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, 20010 THROUGH JUNE 30, 2011
REPORT PERIOD: MARCH 1, 20010 THROUGH FEBRUARY 28, 2011

ABSTRACT

Fort Peck Reservoir reached peak elevation on October 11th, 2010 at 2235.91 feet from a minimum elevation on January 1st, 2010 at 2221.14 feet, a spring rise of 14.77 feet. Spawning walleye populations were sampled in the upper Big Dry Arm with frame traps from April 13th to April 30th. Walleye were spawned and the fertilized eggs were sent to Fort Peck and Miles City Fish Hatcheries. Trap netting captured 1,470 walleye for a catch rate of 5.1 per net night in 2010 which was down from the previous year of 9.9 per net night. Due to the average catch rates of walleyes and favorable spawning conditions, approximately 85 million eggs were collected in 2010. A total of 28.6 million fry and 2.4 million fingerlings were stocked in various locations throughout Fort Peck reservoir. One hundred gill nets were set in standard locations throughout the reservoir from July 13th to August 5th. Eighteen species were captured for a total of 2,349 fish. Goldeye, walleye, and shorthead redhorse were the most abundant species captured overall, with catch rates of 5.1, 3.6, and 3.0 per net night, respectively. Gill net catch rates of walleye met the long term average of 3.6 per-net for the period from 1983 to 2010. Gill-netted walleye averaged 15.4 inches and 1.7 pounds. In 2010, catch rates of stock to quality size walleye continued to increase while catch rates of preferred and greater remained stable. Relative weights of walleye in the quality and preferred length groups increased while stock and memorable length groups remained similar to the previous year. Pike catch rates increased slightly in 2010 to 1.9 per net with an average size of 23.4 inches and 3.9 pounds. Overall, abundance of shoreline forage increased in 2010 and was similar to those observed in the mid to late 1990's. The most notable increase in shoreline forage occurred for spottail shiners form 28 to 193 per seine haul. In addition, young-of-year crappie increased to some their highest relative abundances with 144 per seine haul. In June of 2010, 143,966 salmon were stocked into the Marina Bay. An additional 23,801 larger, adipose fin-clipped, fall stock salmon were released in Marina Bay in October. Artificial lake trout spawns did not occur in 2010. Young-of-year cisco production decreased in 2010, with 70 per net night.

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 selected waters. This objective was met and is presented in Results and Discussion sections of the report.

Activity 2 - Fish Population Management

Objective: To implement fish stocking programs and/or fish eradication actions 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 the 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 fishery and was presented at the annual Missouri River Natural Resource Committee (MRNRC) meeting in Billings and with North and South Dakota during annual Missouri River mainstem reservoir meetings. This information will also be presented to Corps of Engineers to make recommendations for Annual Operating Plan (AOP). Staff also attended the Great Plains Fisheries Workers Association meeting and the Montana American Fisheries Society meeting.

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. Approximately 90 volunteers assisted with the annual walleye egg-take at Nelson Creek. Objective accomplished. Staff assisted with the Home Run Pond kids fishing clinics. Staff also assisted regional information and education officer with multiple press releases and as science fair judges. Staff attended Walleye Unlimited meetings in Lewistown, Billings, and Glasgow to present annual updates on the status the Fort Peck fishery. Staff has been instrumental in providing information for the "Ask the Biologist" web page on the Walleye's Forever web site.

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, 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 2,246 feet above sea level. 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 feet above msl and the bottom of the multipurpose carryover zone is 2160 feet msl. The reservoir reached peak elevation in 2010 on October 11th at 2235.91feet from a minimum elevation on January 1st, 2010 at 2221.14 feet, a spring rise of 14.77 feet (Figure 2). Since then, the reservoir has maintained a relatively stable elevation of 2220.00 feet. Reservoir elevations are predicted to rise approximately 8 to 10 feet from March through June and fall beginning in August of 2011 based on the March 2011 basic forecast (USACE 2010).

