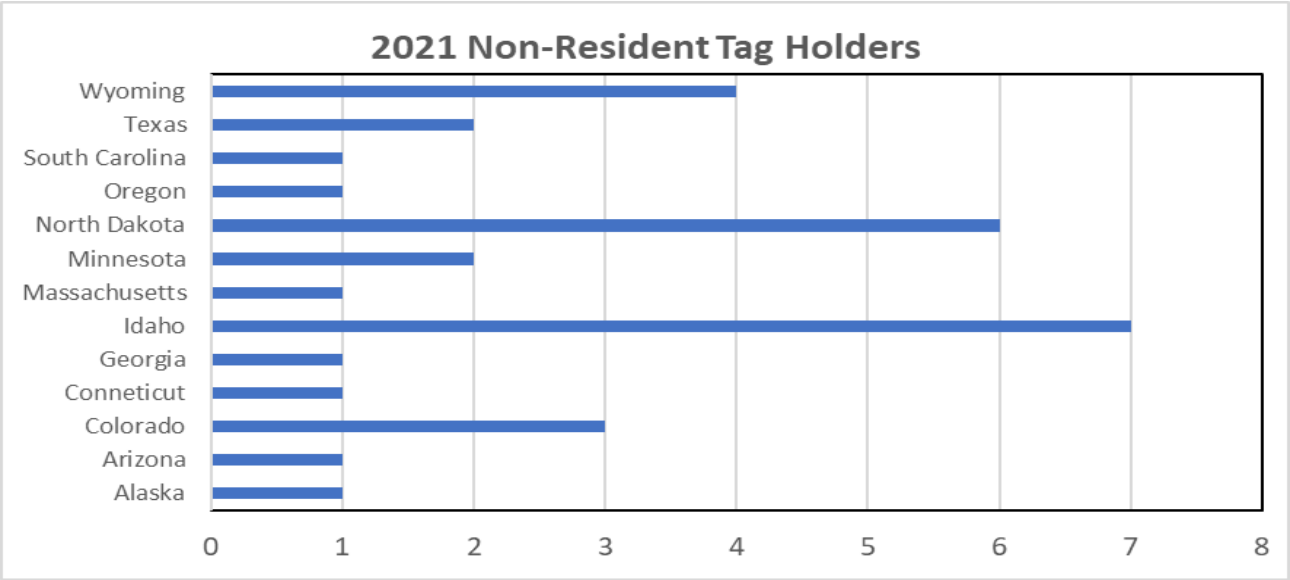


Figure 8. Daily harvest of paddlefish during the Upper Missouri River paddlefish season (May 1-June 15, 2021).

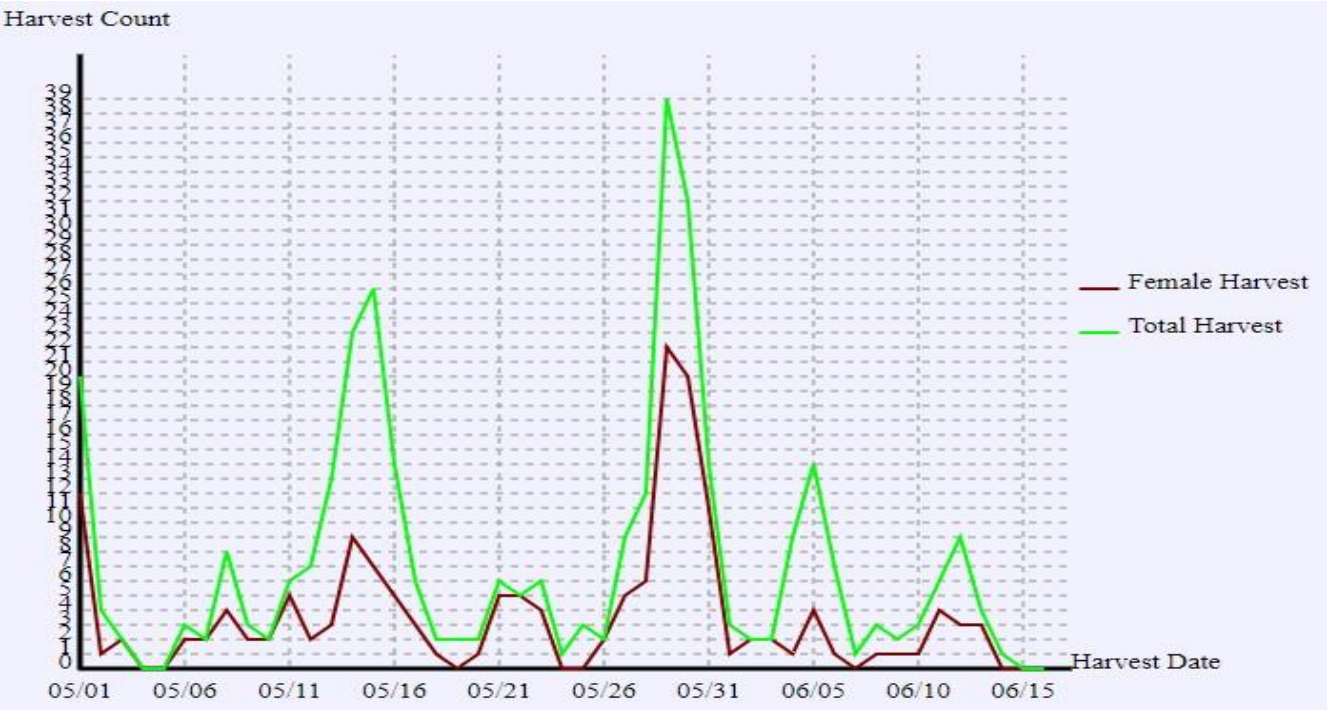


Figure 9. Preference for anglers reporting a harvested paddlefish on the Upper Missouri River in 2019.

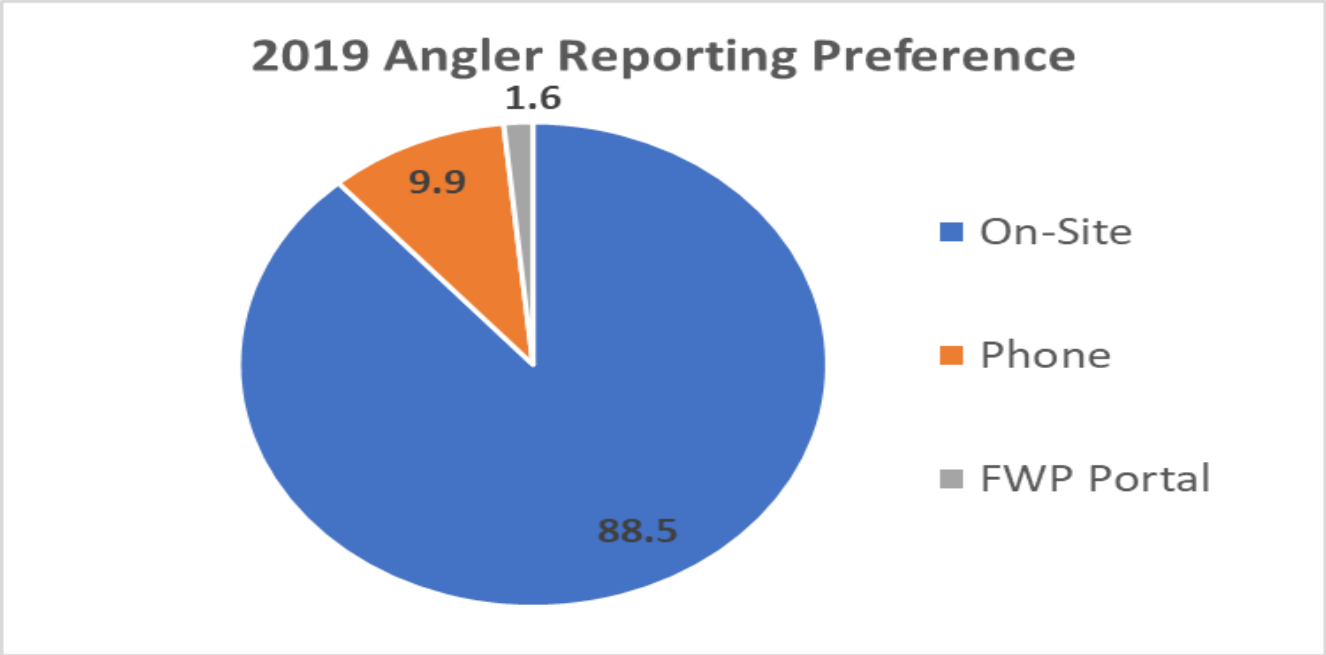
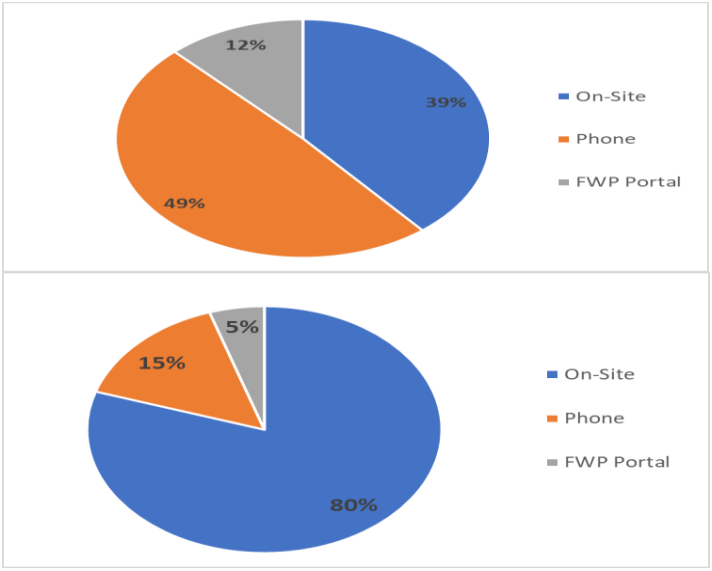


Figure 10. Preference for anglers reporting a harvested paddlefish on the Upper Missouri River in 2020 and 2021.



Harvest Statistics- Paddlefish

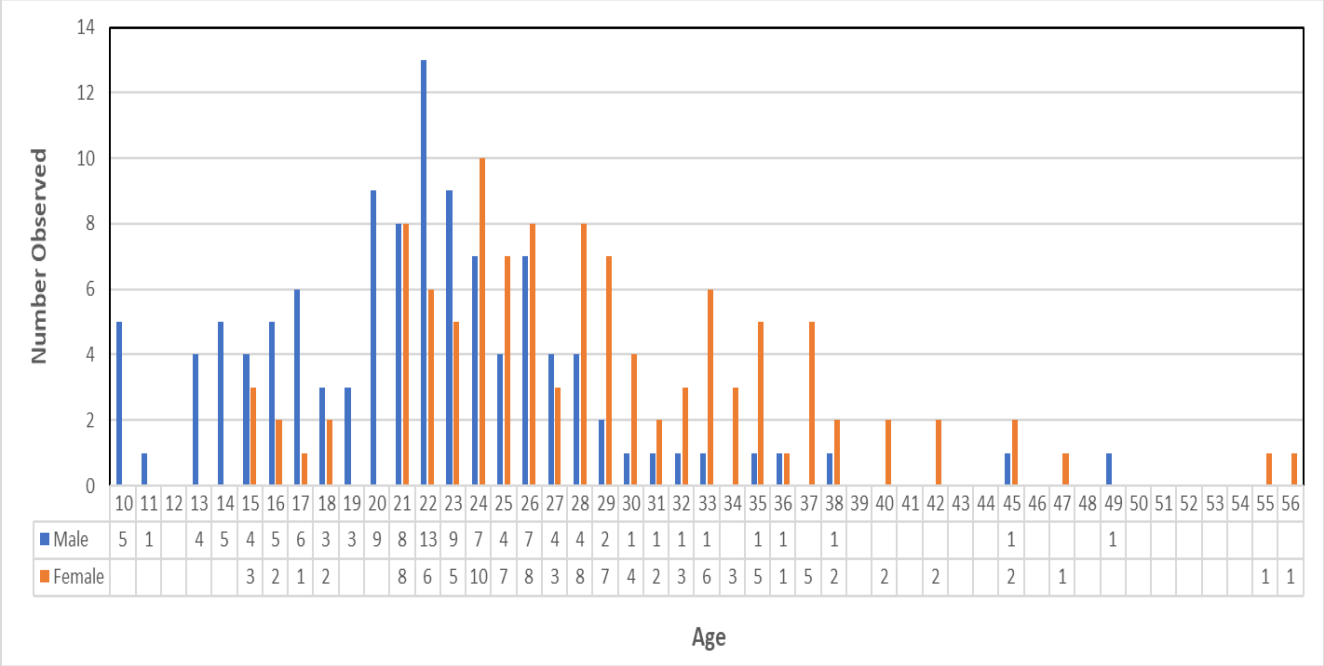
In 2021, anglers mandatorily reported harvesting 340 paddlefish on the Upper Missouri River (Figure 8). Harvested paddlefish ranged in length from 34.0 to 56.0 inches (eye-fork length) and

weight from 15 to 105 pounds (Table 5). Forty-nine percent of the harvested paddlefish were females and 58/340 (17 %) of the harvested paddlefish had jaw tags. Harvested paddlefish ranged in age from 10 to 56 years with 54% of the harvested females (age 25-45) being classified as "prime spawners" and 6.3% of all harvested fish classified as new recruits (Figure 11).

Table 5. – Length, weight, and condition indices of harvested paddlefish on the Upper Missouri River (RM 1897-1921), May-June 2005-2021.

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	31.0-57.1	44.6	5.6	16.0-121.1	59.3	21.8
PF	2020	324	24.0-57.0	44.0	6.6	17.0-117.0	56.0	24.1
PF	2021	337	34.0-74.0	43.8	7.3	15.0-105.0	53.9	24.0

Figure 11. Age structure of male (n=112) and female (n=110) paddlefish harvested in the Upper Missouri River (RM 1897-1921) during the 2021 paddlefish season (May and June).



Discussion

Recruitment is highly variable among years for this population (Tables 2 and 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 and 2006). In addition, the average size of adult females has declined (Bowersox 2004). These declines, especially in growth, are believed to be the result of decreased productivity due to the ageing of Fort Peck Reservoir (rearing habitats for paddlefish) and extremely low Fort Peck Reservoir levels from 1999-2007 (Figure 2 and Table 1). 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. Furthermore, Fort Peck Reservoir water levels increased from 2008-2011and 2018-2020 (Table 1). 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 2021 were very poor and YOY transects conducted in August reflected that. Zero 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).

The Upper Missouri River paddlefish population continues to function as a self-sustaining fishery, with no hatchery augmentation ever occurring on 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" 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.

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 remaining 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 2021 to determine angler use, catch rates, and satisfaction. Bailey ranked 26th in the region for angler pressure in 2019/2020 (361 +/- 236 angler days; MTFWP Fisheries Bureau 2020).

Since 2007, population densities of all species have fluctuated greatly (Table 6; Figure 12). 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). Extensive littoral vegetation has limited seining in some years (i.e., 2021).

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, white sucker, and bluegill in Bailey Reservoir, 1985-2021.

		Northern pike			Yellow Perch			Black Crappie			Rainbow Trout			Walleye			White Sucker			Bluegill		
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.)	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	--	--	--	--
2020	2	10	20.13	1.8	2.5	5.4	0.09	1.5	11.13	0.92	0	--	--	--	4.5	19.41	3.18	0	--	--	0.5	7.6	0.56
2021	2	9	20.39	1.83	0.5	11	0.71	0	--	--	0	--	--	--	0.5	17.9	2.01	0	--	--	--	--	--

Figure 12. Summary of relative abundance for yellow perch, black crappie, northern pike, fathead minnow, walleye, bluegill and rainbow trout captured by trap nets in Bailey Reservoir, 1989-2021.

