MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO.: F-78-R-6 STUDY TITLE: SURVEY AND INVENTORY OF WARMWATER LAKES

JOB NO.: IV-C JOB TITLE: FORT PECK RESERVOIR STUDY

PROJECT PERIOD: JULY 1, 2022 THROUGH JUNE 30, 2023
REPORT PERIOD: MARCH 1, 2022 THROUGH FEBRUARY 29, 2023

ABSTRACT

Fort Peck Reservoir had a peak elevation on January 1st, 2022 at 2224.93 mean feet above sea level (MSL) to a minimum elevation on December 31st, 2022 at 2218.81 MSL, a decrease of 6.12 feet. Spawning walleye populations were sampled in the upper Big Dry Arm with modified fyke nets from April 9th to April 30th, 2022. Walleye eggs were collected and the fertilized eggs were sent to Fort Peck and Miles City fish hatcheries. Trap netting (non-standardized) captured 2,796 walleye for a catch rate of 15.4 per net night which was down from the previous year of 18.8 per net-night. Due to favorable spawning conditions, 96 million walleye eggs were collected. A total of 29.8 million fry and 2.9 million walleye fingerlings were stocked in various locations throughout Fort Peck Reservoir. One hundred gill nets were set in standard locations throughout the reservoir from July 12th to August 4th, 2022. Walleye, channel catfish, and goldeye were the most abundant species captured overall, with catch rates of 7.6, 2.8, and 2.6 per net night, respectively. Relative abundance of walleye in 2022 was up from the previous year at 7.6 per net night and above the long-term average of 4.0 per net for the period from (1992 to 2022). Gill-netted walleye averaged 15.8 inches and 2.0 pounds. In 2022, relative abundance increased for stock-size walleye while catch rates for all other length groups remained similar. Relative weights of walleye for all size groups decreased slightly in 2022 except for stock length fish. Northern pike relative abundance increased slightly to 2.5 per net night which was slightly above the long-term average of 2.1 per net night for the period of 1992 to 2022. Average size of gill-netted northern pike was 25.7 inches and 4.4 pounds. Overall, relative abundance of shoreline forage decreased to 45.5 per haul in 2022 which was slightly below the long-term average of 170.6 per haul from 1992 to 2022. Young-of-year crappie were the most abundant species captured from shoreline seining in 2022 at 27.3 per seine haul. A total of 53,232 chinook salmon were stocked at Marina, and Milk Coulee in June of 2022 at an average size of 26.8 fish/pound. Young-of-year cisco relative abundance decreased to 75.5 per net-night in 2022 and was slightly below the long-term average of 82 per net-night for the period of 1990 to 2022.

OBJECTIVES AND DEGREE OF ATTAINMENT

Activity 1 - Survey and Inventory

Objective: To survey and monitor the characteristics and trends of fish populations and to assess habitat conditions in Fort Peck Reservoir. This objective was met and is presented in the Results and Discussion section of this report.

Activity 2 - Fish Population Management

Objective: To implement fish stocking programs to maintain fish populations at levels consistent with habitat conditions and other limiting factors. This objective was met and results are presented in Results and Discussion of this report.

Activity 3 - Technical Guidance

Objective: To review projects by government agencies and private parties that have the potential to affect fisheries resources, provide technical advice or decisions to mitigate effects on these resources, and provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources. This objective was met by evaluating the impact of reservoir water levels on the Fort Peck Reservoir fishery and presented to Corps of Engineers to make recommendations for Annual Operating Plan (AOP). Objectives of the Fort Peck Reservoir Fisheries Management Plan (FPRFMP) are presented in the Results and Discussion of this report. The FPRFMP will guide fisheries management activities on Fort Peck Reservoir for a ten-year period (2012-2022). Objective accomplished.

Activity 4 - Aquatic Education

Objective: 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. Volunteers assisted with the annual walleye egg-taking operation in the upper Big Dry Arm of Fort Peck Reservoir in 2022. Fisheries staff assisted with fishing clinics and career days at area schools. Public meetings were held with Billings Chapter of Walleyes Unlimited, Crooked Creek Chapter of Walleyes Unlimited, and Malta Chapter of Walleyes Unlimited. Staff assisted the regional information and education officer with several press releases, interviews on the Montana Outdoor Radio Show (x2), and multiple Fisheries Friday posts for the R6 Facebook page. Staff also worked with the Billings Gazette outdoor editor on article discussing the Fort Peck Reservoir chinook salmon fishery and egg collection effort. Objective accomplished.

STUDY AREA

Fort Peck Reservoir is a large earth-filled dam on the Missouri River located in northeastern Montana. Figure 1 depicts major roads around Fort Peck Reservoir, select locations and 5 sampling regions the reservoir is divided into: upper Big Dry Arm (UBD), lower Big Dry Arm (LBD), lower Missouri Arm (LMA), middle Missouri Arm (MMA), and upper Missouri Arm (UMA). The dam was closed in 1937 and is the largest water body in the state of Montana, with 240,000 surface acres at full multiple use pool. Full flood pool is reached at 2250 and multiple use pool is reached at 2246 mean feet above sea level (MSL). At full multiple use pool 1,500 miles of shoreline exists in 130 linear miles of the reservoir with a maximum depth of 220 feet. The bottom of the multiple use pool is 2234.19 MSL and the bottom of the multipurpose carryover zone is 2160 feet MSL. Fort Peck Reservoir had a peak elevation on January 1st, 2022 at 2224.93 mean feet above sea level (MSL) to a minimum elevation on December 31st, 2022 at 2218.81 MSL, an decrease of 6.12 feet. (Figure 2). Reservoir elevations are predicted to increase from March through June and gradually decline in July of 2023 based on the December median runoff forecast (USACE 2022).

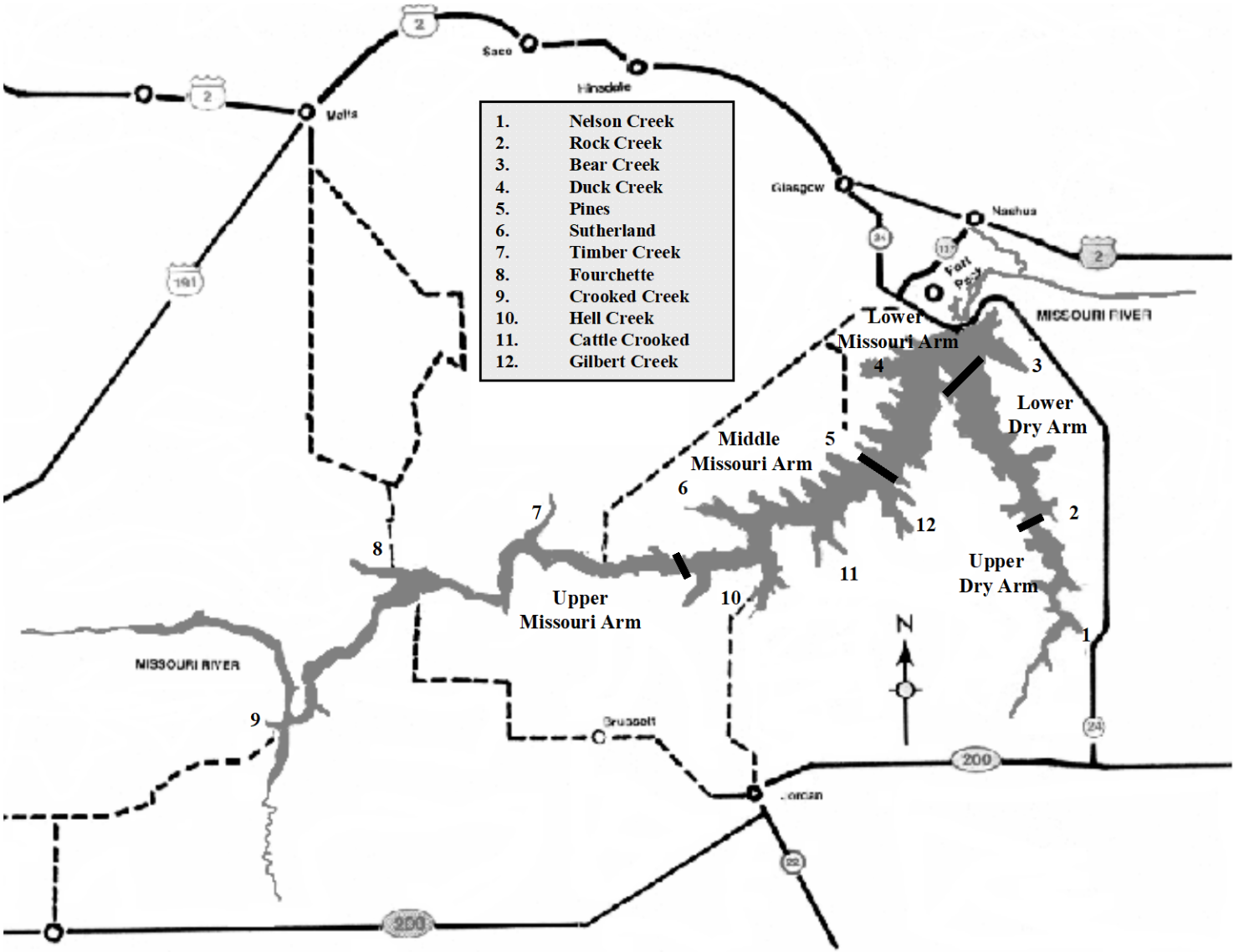


Figure 1. Fort Peck study area describing major sampling zones and select specific locations.

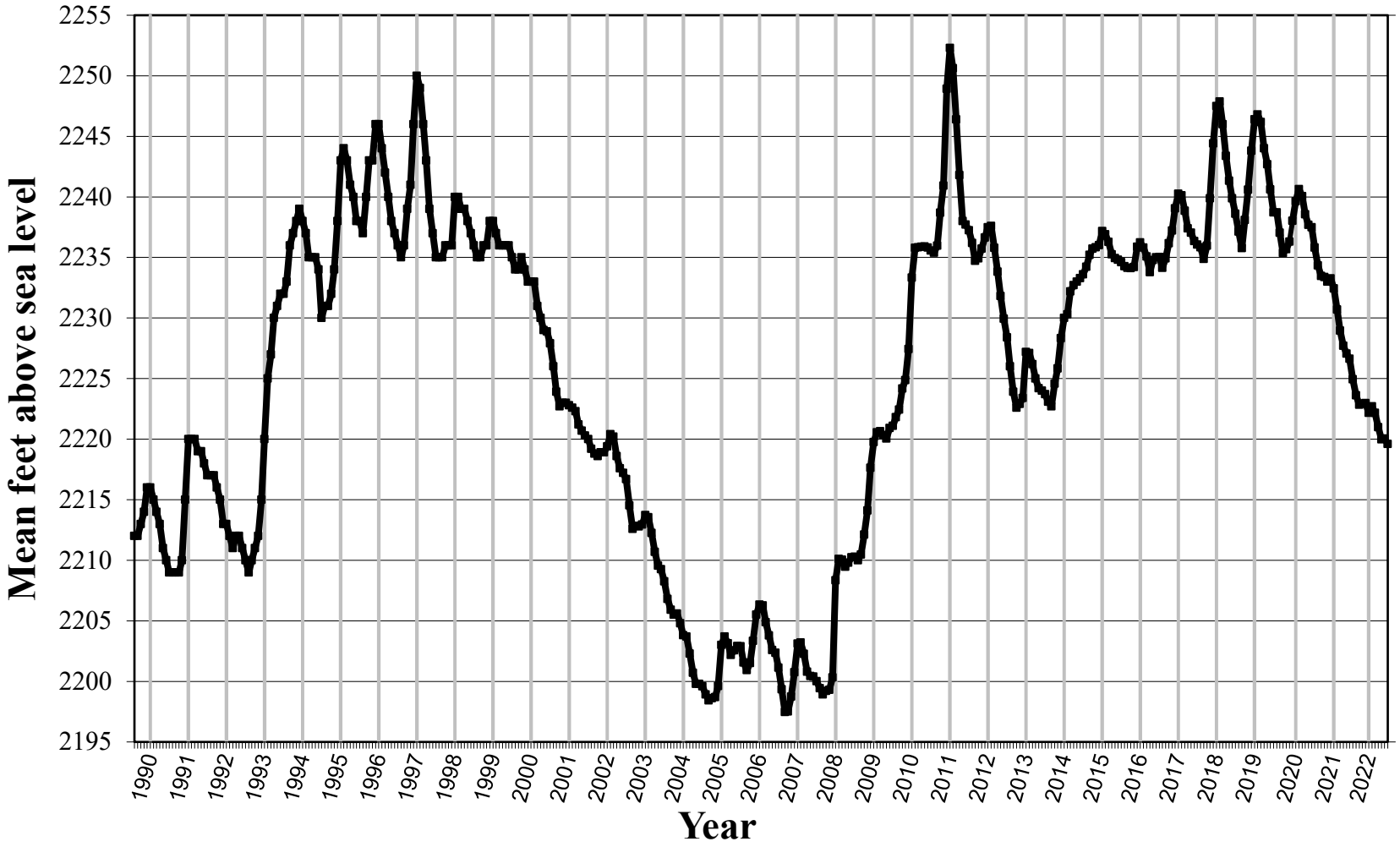


Figure 2. Peak monthly reservoir elevations on Fort Peck Reservoir from January 1990 to January 2022 (Data provided by the U.S. Army Corps of Engineers).

SAMPLING METHODS

Data Collection

- Spring trap netting efforts were conducted from April 9th to April 30th, 2022 in the Big Dry Arm with 4-ft x 6-ft modified fyke nets of 1-in square mesh rigged and 30 to 50-ft leads. These sites are not standardized due to fluctuations in reservoir elevations. This effort is targeted for collection of walleye and northern pike to provide an egg source to meet stocking requests for Fort Peck Reservoir and other sport fisheries for the state of Montana. Subsamples of fish are collected due to time constraints, limited manpower, and rough conditions at times and presented in the tables and length frequency distributions of this report. Vokoun et al. (2001) recommended using 300-400 individuals when constructing length frequency distributions with a given accuracy and precision.
- Limnological sampling was conducted at six sites (Bug Creek, Spring Creek, Haxby, Pines, Hell Creek, and Timber Creek) throughout the reservoir. Profile measurements were collected at 10-ft intervals using a Hydrolab equipped with a DS5 probe and Surveyor 4 data logger from May through September during the middle of each month. Profile measurements were recorded from the subsurface to the maximum depth at each site. Specific measurements included: temperature (°C), dissolved oxygen (mg/L), pH (standard units), turbidity (NTU), and total dissolved solids (g/L). A detailed table is located in Appendix 3 of the report.
- Zooplankton samples were collected using a 153 µ mesh net with a 12-in diameter opening and a 1:3 cone. Sampling was conducted at the same six sites listed above to address differences in general productivity and morphology of the reservoir. Fifty-foot vertical tows were performed monthly at each of the sampling stations from May through September. Two tows were conducted at each site and pooled into one sample. Zooplankton processing methods follow those described by Leathe and Graham (1982).
- One hundred sinking experimental multifilament gill nets 125-ft x 6-ft deep consisting of 25-ft panels of ¾, 1, 1 ¼, 1 ½, and 2-in square mesh were fished from 10 to 30-ft depths at standardized locations from July 12th to August 4th, 2022. A list of sampling dates by region, water surface temperature and reservoir elevation during time of sampling are presented in Appendix 3.
- Walleye otoliths were removed from all walleye collected during reservoir-wide gillnetting. Otoliths were mounted in epoxy and cut into thin sections on an Isomet saw and later mounted on glass slides. Walleye otoliths were used as an aging structure because of their higher precision when compared to scales and spines (Erickson 1983; Isermann et al. 2003). Growth was expressed as mean length-at-age at time of capture in July/August for walleye.
- Beach seining was conducted from August 1st to August 29th, 2022 using a 100-ft x 9-ft beach seine of 3/16-in square mesh at 100 standardized locations throughout the reservoir, to determine relative abundance and reproductive success of game and forage fish.
- Twelve multifilament gill nets 100-ft x 6-ft with ½, ¾, 1, 1-in mesh square mesh were fished vertically from the water's surface to sample young-of-year and adult cisco from September 20th to September 29th, 2022. The lower Big Dry, lower Missouri, and middle Missouri Arm regions were sampled because they contained sufficient depths of 100 ft. Lengths and weights were collected from the first 100 cisco captured per mesh, per site. Otoliths were removed for age estimation (10 per 10-mm length group per sampling region). Otoliths were mounted in epoxy and cut into thin sections on an Isomet saw and later mounted on glass slides (Secor et al. 1992).
- Boat mounted electrofishing was used from October 7th to October 24th, 2022 to locate, sample, and collect chinook salmon as part of the annual egg-take effort. Chinook salmon otoliths were collected from all fish used in the egg taking process. Otolith preparation followed methods outlined by Secor et al. (1992).
- Deepwater gillnets 300-ft x 10-ft deep consisting of 50-ft panels of ¾, 1, 1 ¼, 1 ½, 2, and 2½-in square mesh were fished from August 31st to September 9th, 2022. Nets were set at two different depth strata: shallow (60-90 feet) and deep (90-120 feet) at 10 locations near the dam area. Based on temperature and dissolved oxygen profiles, a thermocline has developed during this time which allows greater effectiveness in sampling coldwater piscivores such as chinook salmon and lake trout (Budy et al. 2009).

Data Analysis

Relative abundance of fish species was expressed as mean catch per unit effort (CPUE) for modified fyke nets (No./net night), gill net (No./net night), and seine catches (No./haul).

Proportional stock density (PSD; Anderson and Weithman 1978) and relative stock density (RSD) values were calculated for channel catfish, lake trout, northern pike, sauger, smallmouth bass, and walleye (Gablehouse 1984). The terminology of PSD has been changed to proportional size distribution and use of RSD was discontinued to assist in communication and name the index more correctly (Guy et al. 2007). Length categories used to calculate PSD values are listed in Table 1.

Table 1. Minimum lengths (in) of length-class designations used when calculating proportional size distribution values for fish population survey samples.

Species	Length Class				
	Stock	Quality	Preferred	Memorable	Trophy
Channel catfish	11	16	24	28	36
Lake trout	12	20	26	31	39
Northern pike	14	21	28	34	44
Sauger	8	12	15	20	25
Smallmouth bass	7	11	14	17	20
Walleye	10	15	20	25	30

Relative weights (*Wr*; Anderson 1980) were calculated using the standard weight (*Ws*) equations developed for channel catfish (Brown et al. 1995), cisco (Fisher and Fielder 1998), lake trout (Hubert et al. 1994) northern pike (Willis 1989), smallmouth bass (Kolander et al. 1993), and walleye (Murphy et al. 1990). These values are presented in the results and discussion section of this report. Proportional size distribution, PSD-P, and *Wr* values were calculated using EXCEL.

RESULTS AND DISCUSSION

Spring Trap Netting

Spawning walleye and northern pike populations were sampled from Nelson Creek to McGuire Creek area of Fort Peck Reservoir from April 9th to April 30th, 2022. A total of 182-trap days were committed to walleye spawning efforts in 2022. Netting effort was higher than previous years due to cooler water temperatures during the first two weeks of trap netting efforts which led to decreased catch rates of walleye as well as ripe female walleye during this time. Ice cover typically recedes by the first week in April and the walleye spawning operation concludes in three to four weeks. Water surface temperatures were 43°F when trap netting efforts commenced but cooled to 38°F and remained at that temperature until April 25th. Temperatures increased quickly to 46F on April 27th resulting in increased spawning activity. Walleye spawning activity peaks when water temperatures are 43°F to 50°F in the north-central United States (Becker 1983).

Because of increasing water temperatures in 2022, the egg-take goal of 60 million was exceeded and 96 million total eggs were collected. Due to these favorable water temperatures time, large numbers of ripe female walleye (39%) were captured during the operation. In addition, 53% of the female walleye captured were green and only 8% were spent female walleye during the 2022 trap netting effort. In contrast, higher than normal numbers of spent female walleye (61%) were captured in 2018 due to late ice cover followed by a rapid increase in water temperatures. It's possible some walleye ascended portions of the Big Dry Creek while there was still ice on the main portion of the reservoir and attempted to spawn in 2018. Liebelt (1979) observed natural reproduction of walleye during periods of higher reservoir elevations and higher inflows to the Big Dry Arm.

The fertilized walleye eggs were sent to Fort Peck and Miles City Fish Hatcheries. A total of 24.9 million fry and 2.9 million walleye fingerlings were stocked in various locations throughout Fort Peck Reservoir in 2022 (Appendix 2). Kerr (2011) recommended walleye release sites should be increased as size and basin complexity of the waterbody increases to distribute them over as wide an area as possible. The goal of 3 million fingerlings for Fort Peck Reservoir was not met (FPRFMP 2012). This was due to below average fingerling production at the Miles City hatchery. Repairs to multiple rearing ponds at Miles City hatchery were being conducted at the time of fry stocking which reduced numbers of fingerling produced in 2022.

Walleye

Relative abundance of walleye captured in spring trap nets was 15.4 per net in 2022 which decreased from 18.8 per net the previous year. This was the third highest on record and above the long-term average of 7.3 per net (1990-2022; Table 2). Length frequency distributions showed 49% of walleye were 20 inches and greater in 2021 and 2022 (Figure 3). The combination of more male walleye measured in 2022 and higher numbers of smaller male walleye 13 to 17-inches influenced this trend (Figure 4). Typically, more male walleye are captured than females during trap netting. In general, length frequency distributions during the spring trap netting effort indicated male walleye were smaller when compared to female; however, male walleye up to 27 inches were captured during these efforts (Figure 4).

Table 2. Summary of mean CPUE (No./net-night), mean length (in), and mean weight (lb)walleye and northern pike captured during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 1990-2022. N is the total number of walleye and northern pike collected.