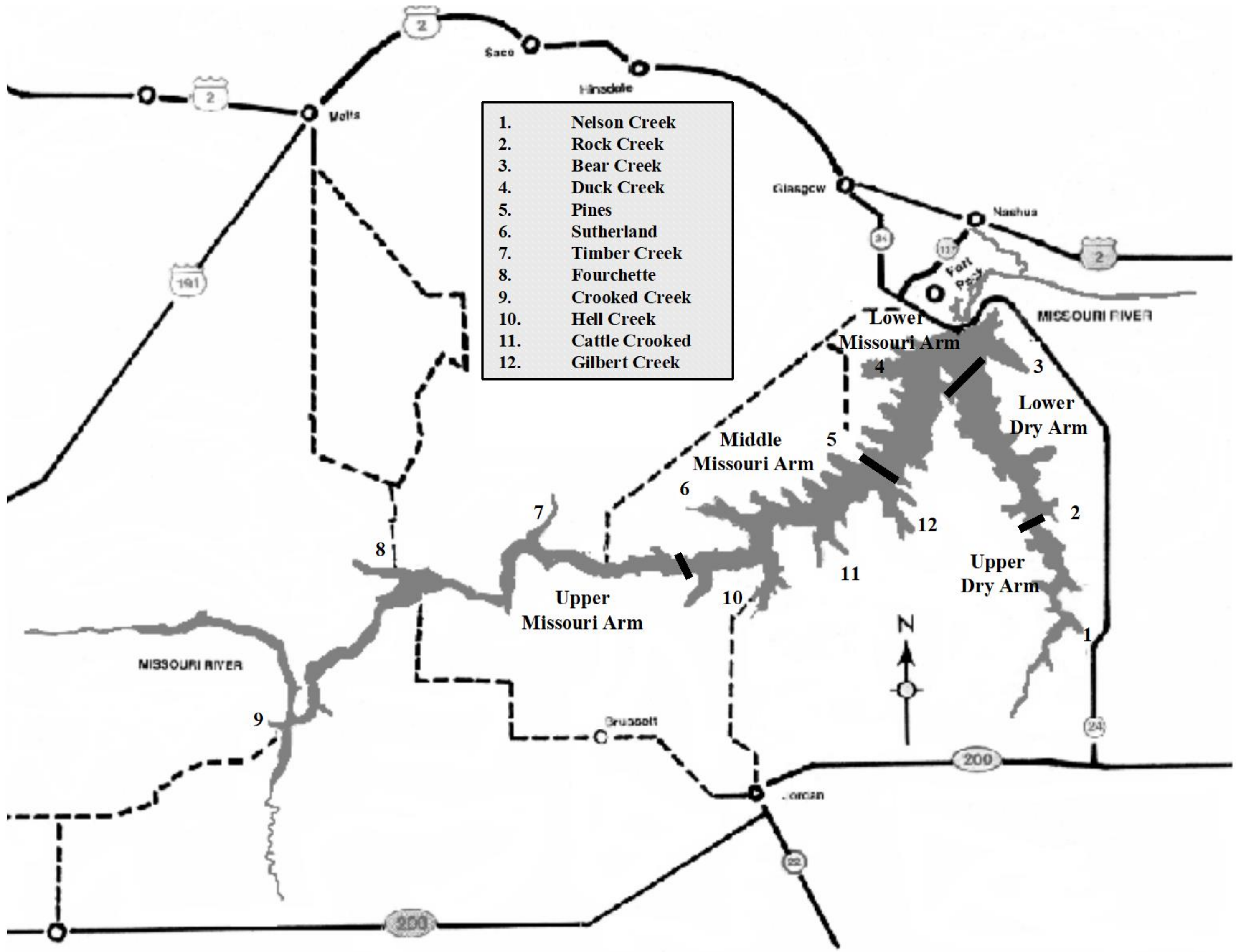


Figure 1. Fort Peck study area describing major sampling zones and select specific locations.

Figure 2. Annual peak monthly elevations on Fort Peck Reservoir from January 1982 to January 2010. Gray bars indicate maximum reservoir elevation in June of each year (Data provided by the U.S. Army Corps of Engineers).