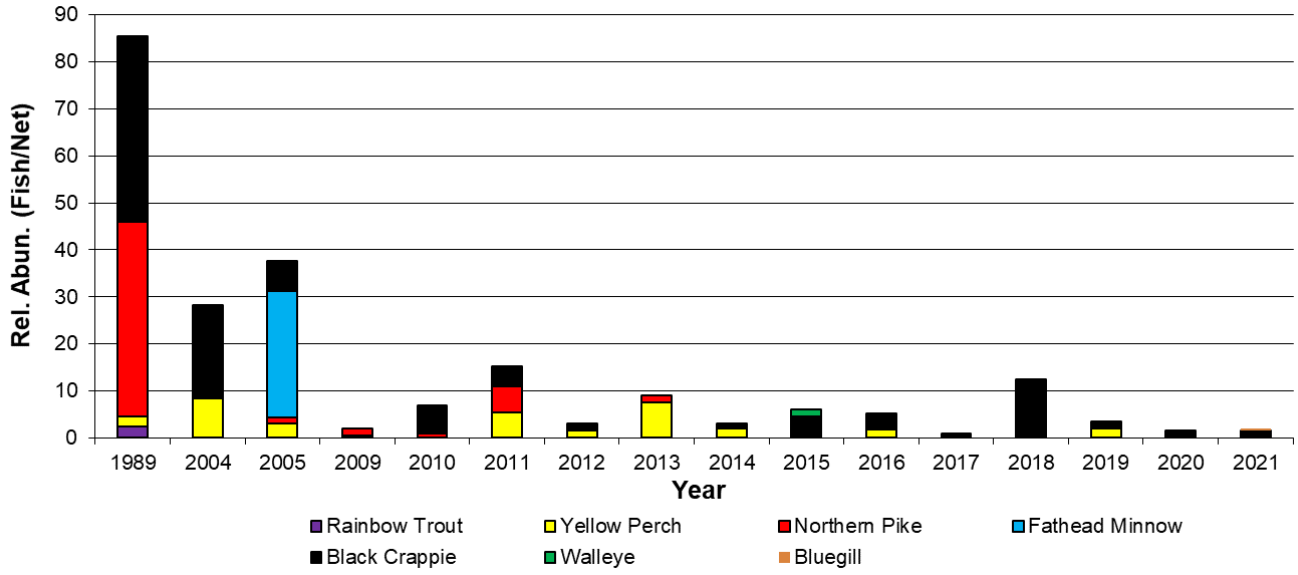


Table 7. Summary of young of year yellow perch (YP), black crappie (BLC), northern pike (NP), fathead minnow (FH MN), largemouth bass (LMB), walleye (WE), and rainbow trout (RB) captured by beach seining in Bailey Reservoir, 1982 to 2019.

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 70 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 19th in the region for angler pressure in 2019/2020 (930 +/- 562 angler days; MTFWP Fisheries Bureau 2020).

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 10 feet during our sampling effort. Gill netting was conducted overnight with three sinking and three floating experimental 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 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.

Yellow perch abundance has trended upward recently. From 2014-2018, 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 and quality sized fish (5-8 in.; Table 9). Severe drought conditions have occurred across the region in 2017 and 2021, which increased the water demands from Beaver Creek Reservoir. From July to October, reservoir pool elevations dropped approximately 15 feet, creating less than ideal rearing conditions and reduced the presence of YOY yellow perch (Table 8). These drawdowns usually result in increased terrestrial vegetation growth in the littoral zone which benefits yellow perch spawning habitat.

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 size. Since 2011, walleye relative abundance has slowly increased to record high abundances observed in 2019 (13.2 walleye/net; Table 9). Walleye relative abundance observed in 2021 was closer to average (5.3 walleye/net; 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 2021.

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
Aug-20	6	162	116	0	6	0	0	0	5	0	0	0	6	0	0
Aug-21	6	18	8	0	0	0	0	0	51	0	0	0	4	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 (fish/net), average total length, and relative weights of fishes collected in fall gill netting surveys in Beaver Creek Reservoir, 1974-2021.

			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
Sep-20	2020	6	0.17	14.90	92.58	20.33	6.48	94.23	3.50	28.61	101.54	--	--	--	6.50	16.31	84.57	0.00	--	1.17	17.91
Sep-21	2021	6	1.17	12.57	108.24	20.83	7.56	100.89	0.83	25.56	103.09	--	--	--	5.33	17.53	84.16	0.00	--	0.17	13.80

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 5,200 surface acres with a mean depth of 27 feet, and a maximum depth of 45 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 into a warm-water fishery supporting walleye, yellow perch, black crappie, Lake Superior whitefish, emerald shiner and spottail shiners. Fresno ranked 5th in the region for angler pressure in 2019/2020 (11,155 +/- 2,586 angler days; MTFWP Fisheries Bureau 2020). Winter angling pressure in 2019/2020 was estimated at 201 angler days and made up less than 2% of the overall estimated pressure. This was by far the lowest winter angling estimate observed on Fresno since 2001.

The fishery in Fresno has varied over the years due to high fluctuations in reservoir water elevations. On average, water levels in Fresno fluctuate 10-25 feet per year with an annual water retention rate of 85 (±25) days (mean storage (acre-feet)/average daily in/out flows (acre-feet)). The timing of this fluctuation greatly impacts the reproduction and survival of forage and sport fish.

Since 2017, FWP has partnered with the Fresno Chapter of Walleyes Unlimited to increase yellow perch spawning habitat utilizing recycled Christmas trees. Approximately 800 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 6-15 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. In May 2020, a catastrophic failure to Drop 5 severely impacted water delivery and users throughout the Milk River basin. The failure at Drop 5 impacted flow in the Milk River above Fresno and resulted in a significant drawdown of the reservoir. Fresno pool elevations dropped approximately 27 feet from June 1 to September 30. Repairs to the drop structures were completed in early October 2020. Water was diverted into Fresno in late October, which increased pool elevations by approximately eight feet and helped buffer pool elevations for the spring spawning period in 2021.

Pool elevations reached 2571' (4 feet below full pool) in early June and then severe drought conditions hit the area and Fresno was drawn down 30 feet by early August. This was the second consecutive year in which pool elevations were severely reduced and third time this had happened since 2017.

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 drawdowns in Fresno in 2001-2002, 2017, and 2020-2021 due to drought conditions and infrastructure failure, greatly reduced the reproductive success and survival of most juvenile 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 excellent spawning and rearing habitat. In these years, 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).

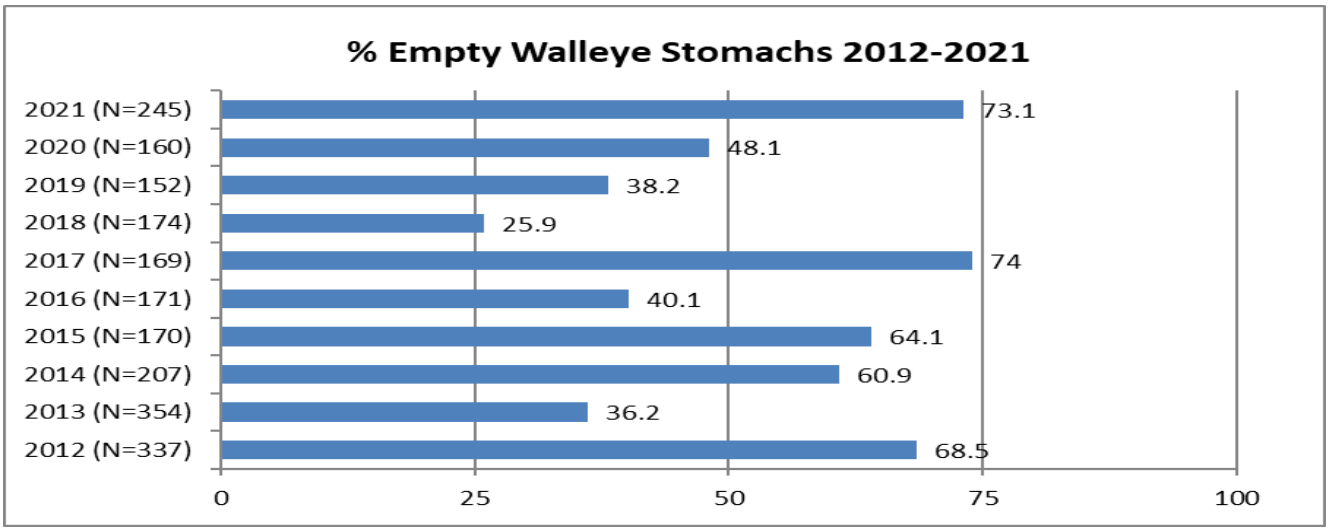
The number of walleye, black crappie and spottail shiner observed during summer seining in 2018 and 2019 suggest spawning conditions were favorable for both early and late spawning fishes (Table 10). Although not strongly represented during our seining efforts, a strong black crappie year-class was also produced in 2018, based on fall gill net surveys (Figure 21). 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 13). This percentage stayed low once again in 2019 but have since increased (Figure 13). Walleye have been the one species that has shown spawning success and survival of juveniles during the recent drawdowns in 2017 and 2020-2021 (Table 10; Figure 17).

Table 10. – A summary of forage and YOY forage and sport fish collected using a 75- x 9-foot x ¼ inch square mesh beach seine in Fresno Reservoir, 1998-2021.

Year	Seine Hauls	*Sanders*	Walleye	Sauger	Northern Pike	YP (yoy)	YP (adult)	Emerald Shiner	Crappie Sp.	Spottail Shiner	Sucker sp.[1]	Minnow sp.[2]
1998[+]	12	44	--	--	1	1,413	--	9	0	1,041	1	3
1999	12	50	--	--	7	4,271	--	176	12	182	13	0
2000	6	29	--	--	0	1,396	--	2	2	30	2	0
2001	6	86*	--	--	0	39[-]	--	3	0	3	3	1
2002	12	28*	--	--	2	86[-]	--	128	400	154	4	29
2003[+]	12	4	--	--	46	1,871[-]	--	5,539	90	207	0	0
2004[+]	12	--	12	2	10	2,898[-]	--	69	48	56	0	2
2005[+]	12	--	26	2	19	934	--	39	15	39	0	0
2006[+]	12	--	27	0	57	2,283	--	80	5	923	0	0
2007[+]	12	--	7	0	13	769	--	68	54	1,106	2	0
2008[+]	12	--	65	0	1	2,329	--	5	721	287	11	0
2009[+]	12	--	24	0	24	1,427	224	13	25	716	1	0
2010[+]	12	--	10	0	7	1,247	4	6	4,517	849	0	0
2011[+]	12	--	18	0	4	4,961[-]	6	5	890	499	0	0
2012	12	--	27	0	9	661[-]	4	2	43	41	0	0
2013	12	--	16	0	4	1,306[-]	0	12	292	816	0	3
2014	12	--	47	0	4	6,834[-]	27	0	575	3,011	0	1
2015	12	--	12	1	3	926[-]	88	634	332	1,337	0	5
2016	12	--	21	0	1	399[-]	5	263	357	641	0	6
2017	12	--	16	0	1	115[-]	2	3	88	207	0	15
2018	12	--	30	0	4	377[-]	1	0	136	957	1	0
2019	12	--	43	0	1	782[-]	2	0	1,214	1,066	0	14
2020	12	--	70	2	2	574	3	0	76	449	52	0
2021	12	--	25	0	2	429	0	2	24	243	0	59

[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, lake whitefish 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 13. – Percentage of empty walleye stomachs observed during fall netting surveys in Fresno Reservoir, 2012-2021 (N= number of individual stomachs checked).



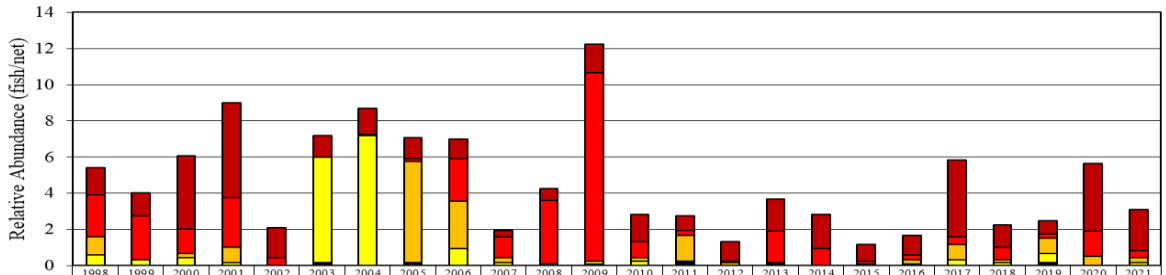
Population Status of Adult Fishes

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 are collected over two days utilizing six sinking multi-filament experimental gill nets each day (12 net-days). Since 2005, otoliths were collected from walleye for aging and oxytetracycline (OTC) analysis. Extremely low water levels in September 2020 altered the number of gillnets used for sampling. In 2020, sampling occurred over a two-day period utilizing four nets/day (8 nets/day, total). Favorable water conditions were present in 2021 and the standard 12 predetermined sites were used.

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 14). Whitefish exhibit fast growth rates in the reservoir and thereby avoid predation from all but the largest walleye and northern pike.

Figure 14. - Relative abundance and size structure of lake whitefish collected with sinking experimental gill nets in Fresno Reservoir, 1998-2021.



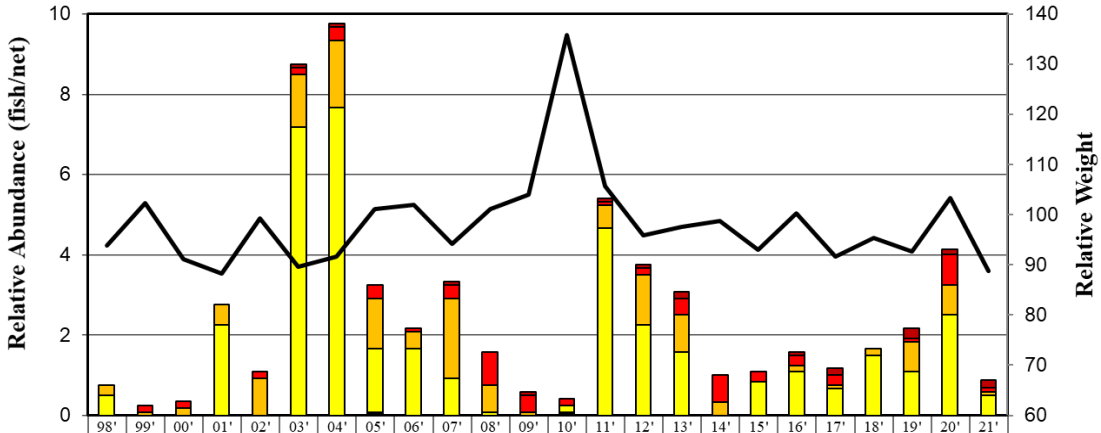
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Memorable (>18.0 in.)	1.50	1.25	4.08	5.25	1.67	1.17	1.42	1.17	1.08	0.333	0.66	1.583	1.5	0.833	1.083	1.75	1.92	0.917	1.08	4.25	1.25	0.75	3.75	2.25
Preferred (14.0-17.9 in.)	2.33	2.42	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	1.38	0.42
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	0.5	0.25
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	0	0.167
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	0	0

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 reproduction was poor and population levels were reduced (Table 10; Figure 15). In 2003 and 2004, water levels increased, flooding shoreline vegetation, and successful spawning and recruitment of forage fish was observed (Table 10). From 2011-2019, pre-spawn yellow perch were 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 recruited into the population, regardless of spawning conditions and reproductive success.

Low water levels throughout the fall and winter months limit overwinter 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, but yellow perch relative abundance continued to remain low (Figure 15). The current yellow perch population is below historical population densities and is comprised of multiple age-classes (Figure 15).

Figure 15. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Fresno Reservoir, 1998-2021.

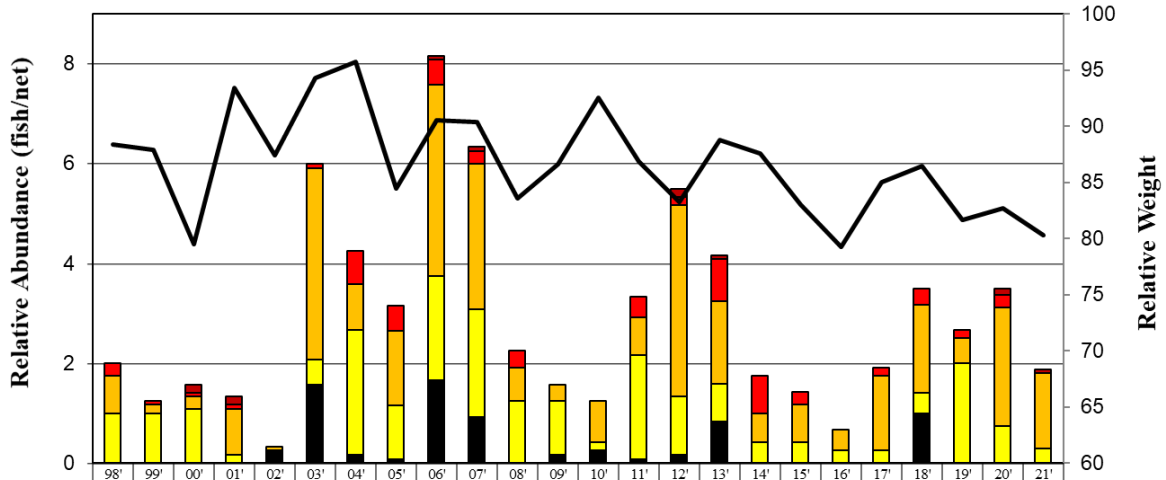


	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>12 in.)						0.1	0.1			0.1		0.1		0.1	0.1	0.2			0.1	0.2		0.3	0.1	0.2
Preferred (10-11.9 in.)		0.2	0.2		0.2	0.2	0.3	0.3	0.1	0.3	0.8	0.4	0.2	0.1	0.2	0.4	0.7	0.3	0.3	0.3		0.1	0.8	0.1
Quality (8-9.9 in.)	0.3	0.1	0.2	0.5	0.9	1.3	1.7	1.3	0.4	2.0	0.7	0.1		0.6	1.3	0.9	0.3		0.2	0.1	0.2	0.8	0.8	0.1
Stock (5-7.9 in.)	0.5			2.3		7.2	7.7	1.6	1.7	0.9	0.1		0.2	4.7	2.3	1.6		0.8	1.1	0.7	1.5	1.1	2.5	0.5
Sub Stock (<5 in.)								0.1					0.1											
Relative Weight	93.8	102.3	91.1	88.3	99.3	89.7	91.6	101.1	102.0	94.1	101.1	104.0	135.8	105.6	95.9	97.5	98.7	93.0	100.3	91.6	95.4	92.7	103.3	88.7

Northern pike

Since the illegal introduction of northern pike in Fresno Reservoir during the 1940s, their population has fluctuated over the years (Figure 16). 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 16). 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) had stabilized but is trending down once again, the current population is comprised of multiple length and age-classes (Figure 16).