Year	Date	Net-Nights	Walleye N	Walleye CPUE	Northern pike N	Northern pike CPUE
1990	(4/05-5/04)	292	1,863	6.4	513	1.8
1991	(4/09-5/10)	375	793	2.1	491	1.3
1992	(4/07-4/29)	278	1,585	5.7	684	2.5
1993	(4/15-4/30)	172	1,945	11.3	201	1.2
1994	(4/12-4/26)	168	1,882	11.2	160	1
1995	(4/11-4/28)	473	3,284	6.9	648	1.4
1996	(4/15-5/02)	391	3,231	8.3	2,307	5.9
1997	(4/15-4/29)	307	3,937	12.8	2,652	8.6
1998	(4/04-4/29)	477	2,806	5.9	1,354	2.8
1999	(3/27-4/26)	434	5,673	13.1	2,573	5.9
2000	(4/04-4/28)	392	2,126	5.4	603	1.5
2001	(4/06-4/27)	328	3,362	10.3	1,922	5.9
2002	(4/17-5/09)	349	2,377	6.8	1,713	4.9
2003	(4/11-5/01)	426	2,366	5.6	1,579	3.7
2004	(4/09-4/26)	324	2,323	7.2	2,174	6.7
2005	(4/06-4/27)	537	2,030	3.8	1,327	2.5
2006	(4/12-5/01)	579	2,345	4.1	503	0.9
2007	(4/03-5/01)	617	2,478	4	1,425	2.3
2008	(4/18-5/07)	383	1,151	3	629	1.6
2009	(4/18-4/28)	176	1,740	9.9	813	4.6
2010	(4/13-4/30)	289	1,470	5.1	525	1.8
2011	(4/18-5/06)	399	1,341	2.8	911	2.3
2012	(3/27-5/01)	730	1,576	2.2	1,499	2.1
2013	(4/17-5/10)	484	2,176	4.5	5,082	10.5
2014	(4/18-5/05)	363	1,670	4.6	2,864	7.9
2015	(3/31-4/23)	405	1,740	4.3	1,147	2.8
2016	(3/29-4/21)	427	2,672	6.3	2,382	5.6
2017	(4/05-4/23)	277	2,261	8.2	1,040	3.8
2018	(4/23-5/08)	255	1,280	5.7	936	4.2
2019	(4/11-4/26)	205	2,058	10.0	1,301	6.3
2020	(4/08-4/18)	101	1,647	16.3	380	3.8
2021	(4/02-4/17)	116	2,176	18.8	700	6.0
2022	(4/09-4/30)	182	2,796	15.4	2,149	11.8

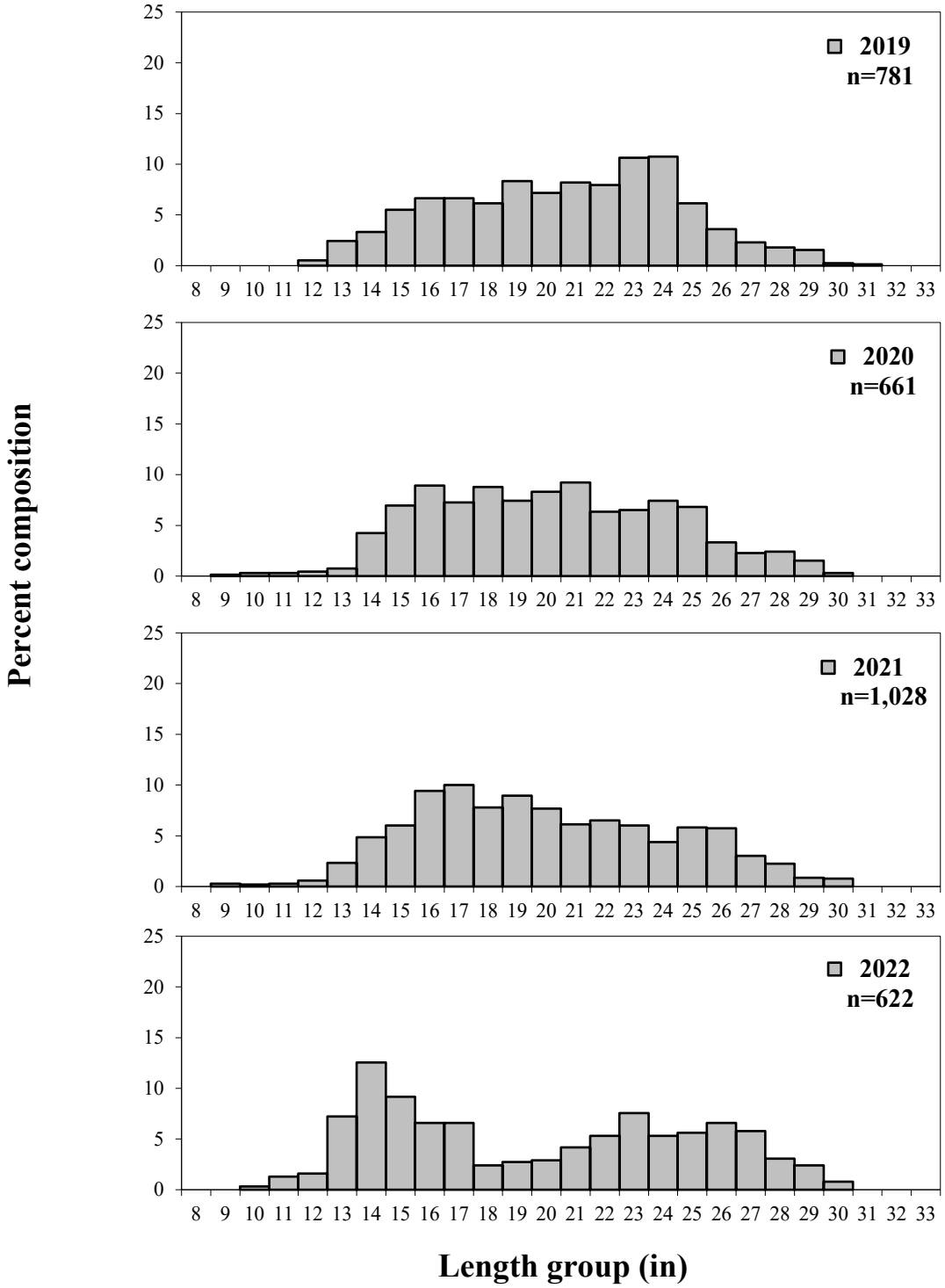


Figure 3. Length frequency of subsampled walleye collected during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 2019-2022.

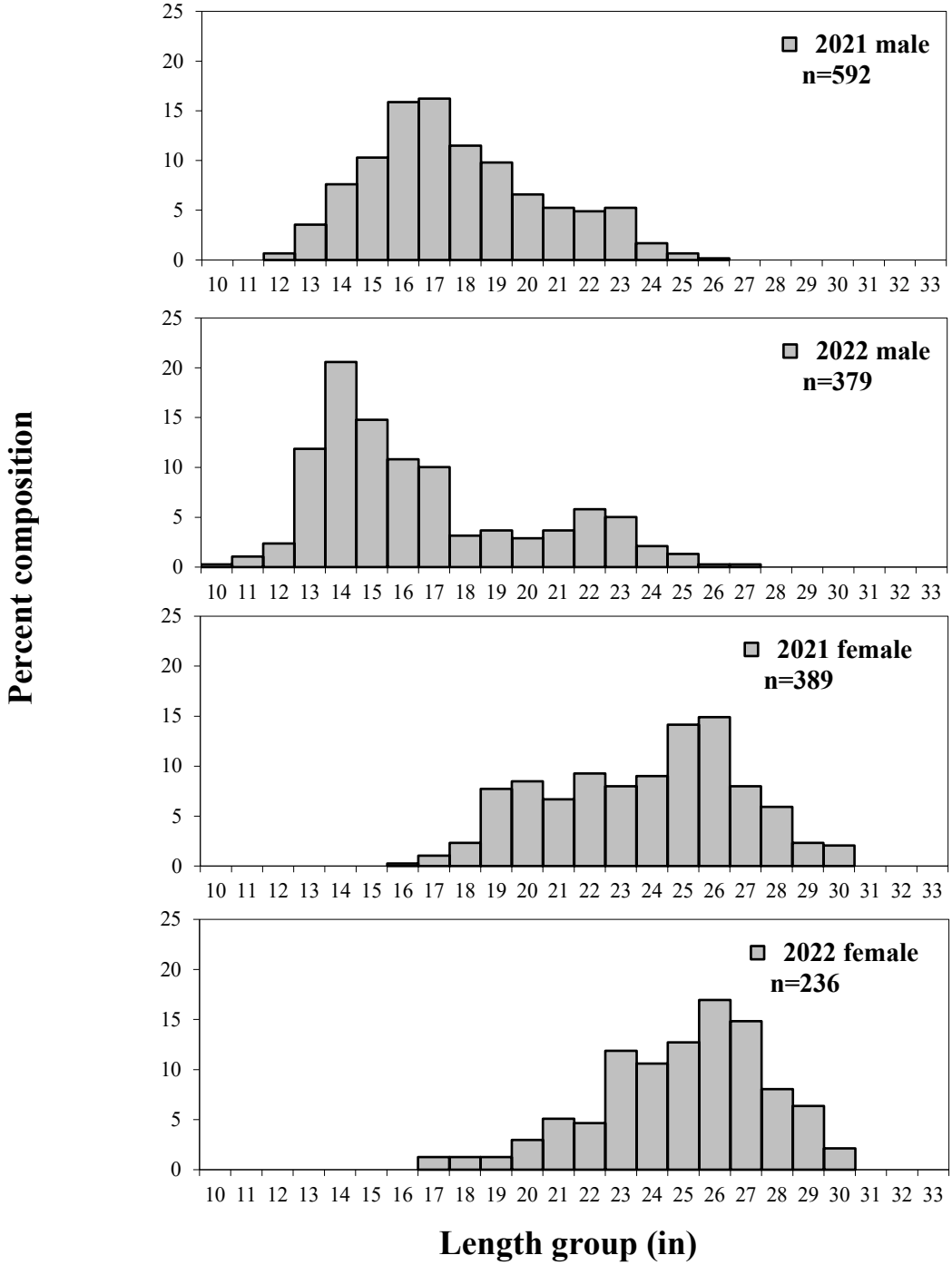


Figure 4. Length frequency of subsampled male and female walleye collected during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 2021-2022.

LIMNOLOGY AND ZOOPLANKTON MONITORING

Water temperature in Fort Peck Reservoir ranged from 25.8°C at the subsurface to 5.4°C at the bottom (Appendix 3). Temperatures throughout the water column were coolest during May and warmest during August. Water temperatures below the surface were warmest at the uppermost sites (Timber Creek and Bug Creek) during the sampling period but gradually decreased at each site moving downstream towards the dam area.

Thermal stratification of Fort Peck Reservoir was not observed until July and strong thermoclines were present in August and September (Appendix 3). Each site was thermally stratified during the month of August and continued into September with the exception of Timber Creek. Thermocline depth varied by month and site. The most pronounced thermocline was located at the Haxby site during July (Figure 5; Appendix 3).

Dissolved oxygen concentrations were highest (11.6 mg/L) during May when the reservoir was coolest. More uniform dissolved oxygen levels were also observed during this time when near isothermal conditions were present (Appendix 3). Dissolved oxygen concentrations decreased to their lowest levels during late summer/early fall. Dissolved oxygen levels fell below 5 mg/L near the bottom at Hell Creek and Timber Creek during August and September. It should be noted that dissolved oxygen levels of less than 5 mg/L may limit some deep-water salmonid habitat (e.g., lake trout; Sellers et al. 1998). Plumb and Blanchfield (2009) found lake trout prefer to occupy depths where dissolved oxygen was greater than 6 mg/L. No anoxic conditions were observed at any of the locations in 2022.

The maximum estimated zooplankton density was 78.3/L which occurred in June of 2022 and was comprised largely of cyclopoids and rotifers. Cyclopoids represented the zooplankton community throughout the sampling season and highest densities were observed during May at 37.2/L. *Daphnia* were the most abundant cladoceran sampled and were most abundant during July (Figure 6). Cladocerans, *Leptodora* and *Diaphanosoma*, were present in small numbers and were only collected periodically. These trends in seasonal abundance are similar to previous findings on Fort Peck Reservoir and other large mainstem Missouri River Reservoir systems (Wiedenheft 1985; Mullins 1991; Fielder 1992).

Comparison of total densities for all zooplankton from each station varied slightly by year and location (Figure 7). Wiedenheft (1985) noted a similar trend in zooplankton density. Mean densities of zooplankton by location in 2022 were similar to those observed in 2021. Increased inflows and increases in reservoir elevation have been shown to increase standing crops of zooplankton and diversity of the zooplankton community (Martin et al. 1981).

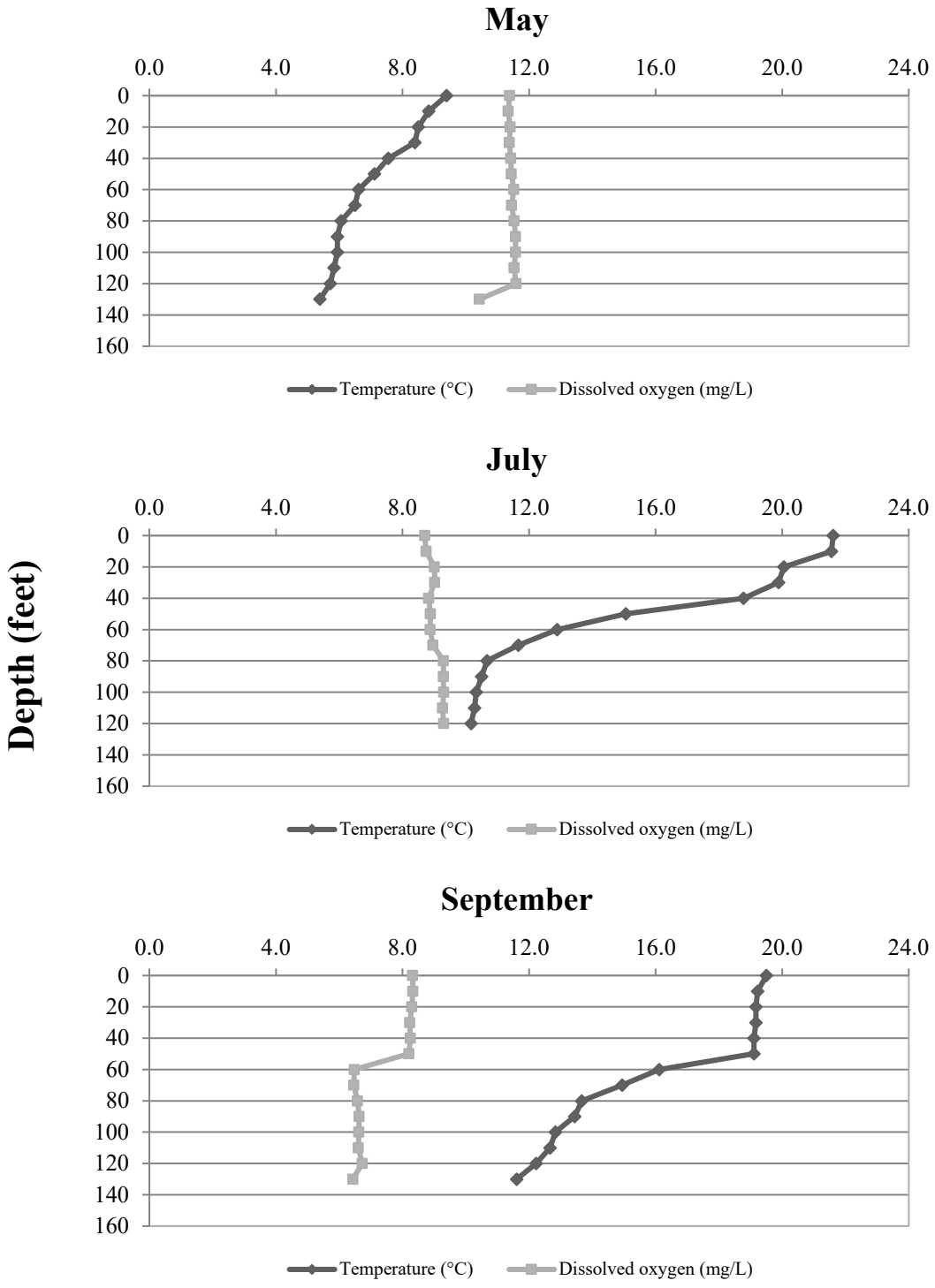


Figure 5. Depth profiles of temperature (°C) and oxygen (mg/L) located near Haxby Point on Fort Peck Reservoir, May-September 2022.

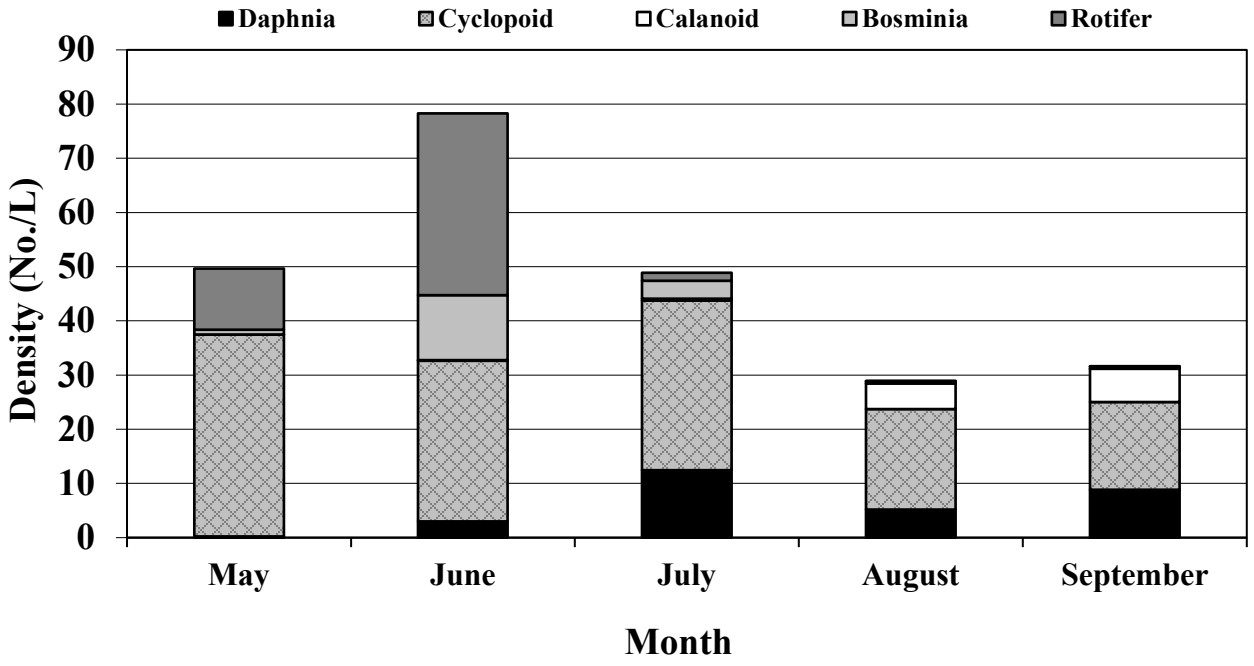


Figure 6. Mean zooplankton density (number of organisms/L) pooled from reservoir-wide samples by taxonomic group and month for Fort Peck Reservoir, 2022.

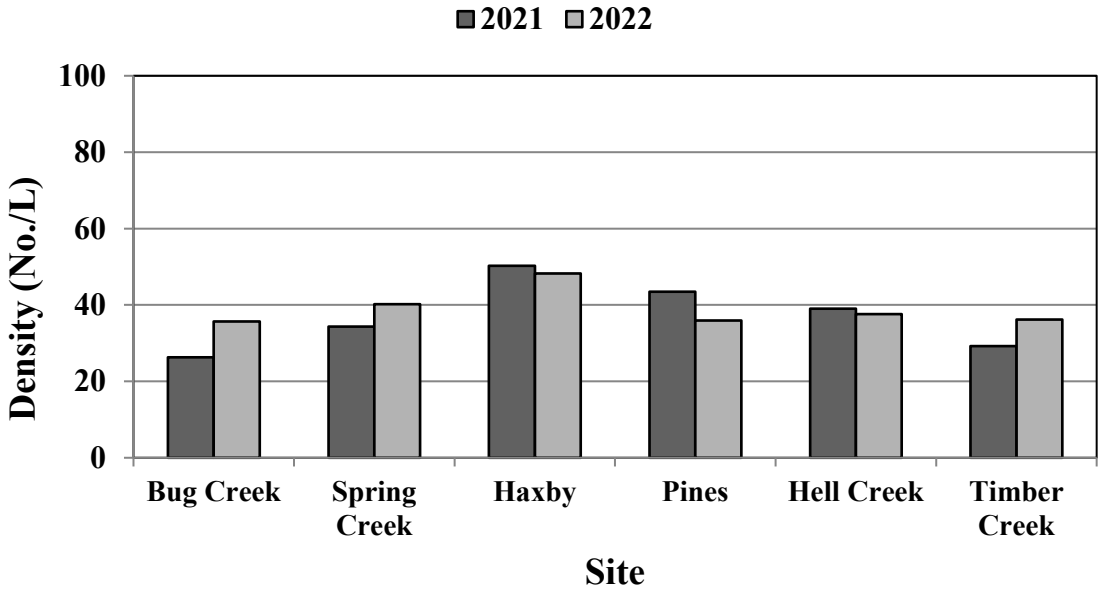


Figure 7. Mean zooplankton density (number of organisms/L) pooled for all months (May-September) for Fort Peck Reservoir, 2021-2022.

RESERVOIR-WIDE GILL NETTING

Standard experimental gill nets were set throughout the reservoir from July 12th to August 4th, 2022 when water surface temperatures ranged from 70.2°F to 80.0°F. Gill netting provides information on species distribution; composition, relative abundance, population parameters, and stomach contents of game species. Fifteen species were captured for a total of 2,511 fish (Table 2). Walleye, channel catfish, and goldeye were the most abundant species captured overall, with catch rates of 7.6, 2.8, and 2.6 per net-night, respectively. Fish with catch rates equal to or greater than 1.0 per-net night include: common carp, northern pike, river carpsucker, shorthead redhorse, smallmouth bass, and smallmouth buffalo.

Walleye

Relative abundance of walleye in 2022 was 7.6 per net which was the highest on record and up from the previous year (Figure 8). This was above the long-term average of 4.0 per net from 1992 to 2022. The three-year running average goal of 3.6 per net was met (5.3 per net in 2020-2022) as outlined in the FPRFMP. Stock-length size groups comprised the largest group of walleye sampled in 2022 suggesting favorable growth and survival (Figure 8). Relative abundance of walleye was greatest in the lower Big Dry arm with a catch rate of 12.8 per net (Table 3).

Length frequency distributions of walleye in 2022 indicated a broad length distribution of fish and the presence of strong year class(es) unlike 2020 (Figure 9). In 2022, there was a high abundance of 12 to 14-inch fish that comprised 43% of the walleye sampled suggesting a strong year class. This year class represented 30% of the walleye sampled in 2021 as 10 to 12-inch fish. Number of walleye greater than 23 inches has remained similar when examining length distribution from the previous years (Figure 9). Based on length frequencies, walleye in Fort Peck Reservoir don't recruit to experimental gill nets until they are greater than 12 inches in length.