SAMPLING METHODS

Data Collection

- Spring trap-net sampling was conducted from April 13^{th} to April 30^{th}, 2010 in the Big Dry Arm with 4-ft x 6-ft frame traps of 1-in square mesh rigged with 30 to 50-ft leads. This netting effort is targeted for the collection of walleye to provide an egg source to meet the stocking requests for Fort Peck Reservoir and other sport fisheries in and out of the state.
- 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 July 13^{th} to August 5^{th}, 2010 to monitor, distribution, species composition, relative abundance, and population parameters for game and native species throughout the reservoir.
- All walleye otoliths were collected at all sampling locations. 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 2^{nd} to August 19^{th}, 2010 using a 100-ft x 9-ft beach seine of 3/16-in square mesh at 100 locations throughout the reservoir, to determine abundance and reproductive success of game and forage fish.
- Twelve monofilament gill nets 100-ft x 6-ft with ½-in square mesh were fished vertically from the water's surface to sample young-of-year cisco from September 22^{nd} to September 30^{th}, 2010. Only the lower Big Dry, lower Missouri, and middle Missouri Arms were sampled because they contained sufficient depths of 100 ft. In previous years when reservoir elevations were higher, other locations were sampled as shown in Table 21.
- Electrofishing was used during October 4^{th} to October 25^{th}, 2010 to locate, sample, and collect chinook salmon as part of the annual egg-take effort.
- Chinook salmon otoliths were collected from all deceased fish used in the egg taking process. Otolith preparation followed methods outlined by Secor et al. (1992). Otoliths were mounted in epoxy and cut into thin sections on an Isomet saw and later mounted on glass slides.
- Lake trout were captured and tagged off rocks 60, 70, and 80 along the face of the dam from November rd to November 10^{th}, 2010 with 300-ft x 6-ft deep multifilament nets consisting of 100-ft panels of 3, 4, and 5-in square mesh. In addition, 300-ft x 8-ft deep multifilament gill nets consisting of 3-100-ft panels of 1¼, 2, and 2½-in mesh were also used to collect spawning lake trout.
- Otoliths were collected from all deceased lake trout collected from 2009-2010 during gill netting surveys and from angling. Otoliths were used as the preferred aging structure due to their reliability (Burnham-Curtis and Bronte 1996; Schram and Fabrizo 1998). Otoliths were prepared for aging similar to walleye and chinook salmon otoliths.

Data Analysis

Relative abundance of fish species was expressed as mean catch per unit effort (CPUE) for standard trap net (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, northern pike, smallmouth bass, and walleye (Gablehouse 1984). Length categories were also assigned to chinook salmon as proposed by Hill and Duffy (1993). Length categories used to calculate PSD and RSD values are listed in Table 1.

Table 1. Minimum lengths (in) of length-class designations used when calculating proportional stock density and relative stock density values for fish population survey samples.

Species	Length Class				
	Stock	Quality	Preferred	Memorable	Trophy
Channel catfish	11	16	24	28	36
Chinook salmon	11	18	24	30	37
Northern pike	14	21	28	34	44
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), lake trout (Piccolo et al. 1993), northern pike (Willis 1989), and walleye (Murphy et al. 1990). Calculated values for channel catfish and northern pike are presented in Appendix 2, while values for lake trout and walleye are presented in the results and discussion section of this report. Proportional stock density, RSD, and *Wr* values were calculated using EXCEL.

Lake trout captured during the fall gill netting surveys were tagged with a circular floy tag behind the dorsal fin. The Jolly-Seber-type method (Jolly 1965; Seber 1965), as outlined in Miranda and Bettoli (2007), was used to calculate annual exploitation rates from tag returns reported by anglers in EXCEL. Exploitation rates were calculated for each year from 2004 through 2010 when the netting and tagging survey was conducted. No variance equations were calculated due to unavailable mark-recapture computer programs.

RESULTS AND DISCUSSION

Spring Trap Netting

Spawning walleye and northern pike populations were sampled in the upper Big Dry Arm with frame traps from April 13th to April 30th, 2010. Eighteen species were captured with walleye being the most abundant with an average catch-rate of 5.1 fish per trap-night (Table 2). Walleye were successfully spawned and the fertilized eggs were sent to the Fort Peck and Miles City Fish Hatcheries. An effort of 289-trap days was committed to walleye spawning efforts in 2010. Compared to previous years, netting effort was slightly lower since the walleye egg taking operation began due to late ice cover, which substantially shortened the number of days. Typically, ice cover has receded by the first week in April and the walleye spawning operation has concluded in three to four weeks.