Figure 16. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental gill nets in Fresno Reservoir, 1998-2021.



	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>34 in.)			0.2	0.2					0.1	0.1					0.2	0.1							0.1	0.1
Preferred (28-33.9 in.)	0.3	0.1	0.1	0.1		0.1	0.7	0.5	0.5	0.3	0.3			0.4	0.2	0.8	0.8	0.3		0.2	0.3	0.2	0.3	
Quality (21-27.9 in.)	0.8	0.2	0.3	0.9	0.1	3.8	0.9	1.5	3.8	2.9	0.7	0.3	0.8	0.8	3.8	1.7	0.6	0.8	0.4	1.5	1.8	0.5	2.4	1.5
Stock (14-20.9 in.)	1.0	1.0	1.1	0.2		0.5	2.5	1.1	2.1	2.2	1.3	1.1	0.2	2.1	1.2	0.8	0.4	0.4	0.3	0.3	0.4	2.0	0.8	0.3
Sub Stock (<14 in.)					0.3	1.6	0.2	0.1	1.7	0.9		0.2	0.3	0.1	0.2	0.8					1.0			
Relative Weight	88.4	87.9	79.5	93.4	87.4	94.3	95.7	84.4	90.5	90.4	83.6	86.7	92.5	86.9	83.3	88.8	87.6	83.0	79.3	85.0	86.4	81.7	82.7	80.3

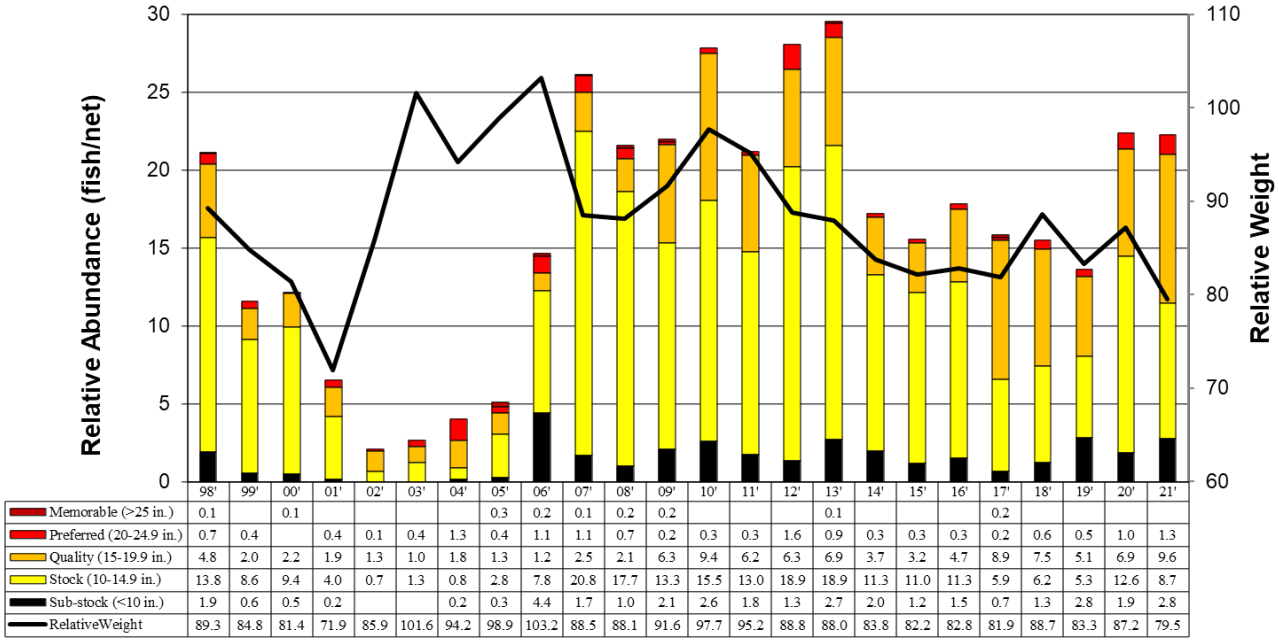
Walleye

From 2003 to 2011 approximately 100,000 fingerling walleye were stocked annually in Fresno Reservoir. Since 1998, five of the eight highest walleye relative abundances were documented from 2007-2013 (Figure 17). It was clear that stocking walleye fingerlings at a rate of 100,000/year was very successful, based on Oxytetracycline analysis these fish recruited and contributed to the adult population (Figure 18). However, the stocking rate and density led to concerns of the sustainability and balance with the forage base, as well as reduced walleye growth rates.

No walleye fingerlings were stocked from 2011-2020. This was done in an effort to balance adult walleye abundances to a more sustainable level and promote better walleye growth rates. Summer seining surveys continue to document successful reproduction of walleye, and the population is showing signs of continued growth and stabilization, regardless of fishing pressure and harvest. Sampling efforts conducted in 2021 documented walleye relative abundance at 22.3 walleye/net, current densities are above the long-term average of 15.2 walleye/net with a diverse age and size structure (Figures 17 and 19).

Approximately 33,000 walleye fingerlings were stocked in 2021 during the establishment of the new Fresno Management Plan, and annual walleye plants will continue to occur. The re-establishment of annual walleye plants is to increase inter and intra specific competition to increase walleye catch rates for anglers. Continued declines in walleye relative weights were observed from 2011-2017 and fell below 80 in 2021 (Figure 17). Walleye growth was close to average in 2021 for all ages observed (Figure 20).

Figure 17. - Relative abundance, size structure, and relative weight of walleye in Fresno Reservoir for the years 1998-2021.



	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>25 in.)	0.1		0.1					0.3	0.2	0.1	0.2	0.2				0.1				0.2				
Preferred (20-24.9 in.)	0.7	0.4		0.4	0.1	0.4	1.3	0.4	1.1	1.1	0.7	0.2	0.3	0.3	1.6	0.9	0.3	0.3	0.3	0.2	0.6	0.5	1.0	1.3
Quality (15-19.9 in.)	4.8	2.0	2.2	1.9	1.3	1.0	1.8	1.3	1.2	2.5	2.1	6.3	9.4	6.2	6.3	6.9	3.7	3.2	4.7	8.9	7.5	5.1	6.9	9.6
Stock (10-14.9 in.)	13.8	8.6	9.4	4.0	0.7	1.3	0.8	2.8	7.8	20.8	17.7	13.3	15.5	13.0	18.9	18.9	11.3	11.0	11.3	5.9	6.2	5.3	12.6	8.7
Sub-stock (<10 in.)	1.9	0.6	0.5	0.2			0.2	0.3	4.4	1.7	1.0	2.1	2.6	1.8	1.3	2.7	2.0	1.2	1.5	0.7	1.3	2.8	1.9	2.8
RelativeWeight	89.3	84.8	81.4	71.9	85.9	101.6	94.2	98.9	103.2	88.5	88.1	91.6	97.7	95.2	88.8	88.0	83.8	82.2	82.8	81.9	88.7	83.3	87.2	79.5

Figure 18. 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.

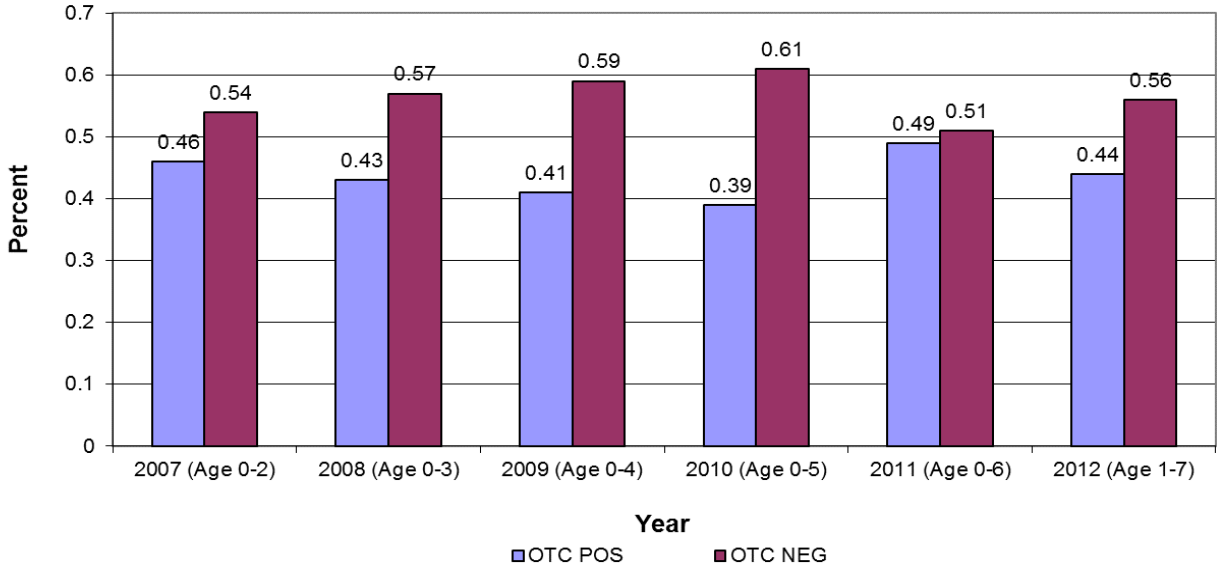


Figure 19. Observed walleye age structure and distribution in Fresno Reservoir, 2021.

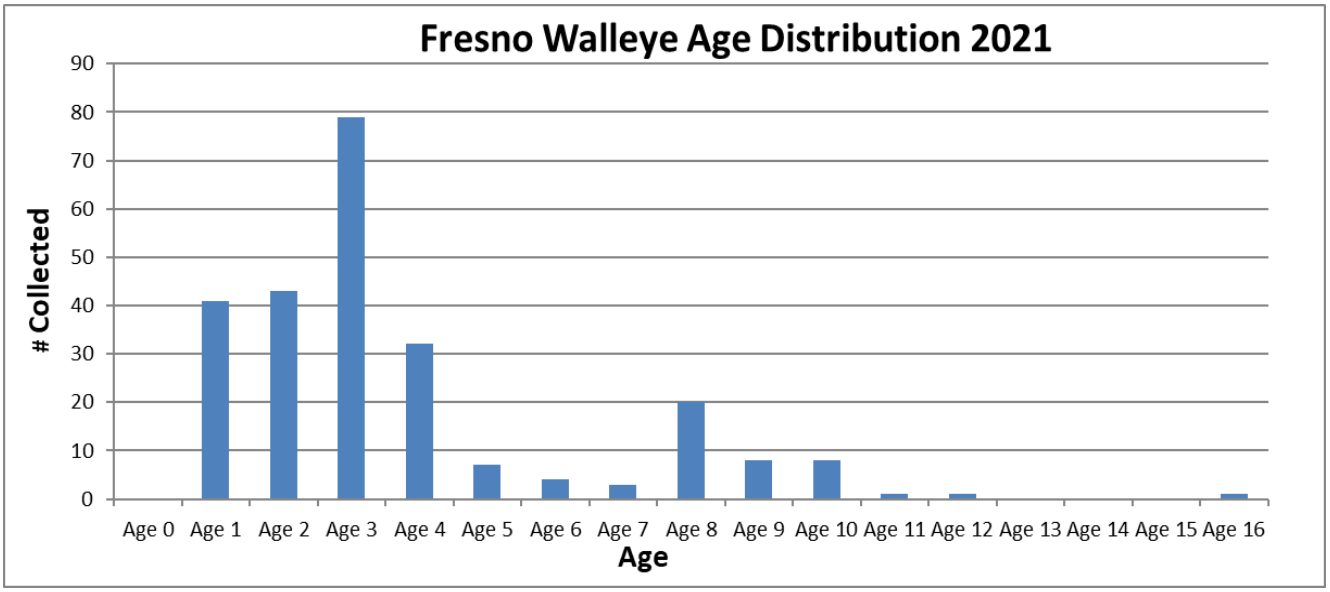
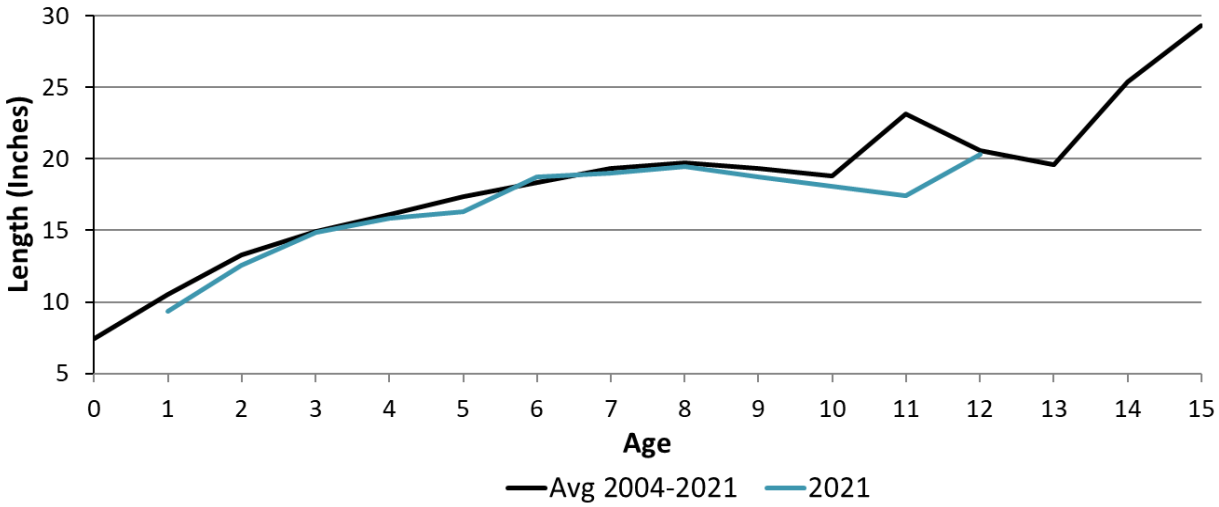


Figure 20. Walleye length at age in Fresno Reservoir, 2004-2021.



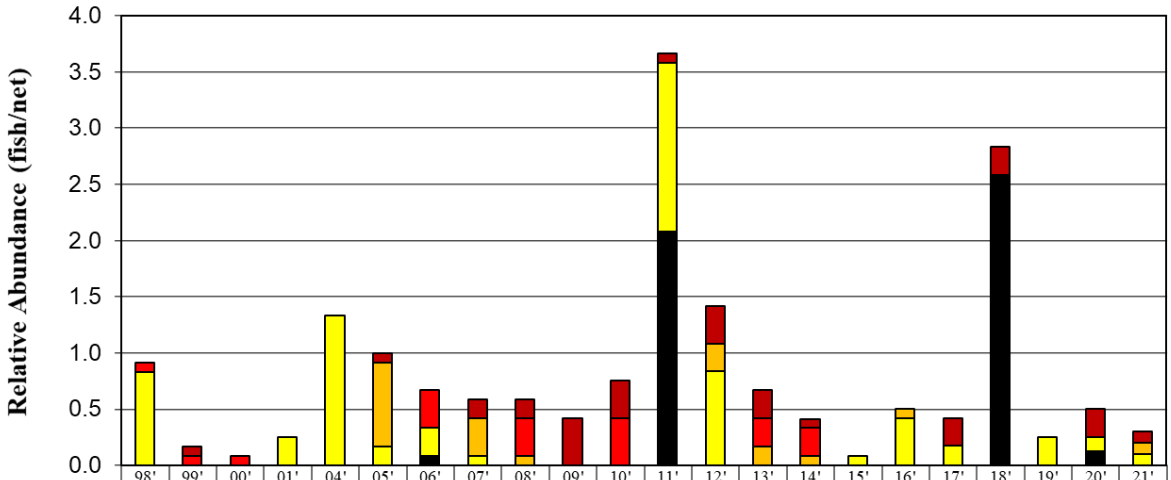
Black Crappie

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 21). 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 adults has been variable (Figure 21). Rapid reductions

to Fresno's pool elevations in 2017 and 2020-2021 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 21). A very good year-class was produced in 2018 but recruitment of this year-class to adults was low (Figure 21).