Mean length-at-age for walleye in 2022 tracked closely to the six-year average (Table 5). Mean lengths-at-age were higher when compared to the drought years (2006-2007) which were characterized by low reservoir elevations, low relative abundance of forage items, and low relative weights for all size groups of walleye (Headley 2012). A large group of age-3 and age-4 walleye were documented which comprised 48% of all walleye aged in 2022. The 2011-year class (10-year old fish) comprised 6% of all walleye aged in 2022 compared to 12% in 2021. This decrease can be attributed to the large number of younger fish aged in 2022. The oldest walleye sampled was aged at 24.

Overall, relative weights of walleye in 2022 increased slightly compared to the previous year (Table 6). Relative weights increased slightly for all length groups except memorable length fish. Relative weights for all length groups of walleyes captured in 2022 were higher than the drought/low water years of 2005-2008 (Figure 10). Relative weights of preferred and memorable+ length groups remained over 90 which can be attributed to an abundance of young-of-year and adult cisco observed in 2022. Cisco have been found to be an important prey item for walleye greater than 18 inches in Fort Peck Reservoir (Mullins 1991).

Since 1992, walleye PSD would have fallen into the favorable category (45-60), with the exception of 1995 and 1996. The favorable trend resumed in 1998 and continued into 2015 with a value of 59 (Table 6). However, PSD of walleye in 2016 was 72 making it the highest on record and PSD-P was 34 indicating a greater abundance of preferred size walleye. A ratio between 10 and 20 is considered desirable as a PSD-P for a balanced population. High values of PSD-P indicate an abundance of larger fish with a small stock size available. However, PSD and PSD-P in 2022 decreased to 39 and 22, respectively suggesting greater numbers of stock length fish in the population.

Table 3. Mean CPUE (No./net-night), mean length (in), and mean weight (lb) of fish collected by experimental gill nets in Fort Peck Reservoir during July-August 2022. *N* is total number collected for length and weight measurements.

			Length		Weight	
Species	Number	CPUE	Inches	*N*	Pounds	*N*
Black crappie	6	<0.1	10.0	6	0.6	6
Channel catfish	279	2.8	19.0	279	2.7	279
Cisco	14	0.1	9.3	12	0.2	12
Common carp	222	2.2	21.8	222	4.9	222
Freshwater drum	63	0.6	15.6	63	1.8	63
Goldeye	256	2.6	13.1	252	0.8	252
Northern pike	249	2.5	25.7	249	4.4	249
River carpsucker	206	2.1	20.9	206	5.0	206
Sauger	14	0.1	15.4	14	1.2	14
Shorthead redhorse	130	1.3	14.8	130	1.5	130
Smallmouth bass	120	1.2	13.4	120	1.5	120
Smallmouth buffalo	148	1.5	24.9	148	9.5	147
Walleye	756	7.6	15.8	756	2.0	756
White sucker	12	0.1	17.4	12	2.3	12
Yellow perch	36	0.4	8.0	35	0.2	35

Table 4. Number (*N*) and mean catch per unit effort (CPUE; No./net-night) of fish species collected by experimental gill nets in Fort Peck Reservoir during July-August, 2022.

	UBD[1]		LBD[2]		LMA[3]		MMA[4]		UMA[5]		Total	
Species	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Black crappie	1	<0.1	0	--	0	--	0	--	5	0.3	6	<0.1
Channel catfish	108	5.4	20	1.0	35	1.8	45	2.3	71	3.6	279	2.8
Cisco	3	0.2	2	0.1	8	0.4	0	0.0	1	0.1	14	0.1
Common carp	28	1.4	44	2.2	53	2.7	60	3.0	37	1.9	222	2.2
Freshwater drum	8	0.4	6	0.3	8	0.4	19	1.0	22	1.1	63	0.6
Goldeye	89	4.5	15	0.8	24	1.2	18	0.9	110	5.5	256	2.6
Northern pike	95	4.8	66	3.3	44	2.2	12	0.6	32	1.6	249	2.5
River carpsucker	35	1.8	25	1.3	12	0.6	60	3.0	74	3.7	206	2.1
Sauger	0	--	2	0.1	3	0.2	2	0.1	7	0.4	14	0.1
Shorthead redhorse	32	1.6	32	1.6	4	0.2	24	1.2	38	1.9	130	1.3
Smallmouth bass	20	1.0	24	1.2	19	1.0	31	1.6	26	1.3	120	1.2
Smallmouth buffalo	11	0.6	26	1.3	37	1.9	56	2.8	18	0.9	148	1.5
Walleye	255	12.8	141	7.1	156	7.8	88	4.4	116	5.8	756	7.6
White sucker	2	0.1	2	0.1	6	0.3	2	0.1	0	--	12	0.1
Yellow perch	2	0.1	4	0.2	8	0.4	2	0.1	20	1.0	36	0.4
Total	689	34.5	409	20.5	417	20.9	419	21.0	577	28.9	2,511	25.1

[1]Upper Big Dry (UBD): Nelson Creek., Lone Tree Creek, McGuire Creek, Bug Creek, Lost Creek
[2]Lower Big Dry (LBD): Box Creek, South Fork Rock Creek, North Fork Rock Creek, Box Elder Creek, Sand Arroyo, Spring Creek
[3]Lower Missouri Arm (LMA): Spillway Bay, Bear Creek, North Fork Duck Creek, South Fork Duck Creek, Main Duck Creek
[4]Middle Missouri Arm (MMA): Pines Bay, Gilbert Creek, Cattle/Crooked Creek, Hell Creek, Sutherland Creek, Snow Creek
[5]Upper Missouri Arm (UMA): Cabin Coulee, Wagon Coulee, Bone Trail, Timber Creek, Seven Blackfoot, Fourchette Bay, Devils Creek

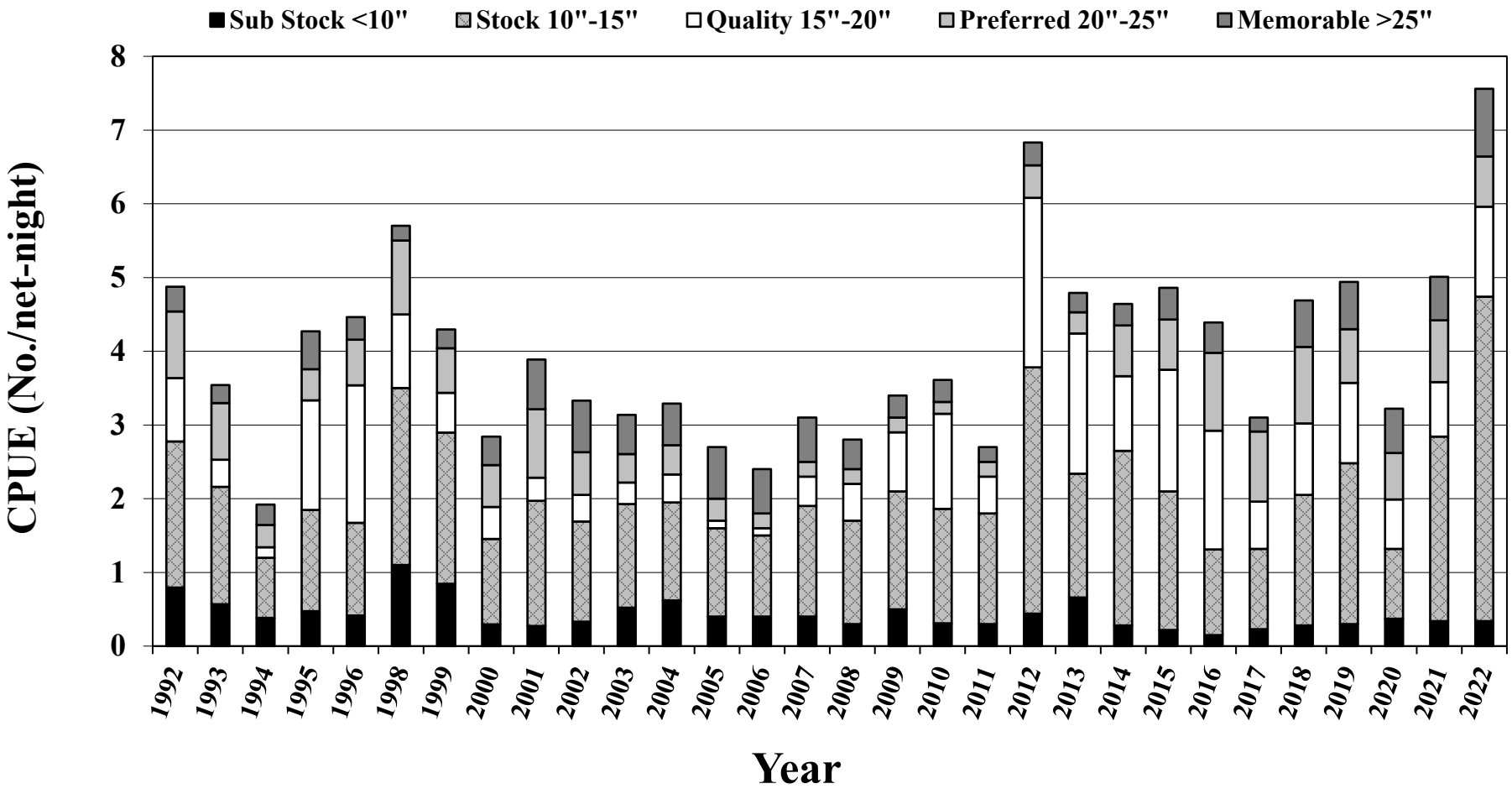


Figure 8. Catch per unit effort (CPUE) of PSD category of walleye collected by experimental gill nets throughout Fort Peck Reservoir during July-August, 1992-2022 (no data for 1997).

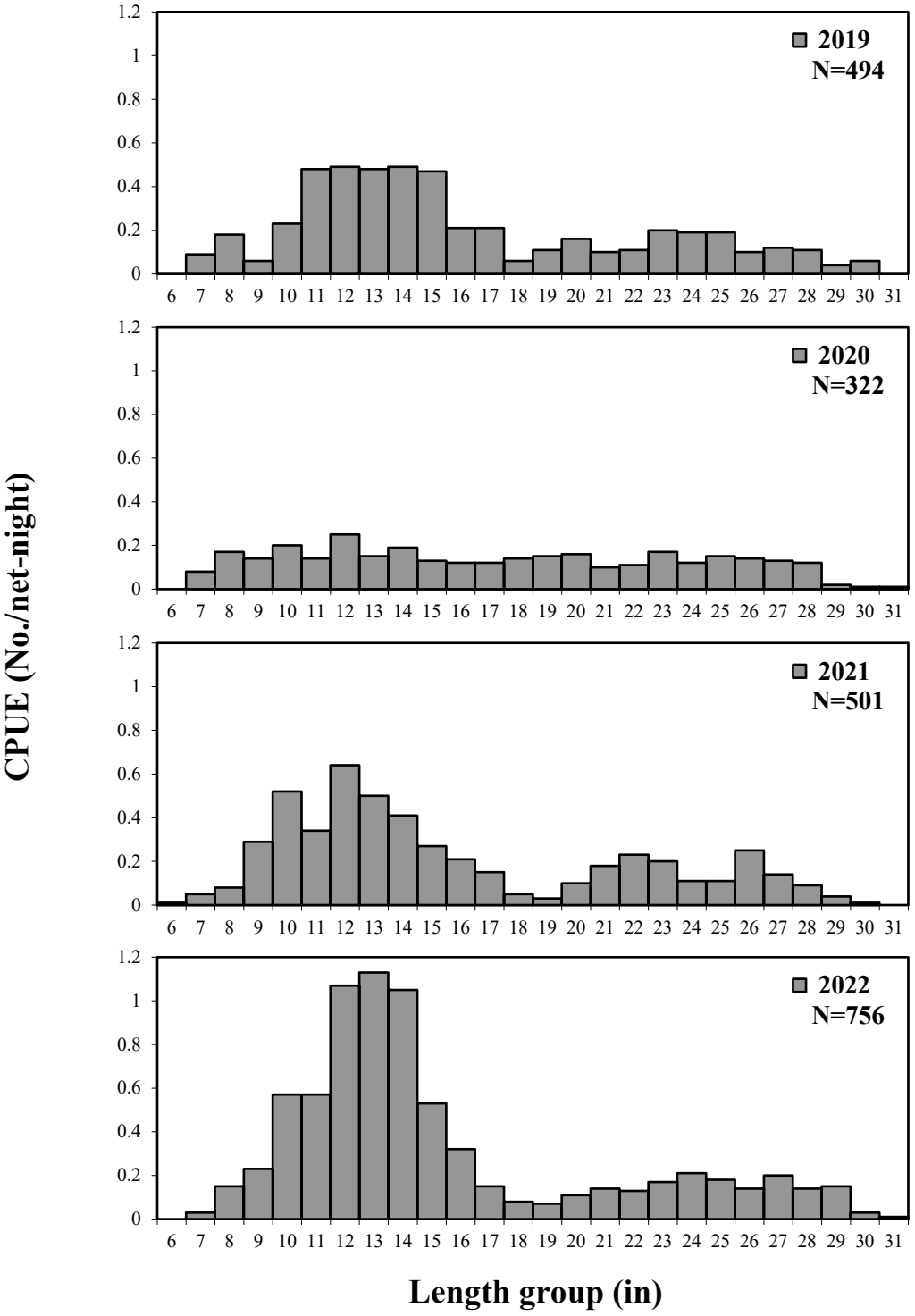
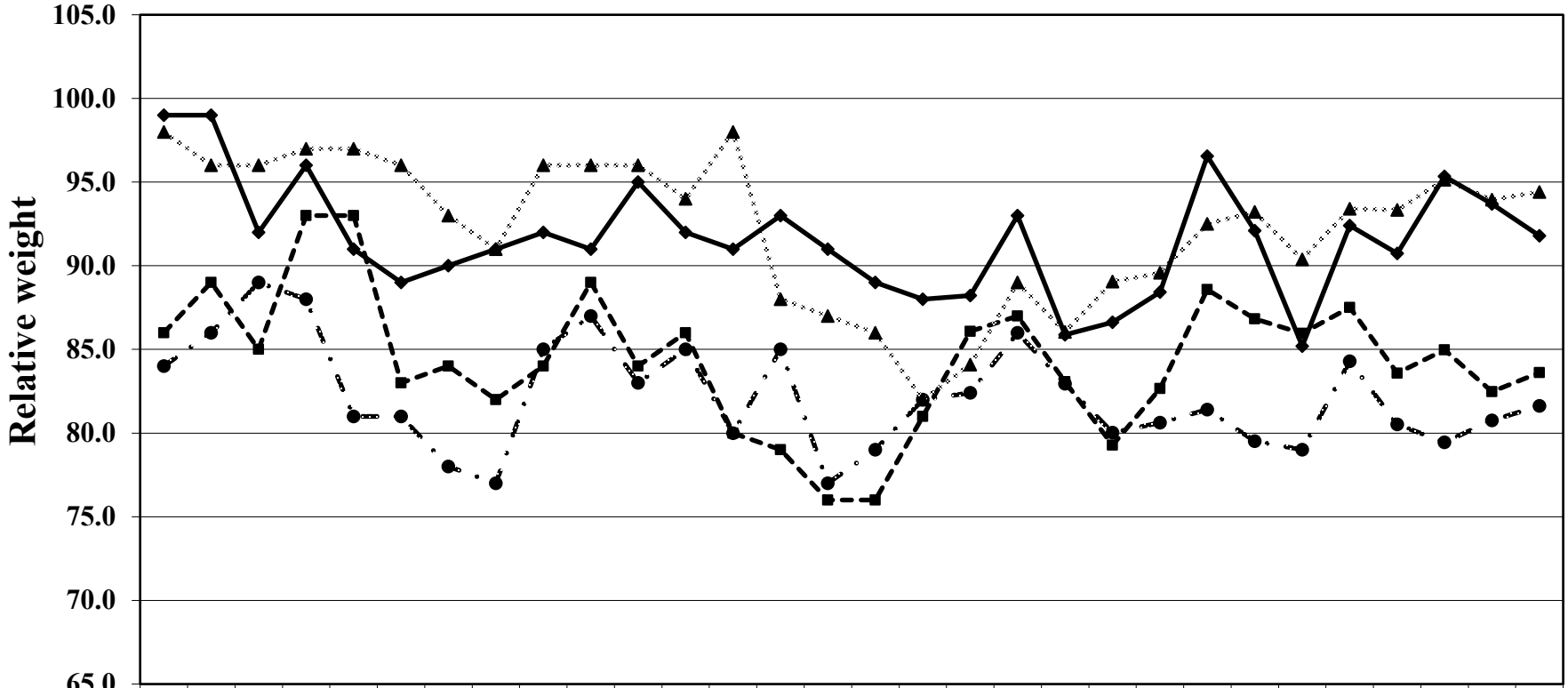


Figure 9. Length frequency, as catch per unit effort, of walleye collected by experimental gill nets in Fort Peck Reservoir during July-August, 2019-2022.



	1992	1993	1994	1995	1996	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Stock 10"-15"	84.0	86.0	89.0	88.0	81.0	81.0	78.0	77.0	85.0	87.0	83.0	85.0	80.0	85.0	77.0	79.0	82.0	82.4	86.0	83.0	80.0	80.6	81.4	79.5	79.0	84.3	80.5	79.4	80.8	81.6
Quality 15"-20"	86.0	89.0	85.0	93.0	93.0	83.0	84.0	82.0	84.0	89.0	84.0	86.0	80.0	79.0	76.0	76.0	81.0	86.1	87.0	83.1	79.3	82.7	88.6	86.8	86.0	87.5	83.6	85.0	82.5	83.6
Preferred 20"-25"	98.0	96.0	96.0	97.0	97.0	96.0	93.0	91.0	96.0	96.0	96.0	94.0	98.0	88.0	87.0	86.0	82.0	84.1	89.0	86.0	89.1	89.6	92.5	93.2	90.4	93.4	93.3	95.1	93.9	94.4
Memorable >25"	99.0	99.0	92.0	96.0	91.0	89.0	90.0	91.0	92.0	91.0	95.0	92.0	91.0	93.0	91.0	89.0	88.0	88.2	93.0	85.9	86.6	88.4	96.5	92.1	85.2	92.4	90.7	95.3	93.7	91.8

Year

Figure 10. Relative weights for stock, quality, preferred, and memorable length groups of walleye collected by experimental gill nets in Fort Peck Reservoir, 1989-2022 (no data for 1990-1991 and 1997).

Table 5. Mean length-at-age at time of capture (in) for walleye collected in experimental gill nets, 2017-2022, on Fort Peck Reservoir, and aged from sectioned otoliths.

Year		Length at age at capture (in)													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
2017	Mean	7.4	9.1	10.6	13.0	16.6	18.4	19.8	23.5	23.6	23.5	23.3	28.3	--	23.4
	N	2	16	33	49	22	103	22	11	20	3	4	1	--	1
	SE	0.3	0.2	0.2	0.3	0.9	0.3	0.8	0.6	0.5	1.6	1.8	--	--	--
	Range	7.1-7.7	7.6-10.6	7.7-13.1	9.6-18.0	10.4-22.2	11.8-24.4	10.9-24.6	20.8-27.8	18.1-26.6	21.9-26.7	19.8-28.3	--	--	--
2018	Mean	8.4	9.8	11.7	13.6	14.6	17.2	18.9	21.8	23.4	24.3	25.9	25.6	26.9	23.1
	N	20	16	38	58	74	34	89	36	13	29	6	5	9	1
	SE	0.2	0.3	0.2	0.2	0.3	0.7	0.4	0.4	0.7	0.5	1.2	1.3	0.6	--
	Range	7.0-9.6	7.4-12.0	8.6-13.9	10.6-17.1	10.9-22.9	12.0-25.3	11.5-25.3	16.2-26.0	17.5-27.0	18.7-28.0	22.3-29.2	21.3-27.7	23.6-28.5	--
2019	Mean	8.3	11.4	13.1	13.8	15.3	16.4	18.7	20.3	22.2	24.0	26.0	27.9	27.6	28.0
	N	27	84	46	47	76	25	28	60	22	12	19	6	10	7
	SE	0.1	0.1	0.2	0.2	0.2	0.5	0.7	0.5	0.7	0.8	0.5	0.3	0.8	1.0
	Range	7.0-10.2	8.1-13.7	10.2-16.7	11.9-17.0	8.3-21.2	12.3-24.8	13.0-25.4	13.4-27.6	14.8-25.9	20.4-28.5	20.2-28.4	27.2-29.1	24.0-30.1	23.3-30.7
2020	Mean	8.1	9.4	12.4	14.6	16.6	17.0	19.1	20.8	22.9	24.1	24.3	26.8	24.5	28.1
	N	1	55	40	30	24	24	19	10	46	15	3	16	3	4
	SE	--	0.2	0.2	0.3	0.5	0.6	0.5	0.7	0.4	0.7	1.4	0.5	1.9	1.4
	Range	--	7.3-12.0	8.1-14.6	11.2-19.1	12.0-20.4	12.7-23.1	12.8-22.5	17.1-25.1	17.5-28.0	18.4-27.3	22.4-27.2	22.3-29.0	22.0-28.2	24.1-30.2
2021	Mean	7.5	10.3	11.7	13.9	15.0	16.5	18.7	20.0	22.1	23.7	25.1	25.3	26.2	27.1
	N	4	42	146	92	21	19	25	27	11	61	10	7	18	3
	SE	0.3	0.2	0.1	0.2	0.6	0.6	0.6	0.6	0.9	0.4	0.6	0.9	0.6	1.0
	Range	6.8-8.0	7.8-12.4	8.4-16.9	9.7-17.6	11.5-21.3	10.6-22.0	14.0-23.8	12.5-24.6	17.0-26.7	15.9-27.6	21.7-27.0	22.1-28.8	22.1-30.6	25.1-28.1
2022	Mean	8.3	10.4	12.8	13.4	14.7	16.9	18.2	20.6	21.9	23.1	24.6	26.3	26.4	26.8
	N	2	82	114	246	107	21	18	19	21	7	48	17	9	19
	SE	0.7	0.1	0.1	0.1	0.2	0.7	0.8	0.8	0.9	1.7	0.4	0.5	0.6	0.7
	Range	7.6-9.0	7.8-12.9	9.0-15.9	9.2-18.9	10.2-20.2	12.3-23.7	14.2-23.3	14.4-24.8	13.0-27.3	15.0-27.2	18.3-29.8	22.5-29.4	22.8-28.4	18.2-30.3
Mean of means		8.0	10.1	12.1	13.7	15.5	17.1	18.9	21.2	22.7	23.8	24.9	26.7	26.3	26.1

Northern Pike

Relative abundance of northern pike captured in gill nets was 2.5 per net in 2022 which was an increase compared to the previous year (Table 3; Figure 11). The three-year running average goal of 2.0 northern pike per net was met (2.2 per net in 2022) as outlined in the FPRFMP. Average length and weight of northern pike in 2022 was 25.7 inches and 4.4 pounds which was similar compared to the previous year but lower during the early 2000's due to limited numbers of small fish present (Table 7). Northern pike greater than 25 inches comprised 44% of the fish sampled in 2022 (Figure 12). In contrast, 80% of the northern pike captured in gill nets were greater than 25 inches during the low water years of 2005-2006 (Headley 2007).