Due to higher reservoir elevations of approximately 2224 msl in during the beginning of April 2010, the walleye spawning operation was moved further up the Big Dry Arm to Nelson Creek. Pontoon barges, which were used as the spawning locations, were set up with the holding pens in 8 to 10-ft of water. By keeping the holding pens and spawning barge in shallow water, warmer water temperatures were maintained. Water surface temperatures warmed gradually 46°F to 55°F on April 21st, 2010. This gradual warming trend resulted in an average number of ripe female walleye These favorable conditions in 2010 developed at a critical time during the walleye spawn as it typically peaks the third week of April. This resulted in a egg-take of just over 85 million eggs as opposed to 48 million collected in 2008 when late ice cover and unseasonable cool water temperatures made for undesirable walleye spawning conditions.

Walleye

Trap netting during captured 1,470 walleye, of which 426 were measured. A subsample of 426 walleye were weighed due to the rough conditions experienced during the spawn. The total number of walleye handled was still relatively low compared to previous years (Figure 3). However, walleye catch rates in 2010 were 5.1per-trap, bringing them under the average of 7.6 per-trap night (period of 1982 to 2010; Figure 4) but better than the 2005 to 2008 period (Table 3). Average weight for spawning walleye in 2010 was 7.0 pounds for females and 3.3 pounds for males which tied for the second highest weight of males during the spawning operation (Table 4). In 2007, the abundance of smaller walleye was most apparent in the 13 to 15-inch length groups (Figure 5). Since then, length groups of smaller walleye have shifted slowly towards 17 to 19 inches suggesting improved growth in the spawning population. Improved numbers of walleye greater than 23 inches in 2010 indicated large fish were continuing to grow and survive satisfactorily.

Northern Pike

Northern pike were spawned in 2010 and the fertilized eggs were sent to the Fort Peck Hatchery. However, quality gravid females were again difficult to capture, but a sufficient number was collected to meet the 2010 egg request. Relative abundance of northern pike captured decreased from 4.6 per-net nigtht in 2009 to 1.8 in 2010 (Table 3). The high relative abundance in 2009 was likely attributed to the late ice cover causing a delay in their spawning activity. Typically, northern pike have spawned by the time the walleye egg taking operation has commenced when water temperatures are below 43°F (Frost and Kipling 1967). Average length and weight in 2010 was similar to previous years with fish averaging 30.4 inches and weighing 7.3 pounds. Subsampled females averaged 33.2 inches and 9.8 pounds, while males averaged 29.1 inches and 6.0 pounds (Table 2). In 2010, length frequency distributions showed a continued trend towards larger fish with a majority of the fish greater than 28 inches (Figure 7). However, smaller pike should be more abundant the next few years due to improved reservoir elevations which will provide suitable spawning and rearing habitat.

Table 2. Mean catch per unit effort (CPUE;No./net-night), mean length (in), and mean weight (lb) of fish captured by trap nets in the upper Big Dry Arm of Fort Peck from April 13th to April 30th 2010. N is total number collected and n is number subsampled for length and weight measurements.