Figure 21. - Relative abundance and size structure of black crappie collected with sinking experimental gill nets in Fresno Reservoir, 1998-2021.



	98'	99'	00'	01'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>12.0 in.)	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.4	0.3	0.1	0.3	0.3	0.1	0.0	0.0	0.3	0.3	0.0	0.3	0.1
Preferred (10.0-11.9 in.)	0.1	0.1	0.1	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.4	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Quality (8.0-9.9 in.)	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.3	0.1	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Stock (5.0-7.9 in.)	0.8	0.0	0.0	0.3	1.3	0.2	0.3	0.1	0.0	0.0	0.0	1.5	0.8	0.0	0.0	0.1	0.4	0.2	0.0	0.3	0.1	0.1
Sub Stock (<5.0 in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.1	0.0

Milk River (Fresno Dam to Harlem Weir)

The Milk River flows approximately 107 miles through this area that starts at Fresno Dam (RM 446) and ends at the Harlem Weir (RM 339). This section of the Milk River is diverse with cottonwood galleries and irrigated crop and hay lands. Dry-land agriculture and rangeland exist throughout the area, and the Bearpaw Mountains are located in this section. There are several major tributaries to the Milk River located in this area. Lodge and Battle Creeks originate well into Alberta, Canada whereas Beaver (Hill), Clear, Snake, and Little Boxelder Creeks originate in the Bear Paw Mountains.

This section is highly influenced by manmade structures and altered river flows. Approximately six dams and weirs are in this section and seasonal flows are altered by irrigation water releases from Fresno Reservoir (low winter flows and high spring and summer flow; Figure 22). Angling pressure is moderate in this section and the fish assemblage is comprised mostly of native and non-native fishes.

Seining surveys occurred at thirteen locations in this section (Table 11). The first area sampled occurred from Fresno Dam to the Havre Weir (RM 445.6 – 427.8). Three sites were selected and a total of 12 seine hauls were conducted (Table 11). The second area sampled was from the Havre Weir to the Lohman Weir (RM 427.8 – 402). Two sites were selected and a total of nine seine hauls were conducted (Table 11). The third area sampled occurred from the Lohman Weir to the Chinook Weir (RM 402 – 387.8). Three sites were selected and a total of ten

seine hauls were conducted (Table 11). The fourth area sampled occurred from the Chinook Weir to Paradise Valley Dam (RM 387.7 – 383.1). This is the shortest section between dams on the entire Milk River and two sites were selected and seven seine hauls occurred (Table 11). The fifth area sampled occurred from Paradise Dam to the Harlem Weir (RM 383.1 – 338.7). Three sites were selected and a total of thirteen seine hauls were conducted (Table 11). Sampling efforts focused on diverse habitats and habitat features (tailwaters, pool, riffle, woody debris, sand, riprap, and cobble/gravel). All sites were selected based on accessibility and areas commonly used by anglers. However, by doing this we failed to get fully represented sample locations within each priority area within this section of the Milk River.

Sampling occurred in August and October when river flows were between 50 and 100 cfs (Table 11). A total of 16 species were observed within the sampling area, with flathead chub, spottail shiner, white sucker, walleye and yellow perch being observed at most sites (Table 12). Spottail shiner, yellow perch and flathead chub had the highest CPUE (# per haul) of all fish observed (Table 12). Spottail shiner and yellow perch were most abundant in upstream sites, specifically sites immediately below Fresno Dam to the Havre Weir, whereas the highest densities of flathead chub occurred at downstream sites near Chinook (Table 12).

Walleye were observed in all sections sampled and ranged in length from 3.6-7.4 inches (Table 12). Sauger ranged in length from 5-6.9 inches, with their observations occurring at downstream sections and sites (Table 12). Additional genetic analysis will occur in the future to confirm that these observations were in fact sauger, as smaller walleye can sometimes portray similar physical features of sauger.

Sampling in 2021 suggests that natives comprised most of the species observed, as well as the highest densities in most areas, though non-natives comprised most gamefish observed (walleye, northern pike, and yellow perch) with the highest densities of these species occurring in the area immediately below Fresno Dam (Table 12). Native species such as flathead chub, western silvery minnow, longnose and white sucker appear to be doing okay in this reach, however very little historic data exists to compare trends over time.

Figure 22- Milk River streamflow at the Havre Weir (USGS guage) from April 1, 2021 to November 1, 2021. Reported data includes daily flow (blue line) and median daily flow for the last 89 years (orange line).

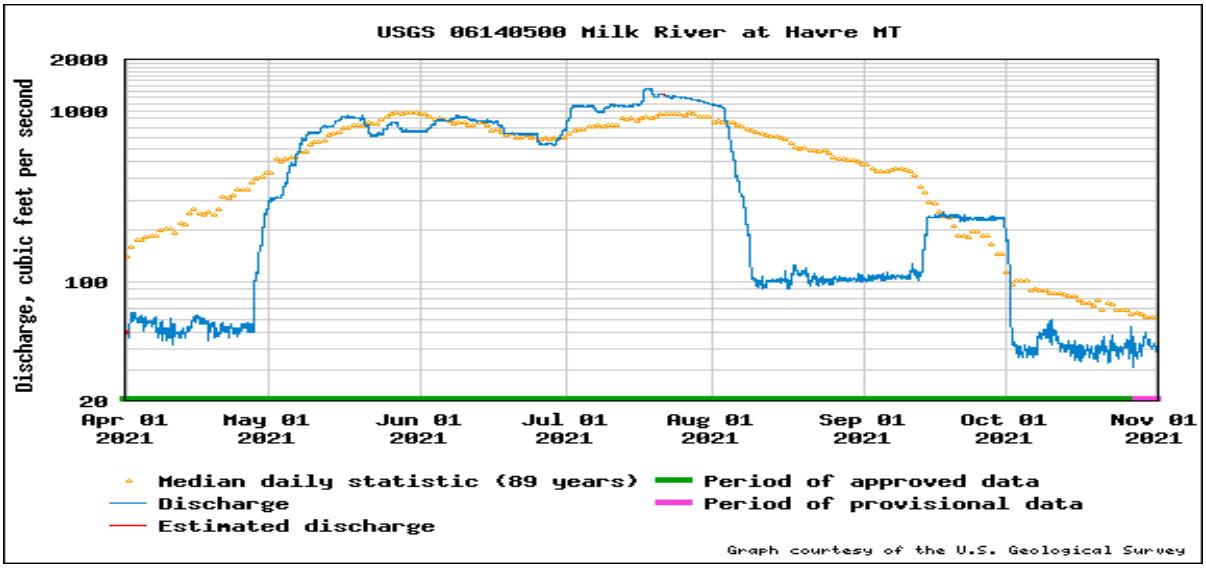


Table 11. Summary of 2021 sampling sites, date, hauls, river mile location and flow on the Milk River. Heavy bars denote on-stream dams and barriers that form the various sections within this reach.

Sampling Site	Date	# of Hauls	Upstream Lat.	Upstream Long.	Downstream Lat.	Downstream Long.	River Mile	Flow
Tailwater FAS	8/26/2021	5	48.60018	-109.9416	48.59914	-109.93721	445.6-445.3	100 cfs
Rookery WMA	8/26/2021	4	48.56848	-109.79726	48.56915	-109.79415	434.7-434.5	100 cfs
Rookery Takeout	8/26/2021	3	48.57479	-109.75539	48.57547	-109.75312	431.7-431.6	100 cfs
Havre Weir	8/30/2021	6	48.56177	-109.7016	48.56176	-109.69973	427.8-427.6	100 cfs
Havre Viaduct	8/30/2021	3	48.55623	-109.67112	48.55603	-109.6702	426-425.9	100 cfs
Lohman Weir	8/30/2021	3	48.60169	-109.40456	48.60107	-109.40341	402-401.9	100 cfs
Highland Rd Bridge	8/30/2021	3	48.60099	-109.39722	48.59996	-109.39478	400.6-400.4	100 cfs
HWY 2 East of Lohman	10/6/2021	4	48.59464	-109.36425	48.59362	-109.36424	398.3-398.2	50 cfs
Chinook Weir	10/6/2021	4	48.57949	-109.23213	48.57918	-109.23091	387.7-387.6	50 cfs
Cleveland Rd Crossing	10/6/2021	3	48.57677	-109.2283	48.57679	-109.22636	387.3-387.1	50 cfs
Paradise Dam	10/13/2021	5	48.56652	-109.18892	48.56702	-109.18555	383.1-382.9	50 cfs
Battle Creek Confluence	10/13/2021	3	48.57719	-109.10853	48.57636	-109.10616	376.3-376.1	50 cfs
Zurich Spa Bar	10/13/2021	5	48.58281	-109.04039	48.58285	-109.03772	371.2-371	50 cfs

Table 12. Summary of water temperature, species CPUE (# per haul), total CPUE and species presence/absence and distribution observed on the Milk River from Fresno Dam to the Harlem Weir, 2021. Dark column bars denote on-stream dams and barriers that create the high number of sections within this reach of the Milk River.

	Sampling Sites												
Species CPUE (# Per Haul) (N depicts native fish)	Tailwaters FAS	Rookery WMA	Rookery Takeout	Havre Weir	Havre Viaduct	Lohman Weir	Highland Rd Bridge	HWY 2 E of Lohman	Chinook Weir	Cleveland Rd Crossing	Paradise Dam	Battle Creek Confluence	Zurich Spa Bar
Water Temperature (F)	63	65	70	66	68	67	68	56	56	59	49	48	49
bluegill	*	*	*	*	*	*	1	*	*	*	0.2	*	*
brassy minnow (N)	*	*	*	*	*	*	*	*	*	1	*	*	*
fathead minnow (N)	0.2	*	*	*	*	*	*	*	*	1.66	*	*	*
flathead chub (N)	*	*	*	*	1.67	1	9.66	0.25	10.75	102	2.4	3.66	*
lake chub (N)	*	*	*	0.17	*	*	*	*	*	*	*	*	*
longnose dace (N)	0.2	*	*	0.5	*	*	1.66	*	*	*	*	*	*
longnose sucker (N)	4.2	0.25	*	*	*	0.66	*	0.75	1.5	2.66	*	*	*
northern pike	0.2	*	*	0.17	0.33	*	*	*	*	*	0.4	*	0.2
sauger (N)	*	*	*	*	*	*	*	2	0.75	*	0.8	*	*
shorthead redhorse (N)	*	*	*	*	*	*	*	*	*	*	0.2	*	*
spottail shiner	27.2	35	21.7	8.17	7.33	2	7.66	*	*	*	1.8	9	3.2
stonecat (N)	*	*	*	*	*	0.33	*	*	*	*	*	0.33	*
white sucker (N)	2.2	3	2	*	1	0.33	2.66	1.75	1	1	0.6	0.33	0.2
walleye	0.2	0.75	0.33	0.17	*	0.66	1.33	0.25	0.25	*	1.2	1.66	*
western silvery minnow (N)	*	0.75	*	*	0.66	*	*	*	*	0.66	*	*	*
yellow perch	27.6	21.5	5.7	4.5	0.33	*	13.66	0.75	0.5	*	0.8	0.33	0.2
Total CPUE	62	61.25	29.73	13.68	11.32	4.98	37.63	5.75	14.75	108.98	8.4	15.31	3.8
# of Species Observed in Sec.	9	9	9	9	9	10	10	10	9	9	10	10	10

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.

BR 047

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

In 2021, one gill net captured two bluegill and two trap nets captured three largemouth bass ($\bar{x}$ TL= 10.5 in.), 54 bluegill ($\bar{x}$ TL= 2.9 in.), and 3,800 fathead minnows. Water levels were extremely low in the fall and this pond is highly susceptible to winterkill in 2021/2022.

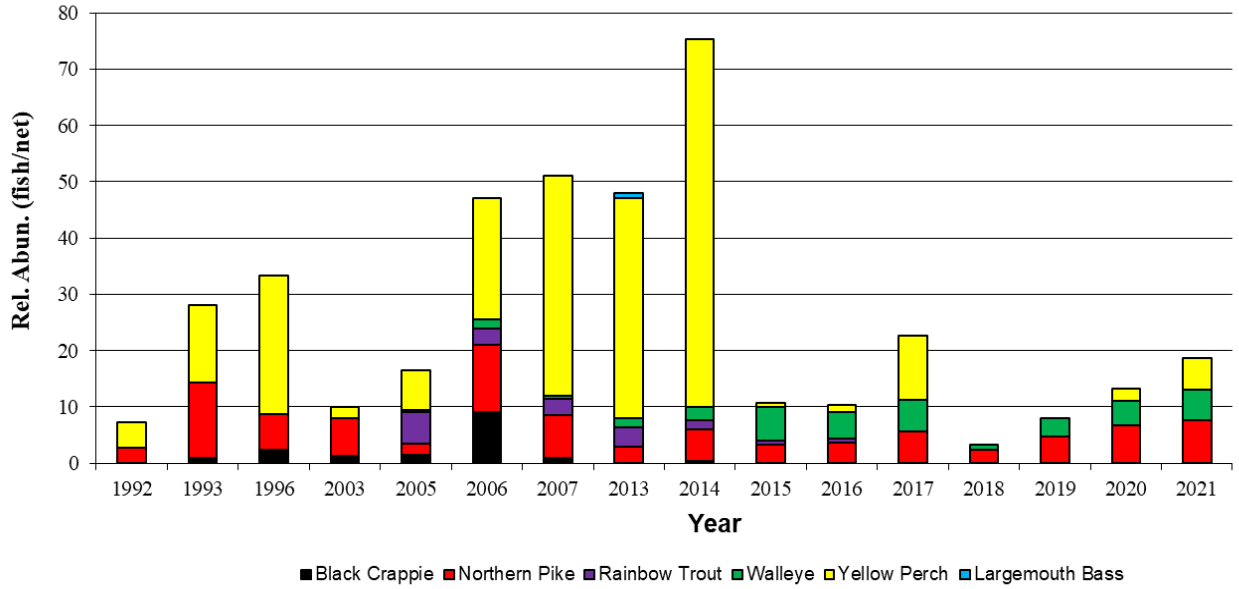
Dry Fork Reservoir

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 2019/2020 this reservoir received 1,232 (± 755) angler days which ranked 15th in regional use (MTFWP Fisheries Bureau 2020).

Good snowpack and run-off in early 2018 re-filled Dry Fork to capacity but severe drought conditions in 2021 had reservoir water levels down approximately 12 feet. Gill net surveys suggests relative abundances for all species have remained low following the initial re-fill of this reservoir (Figure 23). Walleye and northern pike densities have stabilized, and yellow perch numbers have increased slightly.

Figure 23. Relative abundance of yellow perch, northern pike, black crappie, rainbow trout, largemouth bass, and walleye in Dry Fork Reservoir (periodic sampling 1992 to 2021).



Salmo Reservoir

Salmo reservoir is a four-acre pond with a windmill aerator located on BLM land north of Chinook. This pond has been managed primarily as a rainbow trout fishery since 1978. Salmo currently has rainbow trout, largemouth bass, and bluegill. The rainbow trout fishery is maintained with annual plants of approximately 1,000 catchables.

In 2010/2011 Salmo experienced a complete winterkill. Rainbow trout, bluegill, and largemouth bass were immediately stocked thereafter to re-establish sport fish populations. In 2014, one gill net and one trap net were set overnight to assess the stocking success and current sport fish population. The gill net collected one rainbow trout ($\bar{x}$ TL=17.3 in), six bluegill ($\bar{x}$ TL=3.9 in), and one yellow perch ($\bar{x}$ TL=9.5 in). The presence of yellow perch suggests a possible illegal introduction, either directly from an adjacent reservoir or indirectly from illegal bait dumping. The trap net captured 570 bluegill ($\bar{x}$ TL=4.2 in). No largemouth bass were collected; however, anglers did report catching largemouth bass throughout the summer months.