In 2022, northern pike PSD was 85 and PSD-P was 30. During the drought years, PSD ranged from 93 to 98 and PSD-P ranged from 55-71 indicating a population comprised of larger fish. With stable to increasing water levels from 2017 to 2019, inundation of terrestrial vegetation became more prevalent throughout the reservoir which increased the amount of ideal spawning/rearing habitat. Relative abundance of shoreline forage also increased during that time and provided increased food items for juvenile northern pike. As a result, relative abundance of stock and quality length groups of northern pike has increased over the last several years. Relative weight of northern pike was 94 in 2022 which was similar to the previous year.

Channel Catfish

Relative abundance of channel catfish captured by gill netting was 2.8 per net in 2022. This was slightly lower compared to the previous year and above the 30-year average of 2.1 per net (Figure 13). Similar to previous years, highest abundance was observed in the Upper Missouri Arm at 7.0 per net (Table 4). In 2022, mean length and weight was 19.0 inches and 2.7 pounds, respectively. This was slightly higher than the previous and year and above the long-term average of 17.4 inches and 2.0 pounds (Table 8). Relative weight of channel catfish was 88 in 2022 which was slightly higher the previous year. Catfish PSD and PSD-P were 76 and 14, respectively, indicating improved numbers of quality length fish.

Sauger

Sauger numbers have declined in Fort Peck Reservoir since 1985 and remained low since then (Figure 13). This decline has occurred in spite of restrictive angling regulations (i.e., 1 sauger daily and 2 in possession) implemented in 2002. However, fishing regulations changed in 2016 allowing anglers to keep 2 sauger daily and 4 in possession within the walleye/sauger combination of 5 daily and 10 in possession. Relative abundance in 2022 was 0.1 per net. Average size of sauger in 2021 was 15.4 inches and 1.2 pounds with a relative weight of 70. This population relies on natural reproduction from the Missouri River where more suitable spawning habitat is available (Bellgraph et al. 2008). Relative abundance for sauger was highest in the middle and upper Missouri arm with a catch rate of 0.4 per net (Table 4).

Table 6. Summary of mean catch per unit of effort (CPUE; No./net-night), standard error (SE), mean length (in), mean weight (lb), mean *Wr*, and stock density indices of walleye collected in experimental gill nets on Fort Peck Reservoir, 1999-2022.

Year	No. walleye	CPUE	SE	Length	Weight	*Wr*	Substock[1]	Stock[2]	Quality[3]	Preferred[4]	PSD[5]	PSD-P[6]
1999	329	4.2	0.3	14.4	1.5	90	63	266	108	67	41	25
2000	250	2.8	0.2	16.6	2.3	83	26	224	122	84	54	38
2001	272	3.9	0.4	17.4	2.8	88	19	253	134	112	53	44
2002	324	3.3	0.2	17.4	2.8	90	32	291	159	124	55	43
2003	301	3.1	0.3	17.3	2.8	88	38	263	156	105	59	40
2004	250	3.3	0.3	15.9	2.3	88	47	203	102	73	50	36
2005	227	2.7	0.3	16.3	2.6	85	37	190	88	78	46	41
2006	207	2.4	0.2	16.2	2.6	87	38	168	78	66	46	39
2007	261	3.1	0.3	16.2	2.3	81	36	225	100	70	44	31
2008	234	2.8	0.3	15.5	1.9	81	21	212	89	45	42	21
2009	393	3.3	0.3	14.6	1.4	83	59	332	143	53	43	16
2010	361	3.6	0.3	15.4	1.7	84	31	330	175	46	53	13
2011	267	2.8	0.3	14.9	1.7	88	25	251	99	45	39	18
2012	683	6.8	0.4	15.1	1.4	83	44	639	305	75	47	12
2013	479	4.8	0.4	15.0	1.5	81	66	413	245	55	59	13
2014	466	4.7	0.3	15.5	1.7	84	28	436	199	98	46	22
2015	486	4.9	0.4	16.6	2.1	87	22	464	276	111	59	24
2016	440	4.4	0.3	17.8	2.5	87	15	424	308	147	72	34
2017	310	3.1	0.3	17.0	2.2	85	23	287	178	114	62	40
2018	471	4.7	0.3	17.4	2.5	88	28	441	263	167	60	38
2019	494	4.9	0.4	16.7	2.3	85	30	464	246	137	53	29
2020	323	3.2	0.2	17.7	2.9	87	37	285	190	123	67	43
2021	501	5.0	0.4	16.2	2.2	85	34	467	217	143	46	30
2022	756	7.6	0.6	15.8	1.9	84	34	722	282	160	39	22

[1]Substock is the number of all walleye less than 10 inches, [2]Stock is the number of all walleye greater than 10 inches, [3]Quality is the number of all walleye greater than 15 inches, [4]Prefered is the number of all walleye greater than 20 inches, [5]PSD is the proportional size distribution (Quality/Stock), [6]PSD-P is the relative stock density, preferred (Preferred/Stock).

Table 7. Summary of mean catch per unit of effort (CPUE; No./net-night), mean length (in), mean weight (lb), mean *Wr*, and stock density indices of northern pike collected in experimental gill nets on Fort Peck Reservoir during July-August, 2002-2022.

Year	*N*	CPUE	Length	Weight	*Wr*	PSD	PSD-P
2002	144	1.5	29.5	7.2	102	94	62
2003	126	1.3	28.1	6.2	101	98	55
2004	75	1.0	29.1	6.7	100	96	71
2005	86	1.0	28.4	6.5	100	93	59
2006	108	1.3	26.1	5.2	99	89	60
2007	147	1.7	24.8	4.6	101	75	41
2008	137	1.6	26.6	5.2	100	89	39
2009	176	1.5	24.5	4.3	93	73	39
2010	191	1.9	23.4	3.9	100	68	24
2011	293	2.9	23.2	3.6	100	69	18
2012	503	5.0	23.6	3.6	99	75	15
2013	324	3.2	24.6	3.9	93	75	24
2014	336	3.4	25.8	4.6	96	82	33
2015	264	2.6	26.3	5.0	98	88	40
2016	226	2.3	25.8	4.6	93	82	38
2017	184	1.8	26.0	4.4	90	90	32
2018	165	1.7	27.1	5.0	95	94	40
2019	302	3.0	24.7	4.0	96	81	24
2020	206	2.1	25.2	4.3	97	85	25
2021	201	2.0	25.8	4.3	94	89	27
2022	249	2.5	25.7	4.4	94	85	30

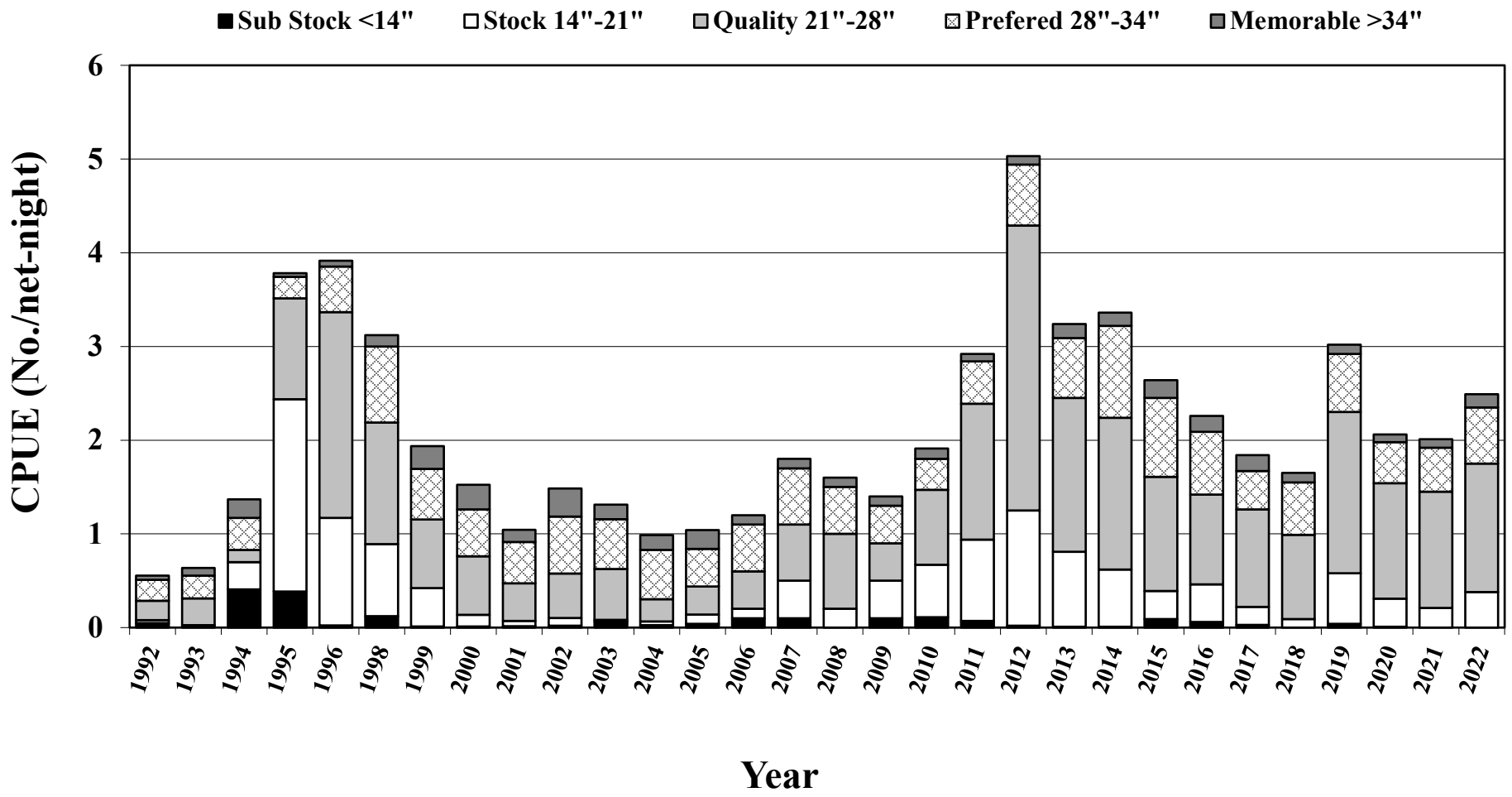


Figure 11. Catch per unit effort (CPUE) of PSD category of northern pike collected by experimental gill nets throughout Fort Peck Reservoir during, July-August, 1992-2022, (no data for 1997).

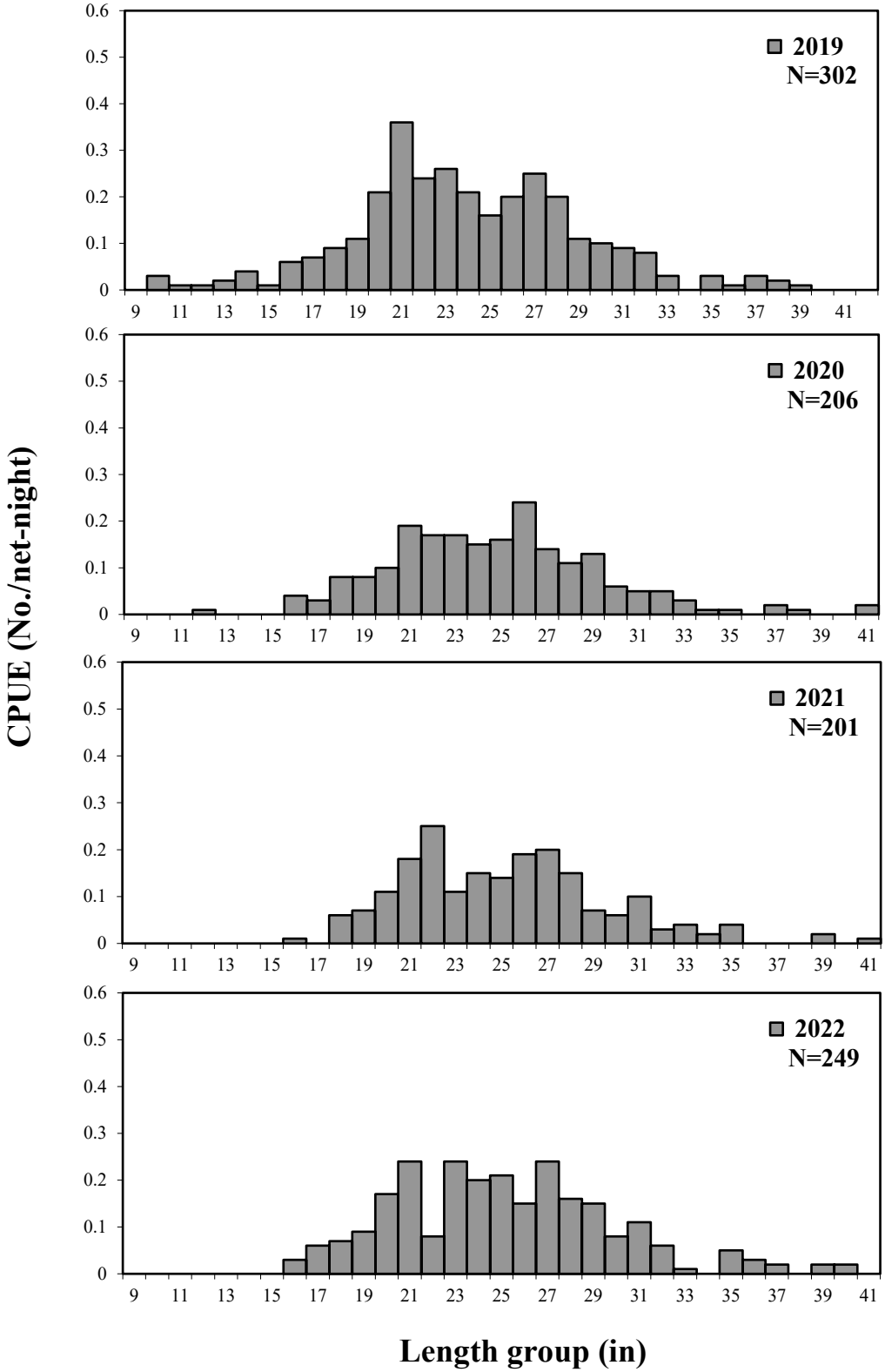
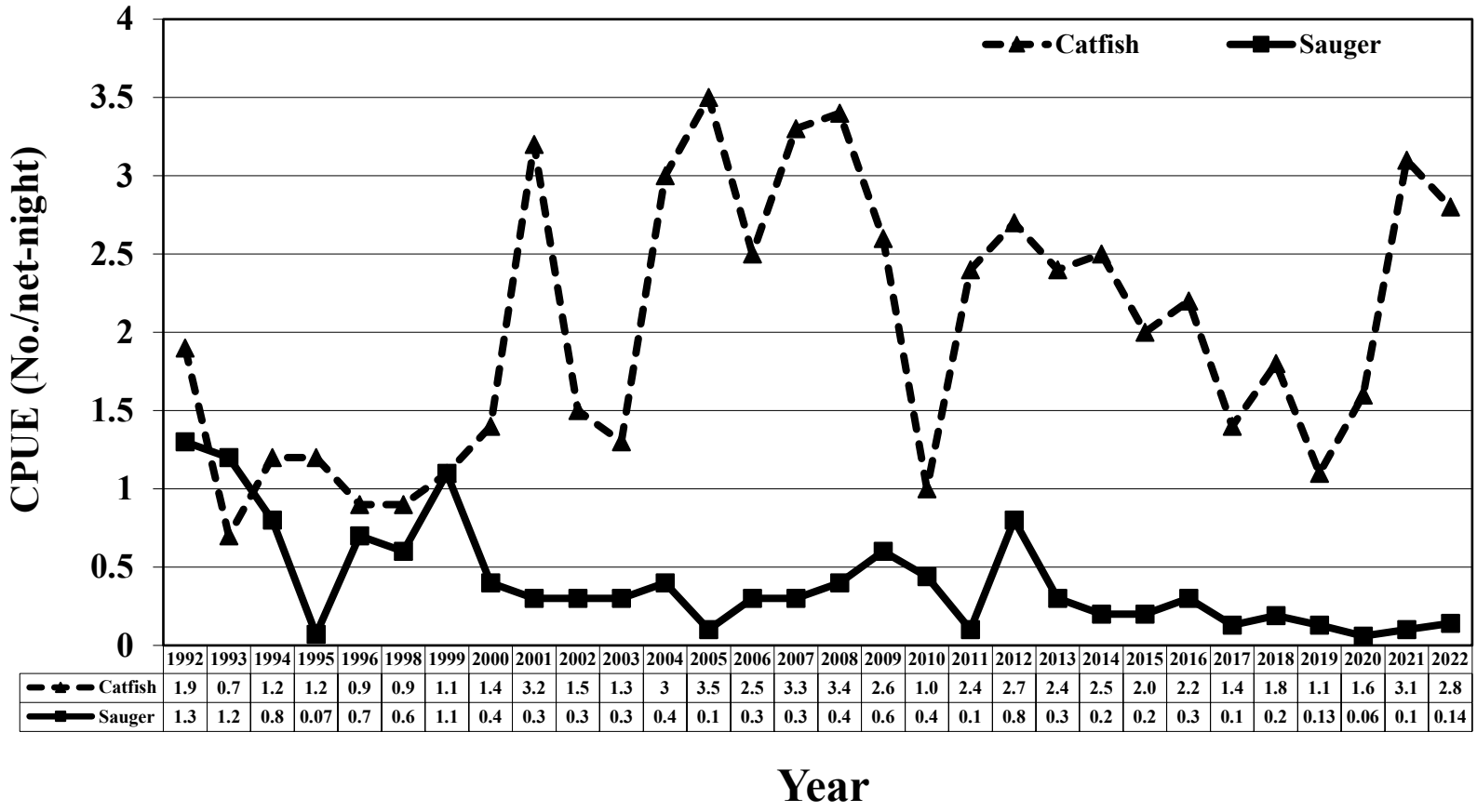


Figure 12. Length frequency, as catch per unit effort (CPUE), of northern pike collected by experimental gill nets in Fort Peck Reservoir during July-August, 2019-2022.



	1992	1993	1994	1995	1996	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Catfish	1.9	0.7	1.2	1.2	0.9	0.9	1.1	1.4	3.2	1.5	1.3	3	3.5	2.5	3.3	3.4	2.6	1.0	2.4	2.7	2.4	2.5	2.0	2.2	1.4	1.8	1.1	1.6	3.1	2.8
Sauger	1.3	1.2	0.8	0.07	0.7	0.6	1.1	0.4	0.3	0.3	0.3	0.4	0.1	0.3	0.3	0.4	0.6	0.4	0.1	0.8	0.3	0.2	0.2	0.3	0.1	0.2	0.13	0.06	0.1	0.14

Figure 13. Mean catch per unit of effort (CPUE; No./net-night) of channel catfish and sauger collected by experimental gill nets in Fort Peck Reservoir, 1992-2022 (no data for 1997).

Table 8. Summary of mean catch per unit of effort (CPUE; No./net-night), mean length (in), mean weight (lb), mean *Wr*, and stock density indices of channel catfish collected in experimental gill nets on Fort Peck Reservoir, 2002-2022.

Year	*N*	CPUE	Length	Weight	*Wr*	PSD	PSD-P
2002	145	1.5	18.0	2.1	89.9	74	3
2003	129	1.3	17.6	2.1	89.4	71	5
2004	227	3.0	15.7	1.8	98.1	57	11
2005	297	3.5	14.3	1.3	91.3	35	6
2006	215	2.5	15.1	1.4	95.1	46	10
2007	278	3.3	15.3	1.3	85.3	38	4
2008	289	3.4	14.2	1.1	88.2	35	2
2009	314	2.6	16.8	1.9	91.6	57	5
2010	104	1.0	18.4	2.4	88.2	74	11
2011	241	2.4	17.9	2.3	90.5	72	8
2012	272	2.7	17.4	1.8	87.9	65	3
2013	240	2.4	17.5	1.9	85.7	64	4
2014	246	2.5	18.0	2.0	84.7	80	3
2015	201	2.0	18.5	2.1	85.5	86	3
2016	217	2.2	17.1	1.8	86.5	65	4
2017	140	1.4	18.0	2.0	84.7	73	6
2018	179	1.8	17.8	2.4	88.2	53	13
2019	110	1.1	20.3	3.1	87.9	83	14
2020	158	1.6	19.9	3.1	85	75	19
2021	307	3.1	18.1	2.1	85.6	45	7
2022	279	2.8	19.0	2.7	88.5	76	14

STOMACH CONTENTS OF GILL NETTED GAME FISH

Stomach contents of walleye, northern pike, sauger, and smallmouth bass captured in experimental gill nets from July 12th to August 4th, 2022 were examined for the presence of forage items. Smallmouth bass had the most diverse diet followed closely by walleye with invertebrates comprising a high percentage of the of identifiable food items (Table 9). Cisco were the most identified fish found in northern pike and walleye. high frequency of occurrence of cisco observed in stomach contents can be explained by the high abundance of young-of-year and adult cisco observed in 2022 (Table 14). Similar to previous years, empty stomach contents comprised a large portion of the walleye, northern pike, sauger, and smallmouth bass stomachs, which is attributed to purging of the stomach during stress (Bowen 1996).

Table 9. Percent frequency of occurrence for various forage items found in stomach contents of northern pike, sauger, smallmouth bass, and walleye collected in experimental gill nets in Fort Peck Reservoir 2022. Sample size is given in parentheses.