Species	N	CPUE	Length	n	Weight	n
Bigmouth buffalo	46	0.2	23.6	14	8.8	11
Black bullhead	12	<0.1	8.8	3	0.3	3
Black crappie	84	0.3	6.0	36	0.1	35
Burbot	4	<0.1	34.1	1	8.1	1
Channel catfish	337	1.2	16.5	72	1.5	72
Cisco	492	1.7	12.4	49	0.5	49
Common carp	326	1.1	16.3	57	2.6	55
Freshwater drum	5	<0.1	17.0	1	2.3	1
Goldeye	463	1.6	13.5	144	0.8	144
Northern pike	525	1.8	30.4	192	7.3	193
Female	224	0.8	33.2	64	9.8	65
Male	269	0.9	29.1	121	6.0	121
Nonproductive	31	0.1	27.6	7	5.4	7
Rainbow trout	3	<0.1	17.7	2	2.1	2
River carpsucker	1,914	6.6	18.1	236	4.4	235
Smallmouth buffalo	1,795	6.2	24.8	86	9.0	86
Sauger	5	<0.1	18.1	4	2.0	4
Shorthead redhorse	145	0.5	18.6	23	2.6	22
Walleye	1,470	5.1	22.2	426	4.9	426
Female	795	2.8	25.1	186	7.0	186
Male	532	1.8	20.2	218	3.3	218
Nonproductive	143	0.5	18.0	22	2.0	22
White sucker	134	0.5	16.4	26	1.9	26
Yellow perch	130	0.4	8.0	55	0.3	55

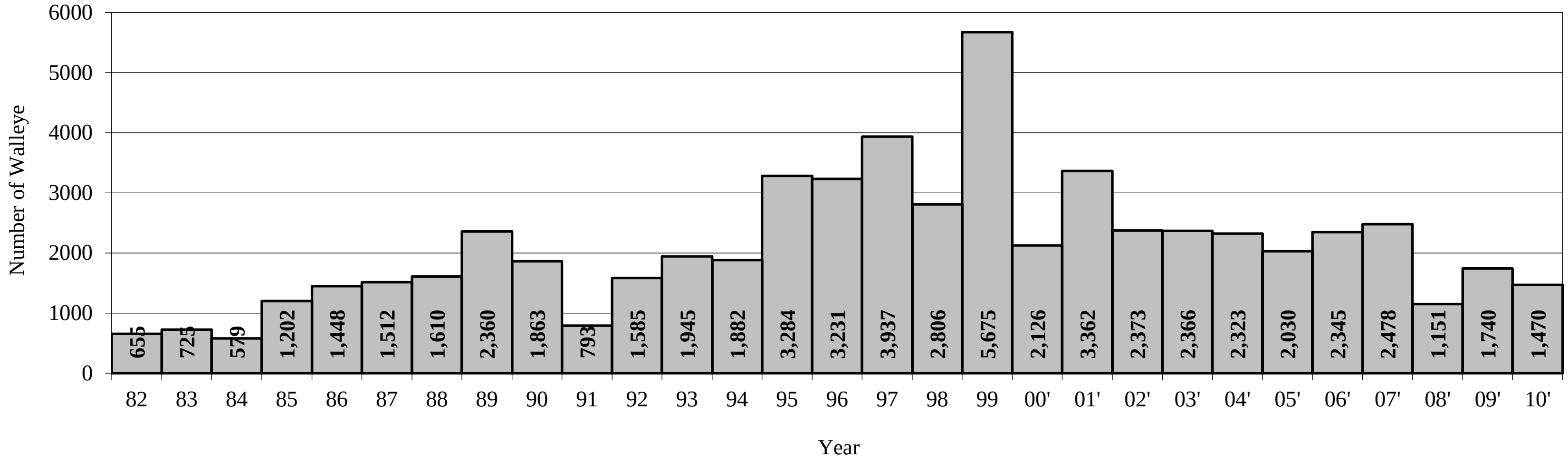


Figure 3. Number of walleye captured during spring trapping in the upper Big Dry Arm of Fort Peck Reservoir from 1982-2010.