In 2020, one gill and trap net were set overnight. The gill net captured 10 rainbow trout ($\bar{x}$ TL=10.3 in) and the trap net captured no fish. Two additional trap nets were set overnight in 2021 and captured 30 bluegill ($\bar{x}$ TL=4.3 in).

Phillips County Fishing Waters

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

Ester Lake

Ester Lake is a 139-acre reservoir located on state land and has been managed by FWP since the 1950s. In the 1960's Ester was a productive fishery with high numbers of yellow perch, black crappie, and walleye.

Since 2009, approximately 19,370 pre-spawn yellow perch have been trapped 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. Additional significant drawdowns occurred again in 2020 and 2021 but netting results suggest the Ester fishery is doing quite well (Figures 24 and 25).

Figure 24. - Relative abundance of yellow perch, northern pike, black crappie, and walleye in Ester Lake (periodic gill net sets 1980 to 2021).

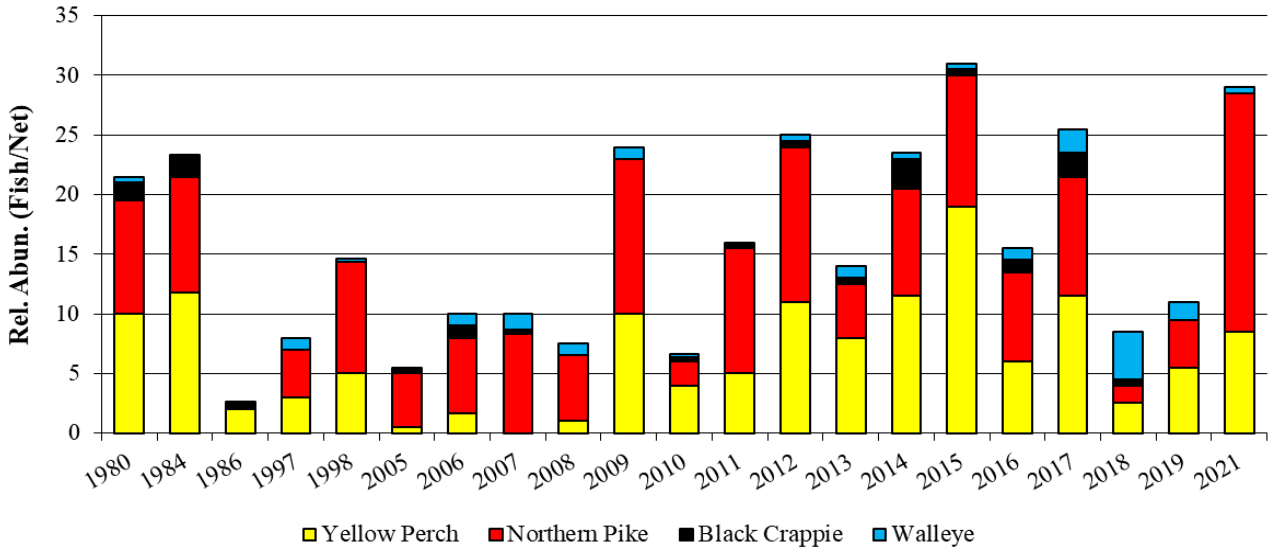
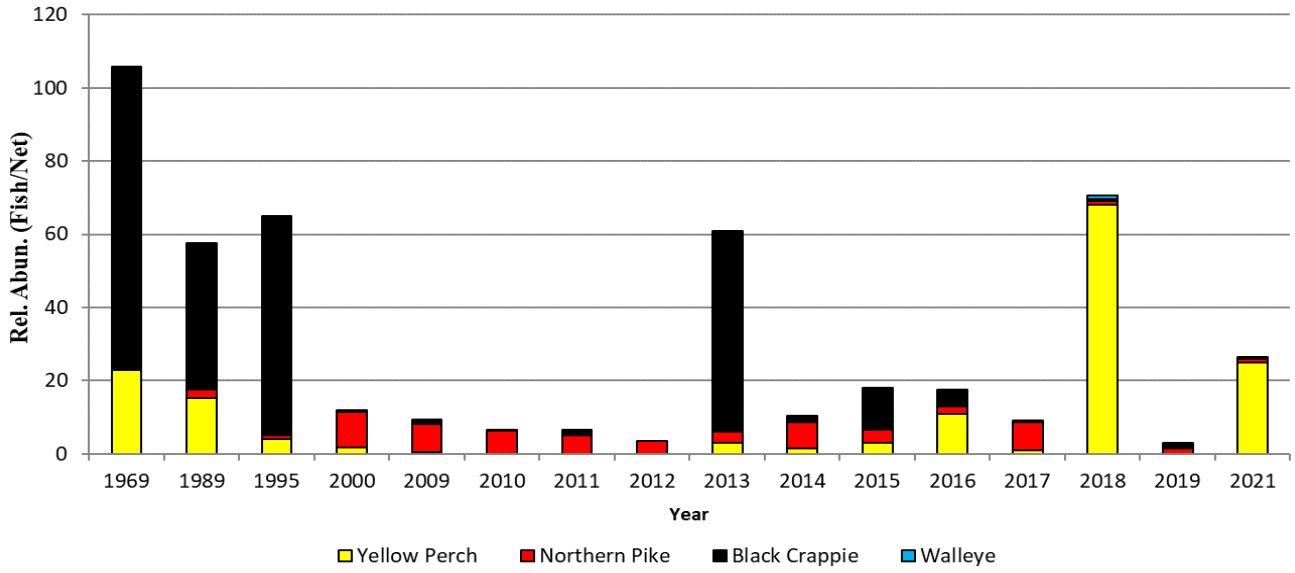


Figure 25. - Relative abundance of yellow perch, northern pike, black crappie, and walleye in Ester Lake (periodic trap net sets 1969 to 2021).



Flinstone Reservoir

Flinstone Reservoir is 5.5-acre pond located on BLM lands in south Phillips County. This pond was built in 2004 but was not managed as a fishery until 2012. In 2011, One gill net and one trap net were set overnight to verify any fish species prior to initiating any management strategies. The gill net captured 15 white sucker ($\bar{x}$ TL =7.4 in.) and one green sunfish (TL=5.8 in.); the trap net captured five fathead minnows.

In 2011 and 2012, approximately 20 adult black crappie were trap and transferred into Flinstone to establish a population. Furthermore, alternate year stocking of 1,000 rainbow trout was established.

Sampling conducted in 2021 indicated the presence of rainbow trout and the establishment of largemouth bass stocked in 2015 (Table 13). The trap net captured four black crappie and one bluegill.

Table 13. Relative abundance and average total length of rainbow trout, white sucker, black crappie, green sunfish, chinook salmon and largemouth bass in Flintstone Reservoir based on gill netting surveys from 2011to 2021.

	Rainbow Trout		White Sucker		Black Crappie		Green Sunfish		Chinook Salmon		Largemouth Bass	
Date	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length
6/23/11	--	--	15	7.35	--	--	1	5.8	--	--	--	--
7/1/14	1	15.30	0	--	1.00	5.2	0	--	1	14	--	--
7/18/18	3	19.70	0	--	0.00	--	0	--	0	--	2	13.25
7/13/21	2	14.35	0	--	1.00	3.8	0	--	0	--	1	13.9

Hump Reservoir

Hump Reservoir is a 10-acre pond located on BLM lands in south Phillips County. This pond was built in 2004 but was not managed as a fishery until 2012. In 2011, One gill net and one trap net were set overnight to verify any fish species prior to implementing a management strategy. No fish were captured or observed.

In 2012, approximately 30 adult black crappie were trap and transferred into Hump to establish a population. Furthermore, alternate year stocking of 1,000 rainbow trout was established.

Sampling conducted in 2018 indicated the presence of rainbow trout and reduced densities of white sucker (Table 14). The trap net captured 129 bluegill and 43 yellow perch. Sampling conducted in 2021 captured no fish and water levels were down approximately eight feet.

Table 14. Relative abundance and average total length of rainbow trout, yellow perch and white sucker in Hump Reservoir based on gill netting surveys from 2011to 2018.

	Rainbow Trout		Yellow Perch		White Sucker	
Date	Rel. Abun	Avg. Length	Rel. Abun	Avg. Length	Rel. Abun	Avg. Length
06/23/11			no fish			
07/01/14	2	12.55	15	9	33	14.58
07/18/18	4	15.53	0	--	4.00	18.08
07/13/21	0	0.00	0	0	0.00	0.00

Little 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 2021 indicate a black crappie population has been established, black crappie were the most abundant gamefish species observed at 16 black crappie/net. Common

carp (19 carp/net), white sucker (22 white sucker/net) and walleye (1 walleye/net) were also present.

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 continue to work with the BLM on identifying options for angling access at this reservoir.

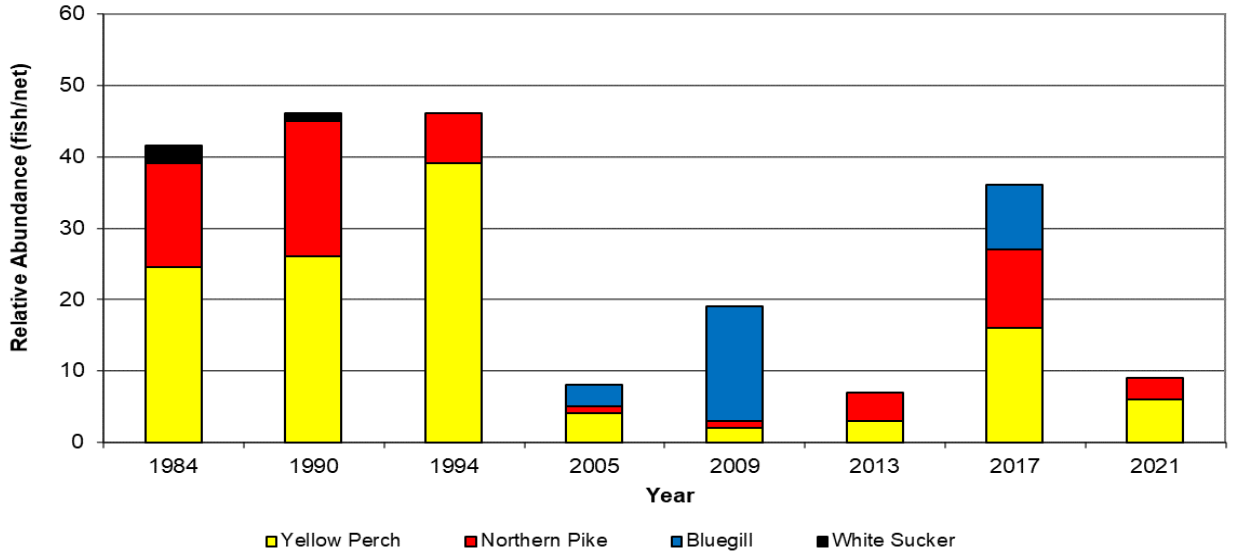
McChesney Reservoir

McChesney Reservoir is a privately-owned reservoir in south Phillips County. This reservoir has been managed as a northern pike, yellow perch, and black crappie fishery since the 1960s. There were also stockings of bluegill, however stocking records are not complete. In 2017/2018, this reservoir received 390 angler days and remains one of the more popular reservoirs in Phillips County (MTFWP Fisheries Bureau 2018).

Yellow perch and northern pike were the most abundant species captured during netting surveys in the early and mid-90's (Figure 26). Several years passed before netting surveys were once again initiated in 2005. In the time between sampling events the area surrounding the reservoir experienced severe drought conditions, which may explain the significant drop in yellow perch and northern pike abundances. The population dynamics also changed, with the introduction of bluegill, black crappie, and common carp

Northern pike, yellow perch, and bluegill were the only species observed in our gill and trap net in 2021 (Figure 26). The gill net captured one northern pike that exceeded 30 inches, as well as several yellow perch that approached 10 inches. FWP will work with the landowner to explore funding options to repair the issues at this dam.

Figure 26. - Relative abundance of yellow perch, northern pike, carp, white sucker, black crappie, and walleye in Ester Lake (periodic gill net sets 1984 to 2021).



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 severely impacted 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 contains 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 the population. Increased stocking frequency has had little impact to the walleye or forage population thus far and the stocking strategy has been closely 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, 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 Reclamation 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 established during the two previous drawdown years was inundated and benefitted the entire Nelson fish assemblage. Infrastructure failure at Drop 5 (St. Mary's Diversion) crippled the water delivery system in the Milk River drainage in 2020 and severe drought impacted water conditions in 2021.

Population Status of Adult and Young-of-Year Fishes

Since 1993, adult fish populations have been monitored at 10 fixed experimental gill netting stations. Gill netting is conducted over a two-day period utilizing five sinking experimental gill nets each day (10 net-days). The sinking multi-filament experimental gill nets measure 125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2 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 15. - A summary of young-of-year forage and sport fish collected at ten fixed sites using a beach seine in Nelson Reservoir, 1998-2021.

Year	Seined (ft)	Walleye	Yellow Perch	YP (Adult)	Northern Pike	Spottail Shiner	White Sucker	Black Crappie	Goldeye	Carp	Smallmouth Bass	Longnose Sucker	Pumpkinseed
1998*	340	0	126	--	0	33	235	4	0	0	0	0	0
1999	750	11	1,489	--	2	222	497	1	0	0	0	0	0
2000*	440	4	449	--	2	189	258	5	6	0	0	0	0
2001	430	2	72	--	1	27	800	88	0	0	0	0	0
2002*	415	2	19	--	4	8	38	482	21	62	0	0	0
2003	530	3	361	--	33	49	235	6,597	0	0	3	0	0
2004*	443	10	1,781	--	0	19	195	5	1	0	10	0	0
2005*	754	5	423	--	2	34	155	278	23	5	1	0	0
2006*	831	3	773	--	8	66	319	89	0	3	1	0	0
2007*	489	6	586	--	2	75	596	5	0	12	9	0	0
2008*	500	10	62	--	0	8	272	1,237	11	94	11	0	0
2009*	750	4	4,522	--	4	3	478	20	8	2	61	14	0
2010*	750	11	2,914	184	3	98	224	131	0	0	115	2	0
2011*	750	8	2,404	530	6	34	181	69	0	0	40	0	0
2012*	750	2	685	312	1	66	49	935	0	7	6	1	0
2013*	750	1	362	2	6	48	24	261	0	7	8	0	0
2014*	750	6	345	280	4	36	38	2,564	6	112	7	0	0
2015*	750	1	883	8	5	6	26	80	0	2	60	0	0
2016*	750	11	126	16	0	108	213	1,362	0	1	2	0	5
2017	750	14	952	0	6	311	191	639	0	4	33	0	0
2018*	750	8	1,196	0	0	251	75	12	0	25	24	0	0
2019*	750	0	5	14	1	253	95	100	0	0	22	1	0
2020*	750	0	274	3	5	71	40	387	0	24	5	0	80
2021*	750	3	104	0	0	2,180	35	14	1	48	12	0	0

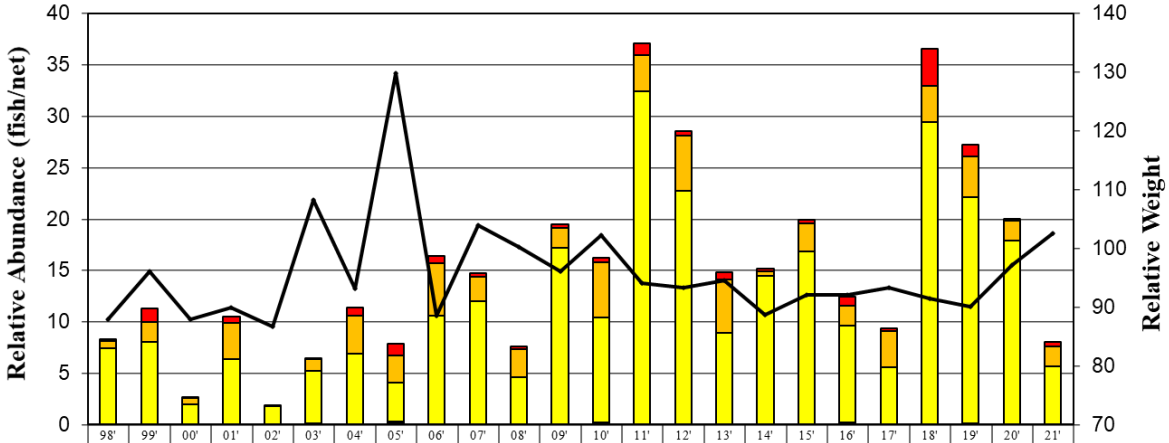
*Years in which walleye fry or fingerlings were stocked

Yellow Perch

The yellow perch population in Nelson Reservoir has been in excellent shape 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 and spawning conditions, and reduced pool elevations (Figure 27). 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 15; Figure 27).