Forage items	Northern pike (*N*=241)	Sauger (*N*=14)	Smallmouth bass (*N*=91)	Walleye (*N*=752)
Cisco	25.3%	--	5.5%	8.8%
Crayfish	0.8%	--	1.1%	0.1%
Empty	65.1%	78.6%	33.0%	47.3%
Freshwater drum	--	--	0.0%	0.3%
Grasshopper	--	--	15.4%	--
Invertebrates	0.8%	14.3%	11.0%	28.2%
Spottail shiner	--	--	1.1%	0.1%
Unknown	7.9%	7.1%	33.0%	15.2%

BEACH SEINING

Shoreline beach seining was conducted to determine reproductive success of age-0 game and non-game fish from August 1st to August 29th, 2022. Seine hauls at 100 standardized locations throughout the reservoir captured 20 species of young-of-year and forage fish for a total of 6,500 fish (Table 10). Combined relative abundance of spottail shiner, emerald shiner, age-0 yellow perch, and age-0 crappie decreased to 45.5 fish per seine haul in 2022 compared to 163 fish per haul in 2021. This was below the long-term average of 170 fish per seine haul. Relative abundance of shoreline forage typically follows changes in reservoir elevations (Figure 15). In 2022, reservoir elevations gradually declined from January to December due to lack of plains runoff, below average mountain snowpack, and lack of precipitation events (Figure 14). As a result, no terrestrial vegetation was inundated beginning in spring and early summer of 2022.

Eurasian watermilfoil (EWM) was first discovered in Fort Peck Reservoir by Montana Fish, Wildlife & Parks and the U.S. Army Corp of Engineers in 2010. Since then, it has become established throughout the reservoir. EWM was documented at 88% of the seining sites in 2021 compared to 68% of the sites in 2022. The decrease of EWM could be attributed to declining reservoir elevations from the 2021 spring and summer months into 2022 (Figure 1). Prior to this, reservoir elevations fluctuated greatly throughout much of the season. Reservoir elevations during 2012-2013 experienced a loss of 15 feet resulting in EWM present at 46% of the seining sites. Furthermore, a gain of 10 feet was observed in 2013-2014 and only 24% of the seining sites contained EWM. It appears large fluctuations in reservoir elevation from year to year and within a year make it difficult for EWM to become established in littoral areas of the reservoir.

It is uncertain what impacts EWM have to the fishery on Fort Peck Reservoir. Some studies have suggested slow growth and poor size structure for some fish species (Unmuth et al. 1999). In contrast, EWM has proved beneficial to fisheries if it occurs in lakes that typically do not support much growth of native submersed species (Engel 1995). Similarly, Pratt and Smokorowski (2003) found more fish and invertebrates in areas with EWM than areas devoid of any submerged aquatic vegetation. Due to Fort Peck Reservoir's fluctuating reservoir elevation, lack of native submerged aquatic vegetation, and complex basin characteristics, it is possible that EWM may provide spawning and rearing habitat for some forage and/or game fish species.

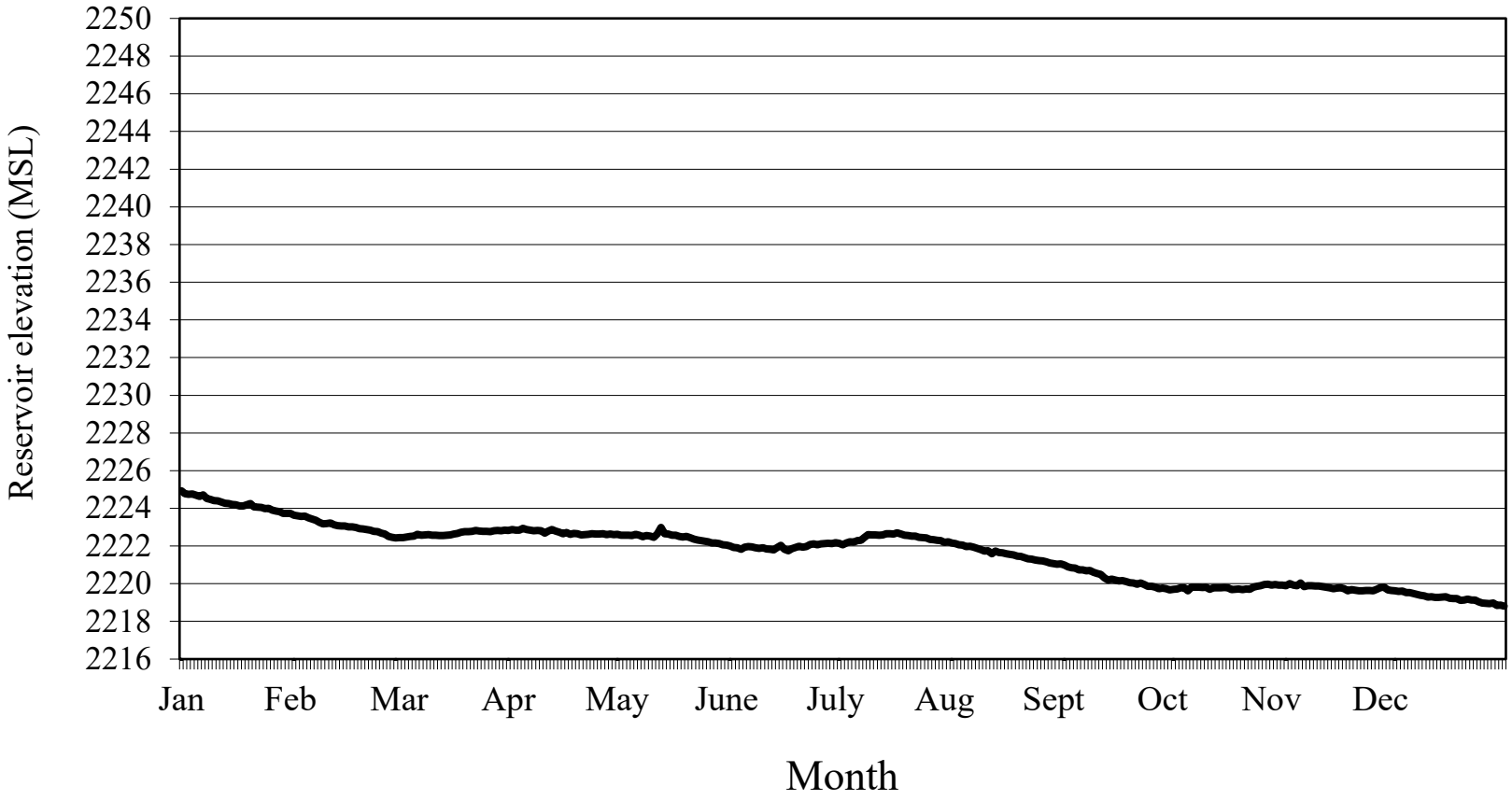


Figure 14. Average daily reservoir elevation for Fort Peck Reservoir from January 1, 2022 to December 31, 2022 (data provided by USACE).

Table 10. Number (*N*) and mean catch per unit effort (CPUE; No./haul) for fish species collected by seine hauls in Fort Peck Reservoir during August-September 2022. Catches are for young-of-year fishes except where noted.

	UBD[1]		LBD[2]		LMA[3]		MMA[4]		UMA[5]		Total	
Species	*N*	CPUE	*N*	CPUE	*N*	CPUE	*N*	CPUE	*N*	CPUE	*N*	CPUE
Bluegill	0	--	2	0.1	2	0.1	0	--	0	--	4	0.0
Channel catfish	0	--	0	--	0	--	0	--	1	0.1	1	<0.1
Common carp	139	7.0	13	0.7	35	1.8	40	2.0	29	1.5	256	2.6
Emerald shiner*	208	10.4	8	0.4	202	10.1	12	0.6	358	17.9	788	7.9
Fathead minnow*	5	0.3	8	0.4	0	--	1	<0.1	0	--	14	0.1
Flathead chub	1	<0.1	0	--	0	--	0	--	0	--	1	<0.1
Freshwater drum	127	6.4	3	0.2	0	--	1	<0.1	86	4.3	217	2.2
Goldeye	0	--	0	--	0	--	0	--	103	5.2	103	1.0
*Hybognathus spp.**	0	--	0	--	0	--	1	<0.1	118	5.9	119	1.2
Northern pike	1	<0.1	0	--	0	--	1	<0.1	0	--	2	<0.1
Plains killifish	1	<0.1	0	--	0	--	0	--	0	--	1	<0.1
Pomoxis spp.	324	16.2	188	9.4	0	--	234	11.7	1,981	99.1	2,727	27.3
Pumpkinseed sunfish	0	--	0	0.0	0	--	1	<0.1	0	--	1	<0.1
River carpsucker	6	0.3	4	0.2	1	<0.1	0	--	80	4.0	91	0.9
Sauger	0	--	0	0.0	0	--	0	--	8	0.4	8	0.1
Smallmouth bass	190	9.5	153	7.7	77	3.9	222	11.1	203	10.2	845	8.5
Smallmouth buffalo	45	2.3	0	0.0	0	0.0	3	0.2	187	9.4	235	2.4
Spottail shiner*	67	3.4	63	3.2	53	2.7	249	12.5	122	6.1	554	5.5
Walleye	19	1.0	3	0.2	2	0.1	9	0.5	18	0.9	51	0.5
Yellow perch	106	5.3	34	1.7	15	0.8	289	14.5	38	1.9	482	4.8
Total	1,239	62.0	479	24.0	387	19.4	1,063	53.2	3,332	166.6	6,500	65.0

*Includes all ages.
[1]Upper Big Dry (UBD): Nelson Cr., Lone Tree Cr., McGuire Cr., Bug Cr., Lost Cr.
[2]Lower Big Dry (LBD): Box Cr., S. Fork Rock Cr., N. Fork Rock Cr., Box Elder Cr., Sand Arroyo, Spring Cr.
[3]Lower Missouri Arm (LMA): Spillway Bay, Bear Cr., N.Fork Duck Cr., S. Fork Duck Cr., Main Duck
[4]Middle Missouri Arm (MMA): Pines, Gilbert Cr., Cattle Crooked Cr., Hell Cr., Sutherland Cr., Snow Cr.
[5]Upper Missouri Arm (UMA): Bone Trail, Timber Cr., Seven Blackfoot, Fourchette Bay, Devils Cr.

Yellow Perch

Young-of-year yellow perch relative abundance in 2022 was 4.8 per seine which was a decrease from 39.8 per seine in 2021 (Figure15). Declining reservoir elevations in 2022 provided no spawning and rearing habitat for yellow perch as no shoreline vegetation was inundated during the spring. Relative abundance of young-of-year yellow perch in 2022 was similar to the high-water years (i.e., 1999-2006; Figure 15). Nelson and Walburg (1977) determined newly flooded vegetation was the most important factor affecting year-class strength of yellow perch in two large Missouri River reservoir systems. Yellow perch were most abundant in the middle Missouri arm with a catch rate of 14.5 per seine haul in 2022 (Table 10).

Crappie

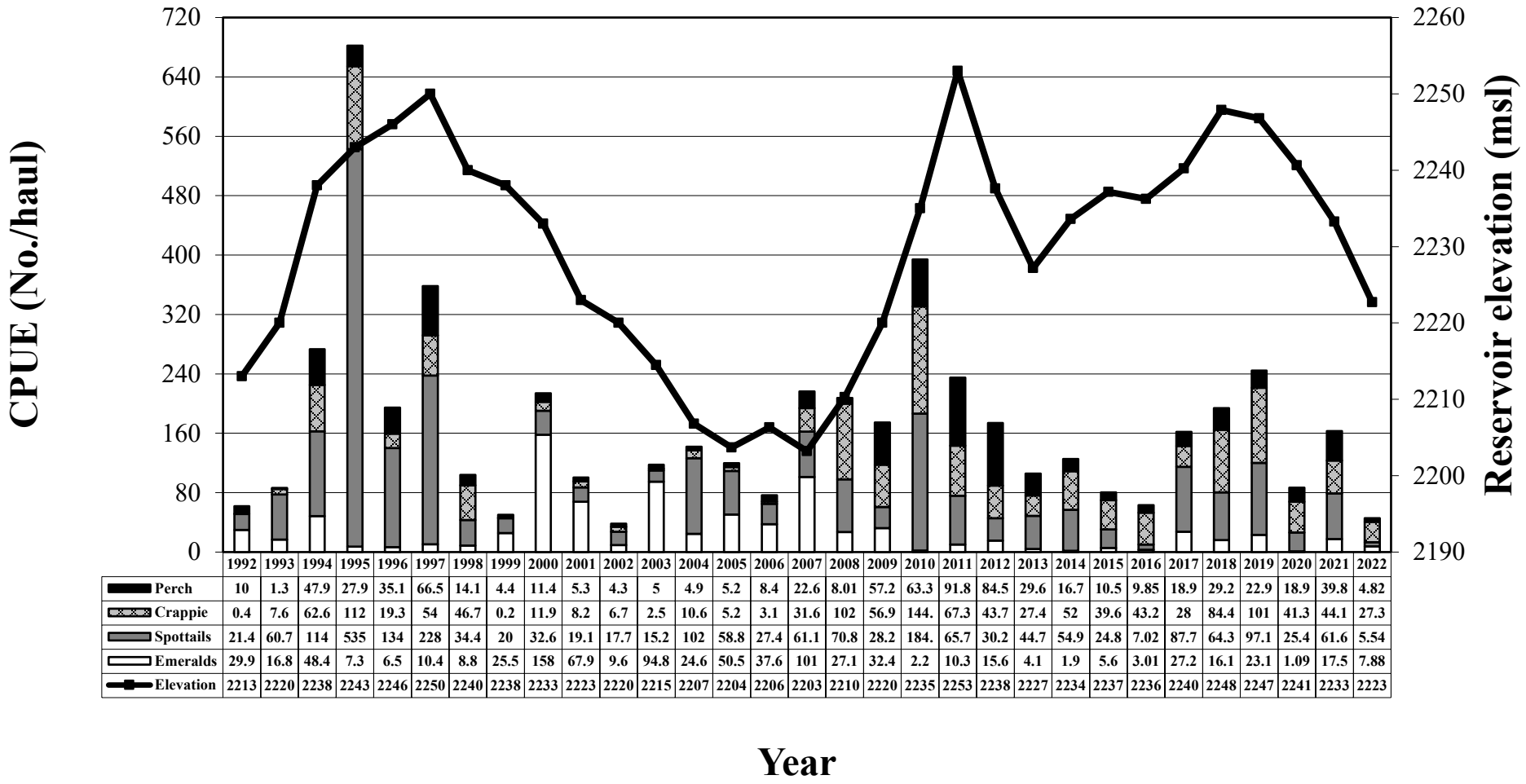
Young-of-year crappie relative abundance decreased from 44.1 per seine haul in 2021 to 27.3 per seine haul in 2022. Unlike young-of-year yellow perch, relative abundance of young-of-year crappie remains higher than during the drought years (Figure 15). Similar to previous years, crappie were most abundant in the upper Missouri arm with a catch rate of 99.1 per seine haul which comprised 73% of the fish sampled in 2022 (Table 10). Typically, the upper Missouri arm contains a majority of the young-of-year crappie captured due to more suitable spawning and rearing habitat (i.e., submerged brush and aquatic macrophytes).

Emerald Shiner

Emerald shiner relative abundance in 2022 was 7.9 per seine haul, which was a decrease from 17.5 per seine haul in 2021. Relative abundance of emerald shiners has been low over the last several years making them similar to the mid to late 1990's when reservoir elevations were relatively high or increasing (Figure 15). A possible explanation for these decreases could be upstream movement into more riverine-type habitat. Furthermore, distribution of emerald shiner relative abundance was highest in the upper Missouri arm at 17.9 per seine haul (Table 10).

Spottail Shiner

Relative abundance of spottail shiners decreased from 61.6 per seine haul in 2021 to 5.5 per seine haul in 2022 which was below the long-term average of 77.6 per seine haul. Relative abundance in 2022 was similar to those observed declining reservoir elevations during the mid-2000's (Figure 15). Spottail shiner relative abundance was highest in the middle Missouri arm at 12.5 per seine haul (Table 10). Typically, relative abundance is higher in main lake portions (i.e., lower Big Dry arm, lower Missouri arm, middle Missouri arm) of the reservoir.



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Perch	10	1.3	47.9	27.9	35.1	66.5	14.1	4.4	11.4	5.3	4.3	5	4.9	5.2	8.4	22.6	8.01	57.2	63.3	91.8	84.5	29.6	16.7	10.5	9.85	18.9	29.2	22.9	18.9	39.8	4.82
Crappie	0.4	7.6	62.6	112	19.3	54	46.7	0.2	11.9	8.2	6.7	2.5	10.6	5.2	3.1	31.6	102	56.9	144.	67.3	43.7	27.4	52	39.6	43.2	28	84.4	101	41.3	44.1	27.3
Spottails	21.4	60.7	114	535	134	228	34.4	20	32.6	19.1	17.7	15.2	102	58.8	27.4	61.1	70.8	28.2	184.	65.7	30.2	44.7	54.9	24.8	7.02	87.7	64.3	97.1	25.4	61.6	5.54
Emeralds	29.9	16.8	48.4	7.3	6.5	10.4	8.8	25.5	158	67.9	9.6	94.8	24.6	50.5	37.6	101	27.1	32.4	2.2	10.3	15.6	4.1	1.9	5.6	3.01	27.2	16.1	23.1	1.09	17.5	7.88
Elevation	2213	2220	2238	2243	2246	2250	2240	2238	2233	2223	2220	2215	2207	2204	2206	2203	2210	2220	2235	2253	2238	2227	2234	2237	2236	2240	2248	2247	2241	2233	2223

Figure 15. Maximum annual reservoir elevation compared to mean catch per unit effort (CPUE; No./haul) of emerald, spottail, young-of-year yellow perch, and young-of-year crappie collected by seine hauls in Fort Peck Reservoir from 1992-2022.

Chinook salmon

A total of 53,232 spring-stocked chinook salmon were released into Fort Peck Reservoir during in early June of 2022 averaging 26.8 per pound. This did not met the management goal of 200,000 fingerlings as outlined in the Fort Peck Reservoir Fisheries Management Plan (Headley et al. 2012). Compared to previous years, this was fewer salmon released since the program began but at a larger size (Table 11; Figure 16). In the past, Montana has typically stocked fewer fingerlings and less total pounds than North and South Dakota. However, Montana has increased stocking numbers and/or size in efforts to create a more stable fishery and more fish for spawning beginning in 2000 (Figure 16 and 17). North and South Dakota Game and Fish have used this strategy and been successful in developing a return run from larger spring-stocked chinook salmon (Lott et al. 1997).

Return of salmon to the release site has been variable over the years. In 2022, the number of females spawned and eggs collected was higher compared to the previous year (Figure 18). The 2022 egg-take effort for Montana resulted in 184,514 green eggs from 45 females. Fecundity of female salmon was 4,100 in 2021 which was slightly lower than 4,388 eggs per female in 2020. The lower fecundity can be attributed to a combination of 3 and 4-year old female salmon compared to a larger, older age group (age-4) captured in 2020.

Fisheries personnel relied exclusively on electrofishing to obtain brood stock for the annual chinook salmon egg-take in 2022. This has proven to be a more cost effective and efficient manner due to limited time and manpower issues as opposed to the fish ladder. Electrofishing was conducted from Ocotober 7th to October 24th, 2022 in various embayments adjacent to the marina, spillway, Duck Creek and dam area.

Biological data was collected from adult chinook salmon during spawning to provide more information on age, growth, and stocking-and-rearing history. Age-3 female salmon comprised 34% of all females collected in 2021 (Table 12). In contrast, age-3 female salmon comprised 95% of the salmon captured in 2022 (Table 13). The large proportion of mature age-2 male salmon captured in 2021 indicated a strong year class from the 2019 brood year. Earlier maturity was also observed for age-2 males in 2022 which could be attributed to improved growing conditions (i.e., increases in young-of-year cisco abundance) and allow more energy to be allocated to gonad production instead of somatic growth. Lott et al. (1997) noted a similar trend with chinook salmon age classes in Lake Oahe, SD when rainbow smelt populations, which are the primary forage, were at peak abundances.

Mean weights at age varied for male and female chinook salmon captured and spawned in 2022. Average weights for age-3 male and female salmon collected in 2022 were higher than those collected in 2021 and were the fourth highest on record. (Table 12; Table 13). Three-year old females averaged 13.7 pounds in 2022 compared to 9.5 pounds in 2021. Three-year old males averaged 13.7 pounds in 2022 compared to 7.5 pounds in 2021. Age-2 males averaged 5.0 pounds in 2022 which was slightly lower compared to the previous year. The higher relative abundance of young-of-year and adult cisco observed in 2021 likely contributed to increased weights at age-2 for male salmon. Cisco have been found to be the primary forage item of age 1+ chinook salmon in Fort Peck Reservoir (Brunsing 1998; Headley 2010).

Table 11. Chinook salmon stocked by number, size, and location in Fort Peck Reservoir, 2019-2022.