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 and yellow perch relative abundance was the second highest on record at 36.5 yellow perch/net. Yellow perch abundance dropped to 8.7 perch/net in 2021 (Figure 27).

Figure 27. - Relative abundance, size structure, and relative weight of yellow perch collected with sinking experimental gill nets in Nelson Reservoir, 1998-2021.



	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>12 in.)	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Preferred (10-11.9 in.)	0.1	1.3	0.1	0.6	0.0	0.1	0.8	1.2	0.7	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	0.2	0.4
Quality (8-9.9 in.)	0.7	2.0	0.6	3.5	0.1	1.2	3.7	2.6	5.1	2.4	2.7	1.9	5.4	3.5	5.4	5.2	0.4	2.8	2	3.5	3.5	4	1.9	1.9
Stock (5-7.9 in.)	7.4	8.0	2.0	6.4	1.8	5.1	6.9	3.8	10.6	12	4.6	17.2	10.2	32.4	22.7	8.9	14.5	16.8	9.4	5.6	29.4	22	17.9	5.7
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	0	0	0.1	0	0
Relative weight	87.94	96.13	87.97	89.95	86.76	108.2	93.10	129.7	88.60	104	100.2	96.15	102.3	94.08	93.38	94.6	88.69	92.1	92.02	93.28	91.41	90.01	97.16	102.6

Walleye

Historically, walleye fingerlings and fry were periodically stocked into Nelson Reservoir to supplement natural reproduction. Nelson has been maintained with annual plants of 100,000 fingerling walleye since 2003. An OTC evaluation was conducted from 2007-2020 to evaluate survival of stocked walleye and their contribution to the walleye fishery.

Even with the addition of these fish, catch of YOY walleye during seining surveys remain low when compared to pre-drought levels (Table 15). 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 2021 (Figure 28). OTC analysis suggests the majority (~75%) of YOY walleye recruiting into the population are naturally reproduced (Figure 29).

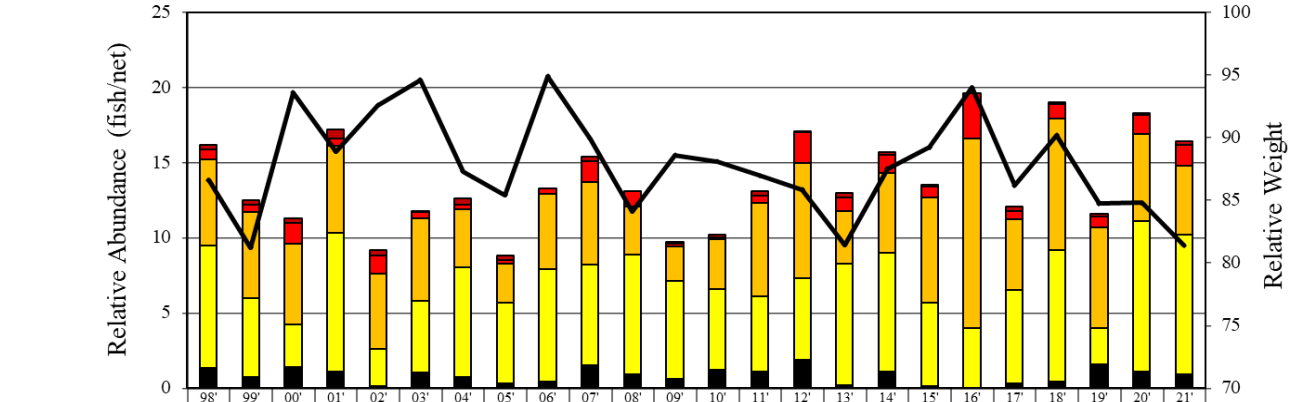
The relative abundance of adult walleye has remained stable, regardless of walleye stocking densities and size (Figure 28). In 2016, walleye relative abundance was the highest documented since 1991 (19.6 walleye/net), with good age and size structure (Figure 28). Since 2017, walleye relative abundance has fluctuated from 12.1 to 19 walleye/net the past few years (Figure 28).

Water and forage conditions are most likely the primary factors contributing to the increase in walleye densities observed since 2010. The current age structure of walleye in Nelson suggests strong year-classes were produced in 2016, 2017, 2019 and especially 2018 (Figure 30). In these years good water conditions persisted in the spring but pool elevations were severely impacted in the summer/fall.

Walleye condition and growth was slightly below average for walleye younger than age 4, possibly due to competition among individuals in that strong age-3 year-class that currently dominates the population (Figure 31). Growth was highly variable for older age walleye in 2021

(Figure 31). The future looks bright and the current age-3 year-class should continue to carry the fishery in the coming years.

Figure 28. - Relative abundance, size structure, and relative weight of walleye collected with sinking experimental gill nets in Nelson Reservoir, 1998-2021.



	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>25 in.)	0.3	0.3	0.3	0.6	0.4	0.1	0.4	0.3	0.0	0.3	0.0	0.1	0.2	0.3	0.1	0.3	0.2	0.1	0.0	0.3	0.1	0.2	0.1	0.2
Preferred (20-24.9 in.)	0.7	0.5	1.4	0.5	1.2	0.4	0.3	0.2	0.4	1.4	1.0	0.2	0.1	0.5	2.0	0.9	1.2	0.7	3.0	0.6	1.0	0.7	1.3	1.4
Quality (15-19.9 in.)	5.7	5.7	5.4	5.8	5.0	5.5	3.9	2.6	5.0	5.5	3.2	2.3	3.3	6.2	7.7	3.5	5.3	7.0	12.6	4.7	8.7	6.7	5.8	4.6
Stock (10-14.9 in.)	8.2	5.3	2.8	9.2	2.5	4.8	7.3	5.4	7.5	6.7	8.0	6.5	5.4	5.0	5.4	8.1	7.9	5.6	4.0	6.2	8.8	2.4	10.0	9.3
Sub-stock (<10 in.)	1.3	0.7	1.4	1.1	0.1	1.0	0.7	0.3	0.4	1.5	0.9	0.6	1.2	1.1	1.9	0.2	1.1	0.1	0.0	0.3	0.4	1.6	1.1	0.9
Relative weight	86.6	81.2	93.6	88.9	92.6	94.6	87.3	85.4	94.9	89.9	84.1	88.6	88.1	87.0	85.8	81.4	87.5	89.2	94.0	86.2	90.2	84.7	84.8	81.4

Figure 29. 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.

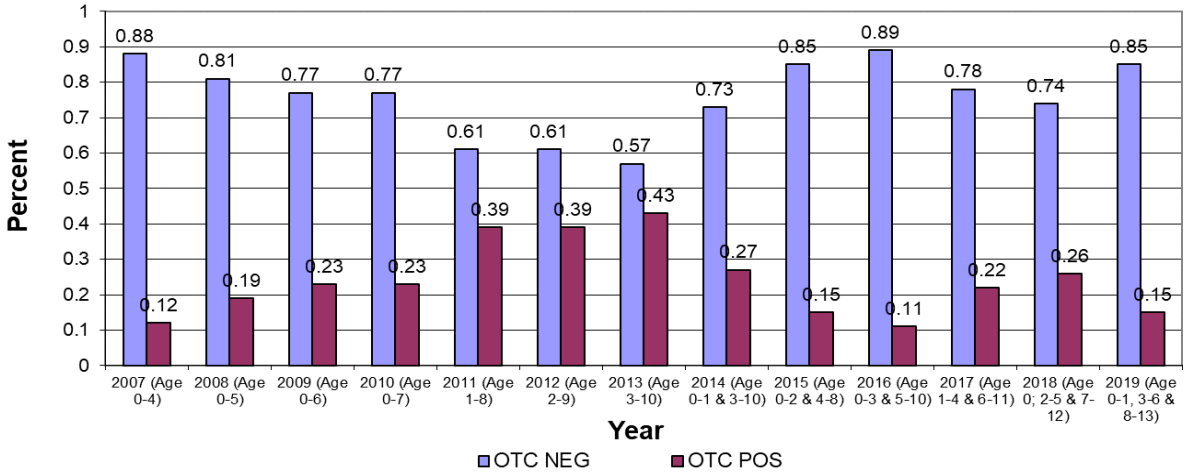


Figure 30. Observed walleye age structure and distribution in Nelson Reservoir, 2021.

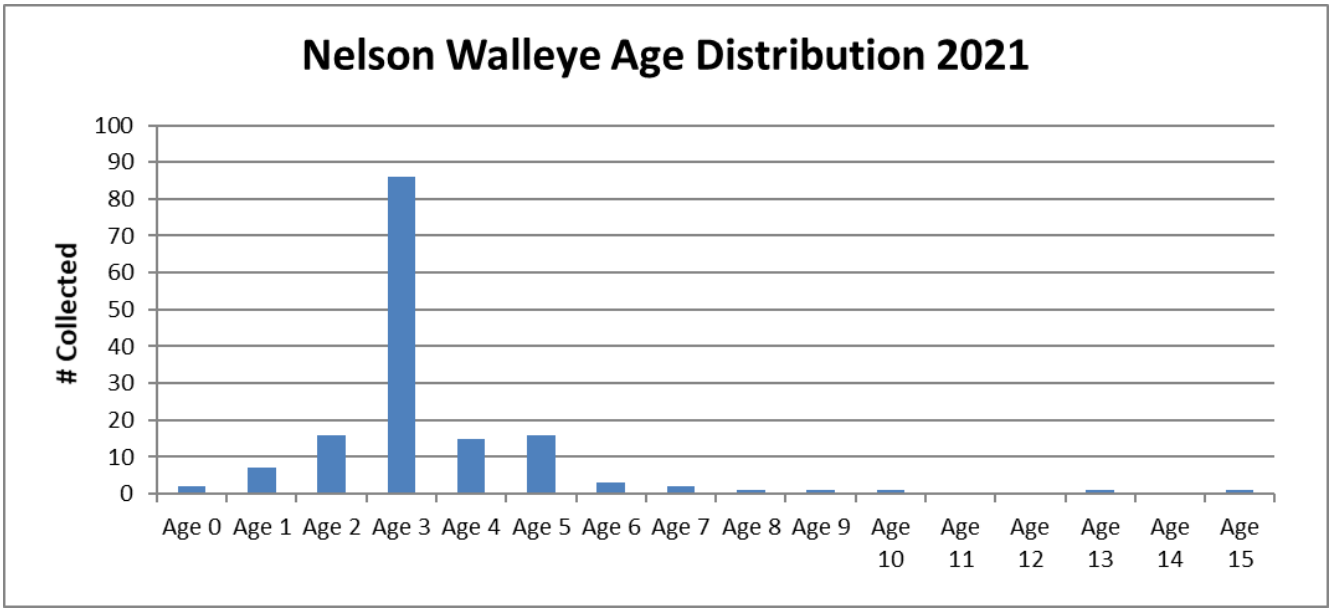
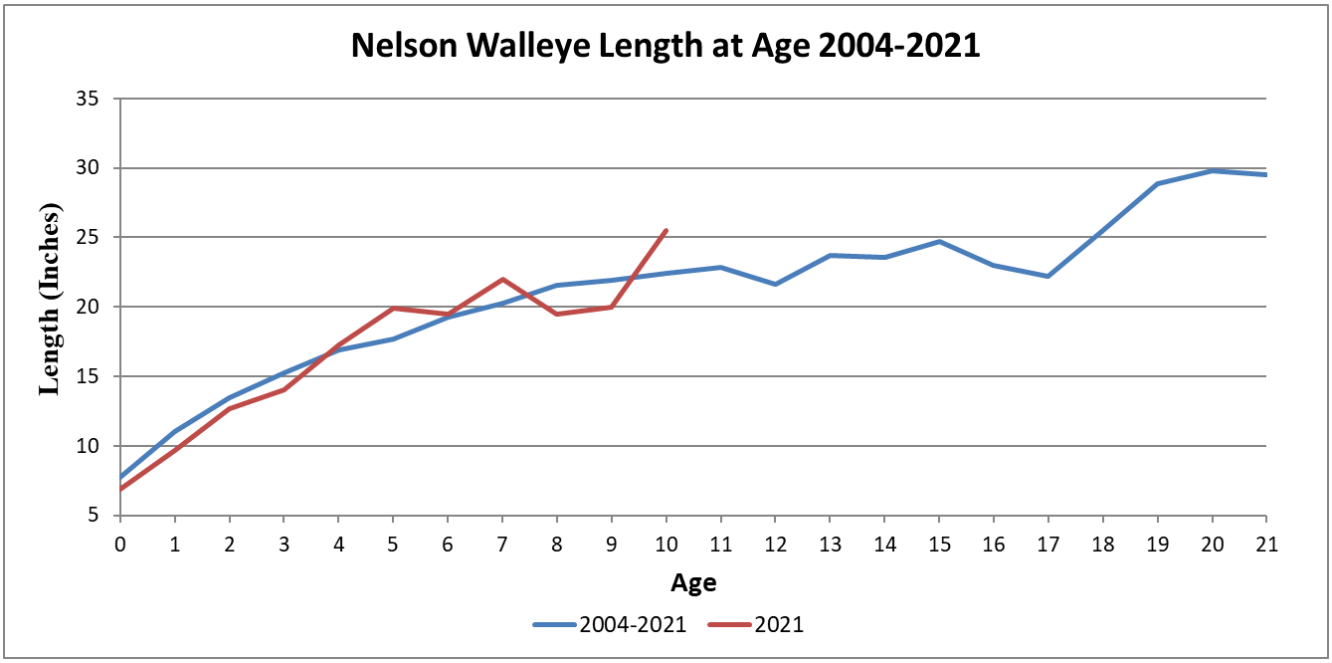


Figure 31. Walleye length at age in Nelson Reservoir, 2004-2021.



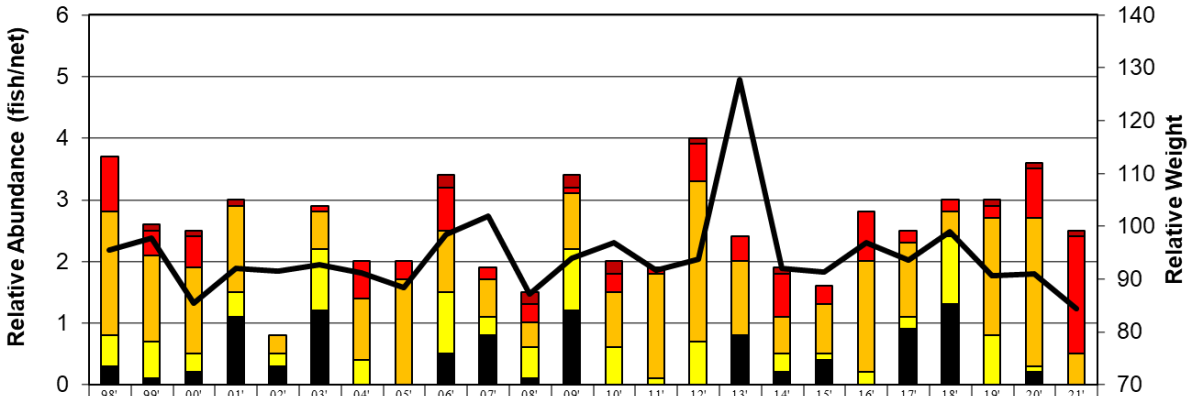
Northern Pike

Historically, the relative abundance of adult northern pike has remained stable, consisting of a high proportion of quality and preferred sized fish (Figure 32). The northern pike population in Nelson remains stable, despite three 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 and are currently making up the majority of the pike population (Figure 32).

These year-classes have exhibited good growth and the current pike population is dominated by quality and preferred sized northern pike (Figure 32).

Figure 32. - Relative abundance, size structure, and relative weight of northern pike collected with sinking experimental mesh gill nets in Nelson Reservoir, 1998-2021.

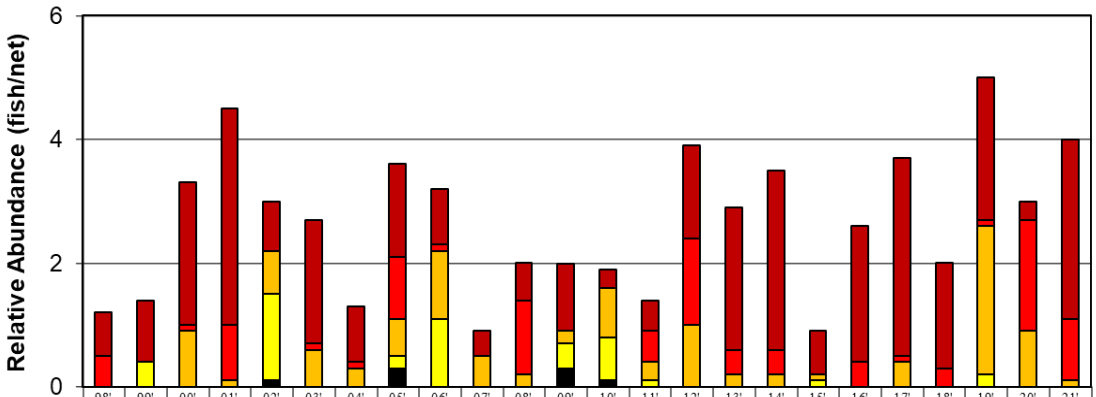


	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>34 in.)	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.2	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Preferred (28-33.9 in.)	0.9	0.4	0.5	0.0	0.0	0.1	0.6	0.3	0.7	0.2	0.3	0.1	0.3	0.1	0.6	0.4	0.7	0.3	0.8	0.2	0.2	0.2	0.8	1.9
Quality (21-27.9 in.)	2.0	1.4	1.4	1.4	0.3	0.6	1.0	1.7	1.0	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	2.4	0.5
Stock (14-20.9 in.)	0.5	0.6	0.3	0.4	0.2	1.0	0.4	0.0	1.0	0.3	0.5	1.0	0.6	0.1	0.7	0.0	0.3	0.1	0.2	0.2	1.1	0.8	0.1	0.0
Sub Stock (<14 in.)	0.3	0.1	0.2	1.1	0.3	1.2	0.0	0.0	0.5	0.8	0.1	1.2	0.0	0.0	0.0	0.8	0.2	0.4	0.0	0.9	1.3	0.0	0.2	0.0
Relative weight	95.5	97.8	85.4	92.1	91.5	92.7	91.1	88.4	98.4	101.8	87.2	94.0	96.9	91.7	93.7	127.7	92.1	91.3	96.9	93.6	98.9	90.6	90.9	84.3

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 33). 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 33; 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 and remained close to average, the current population is comprised mostly of memorable and preferred fish (Figure 33).

Figure 33. - Relative abundance and size structure of lake whitefish collected with sinking experimental gill nets in Nelson Reservoir, 1998-2021.



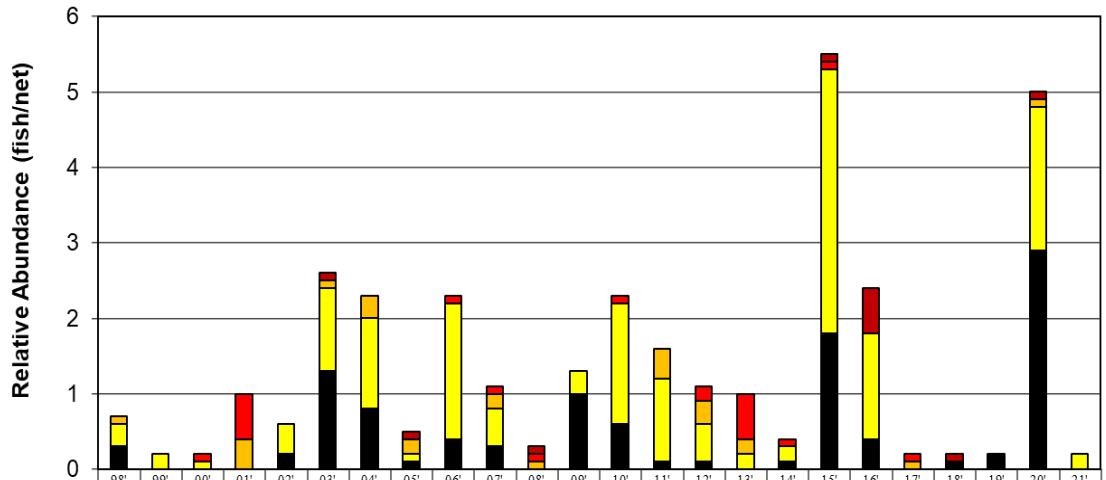
	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
Memorable (>18.0 in.)	0.7	1	2.3	3.5	0.8	2	0.9	1.5	0.9	0.4	0.6	1.083	0.3	0.5	1.5	2.3	2.9	0.7	2.2	3.2	1.7	2.3	0.3	2.9
Preferred (14.0-17.9 in.)	0.5	0	0.1	0.9	0	0.1	0.1	1	0.1	0	1.2	0	0	0.5	1.4	0.4	0.4	0	0.4	0.1	0.3	0.1	1.8	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	0.9	0.1
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	0	0
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	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 15). Recruitment of YOY crappie into the adult population has resulted in higher relative abundances of adult black crappie during that same timeframe (Figure 34). High reproductive success 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 and 2021 (Figure 34). It is unknown whether this was 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. Black crappie relative abundance was the second highest ever observed in 2020 and is comprised mostly of younger black crappie (Figure 34).

Figure 34. - Relative abundance and size structure of black crappie collected with sinking experimental gill nets in Nelson Reservoir, 1998-2021.



	98'	99'	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
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	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	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	0.1	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	1.9	0.2
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	2.9	0

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, pumpkinseed 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 15) and will continue to recruit and supplement the adult population. Pumpkinseeds also showed up in higher numbers during our summer seining surveys in 2020 (Table15). This species was first documented in Nelson Reservoir in 2016 but their presence in our sampling gear has been highly variable. FWP will continue to monitor this species abundance, recruitment, and impacts/contributions to the Nelson fish community.

PR 018

PR 018 is a 6-acre pond located on BLM land in south Phillips County. PR 018 has a windmill aeration system and was historically a warm water fishery consisting primarily of largemouth bass. In 2004, a winterkill occurred, and surplus rainbow trout were stocked in the spring of 2004.

Netting surveys conducted in 2009 captured no fish. Re-introduction of largemouth bass occurred in 2009 (n=3,000) and 250 adult bluegill were introduced in 2011. Periodic trap netting surveys conducted from 2009-2021 indicate bluegill successfully established within PR 018 (Table 16). Two rainbow trout were also observed in the gill net.

Table 16. Relative abundance and average total length and weight of largemouth bass, rainbow trout and bluegill in PR 018 Reservoir based on trap netting surveys from 2011 to 2021.

	Largemouth Bass		Rainbow Trout		Bluegill	
Date	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length	Rel. Abun.	Avg. Length
10/02/85	96	7.5	0.00	0	0	0
07/16/09	0	0.00	0.00	0	0	0
07/11/13	0	0.00	0.00	0	3	7.20
06/27/17	0	0.00	0.00	0	195	3.73
07/18/18	0	0	0.00	0	9	2.31
07/13/21	0	0	0.00	0	136	3.99

Fresno Angler Creel Survey 2021

In the last decade, several considerable changes have occurred on Fresno Reservoir. The fishery recovered from extreme drought and experienced highly variable water conditions since 2016. A stocking strategy for walleye was established and implemented from 2005-2011(100,000 walleye fingerling/year) and no walleye had been stocked until 2021, when approximately 33,000 walleye fingerlings were stocked. Furthermore, growing concern over poor angling catch rates by local anglers and Havre area residents prompted the circulation of a petition to have FWP stock fish into Fresno. FWP responded by holding public meetings to solicit feedback, initiated the development of a ten-year fisheries management plan and conducted an onsite creel survey from December 2020 to September 2021.

The last creel survey conducted by FWP on Fresno Reservoir occurred in 2015. The 2021 on-site angler creel survey at Fresno Reservoir was developed similarly to previous creels and looked to answer several questions: 1) Compare current angler trends with previous creel surveys conducted on Fresno Reservoir (1990, 1996 and 2015) 2) Gain a better understanding of annual fishing pressure (both winter and summer) 3) Better understand the contribution winter fishing pressure has on target species, exploitation, and catch rates for all sport fishes 4) Identify contribution of younger walleye (Age 1 and 2; < 14") to angler catch rates 5) Gauge current satisfaction of the fishery from anglers 6) Gauge angler's thought on key contributions to the overall fishery and what it will take (in their opinion) to maintain a sustainable fishery into the future and 7) Better understand anglers knowledge on the threat from aquatic invasive species.

Methods

Creel surveys conducted on Fresno in the 1990's surveyed anglers during the open water season (May-September) and incorporated both the weekend and some weekdays. The creel survey conducted in 2015 went year-round (December 20, 2014-November 8, 2015) and only incorporated weekends (Saturday and Sunday). Due to limited funding for this survey, the creel ran from December-September, several weekends weren't surveyed due to weather, ice conditions, or tournaments taking place. During the winter the creel clerk was able to utilize an ATV to rove the lake and survey anglers across the entire reservoir. During the open water

season the creel clerk roved from several public boat ramps and access points throughout the day, all shore anglers contacted were surveyed on-site. Additional recreational use data, non-angler, was also collected.

Only one person from each party was interviewed and asked a series of questions related to time spent fishing, number in party, residence, bait type, target species, catch data, and several supplemental questions (Appendix 1). Those parties who classified themselves as pleasure were asked none of the questions related to angling and were discarded from pressure analysis (Appendix 1). Lengths and weights were taken from harvested fish, with permission of the anglers. When anglers harvested a high proportion of one species (i.e. 20+ yellow perch) the creel clerk would take a random sub-sample of 10-15 individuals, to allow more time to interview other parties.

Appendix 1. Interview sheet used during the 2021 Fresno Creel Survey.

Fresno Reservoir Creel Survey

Interview #: FR- Date: / /
Reservoir Pool Elevation: ft Time of Interview: : AM / PM
Angler Type: Shore / Boat / Ice / Pleasure
Anglers in Party: Time Started Fishing: : AM / PM
Done Fishing for the Day?- 1= Yes / 2= No Time Stopped Fishing: : AM / PM
Total Angler Hours: :

Fill in if party stopped fishing prior to time of interview

(Total angler hours = # anglers x hours per angler. Subtract hours not fished. Calculate to nearest ¼ hour.)

On average, how many days per year do you fish Fresno Reservoir? _____

Angler Origins: (Record county, state, or province for each angler in party)

_____, _____, _____,
_____, _____, _____

Total # of Attended Lines Used: _____
Bait Type: 1= Lures/Artificial 2= Bait (worms, leeches, dead minnows) 3= Lures and Bait 4= Other _____
Target Species:
1= Walleye 2= Northern Pike 3= Yellow Perch 4= Black Crappie
5= Lake Whitefish 6= Walleye & Pike 7= Walleye, Pike, Perch 8= Any Fish
9= Other: _____

Catch Data:

	Walleye	Pike	Perch	Crappie	Other:	Other:
# Kept						
# Released						
Total						
# of WE caught < 14"		----------	----------	----------	----------	----------

Q1. Were you satisfied with the number of fish caught today? (No) 1 2 3 4 5 (Yes)
Q2. Were you satisfied with the average size of fish caught today? (No) 1 2 3 4 5 (Yes)
Q3. In your opinion, what is the single most important factor influencing the overall fishery on Fresno Reservoir.

Q4. Are you aware of the threat to Montana waters from aquatic invasive species such as zebra mussels and Eurasian water milfoil? Yes No

Results

A total of 128 angler interviews were conducted during the year-long creel survey, comprising 282 anglers. Of the 128 interviews conducted, (2.3%) were shore anglers, (39.8%) were ice fishing, and (57.8%) were fishing from a boat. Additionally, another 147 non-angling

recreationists were documented, totaling 562 people. Anglers surveyed represented 18 of 56 Montana counties and three states. The highest proportion of people came from Hill (58.6%), Cascade (18.7%), and Choteau counties (7.5%). Reservoir pool elevations never obtained full pool in 2021 and averaged 16 feet below full pool (2559') during the creel period. Severely decreasing pool elevations throughout the summer months, due to drought conditions, had the reservoir almost 30 feet below full pool by July 31st and remained low well into September (Table 17). Historically, Fresno Reservoir pool elevations fluctuate approximately 10-20 feet per year. The number of monthly interviews conducted was very low during the summer months (May-September), when compared to the 2015 creel. Weekend weather conditions seemed poor throughout the creel period. Rainy conditions persisted in May, high winds were common throughout, and extreme drought conditions had water elevations extremely low, with only one boat ramp accessible throughout most of July and August. Warm temperatures didn't create optimal ice fishing conditions in March and April (Table 17).

The average party size was 2.2 people/trip (range=1-7) with the largest parties being interviewed during the winter months (Table 17). Average lines used per party was 5/trip (range=1-35), with winter anglers using on average more lines (10.2 lines/party) than open water anglers (3.2 lines/party). This was expected as winter regulations allow anglers 6 lines/person compared to open water regulations, which allow 2 lines/person. On average, anglers reported they fished Fresno Reservoir approximately 18.9 days/year (range=1-250; Table 17). Of the anglers surveyed during the winter, 70.5% reported using some sort of live/dead bait (dead minnows, wax worms, etc.), 11.7% used a spear, 7.8% used artificial, and 11.8% used a combination of live bait and artificial. During the open water season, 68.8% of anglers reported using some sort of live/dead bait (dead minnows, worms, leeches, etc.), 7.8% used artificial, and 20.8% used a combination of live/dead bait and artificial.

Table 17. Breakdown (by month) of average reservoir pool elevations, anglers interviewed, and party characteristics during the 2021Fresno creel survey.

Month	Avg. Pool Elevation	# Interviewed	Total Anglers	Avg. Party Size	Avg. Lines Used/Party	Reported Days Fished Annually (Avg.)
December	2555.18	10	25	2.5	7.5	14.2
January	2555.77	12	21	1.75	8.25	18.2
February	2555.5	27	66	2.44	8.7	31.6
March	2555	2	6	3	16.5	15.5
April	--	--	--	--	--	--
May	2570.48	19	39	2.05	2.79	20.3
June	2568.92	9	17	1.89	2.89	13.2
July	2558.13	32	69	2.16	3.16	13.7
August	2551.21	11	25	2.27	3.18	8.4
September	2560.58	6	14	2.33	3.76	14.8
October	--	--	--	--	--	--
November	--	--	--	--	--	--
Total	**2559**	**128**	**282**	**2.2**	**5.3**	**19**

Effort

Angling effort recorded during the survey totaled 1,259.5 hours, with the peak winter effort occurring in February and peak open water effort occurring in July (Table 18). The highest catch rates were observed during June and July (Table 18). During the winter months, anglers reported targeting a more diverse range of species (walleye, pike, perch, and any fish) when

compared to those surveyed during the open water months (only walleye; Table 19). This difference could be attributed to more lines being allowed during the winter months, covering multiple depths with various set-ups to target multiple species. Anglers may also have a more opportunistic attitude during the ice fishing season as well.

Catch Rates and Harvest Data

Walleye

Walleye catch rates were low during the winter months (mean= 0.009 walleye/hour) when compared to the open water months (mean= 0.73 walleye/hour). The average annual catch rate recorded was 0.43 walleye/hour (Table 18). Nationally, walleye catch rates ≥ 0.25 walleye/hour is considered good (Colby et. al 1979). Based on this survey, the majority of fishing effort specifically targeting walleye occurs during the open water season (May-November), with 87% of anglers surveyed during these months reporting walleye as their target species (Table 19). Although most of the effort targeting walleye occurred during the open water months, the highest percentages of harvest occurred during the winter/spring months (Table 20). Anglers harvested 100% of all walleye caught during the winter (n=5), compared to just 46% during the summer/fall (n=243; Table 20). Harvested walleye averaged 15.56 inches and 1.22 pounds (Table 21). Based on length data collected, the highest proportion of walleye harvested ranged in age from 2-6 years old (Figure 17).

An additional question to anglers was "How many walleye < 14" did you catch today?" The question was asked to identify the contributions of younger aged walleye to the overall catch. Anglers reported catching a good percentage of these fish and they comprised 36.7% of the overall walleye catch (Table 22). The highest proportion of these fish were caught during the summer months (June-September), with the lowest proportions being reported during the spawning period (April/May; Table 22). Walleye < 14" in Fresno range from 1 to 2 years old with an estimated 19% harvest rate on these age classes (based on length data collected from the creel). No walleye had been stocked since 2011 and all catchable sized walleye reported during the 2021 creel survey were naturally reproduced.

Northern Pike

Northern pike catch rates remained somewhat consistent throughout the survey period, with the highest catch rates observed in January, March and June. Catch rates averaged 0.09 pike/hour (range= 0.02-0.30 pike/hour; Table 18). Based on this survey, the majority of fishing effort specifically targeting northern pike occurs during the winter and early spring period (December-May; Table 19). The highest percentages of harvest occurred during the winter months (Table 20). On average, anglers harvested 54% of all northern pike caught during the winter, compared to just 23% during the open water months (Table 20). Harvested pike averaged 22.79 inches and 2.66 pounds (Table 23).