Date	Number	Pounds Stocked	No./lb	Mark	Location
5/30/2019	45,750	1,536	29.8	OTC	Duck Creek
5/30/2019	25,450	854	29.8	OTC	Marina
5/30/2019	25,455	854	29.8	OTC	Spillway
5/31/2019	7,147	162	44.2	None	Duck Creek
5/31/2019	29,547	669	44.2	None	Marina
6/3/2019	73,301	1,581	46.4	None	Duck Creek
6/3/2019	52,667	1,136	46.4	None	Marina
6/4/2019	27,388	605	45.3	None	Duck Creek
6/4/2019	33,004	729	45.3	None	Marina
6/11/2019	82,524	1,685	49	None	Pines
6/11/2019	41,490	847	49	None	Rock Creek
6/12/2019	24,324	454	53.6	None	Pines
6/12/2019	65,820	1,228	53.6	None	Rock Creek
6/1/2020	34,833	1,326	22.8	None	Marina
6/1/2020	33,606	1,668	22.8	None	Duck Creek
6/2/2020	18,567	414	27.6	None	Duck Creek
6/2/2020	43,204	1,615	26.9	None	Flat Lake
6/2/2020	16,084	616	26.1	None	Marina
6/7/2021	11,361	428	26.6	None	Duck Creek
6/7/2021	14,029	554	25.5	None	Spillway
6/7/2021	15,436	622	24.8	None	Marina
6/8/2021	48,273	1,705	28.3	None	Spillway
6/8/2021	43,204	1,000	43.2	None	Duck Creek
6/8/2021	34,024	1,154	29.9	None	Marina
6/9/2021	18,564	688	27	None	Marina
6/9/2021	23,263	862	27	None	Duck Creek
6/6/2022	10,839	453	23.9	None	Marina
6/6/2022	6,613	276	23.9	None	Spillway
6/7/2022	12,618	436	28.9	None	Marina
6/7/2022	13,822	478	28.9	None	Spillway
6/8/2022	3,092	110	28.1	None	Marina
6/8/2022	6,249	222	28.1	None	Spillway

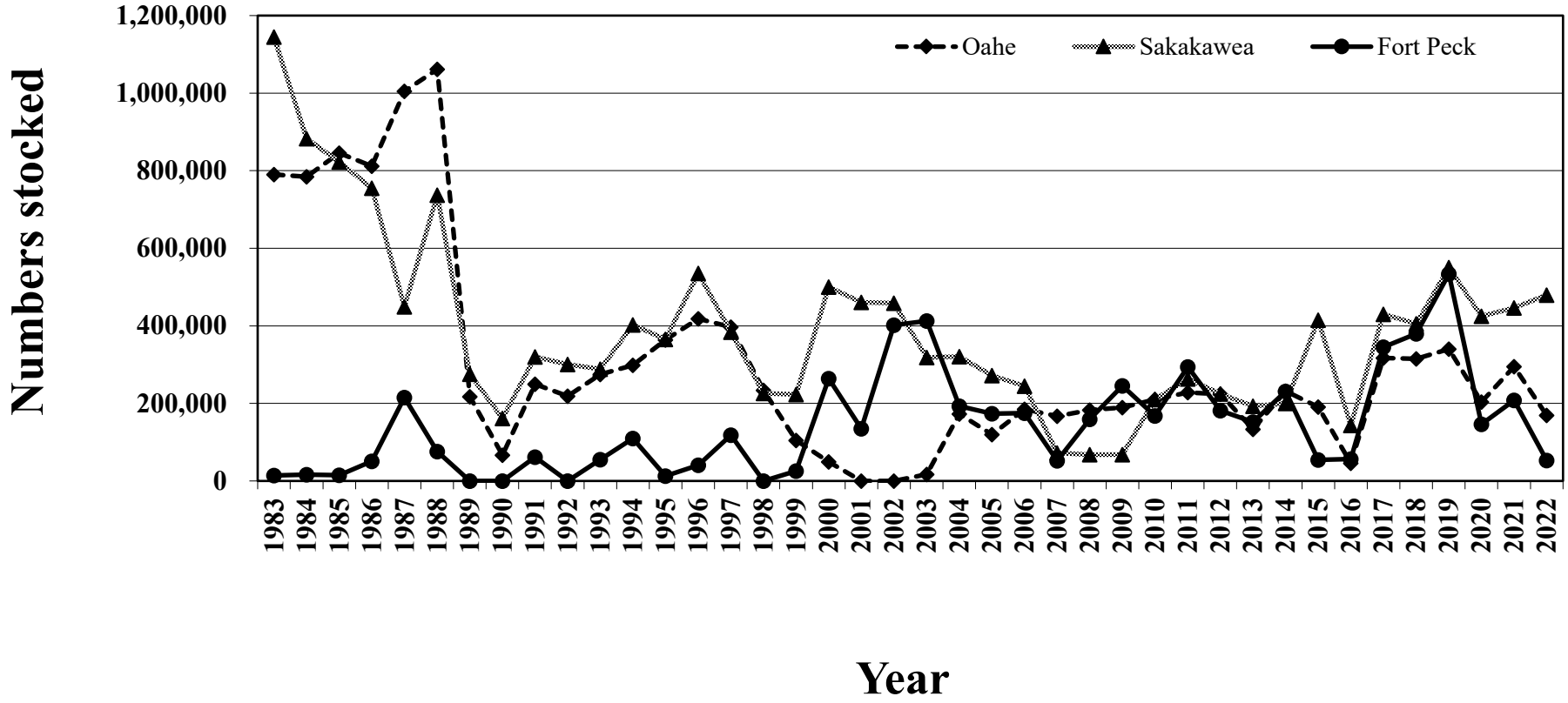


Figure 16. Annual comparison of total chinook salmon numbers stocked in Oahe, Sakakawea, and Fort Peck Reservoir, 1983-2022.

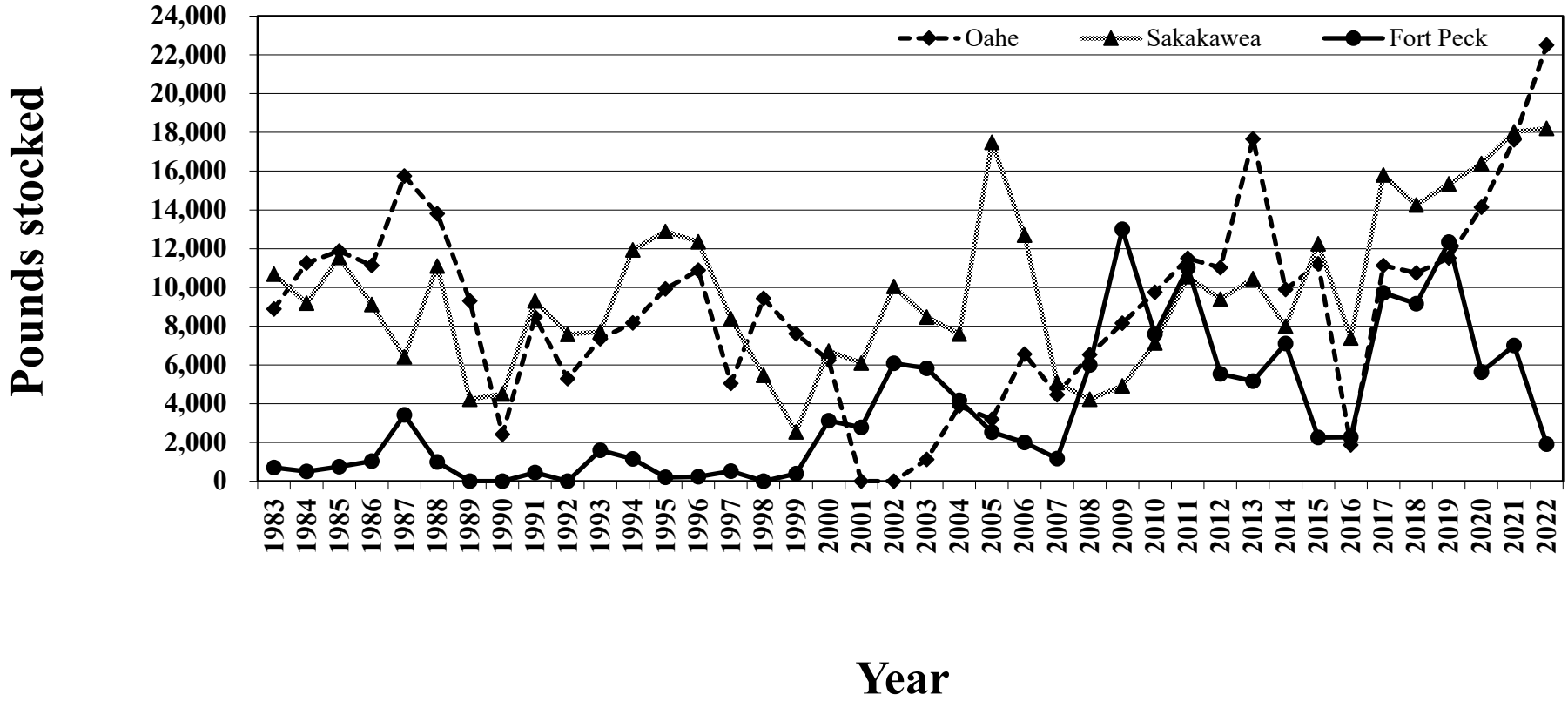


Figure 17. Annual comparison of total chinook salmon pounds stocked in Oahe, Sakakawea, and Fort Peck Reservoir, 1983-2022.

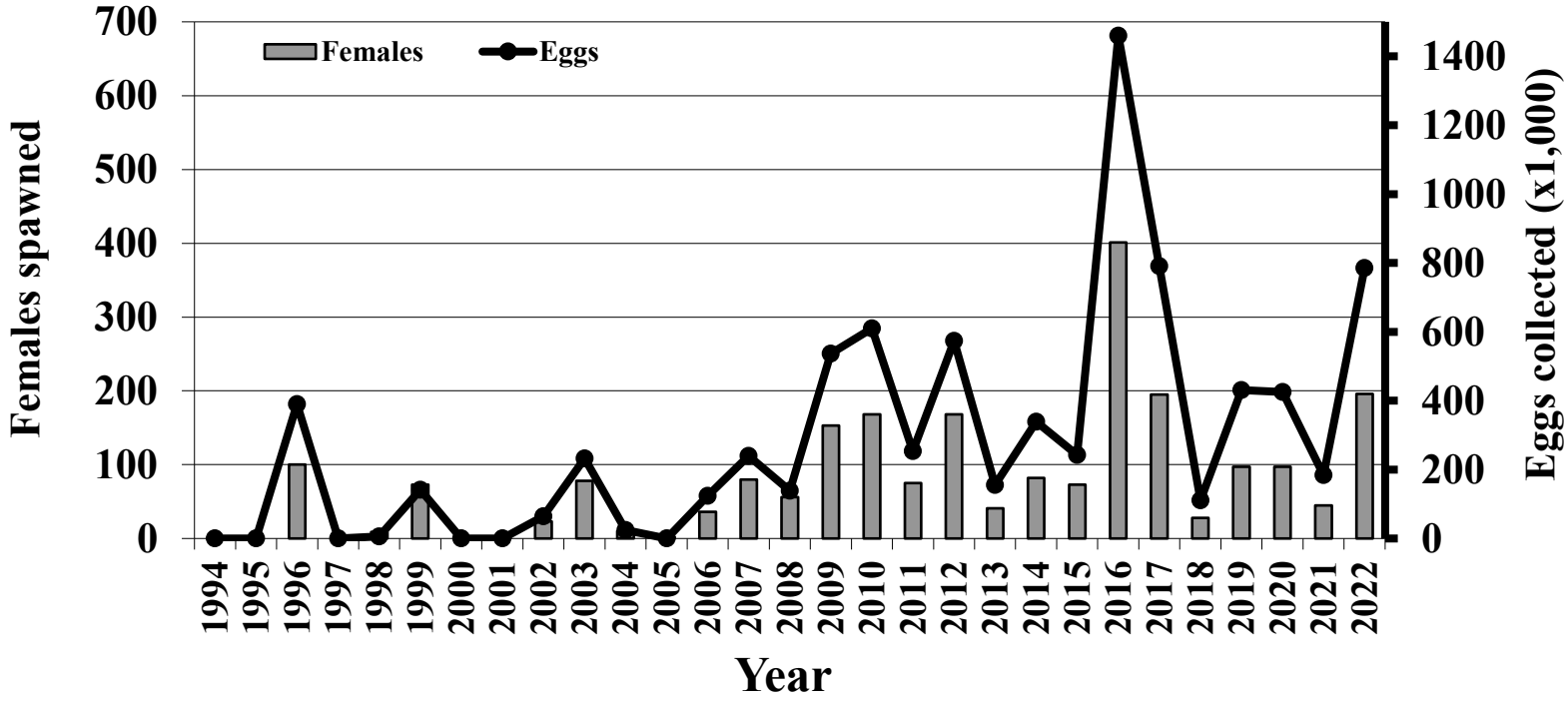


Figure 18. Annual comparison of female chinook salmon spawned and eggs collected from Fort Peck Reservoir, 1994-2022.

Table 12. Age composition, length and weight of 184 chinook salmon collected by electrofishing, fall 2021.

Age	Sex	Brood year	Number	Mean length (in)	Range	Mean weight (lb)	Range
1	Female	2020	0	--	--	--	--
	Male		0	--	--	--	--
2	Female	2019	1	22.6	--	4.7	--
	Male		68	23.2	22.7-27.3	5.4	2.9-8.0
3	Female	2018	18	27.3	24.5-30.1	9.5	6.2-12.2
	Male		13	25.7	23.4-29.4	7.5	5.8-13.2
4	Female	2017	33	32.9	28.7-37.9	17.1	9.9-25.8
	Male		5	32.7	28.4-34.8	14.6	12.4-16.9
5	Female	2016	0	--	--	--	--
	Male		0	--	--	--	--

Table 13. Age composition, length and weight of 353 chinook salmon collected by electrofishing, fall 2022.

Age	Sex	Brood year	Number	Mean length (in)	Range	Mean weight (lb)	Range
1	Female	2021	0	--	--	--	--
	Male		0	--	--	--	--
2	Female	2020	1	24.6	--	5.2	--
	Male		58	22.8	19.1-29.0	5.0	3.09.3
3	Female	2019	200	30.8	25.0-34.1	13.7	6.9-20.6
	Male		85	32.1	26.8-36.6	13.7	7.5-20.4
4	Female	2018	9	32.1	28.0-35.1	15.9	11.8-23.4
	Male		0	--	--	--	--
5	Female	2017	0	--	--	--	--
	Male		0	--	--	--	--

Cisco Vertical Gill Netting

Young-of-year cisco

Relative abundance of young-of-year cisco in Fort Peck Reservoir was 75.5 per net-night in 2022 which was down from 152.7 per net-night in 2021. This was slightly below the long-term average of 82 per net-night from 1990 to 2022. Young-of-year cisco relative abundance has fluctuated over the years on Fort Peck Reservoir and similar trends have been observed in other reservoirs where cisco populations occur (Vivian and Frazer 2021; Figure 19).

Limited ice cover appears to correlate with decreases in young-of-year cisco relative abundance on Fort Peck Reservoir. Duration of ice cover has been shown to reduce the wind and wave action, which decreases sedimentation over incubating eggs, and ultimately reduces mortality (Freeberg et al. 1990; Rook et al. 2013). For example, in 1987 and 1992 the reservoir did not freeze over and resulted in very few young-of-year cisco captured. In contrast, ice cover occurred on December 13th, 1985 and December 21st, 2000 resulting in two of the largest year classes ever produced. Ice cover occurred on January 3rd, 2022 and receded on April 4th, 2022 resulting in a moderate year class of cisco.

Decreases in reservoir elevation could also explain reductions in young-of-year cisco on Fort Peck Reservoir. Decreases in reservoir elevation, which dewater incubating eggs, have been shown to reduce to young-of-year cisco abundance in other reservoir systems (Gaboury and Patalas 1984; Zollweg and Leathe 2006). For example, large decreases in reservoir elevation during 1989, 1996, 2003, and 2007 resulted in low relative abundance of young-of-year cisco (Figure 19). In contrast, when water levels were increasing over winter of 1993-1994 and again in 2008-2009, two of the best year classes of cisco were produced. Reservoir elevations decreased 4.2 feet during the 2021-2022 winter months. Scott and Crossman (1973) indicated cisco spawn in three to 10 feet of water which may in part explain the moderate relative abundance of young-of-year cisco observed in 2022.

Adult cisco

Larger mesh, vertical gill netting efforts have provided additional information on the adult cisco population in Fort Peck Reservoir. This technique has been used successfully on other water bodies that contain cisco and other pelagic species (Hubert 1996). Large year classes of cisco produced in 2013 and 2014, which were observed in the ½-in mesh, recruited to the population as indicated by the increase in relative abundance of cisco captured in the ¾-in mesh from 2015-2016 (Figure 20). When examining length frequencies from 2019-2022, similar trends exist as age-0 fish ranging from 110 to 130 mm grow and recruit to the population as age-1 fish that range from 170 to 190 mm (Figure 21). No young-of-year cisco were captured in 2019 and that trend was apparent in 2020 with the absence of fish in the 150 to 190 mm length groups. However, multiple age classes were observed based on length frequency distribution in 2022. No cisco greater than 300 mm in length were sampled which was similar to previous years.

Lengths of cisco captured in Fort Peck Reservoir are currently lower than those observed shortly after their introduction (Wiedenheft 1989; Mullins 1991). Mean length-at-age for cisco captured by vertical gill nets in Fort Peck Reservoir during 2022 suggested slow growth when compared to other cisco populations (Figure 22; Ebener et al. 2008). In addition, relative weight of adult cisco remained low in 2022 at 73 which similar to 2021. The slow growth rates, low relative weights, and high relative abundance would suggest intraspecific competition. Rook et al. (2013) observed similar trends with cisco in Lake Superior and found a negative correlation to post year class survival. Currently, it is uncertain what impacts these large year classes are having on the overall zooplankton density and composition in Fort Peck Reservoir because long-term zooplankton data is unavailable. Large year classes of cisco have been shown to alter the zooplankton community by selecting for the largest zooplankters in the system (Rudstrum et al. 1993).

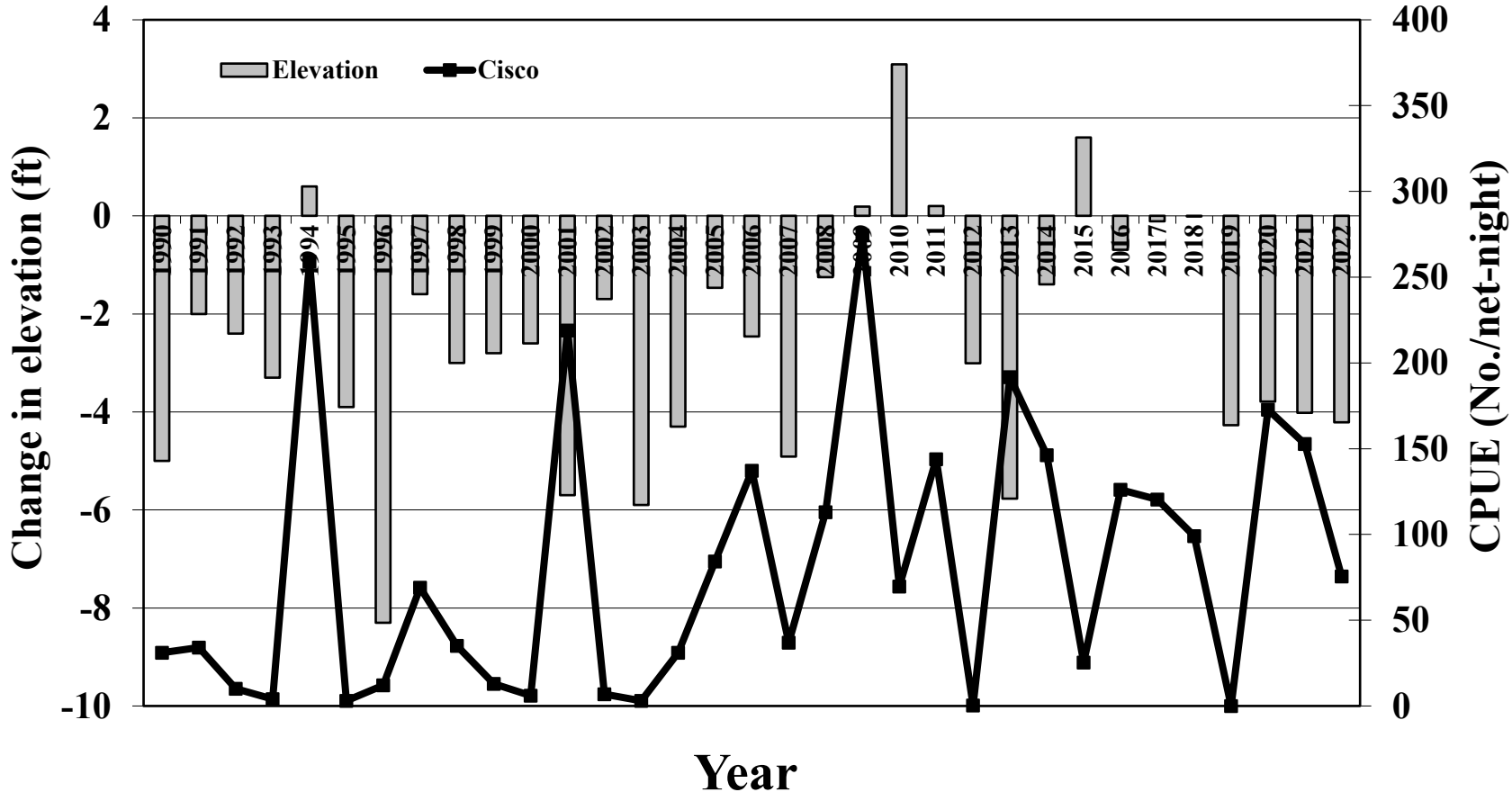


Figure 19. Change in reservoir elevation from December high to March low in contrast to mean CPUE (No./net-night) of young-of-year cisco collected in vertical gill nets on Fort Peck Reservoir, 1990-2022.

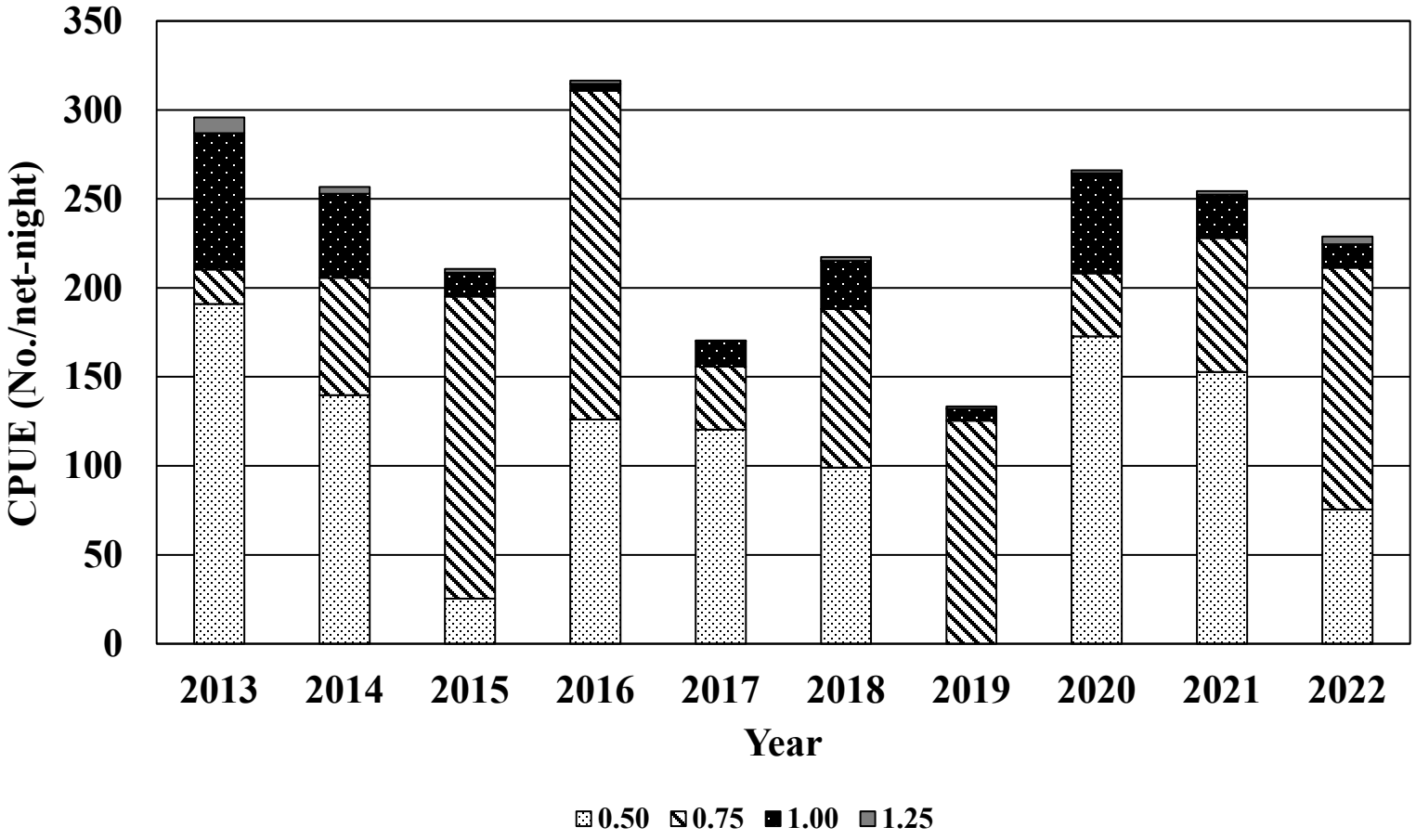


Figure 20. Mean CPUE (No./net-night) of cisco by mesh size collected in vertical gill nets on Fort Peck Reservoir, 2013-2022.

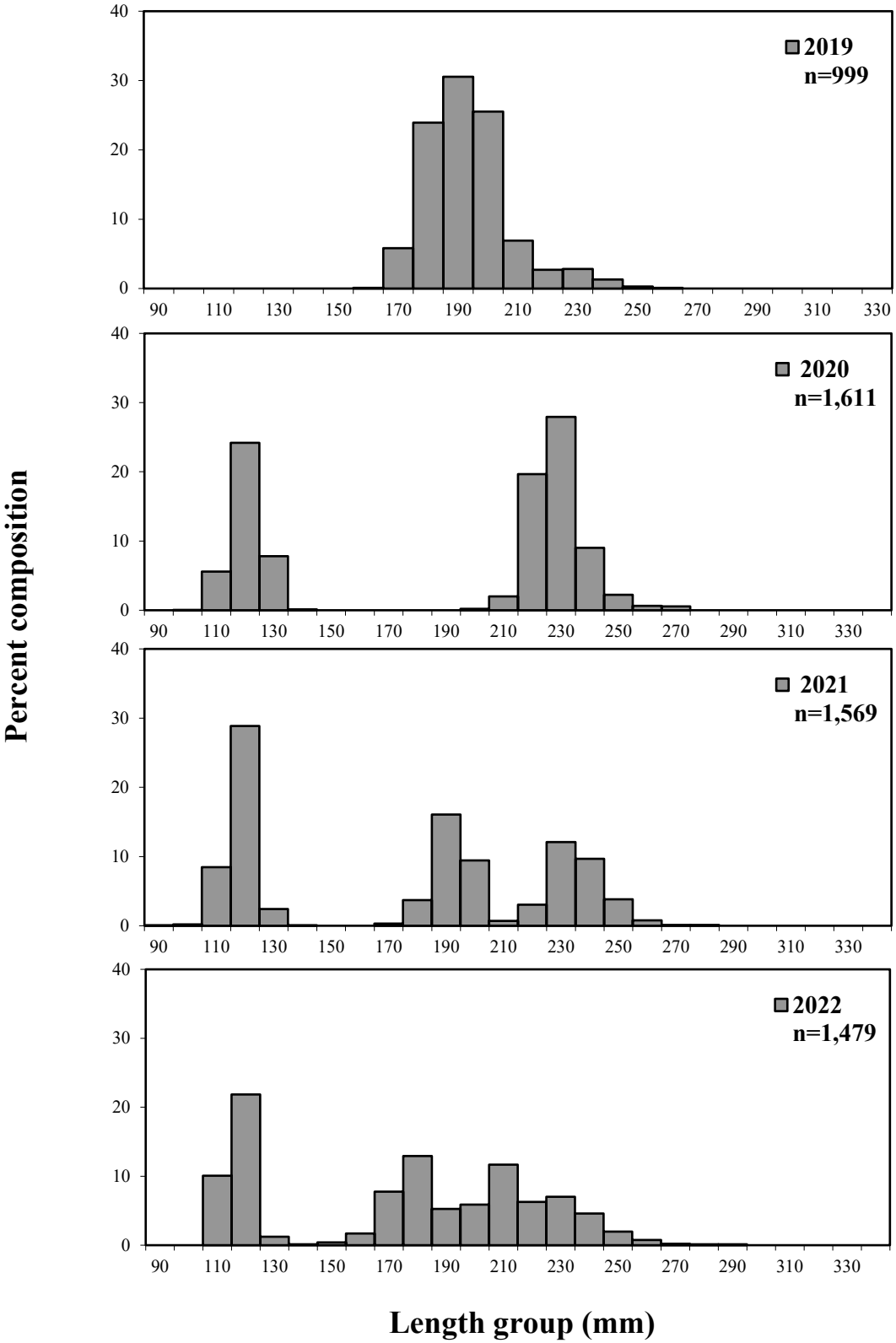
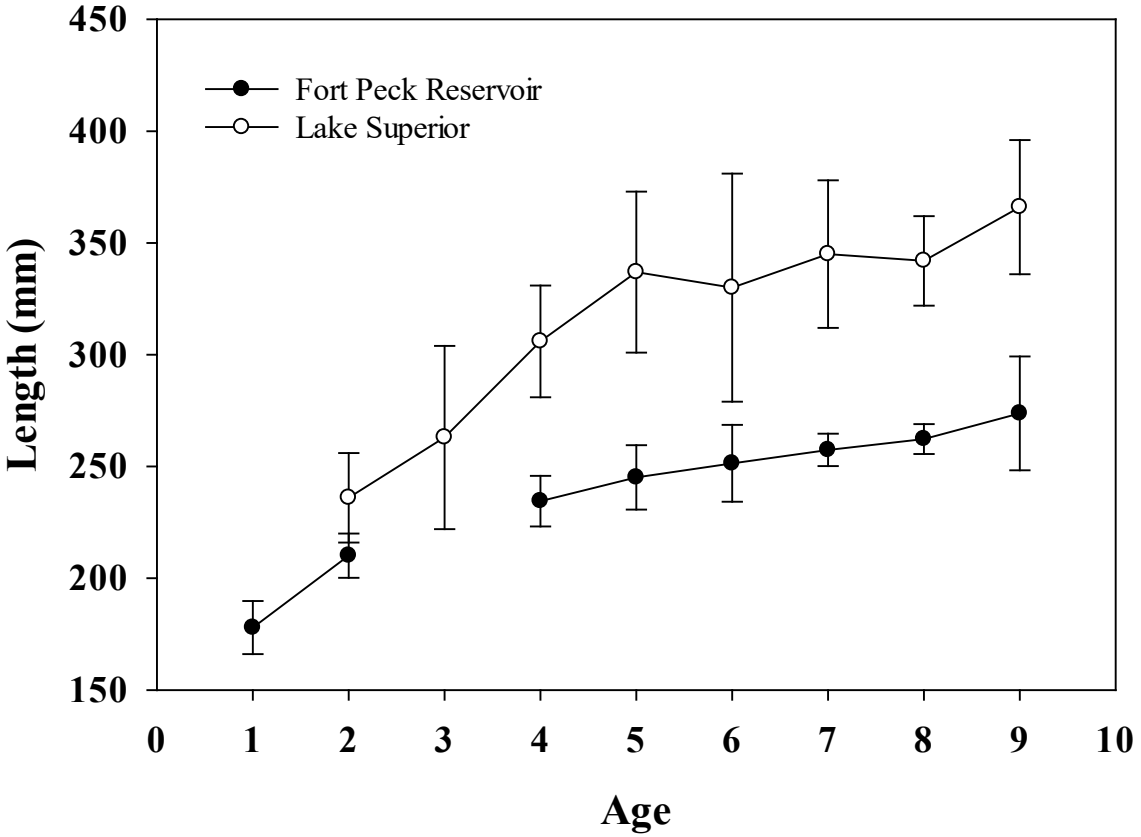


Figure 21. Length frequency of subsampled cisco collected by vertical gill nets in Fort Peck Reservoir during September, 2019-2022.

Figure 22. Mean length-at-age (±SD) of cisco caught in vertical gill nets on Fort Peck Reservoir in September 2022 compared to mean length-at-age of cisco captured in the Apostle Islands area of Lake Superior. Lake Superior data are from Ebener et al. (2008). No age-3 cisco were collected in 2022.



Lake trout

Deepwater gill nets were set from August 31st to September 9th, 2022. Gill nets were fished at two different depth strata: shallow (60-90 feet) and deep (90-120 feet) at 10 locations near the dam area. This netting effort is designed to target coldwater game fish (i.e., chinook salmon and lake trout) in Fort Peck Reservoir and provide information on species composition, relative abundance, and population parameters. Eight species were captured in 2022 with cisco being the most abundant species with a catch rate of 27.2 and 91.8 per net-night in shallow and deep gill net sets, respectively (Table 14). Chinook salmon, lake trout, northern pike, and walleye had catch rates greater than 1.0 per net night in one or both netting strata.

Relative abundance of lake trout captured in 2022 was higher in deep net sets than shallow net sets and was similar to previous years on Fort Peck Reservoir (Table 15). Based on water temperature profiles during late summer, depths of 90-120 feet near the dam area provides optimal thermal habitat for lake trout which is between 46.6 and 50F (Christie and Reiger 1988; Mackenzie-Grieve and Post 2006; Appendix 3). Therefore, lake trout captured in the deep gill netting stratum may be more representative when evaluating relative abundance. Relative abundance increased slightly to 3.8 per net night in 2022 which was above the average of 2.6 lake trout per net-night from 2010-2022.

Length frequency distributions of lake trout in 2022 indicated a broad length distribution of fish which was similar to 2021 (Figure 23). However, length frequency distributions in 2019 and 2020 indicated a population comprised of larger individuals. The presence of 7 to 18-inch lake trout in 2021 and 2022 would suggest favorable spawning and recruitment over the last several years. Higher reservoir elevations over the last few years may have provided additional spawning habitat. It's believed the primary spawning location is off the face of the dam which is characteristic of lake trout spawning habitat because it contains cobble and boulder substrates that have deep interstitial spaces that lack fine sediments (Nester and Poe 1987). No lake trout have been stocked in Fort Peck Reservoir since 2004.

Relative weights of lake trout in 2022 decreased slightly compared to the previous year but remained higher than the 2010 to 2014 period (Table 15). Similar to other game fish species in Fort Peck Reservoir, relative weights of lake trout have remained high due to an abundance of young-of-year and adult cisco observed over the last several years. Relative weights of lake trout captured from 2015 to 2021 were over 100.

Lake trout PSD has varied since deepwater gill netting survey were implemented in 2010. Values of 56 and 65 during the last two years would suggest a balanced population comprised of more stock length lake trout in the population. The period of 2015 to 2020 indicated a population comprised over larger individuals and limited recruitment with values that ranged from 78 to 100. However, caution should be exercised when interpreting these values due to low sample sizes in some years.

Table 14. Mean catch per unit effort (CPUE) for fish species collected from shallow (60-90 feet) and deep (90-120 feet) gillnets in Fort Peck Reservoir during August to September, 2017-2022.

	2017		2018		2019		2020		2021		2022	
Species	Shallow CPUE	Deep CPUE	Shallow CPUE	Deep CPUE	Shallow CPUE	Deep CPUE	Shallow CPUE	Deep CPUE	Shallow CPUE	Deep CPUE	Shallow CPUE	Deep CPUE
Channel catfish	0.7	--	1.0	0.2	1.7	1.2	3.5	1.3	2.4	0.5	0.9	0.3
Chinook salmon	0.5	0.5	0.8	0.2	0.2	--	0.3	--	0.5	0.5	2.2	1.1
Cisco	2.7	52.2	69.7	77.8	23.2	46.3	13.8	92.0	23.5	57.3	27.2	91.8
Common carp	0.3	--	--	--	0.2	0.2	0.3	--	--	--	--	--
Goldeye	0.5	--	--	--	0.5	1.3	0.3	--	0.1	--	0.1	--
Lake trout	0.2	1.2	2.5	3.5	0.7	3.2	--	3.8	0.1	2.8	0.5	3.8
Lake whitefish	--	--	--	--	--	--	0.3	0.0	0.1	--	0.1	0.3
Northern pike	1.3	0.7	0.7	0.3	0.8	0.2	0.8	--	1.1	0.3	1.5	--
Sauger	0.2	--	--	--	--	--	--	--	--	--	--	0.1
Smallmouth bass	--	--	--	--	--	--	0.3	--	--	--	--	--
Walleye	3.3	0.2	2.0	1.2	4.3	1.3	5.8	0.5	1.0	--	4.0	0.5
Yellow perch	--	--	--	--	--	0.2	--	--	--	--	--	--

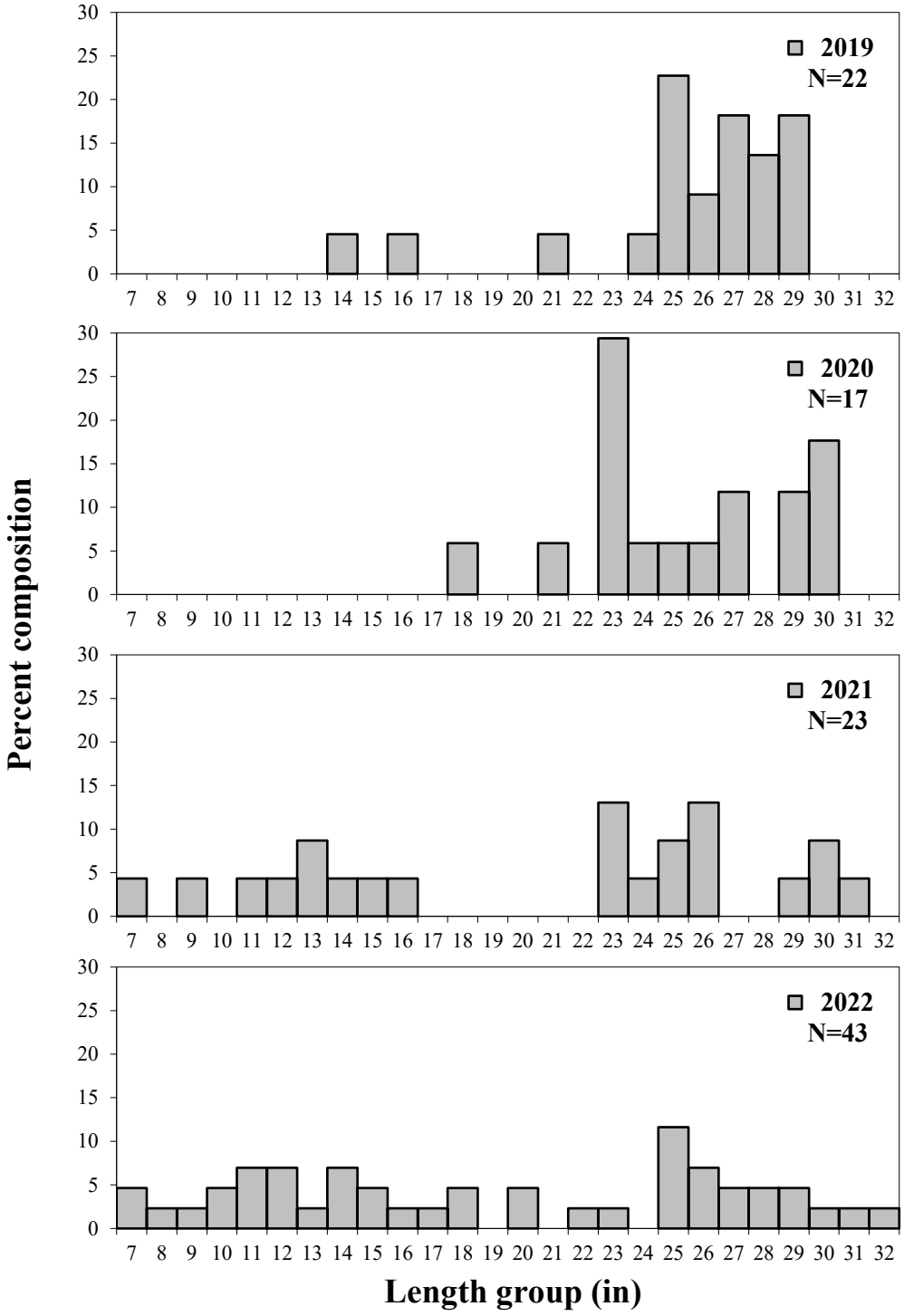


Figure 23. Length frequency of lake trout captured during deepwater gillnetting on Fort Peck Reservoir, 2019-2022.

Table 15. Summary of mean catch per unit of effort (CPUE; No./net-night), total number captured, mean length (in), mean weight (lb), mean *Wr*, and stock density indices of lake trout collected in deepwater gill nets on Fort Peck Reservoir, 2010-2022. No gillnetting was conducted in 2012, 2013, or 2016.

Year	Shallow CPUE	Deep CPUE	N	Mean Length	Mean Weight	*Wr*	PSD
2010	0.5	1.0	6	24.9	6.6	92	66
2011	0.3	1.2	7	22.8	4.4	88	57
2014	0.2	3.0	19	22.2	5.3	94	47
2015	0.2	2.2	14	23.7	5.8	101	78
2017	0.2	1.2	8	25.7	6.5	102	100
2018	2.5	3.5	35	27.5	8.4	104	97
2019	0.7	3.2	22	27.3	8.3	102	90
2020	--	3.8	17	26.7	7.8	104	94
2021	0.7	3.2	23	21.4	5.2	102	65
2022	0.5	3.8	43	20.6	4.8	98	56

RECOMMENDATIONS

- Spring trapping of walleye and northern pike will continue to provide an egg source for supplementing Fort Peck Reservoir and sport fisheries in and out of state.

- Provide walleye eggs to Fort Peck Hatchery staff to develop methods to produce sterile walleye.

- Annual standardized sampling with modified fyke nets, experimental gill nets, vertical gill nets and beach seines will continue to obtain relative abundance data on game and forage fish distribution, abundance, production and condition.

- Evaluate native species (sauger, channel catfish, burbot) more closely by continuing to collect additional length, weight, and age information during routine sampling.

- Reservoir water levels will be monitored to determine impacts to the overall fishery. Information will be utilized to make recommendations to Corps of Engineers for Annual Operating Plan in conjunction with the Missouri River Natural Resource Committee.

- Continue working with South Dakota and North Dakota to develop a stronger tri-state chinook salmon fishery. This may require traveling out of-state to help collect and spawn salmon to receive additional eggs or collection of eggs from Fort Peck to support North and South Dakota needs.

- An evaluation of stocking strategies indicates the size of salmon released is more important than the timing of release. Efforts should be made to increase the numbers of total pounds stocked as opposed to total numbers of fish.

- Continue efforts to spawn Fort Peck salmon when numbers of adults permit. Adults should be captured with the aid of an electrofishing boat due to time and manpower constraints.

- Continue to evaluate the use of deepwater summer gill netting surveys to determine relative abundance and population dynamics of lake trout. Evaluate the use of lake trout otoliths and maxilla to provide age and growth information.

- Continue young-of-year and adult cisco standardized monitoring (vertical gill netting) to further explore the population dynamics of this species. Work to develop age structure and growth information for adult cisco.

- Continue annual public informational meetings and press releases to disseminate information from the previous year’s work and to discuss stocking goals and work plans for the coming year.

- Continue transferring or entering historical data to create a full database of all documented work with Fort Peck’s fishery while ensuring data is proofed and error checked.

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Prepared by: Heath Headley
Date: May 9th, 2023

Appendix 1. Common and scientific names of fishes mentioned in this report.

Common Name	Scientific name
Bigmouth buffalo	*Ictiobus cyprinellus*
Black bullhead	*Ameiurus melas*
Black crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis macrochirus*
Brassy minnow	*Hybognathus hankinsoni*
Brook stickleback	*Culaea inconstans*
Brown trout	*Salmo trutta*
Burbot	*Lota lota*
Channel catfish	*Ictalurus punctatus*
Chinook salmon	*Oncorhynchus tshawytscha*
Cisco	*Coregonus artedi*
Common carp	*Cyprinus carpio*
Creek chub	*Semotilus atromaculatus*
Emerald shiner	*Notropis atherionoides*
Fathead minnow	*Pimephales promelas*
Flathead chub	*Platygobio gracilis*
Freshwater drum	*Aplodinotous grunniens*
Goldeye	*Hiodon alosoides*
Green sunfish	*Lepomis cyanellus*
Lake chub	*Couesius plumbeus*
Lake trout	*Salvelinus namaycush*
Lake whitefish	*Coregonus clupeaformis*
Largemouth bass	*Micropterus salmoides*
Northern pike	*Esox lucious*
Paddlefish	*Polyodon spathula*
Pallid sturgeon	*Scaphirhynchus albus*
Plains minnow	*Hybognathus placitus*
Rainbow trout	*Oncorhynchus mykiss*
River carpsucker	*Carpiodes carpio*
Sauger	*Sander canadensis*
Shorthead redhorse	*Moxostoma macrolepidotum*
Shovelnose sturgeon	*Scaphiryhynchus platorynchus*
Smallmouth bass	*Micropterus dolemieu*
Smallmouth buffalo	*Ictiobus bubalus*
Spottail shiner	*Notropis hudsonius*
Walleye	*Sander vitreus*
Western silvery minnow	*Hybognathus argyritis*
White crappie	*Pomoxis annularis*
White sucker	*Catostomus commersonii*
Yellow perch	*Perca flavescens*

Appendix 2. Number of walleye stocked in Fort Peck Reservoir during 2022 by date, region, location, and size.