Yellow Perch

Yellow perch catch rates were low throughout the creel survey (mean= 0.03 perch/hour), with highest catch rates being observed in the summer (Table 18). Based on this survey, the majority of fishing effort specifically targeting yellow perch occurs during the winter months (December-March), with 10% of anglers surveyed during this time reporting yellow perch as

their target species (Table 19). The highest percentages of harvest correlated with the highest percentage of anglers targeting yellow perch, winter months (Table 20). On average, anglers harvested 100% of all yellow perch caught during the winter (n=6/6), compared to just 28% during the open water months (n=8/29; Table 20). Harvested perch averaged 11.98 inches and 0.90 pounds (Table 24).

Black Crappie

Black crappie catch rates were almost non-existent throughout the survey period, with only three black crappie being reported as caught. Black crappie catch rates averaged 0.002 crappie/hour (range= 0-0.01 crappie/hour; Table 18). Based on this survey, a few anglers specifically targeted black crappie in the winter and summer (Table 19). Anglers reported catching black crappie the least of any species during this survey, and no black crappie were reported as harvested (Table 23).

Other species

Other species reported as caught during this survey included rainbow trout and lake whitefish. Both species were reported in low quantities and didn't make up a large proportion of the total catch (2/687 or 0.3%).

Table 18. Monthly breakdown of angling effort, species caught and harvested, and catch rates during the 2021 Fresno creel survey.

Month	Total Effort (Hours)	Total Caught					Harvested					Catch Rates					Total Caught	Catch Rate (All species)
		WE	NP	YP	BL CR	RB	WE	NP	YP	BL CR	RB	WE	NP	YP	BL CR	RB		
December	80.75	0	3	4	0	0	0	2	4	0	0	0.000	0.037	0.050	0.000	0.000	7	0.087
January	101	3	19	1	0	1	3	13	1	0	1	0.030	0.188	0.010	0.000	0.010	24	0.238
February	345	2	17	1	0	0	2	10	1	0	0	0.006	0.049	0.003	0.000	0.000	22	0.064
March	16.5	0	5	0	0	0	0	1	0	0	0	0.000	0.303	0.000	0.000	0.000	5	0.303
April	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	195	75	14	6	0	0	40	0	0	0	0	0.385	0.072	0.031	0.000	0.000	96	0.492
June	74.5	65	12	5	0	0	30	5	2	0	0	0.872	0.161	0.067	0.000	0.000	82	1.101
July	302.5	295	35	14	3	0	131	9	6	0	0	0.975	0.116	0.046	0.010	0.000	347	1.147
August	92.5	56	4	1	0	0	20	0	0	0	0	0.605	0.043	0.011	0.000	0.000	61	0.659
September	51.75	41	1	3	0	0	22	0	0	0	0	0.792	0.019	0.058	0.000	0.000	45	0.870
October	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
November	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
Total	**1,259.50**	**537**	**110**	**35**	**3**	**1**	**248**	**40**	**14**	**0**	**1**	0.426	0.087	0.028	0.002	0.001	**689**	0.547

Table 19. Monthly breakdown of species (WE-walleye, NP- northern pike, YP- yellow perch, BLCR-black crappie, and LWF- lake whitefish) targeted by anglers (%) on Fresno Reservoir in 2021.

Month	WE	NP	YP	BLCR	LWF	WE & NP	WE,NP,YP	ANY FISH	OTHER
December (n=13)	23%	23%	15%	8%	--	15%	--	15%	--
January (n=12)	25%	25%	--	--	--	33%	--	17%	--
February (n=27)	18%	18%	4%	--	--	26%	--	33%	--
March (n=2)	--	50%	--	--	--	50%	--	--	--
April (n=0)	--	--	--	--	--	--	--	--	--
May (n=19)	74%	5%	--	--	--	16%	--	5%	--
June (n=9)	89%	--	--	--	--	11%	--	--	--
July (n=32)	88%	--	--	3%	--	--	--	9%	--
August (n=11)	84%	--	--	8%	--	--	--	8%	--
September (n=6)	100%	--	--	--	--	--	--	--	--

Table 20. Monthly breakdown of species harvested by anglers on Fresno Reservoir in 2021.

Month	% Harvested				
	WE	NP	YP	BL CR	RB
December	--	66.7%	100.0%	--	--
January	100.0%	68.4%	100.0%	--	100.0%
February	100.0%	58.8%	100.0%	--	--
March	--	20.0%	--	--	--
April	--	--	--	--	--
May	53.3%	0.0%	0.0%	--	--
June	46.2%	41.7%	40.0%	--	--
July	44.4%	25.7%	42.9%	--	--
August	35.7%	--	--	--	--
September	53.7%	--	--	--	--
October	--	--	--	--	--
November	--	--	--	--	--
Total	**46.2%**	**36.4%**	**40.0%**	**0.0%**	**100.0%**

Table 21. Length and weight data collected from harvested walleye during the 2021 Fresno creel survey.

Month	Sample Size	Length Range	Length Average	Weight Range	Weight Average
December	--	--	--	--	--
January	3	12.9-15.0	14.13	0.65.1.30	0.92
February	2	18.25-19.0	18.63	1.8-2.3	2.05
March	--	--	--	--	--
April	--	--	--	--	--
May	33	13.0-23.6	16.31	0.75-4.12	1.45
June	9	13.0-16.6	14.52	0.65-1.20	0.89
July	36	12.6-21.2	15.16	0.66-2.42	1.09
August	5	13.5-16.8	14.98	0.88-1.22	1
September	--	--	--	--	--
October	--	--	--	--	--
November	--	--	--	--	--
Total	**88**	**12.6-23.6**	**15.56**	**0.65-4.12**	**1.22**

Figure 35. Walleye estimated age at harvest based on length data collected during the 2021 Fresno creel survey.

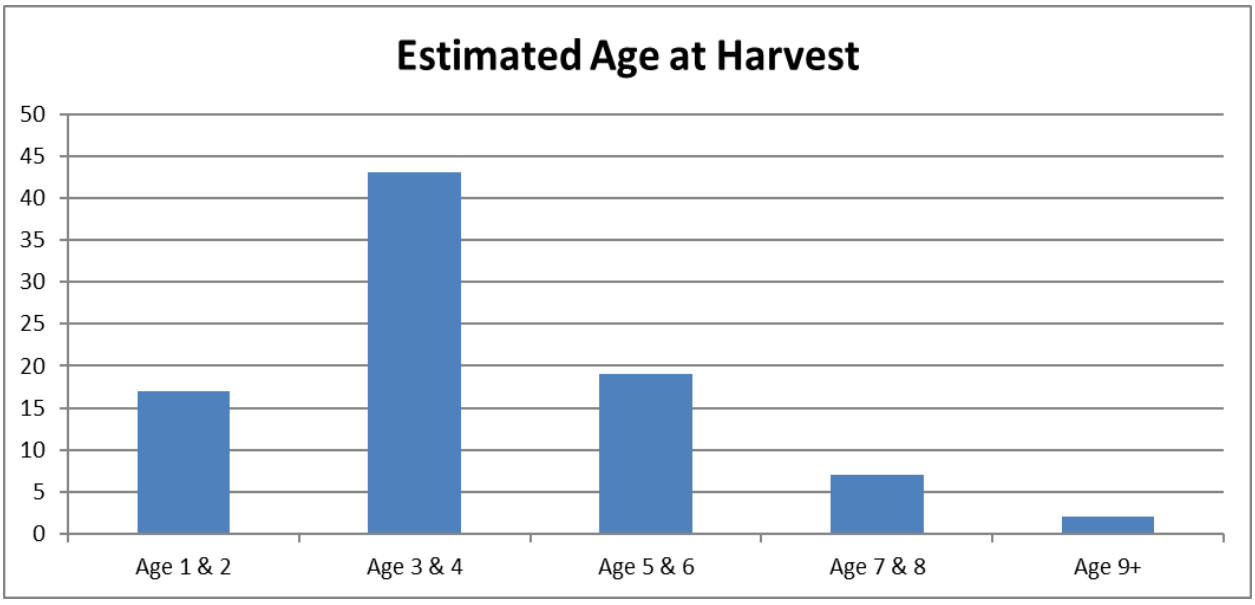


Table 22. Monthly breakdown of contribution of walleye < 14” to the fishery, as reported by anglers during the 2021 Fresno creel survey.

Month	Total Walleye Caught	Walleye Reported < 14"	Walleye < 14" Influnce on Creel
December	0	0	0.0%
January	3	1	33.3%
February	2	0	0.0%
March	0	0	--
April	--	--	--
May	75	10	13.3%
June	65	28	43.1%
July	295	114	38.6%
August	56	28	50.0%
September	41	16	39.0%
October	--	--	--
November	--	--	--
Total	**537**	**197**	**36.7%**

Table 23. Length and weight data collected from harvested northern pike during the 2021 Fresno creel survey.

Month	Sample Size	Length Range	Length Average	Weight Range	Weight Average
December	2	17.0-21.0	19	1.10-2.10	1.6
January	13	20.6-30.0	24	2.0-5.80	3.08
February	11	18.5-25.5	21.75	1.1-4.32	2.27
March	1	--	23.2	--	2.4
April	--	--	--	--	--
May	--	--	--	--	--
June	1	--	22.3	--	2.42
July	3	21.9-28.0	24	2.08-4.60	3.32
August	--	--	--	--	--
September	--	--	--	--	--
October	--	--	--	--	--
November	--	--	--	--	--
Total	**31**	**17.0-30.0**	**22.79**	**1.10-5.80**	**2.66**

Table 24. Length and weight data collected from harvested yellow perch during the 2021 Fresno creel survey.

Month	Sample Size	Length Range	Length Average	Weight Range	Weight Average
December	4	11.0-15.5	12.88	0.6-1.9	1.1
January	1	--	12	--	1
February	1	--	11.75	--	0.6
March	--	--	--	--	--
April	--	--	--	--	--
May	--	--	--	--	--
June	2	10.8-10.9	10.85	0.64-0.67	0.66
July	2	11.3-11.5	11.4	0.72-0.92	0.82
August	--	--	--	--	--
September	--	--	--	--	--
October	--	--	--	--	--
November	--	--	--	--	--
Total	**10**	**10.8-15.5**	**11.98**	**0.60-1.90**	**0.9**

Supplemental Questions

Anglers were asked several additional questions regarding walleye harvest, satisfaction, their personal opinion on Fresno's fishery, and knowledge of aquatic invasive species (Appendix 1).

Q1- Were you satisfied with the number of fish caught today?

This question was based on a numbered scale (1-5) with 1 being unsatisfied and 5 being very satisfied, 3 was considered neither satisfied nor dissatisfied. Of the 118 parties who responded to this question; 35 (29.7%) reported a satisfaction rating of 1, 19 (16.1%) reported a satisfaction rating of 2, 17 (14.4%) reported a satisfaction rating of 3, 27 (22.9%) reported a satisfaction rating of 4, and 20 (16.9%) reported a satisfaction rating of 5. The average satisfaction rate of all anglers surveyed was 2.81.

Q2- Were you satisfied with the average size of fish caught today?

This question was based on a numbered scale (1-5) as well, with 1 being unsatisfied and 5 being very satisfied, 3 was considered neither satisfied nor dissatisfied. Of the 94 parties who responded to this question; 18 (19.1%) reported a satisfaction rating of 1, 18 (19.1%) reported a satisfaction rating of 2, 21 (22.3%) reported a satisfaction rating of 3, 23 (24.5%) reported a satisfaction rating of 4, and 14 (14.9%) reported a satisfaction rating of 5. The average satisfaction rate of all anglers surveyed was 2.97.

Q3- In your opinion, what is the single most important factor influencing the overall fishery on Fresno Reservoir?

This question was very broad and open ended, with a wide array of answers. Answers were compiled, analyzed, and broken into six general categories, based on the answers given. These categories were 1) Biological (water, habitat, forage/fish densities) 2) Conditions (weather, water clarity, location) 3) Management (stocking, length limits, regulations) 4) Social (angling pressure, littering, infrastructure) 5) Other and 6) Don't Know (N/A).

A total of 126 parties interviewed responded to this question. Responses relating to biological (48%), management (36%), and social (11%) were the most frequently reported influences on the Fresno fishery. Water level management, habitat, forage densities, stocking, angling pressure/selective harvest, and proximity to Havre were the most frequent responses.

Q4. Are you aware of the threat to Montana waters from aquatic invasive species such as zebra mussels and Eurasian water milfoil?

All parties surveyed said yes, they were aware of the threat.

Historic Comparison

The creel survey conducted at Fresno Reservoir in 2021 was only the fourth creel survey in Fresno Reservoir history, and the second creel survey that focused on both winter and summer angling trends. The three previous creel surveys were conducted in 1990, 1996 and 2015. For comparison purposes, data displayed in Table 23, for the 2021 survey, consists of only May-September data collected to compare trends.

Catch rates for walleye in 2021 were higher than those reported during both the 1990 and 1996 surveys and almost identical to 2015 (Table 25). The average length and weight of walleye harvested in 2021 was larger than previous surveys as well, the percent of walleye harvest was similar of that reported in the previous creels conducted in the 1990's (Table 25). Catch rates for northern pike were identical to those observed in 2015 and lower than the previous creels (Table 25). The average length and weight of northern pike harvested was higher in 2021 (Table 25). The percentage of northern pike harvested was similar to previous creels.

Catch rates for yellow perch were low in 2015 and 2021, however no catch rates were identified in previous creel surveys and no comparison could be made (Table 25). The average length and weight of harvested yellow perch was higher than 2015 yet the percentage of yellow perch harvested decreased (Table 25).

Fresno average pool elevations during the four creel surveys ranged from 6.5-13.5 feet below full pool elevation (elevation 2575; Table 25).

Table 25. Creel statistic comparison of the four previous surveys conducted at Fresno Reservoir (May-September).

Category	1990	1996	2015	2021
Overall Catch Rate (WE/hr) May-September	0.5	0.41	0.75	0.74
Avg. Length of WE Harvested	14.8	14.2	15.38	15.56
Avg. Weight of WE Harvested (lbs.)	1.07	0.98	1.10	1.22
Percent Harvested	52%	53%	32%	46%
Overall Catch Rate (NP/hr) May-September	0.2	0.41	0.1	0.1
Avg. Length of NP Harvested	19.8	20.4	22.6	22.8
Avg. Weight of NP Harvested (lbs.)	1.69	1.82	2.42	2.66
Percent Harvested	29%	19%	11%	21%
Overall Catch Rate (YP/hr) May-September	N/A	N/A	0.01	0.04
Avg. Length of YP Harvested	10.8	N/A	10.5	12
Avg. Weight of YP Harvested (lbs.)	0.68	N/A	0.61	0.9
Percent Harvested	N/A	N/A	42%	28%
Average Pool Elevation	2565.9	2566.1	2568.5	2561.8

Discussion

Poor weather conditions throughout the creel weekends and extremely low water levels from July-September impacted the overall interviews collected in 2021. For comparison, over 600 interviews were conducted in 2015 compared to just 128 in 2021. Statewide creel surveys conducted over the years support what was observed in 2021, when Fresno water levels decrease significantly, angling, and recreational use drops to very low levels and access is impacted. The 2021 creel survey conducted on Fresno Reservoir showcased the current state of the walleye fishery and highlights the lack of diversity within this fish community from a sport fish and opportunity perspective. Walleye catch rates, lengths, and weights were high in 2015 and 2021 when compared to surveys conducted in 1990 and 1996 (Table 25). However, catch rates for other species in remained low. Northern pike average length and weight was greater in 2021 when compared to previous creel surveys, and increased harvest was observed in 2021 (Table 25).

Walleye remain the primary target species for many anglers. However, this survey did highlight several other important species angler's target. Anglers increased interest in northern pike, yellow perch, and black crappie during the winter months suggest these species must be considered when making management and regulation decisions in the future.

Overall, most anglers were neutrally satisfied with their fishing experiences at Fresno in 2021. They highlighted biological, management, and social reasons as being the most important influences contributing to the current overall health of the fishery. These three categories should be at the forefront of every decision being made to this fishery and its surrounding lands and management.

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 2022 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 2022, 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 Fresno should continue to be evaluated to determine survival of stocked walleye fingerlings.

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

154535 Bailey Reservoir
154570 Beaver Creek Reservoir

157445 BR 047
155083 Dry Fork Reservoir
155120 Ester Lake
165115 Flintstone Reservoir
165140 Fort Peck Reservoir
155240 Fresno Reservoir
166040 Hump Reservoir
Little Nelson Reservoir
166921 McChesney Reservoir
152840 Milk River Sec. 05
162500 Missouri River Sec. 05
162520 Missouri River Sec. 06
156480 Nelson Reservoir
157040 PR 018
159175 Salmo Reservoir

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, 2022