Date	Location	Region	Fry	Fingerling	Hatchery
5/19/2022	McGuire Creek	UBD	2,400,000		Fort Peck
5/24/2022	McGuire Creek	UBD	3,600,000		Fort Peck
5/25/2022	McGuire Creek	UBD	4,600,000		Fort Peck
5/17/2022	North Fork Rock Creek	LBD	5,500,000		Miles City
6/20/2022	Box Creek	LBD		154,830	Fort Peck
6/20/2022	Box Elder Creek	LBD		154,830	Fort Peck
6/22/2022	Sand Arroyo	LBD		234,736	Fort Peck
7/5/2022	Spring Creek	LBD		69,564	Fort Peck
7/5/2022	Bobcat Creek	LBD		69,564	Fort Peck
7/5/2022	Cut Coulee	LBD		56,331	Fort Peck
6/21/2022	Mid Duck Creek	LMA		76,245	Fort Peck
6/21/2022	South Fork Duck Creek	LMA		76,245	Fort Peck
6/29/2022	Bear Creek	LMA		183,056	Fort Peck
6/30/2022	Skunk Coulee	LMA		86,994	Fort Peck
6/30/2022	Third Coulee	LMA		86,994	Fort Peck
7/1/2022	Duck Creek - Ramp	LMA		82,217	Fort Peck
7/5/2022	Flat Lake - Ramp	LMA		125,896	Fort Peck
7/6/2022	Main Duck	LMA		256,399	Fort Peck
7/6/2022	Duck Creek - Ramp	LMA		111,106	Fort Peck
5/14/2022	Hell Creek - Ramp	MMA	8,800,000		Miles City
6/11/2022	Hell Creek - Ramp	MMA		65,726	Miles City
6/14/2022	Hell Creek - Ramp	MMA		123,297	Miles City
6/17/2022	Hell Creek - Ramp	MMA		29,837	Miles City
6/20/2022	Hell Creek - Ramp	MMA		127,332	Miles City
6/23/2022	Middle Eighth Coulee	MMA		77,557	Fort Peck
6/27/2022	Upper Duck Creek	MMA		81,193	Fort Peck
6/27/2022	Sutherland Bay	MMA		81,192	Fort Peck
6/28/2022	Pines - Ramp	MMA		171,054	Fort Peck
7/1/2022	Cattle/Crooked Creek Bay	MMA		93,121	Fort Peck
7/1/2022	Seventh Coulee	MMA		93,121	Fort Peck
7/6/2022	Gilbert Creek Bay	MMA		96,466	Fort Peck
Total			24,900,000	2,864,903	

[1]Upper Big Dry (UBD), Lower Big Dry (LBD), Lower Missouri Arm (LMA), Middle Missouri Arm (MMA).

Appendix 3. Temperature (°C), dissolved oxygen (mg/L), pH (standard units), turbidity (NTU), and total dissolved solids (g/L), profiles by month at Bug Creek site, Fort Peck Reservoir, 2022.

Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)		Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)
		May							**June**			
0	11.3	10.8	8.7	2.7	0.424		0	14.5	9.5	9.0	8.7	0.429
10	10.5	10.8	8.7	3.5	0.424		10	14.2	9.6	9.0	9.5	0.428
20	10.3	10.8	8.6	3.5	0.423		20	13.7	9.5	8.9	9.8	0.427
30	10.2	10.8	8.6	2.5	0.423		30	13.6	9.5	8.9	10.2	0.427
40	9.7	10.7	8.6	4.1	0.423		40	13.3	9.4	8.9	18.5	0.429
		July							**August**			
0	24.2	8.9	9.3	3.7	0.448		0	24.2	8.4	9.5	2.5	0.425
10	23.4	8.9	9.2	3.9	0.446		10	23.8	8.4	9.5	2.5	0.425
20	20.1	9.1	9.2	3.9	0.427		20	23.6	8.4	9.5	2.7	0.427
30	18.1	8.4	9.0	3.7	0.426		30	23.1	8.4	9.5	3.4	0.431
40	15.5	8.1	8.9	3.4	0.423		40	22.1	8.1	9.4	4.3	0.445
		September										
0	19.8	8.4	9.5	3.5	0.458							
10	19.3	8.4	9.6	4.1	0.430							
20	19.2	8.3	9.5	3.5	0.430							
30	19.2	8.2	9.5	4.0	0.429							
40	19.1	8.3	9.5	4.7	0.430							
50	18.1	7.9	9.5	16.0	0.430							

Appendix 3 continued. Temperature (°C), dissolved oxygen (mg/L), pH (standard units), turbidity (NTU), and total dissolved solids (g/L), profiles by month at Spring Creek site, Fort Peck Reservoir, 2022.

Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)		Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)
		May							**June**			
0	9.7	11.1	8.7	8.1	0.424		0	15.1	9.4	9.0	132.7	0.420
10	7.8	11.4	8.6	2.7	0.420		10	14.6	9.5	9.0	14.3	0.417
20	7.3	11.4	8.6	2.4	0.419		20	13.8	9.4	9.0	12.2	0.417
30	7.1	11.4	8.6	2.1	0.419		30	13.8	9.5	8.9	11.6	0.416
40	7.0	11.3	8.6	1.9	0.419		40	13.7	9.5	8.9	10.9	0.417
50	7.0	11.4	8.6	2	0.420		50	13.5	9.5	8.9	9.5	0.416
60	6.9	11.3	8.6	1.9	0.419		60	13.3	9.6	8.9	11.5	0.417
70	6.9	11.3	8.6	2.2	0.419		70	13.3	9.6	8.9	12.7	0.416
80	6.9	11.3	8.6	2.4	0.420		80	13.3	9.6	8.9	15.4	0.416
		July							**August**			
0	23.1	8.7	9.2	2	0.427		0	22.9	8.4	9.5	2.3	0.422
10	21.3	9.0	9.2	2.6	0.424		10	22.9	8.4	9.5	2.9	0.422
20	20.8	9.0	9.2	3.1	0.423		20	22.6	8.5	9.5	3.2	0.423
30	19.6	8.9	9.1	3.7	0.422		30	22.2	8.5	9.5	3.7	0.423
40	15.4	8.8	9.0	3.1	0.419		40	20.8	8.3	9.4	5.4	0.425
50	14.3	8.8	8.9	2.8	0.418		50	19.6	7.8	9.3	7.9	0.424
60	13.3	8.7	8.9	3.2	0.417		60	16.8	7.4	9.2	3.5	0.422
70	12.8	8.7	8.9	3.2	0.417		70	14.2	7.3	9.0	4.4	0.419
80	12.0	8.7	8.8	2	0.417		80	12.9	7.4	9.0	3.9	0.417
		September										
0	19.4	8.4	9.5	1.8	0.418							
10	19.2	8.4	9.5	2.5	0.417							
20	19.1	8.3	9.5	3.5	0.417							
30	18.9	8.4	9.5	3.1	0.418							
40	18.8	8.3	9.5	5.4	0.418							
50	17.5	7.3	9.3	4.1	0.418							
60	15.5	6.7	9.2	3.7	0.417							
70	14.4	6.4	9.1	4.1	0.417							
80	13.2	6.4	9.0	4.4	0.416							

Appendix 3 continued. Temperature (°C), dissolved oxygen (mg/L), pH (standard units), turbidity (NTU), and total dissolved solids (g/L), profiles by month at Haxby site, Fort Peck Reservoir, 2022.

Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)		Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)
		May							**June**			
0	9.4	11.4	8.6	1.8	0.401		0	14.6	9.7	9.0	6.5	0.391
10	8.8	11.3	8.6	2.4	0.400		10	12.8	9.9	9.0	5.8	0.397
20	8.5	11.4	8.6	2.4	0.401		20	12.5	9.9	8.9	5.4	0.399
30	8.4	11.4	8.6	2.7	0.401		30	12.4	9.9	8.9	4.5	0.397
40	7.6	11.4	8.6	2.7	0.408		40	12.4	10.0	8.9	3.1	0.397
50	7.1	11.4	8.6	2.5	0.412		50	12.3	10.0	8.9	3.3	0.398
60	6.6	11.5	8.6	2.0	0.415		60	11.8	10.0	8.9	4.1	0.403
70	6.5	11.5	8.6	2.3	0.415		70	10.4	10.3	8.9	3.2	0.412
80	6.1	11.5	8.6	2.3	0.418		80	9.7	10.4	8.8	2.7	0.415
90	5.9	11.6	8.5	2.0	0.419		90	9.2	10.4	8.8	2.9	0.416
100	5.9	11.6	8.6	1.9	0.419		100	9.1	10.5	8.8	2.7	0.416
110	5.8	11.5	8.5	1.9	0.419		110	9.1	10.4	8.8	2.5	0.416
120	5.7	11.6	8.5	1.3	0.420		120	9.0	10.5	8.8	2.7	0.417
130	5.4	10.4	7.8	3000.0	4.206							
		July							**August**			
0	21.6	8.7	9.3	2.6	0.411		0	22.9	8.5	9.5	2.6	0.419
10	21.6	8.8	9.2	2.9	0.411		10	22.9	8.5	9.5	3.0	0.419
20	20.1	9.0	9.2	2.9	0.417		20	22.8	8.5	9.4	3.4	0.419
30	19.9	9.0	9.2	2.7	0.416		30	21.6	8.3	9.4	3.9	0.418
40	18.8	8.8	9.2	3.6	0.416		40	21.2	8.1	9.4	3.6	0.417
50	15.1	8.9	9.1	3.1	0.414		50	18.2	7.2	9.2	3.7	0.411
60	12.9	8.9	8.9	3.4	0.413		60	16.0	7.0	9.0	2.9	0.407
70	11.7	9.0	8.9	2.8	0.411		70	14.0	7.6	9.0	3.1	0.412
80	10.7	9.3	8.9	2.6	0.410		80	13.1	7.7	9.0	2.5	0.411
90	10.5	9.3	8.8	2.0	0.411		90	11.8	8.1	9.0	2.1	0.411
100	10.3	9.3	8.8	1.7	0.410		100	10.5	8.2	8.9	1.7	0.411
110	10.3	9.3	8.8	1.9	0.412		110	10.3	8.2	8.9	1.8	0.411
120	10.2	9.3	8.8	1.5	0.412		120	10.2	8.2	8.9	1.4	0.412
		September										
0	19.5	8.3	9.5	1.6	0.415							
10	19.2	8.3	9.5	2.1	0.414							
20	19.2	8.3	9.5	3.0	0.412							
30	19.2	8.2	9.5	3.1	0.413							
40	19.1	8.3	9.5	3.3	0.413							
50	19.1	8.2	9.5	3.1	0.413							
60	16.1	6.5	9.2	3.4	0.411							
70	14.9	6.5	9.1	2.8	0.411							
80	13.7	6.6	9.1	3.4	0.410							
90	13.4	6.6	9.1	2.7	0.411							
100	12.8	6.6	9.0	2.0	0.408							
110	12.7	6.6	9.0	3.0	0.407							
120	12.2	6.7	9.0	2.3	0.409							
130	11.6	6.4	9.0	32.7	0.524							

Appendix 3 continued. Temperature (°C), dissolved oxygen (mg/L), pH (standard units), turbidity (NTU), and total dissolved solids (g/L), profiles by month at Pines site, Fort Peck Reservoir, 2022.

Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)		Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)
		May							**June**			
0	8.0	11.5	8.6	1.9	0.402		0	10.7	10.3	8.8	2.1	0.402
10	7.9	11.6	8.6	1.8	0.402		10	10.0	10.4	8.8	2.1	0.406
20	7.9	11.6	8.6	2.2	0.401		20	9.8	10.4	8.8	2.4	0.407
30	7.9	11.5	8.6	2.1	0.401		30	9.6	10.4	8.8	2.6	0.407
40	7.8	11.5	8.6	2.4	0.400		40	9.3	10.4	8.8	2.8	0.406
50	7.8	11.5	8.6	2.4	0.400		50	9.0	10.4	8.8	4.3	0.408
60	7.6	11.5	8.6	2.6	0.401		60	8.9	10.4	8.8	4.8	0.408
70	7.3	11.5	8.6	2.3	0.405		70	8.8	10.4	8.8	4.7	0.408
80	6.6	11.6	8.5	2.1	0.410		80	8.8	10.4	8.8	4.9	0.409
90	6.2	11.5	8.5	2.2	0.413		90	8.7	10.4	8.8	5.1	0.409
		July							**August**			
0	22.2	8.7	9.3	2.6	0.407		0	24.2	8.6	9.5	3.3	0.405
10	21.9	8.8	9.3	2.9	0.406		10	23.8	8.7	9.5	3.6	0.407
20	21.1	8.9	9.3	2.6	0.403		20	23.0	8.5	9.4	4.8	0.409
30	20.8	8.8	9.2	2.7	0.406		30	21.9	7.5	9.3	4.4	0.396
40	17.9	8.8	9.1	3.4	0.411		40	20.9	7.1	9.3	4.5	0.396
50	16.1	8.7	9.0	3.5	0.409		50	16.8	6.4	9.0	4.6	0.395
60	15.2	8.7	9.0	3.1	0.407		60	13.6	7.1	8.9	3.8	0.402
70	14.1	8.7	9.0	2.7	0.406		70	12.4	7.5	8.8	3.2	0.406
80	13.2	8.6	8.9	2.8	0.405		80	11.6	7.8	8.8	2.3	0.404
90	12.4	8.7	8.9	2.3	0.405		90	11.2	8.0	8.8	2.4	0.406
		September										
0	19.7	8.2	9.5	3.1	0.401							
10	19.6	8.1	9.5	3.1	0.400							
20	19.6	8.1	9.5	3.4	0.401							
30	19.6	8.1	9.5	4.4	0.400							
40	19.5	8.1	9.5	3.3	0.406							
50	19.4	8.2	9.5	3.0	0.406							
60	19.4	8.2	9.5	4.3	0.407							
70	19.0	7.3	9.4	4.1	0.406							
80	13.8	5.9	9.0	4.5	0.404							
90	11.8	5.9	8.9	5.3	0.405							

Appendix 3 continued. Temperature (°C), dissolved oxygen (mg/L), pH (standard units), turbidity (NTU), and total dissolved solids (g/L), profiles by month at Hell Creek site, Fort Peck Reservoir, 2022.

Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)		Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)
		May							**June**			
0	9.7	11.5	8.6	2.7	0.357		0	15.1	9.5	9.0	6.7	0.371
10	9.7	11.6	8.6	2.9	0.357		10	14.4	9.5	9.0	8.3	0.371
20	9.6	11.6	8.6	2.8	0.356		20	12.6	9.7	8.9	7.3	0.374
30	9.6	11.5	8.6	3.0	0.357		30	11.9	9.8	8.9	5.6	0.376
40	9.6	11.5	8.6	3.6	0.358		40	11.6	9.8	8.9	5.3	0.376
50	8.9	11.5	8.6	3.2	0.362		50	11.2	9.8	8.9	4.6	0.378
60	8.7	11.5	8.6	3.4	0.365		60	10.5	9.9	8.8	3.9	0.384
70	8.1	11.1	8.5	3.2	0.367		70	10.2	9.8	8.8	3.4	0.384
80	6.3	11.0	8.5	2.3	0.391		80	7.9	9.9	8.7	2.9	0.402
90	5.8	11.0	8.5	2.9	0.393							
		July							**August**			
0	24.1	8.6	9.3	3.3	0.368		0	23.8	8.6	9.5	3.1	0.386
10	23.1	8.9	9.3	3.3	0.367		10	23.7	8.7	9.5	3.4	0.386
20	21.3	9.1	9.3	3.6	0.374		20	23.6	8.6	9.5	3.6	0.386
30	16.7	8.1	9.0	4.9	0.386		30	23.4	8.4	9.5	3.9	0.388
40	14.3	7.8	8.9	4.5	0.387		40	21.7	6.7	9.3	8.4	0.384
50	11.9	8.3	8.8	3.9	0.391		50	16.3	5.0	8.8	6.0	0.375
60	11.8	8.4	8.8	3.7	0.393		60	12.7	6.1	8.7	5.1	0.391
70	10.9	8.5	8.8	3.8	0.395		70	11.7	6.3	8.7	3.8	0.395
80	10.1	8.1	8.7	4.4	0.397		80	11.6	6.2	8.7	4.2	0.395
		September										
0	19.8	8.1	9.44	3.9	0.382							
10	19.8	8.1	9.45	4.1	0.383							
20	19.8	8.0	9.44	4.5	0.383							
30	19.7	7.9	9.43	4.4	0.383							
40	19.7	7.9	9.42	4.4	0.383							
50	19.7	7.9	9.42	4.8	0.383							
60	18.8	6.3	9.2	5.7	0.384							
70	16.7	5.0	8.96	6.2	0.386							
80	15.3	4.6	8.84	8.2	0.389							
90	13.3	3.8	8.7	40.2	0.394							

Appendix 3 continued. Temperature (°C), dissolved oxygen (mg/L), pH (standard units), turbidity (NTU), and total dissolved solids (g/L), profiles by month at Timber Creek site, Fort Peck Reservoir, 2022.

Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)		Depth (feet)	Temperature (C)	Dissolved oxygen (mg/L)	pH (units)	Turbidity (NTU)	TDS (g/L)
		May							**June**			
0	9.5	11.0	8.5	4.5	0.343		0	13.3	9.1	8.8	13.5	0.355
10	9.4	10.9	8.6	4.7	0.343		10	12.7	9.0	8.8	12.4	0.354
20	9.3	10.9	8.5	4.5	0.344		20	12.6	8.9	8.8	12.5	0.355
30	8.4	10.7	8.5	4.8	0.346		30	12.4	8.9	8.8	16.9	0.356
40	8.0	10.7	8.4	5.1	0.349		40	12.3	9.0	8.8	18.2	0.358
50	7.6	10.6	8.5	9.6	0.351		50	11.7	9.0	8.8	19.7	0.363
		July							**August**			
0	25.8	8.5	9.4	3.6	0.305		0	23.2	7.9	9.4	5.7	0.354
10	24.4	8.7	9.3	9.4	0.318		10	23.1	7.9	9.4	6.2	0.354
20	19.7	6.5	8.9	6.1	0.348		20	22.8	7.7	9.4	5.6	0.355
30	15.6	6.1	8.7	6.4	0.357		30	22.6	7.1	9.3	6.1	0.352
40	13.9	5.9	8.6	9.5	0.369		40	22.3	6.5	9.2	6.2	0.347
50	13.6	5.7	8.5	11.7	0.370		50	19.6	3.1	8.7	15.9	0.349
		September										
0	19.6	7.5	9.3	6.6	0.337							
10	19.6	7.5	9.4	6.9	0.337							
20	19.6	7.5	9.4	7.3	0.337							
30	19.6	7.5	9.3	7.8	0.337							
40	19.6	7.4	9.3	8.5	0.336							
50	19.5	7.4	9.3	13.1	0.338							

Appendix 4. Gill netting dates by region, water surface temperature range (°F), and reservoir elevation (MSL) during standard experimental gill net surveys on Fort Peck Reservoir. Mean water surface temperatures are given in parentheses.

	Region[1]					Water surface	Reservoir
Year	UBD	LBD	LMA	MMA	UMA	Temperature (°F)	Elevation (MSL)
2002	7/17 to 9/6	7/18 to 9/6	7/23 to 8/1	7/25 to 9/4	8/6 to 8/14	68 to 81 (74.3)	2220.2 to 2219.3
2003	7/10 to 8/20	7/10 to 8/5	7/8 to 8/13	7/15 to 8/12	7/22 to 7/24	NA	2213.0 to 2211.6
2004	7/14 to 7/15	7/13 to 7/15	7/20 to 7/22	7/21 to 7/27	7/27 to 7/29	69 to 77 (73.6)	2203.2 to 2201.6
2005	7/19 to 7/21	7/21 to 7/27	7/28 to 8/2	8/2 to 8/17	8/16 to 8/17	68 to 78 (72.1)	2203.4 to 2202.7
2006	7/11 to 7/13	7/18 to 7/20	7/20 to 7/26	7/26 to 8/3	8/3 to 8/16	69 to 80 (74.3)	2205.6 to 2204.2
2007	7/17 to 7/24	7/24 to 7/27	7/27 to 8/1	8/1 to 8/7	8/14 to 8/15	70.3 to 84.9 (78.2)	2202.9 to 2201.6
2008	7/15 to 7/17	7/17 to 7/23	7/24 to 7/30	7/30 to 8/4	8/4 to 8/6	67.1 to 80.2 (74.3)	2209.9 to 2210.0
2009	7/16 to 7/21	7/21 to 7/23	7/24 to 7/28	7/29 to 8/3	8/3 to 8/5	66.7 to 76.3 (71.1)	2220.5 to 2220.4
2010	7/13 to 7/20	7/20 to 7/22	7/22 to 7/28	7/28 to 8/5	8/3 to 8/5	67.3 to 77.9 (73.3)	2235.2 to 2235.7
2011	7/26 to 7/28	7/28 to 7/29	8/2 to 8/3	8/3 to 8/5	8/9 to 8/11	70.5 to 79.8 (75.2)	2249.3 to 2244.7
2012	7/17 to 7/19	7/19 to 7/20	7/24 to 7/25	7/25 to 8/1	7/30 to 8/1	67.2 to 83.5 (75.5)	2236.6 to 2235.8
2013	7/23 to 7/25	7/25 to 8/1	8/1 to 8/7	8/8 to 8/9	8/13 to 8/15	63.5 to 77.9 (72.3)	2236.3 to 2234.9
2014	7/17 to 7/22	7/22 to 7/24	7/24 to 7/30	7/30 to 8/7	8/5 to 8/7	67.8 to 79.8 (74.0)	2230.3 to 2229.9
2015	7/21 to 7/23	7/23 to 7/31	7/31 to 8/5	8/5 to 8/13	8/11 to 8/13	67.9 to 79.2 (73.0)	2236.4 to 2235.9
2016	7/19 to 7/21	7/21 to 7/27	7/27 to 8/3	8/2 to 8/5	8/9 to 8/11	69.4 to 77.7 (73.1)	2235.4 to 2234.7
2017	7/18 to 7/20	7/20 to 7/26	7/26 to 8/3	8/2 to 8/9	8/7 to 8/9	68.6 to 75.5 (72.1)	2239.6 to 2238.5
2018	7/18 to 7/20	7/20 to 7/24	7/24 to 7/31	7/31 to 8/8	8/6 to 8/8	69.2 to 77.4 (74.4)	2233.8 to 2247.9
2019	7/17 to 7/19	7/19 to 7/23	7/23 to 8/1	7/30 to 8/15	8/14 to 8/16	69.4 to 79.4 (73.2)	2246.7 to 2245.2
2020	7/15 to 7/17	7/17 to 7/22	7/22 to 7/28	7/28 to 8/4	8/4 to 8/6	68.7 to 78.7 (73.4)	2240.4 to 2240.0
2021	7/13 to 7/15	7/15 to 7/21	7/21 to 7/29	7/29 to 8/5	8/3 to 8/5	70.7 to 80.5 (75.7)	2231.8 to 2230.5
2022	7/12 to 7/14	7/14 to 7/22	7/19 to 7/26	7/26 to 8/4	8/2 to 8/4	70.2 to 80.0 (75.1)	2222.6 to 2222.1

[1]Upper Big Dry (UBD), Lower Big Dry (LBD), Lower Missouri Arm (LMA), Middle Missouri Arm (MMA), and upper Missouri Arm (UMA).