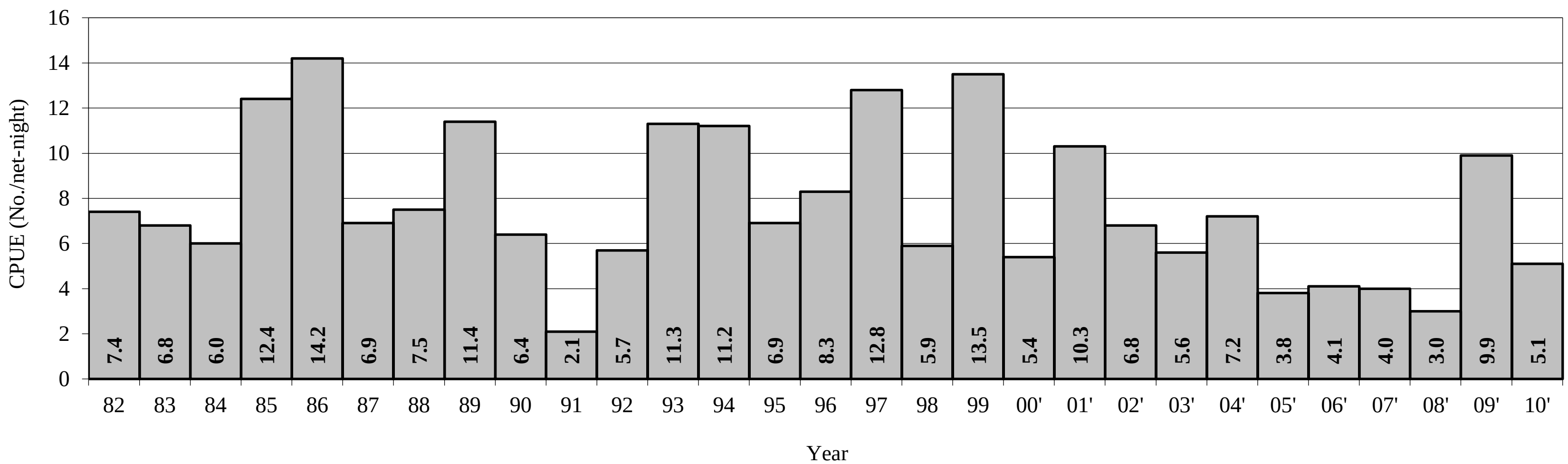


Figure 4. Walleye trap net CPUE during spring tapping in the upper Big Dry Arm of Fort Peck Reservoir from 1982-2010.

Table 3. Summary of mean walleye and northern pike CPUE (No./net-night) captured during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 1982-2010.

Year	Date	Net Nights	Walleye N	Walleye CPUE	Pike N	Pike CPUE
1982	(4/21-5/07)	89	655	7.4	221	2.5
1983	(4/06-5/09)	106	725	6.8	87	0.8
1984	(4/10-5/04)	96	579	6	21	0.2
1985	(4/08-4/26)	97	1,202	12.4	69	0.7
1986	(4/07-4/24)	102	1,448	14.2	174	l.7
1987	(4/07-4/24)	220	1,512	6.9	78	0.3
1988	(4/06-4/22)	214	1,610	7.5	163	0.8
1989	(4/25-5/06)	207	2,360	11.4	383	1.9
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

Table 4. Summary of mean weights (lb) and sex ratios for walleye captured during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 1982-2010.

Year	Male Weight	n	Female Weight	n	Male:Female
1982	1.1	565	3	58	10:1
1983	0.8	644	3.2	37	18:1
1984	0.9	454	2.1	34	13:1
1985	1.3	606	2.5	111	5:1
1986	1.3	851	2.4	216	3:1
1987	1.2	152	2.9	94	2:1
1988	1.7	283	3.7	239	3:1
1989	1.8	192	4.9	129	3:1
1990	2.1	362	5.8	142	2:1
1991	1.8	234	5.3	106	2:1
1992	2.3	229	6.1	522	1:1
1993	2.5	446	6.5	351	1:1
1994	4.2	1,024	7.4	319	2:1
1995	2.5	942	7.9	244	2:1
1996	3.3	690	8.5	280	2:1
1997	2.9	844	7.2	1,157	2:1
1998	2.3	558	4.8	264	2:1
1999	2	525	6	213	2:1
2000	2.4	457	6.3	346	1:1
2001	2.2	491	5.8	85	4:1
2002	1.5	229	7.5	64	2:1
2003	2.8	284	7.1	210	1:1
2004	2.7	639	7.2	96	2:1
2005	1.7	199	7.4	64	1:1
2006	2.5	533	7.5	108	2:1
2007	1.8	253	7	52	2:1
2008	2	232	7.2	105	2:1
2009	2.5	233	8.5	175	1:1
2010	3.3	218	7.0	186	1:1

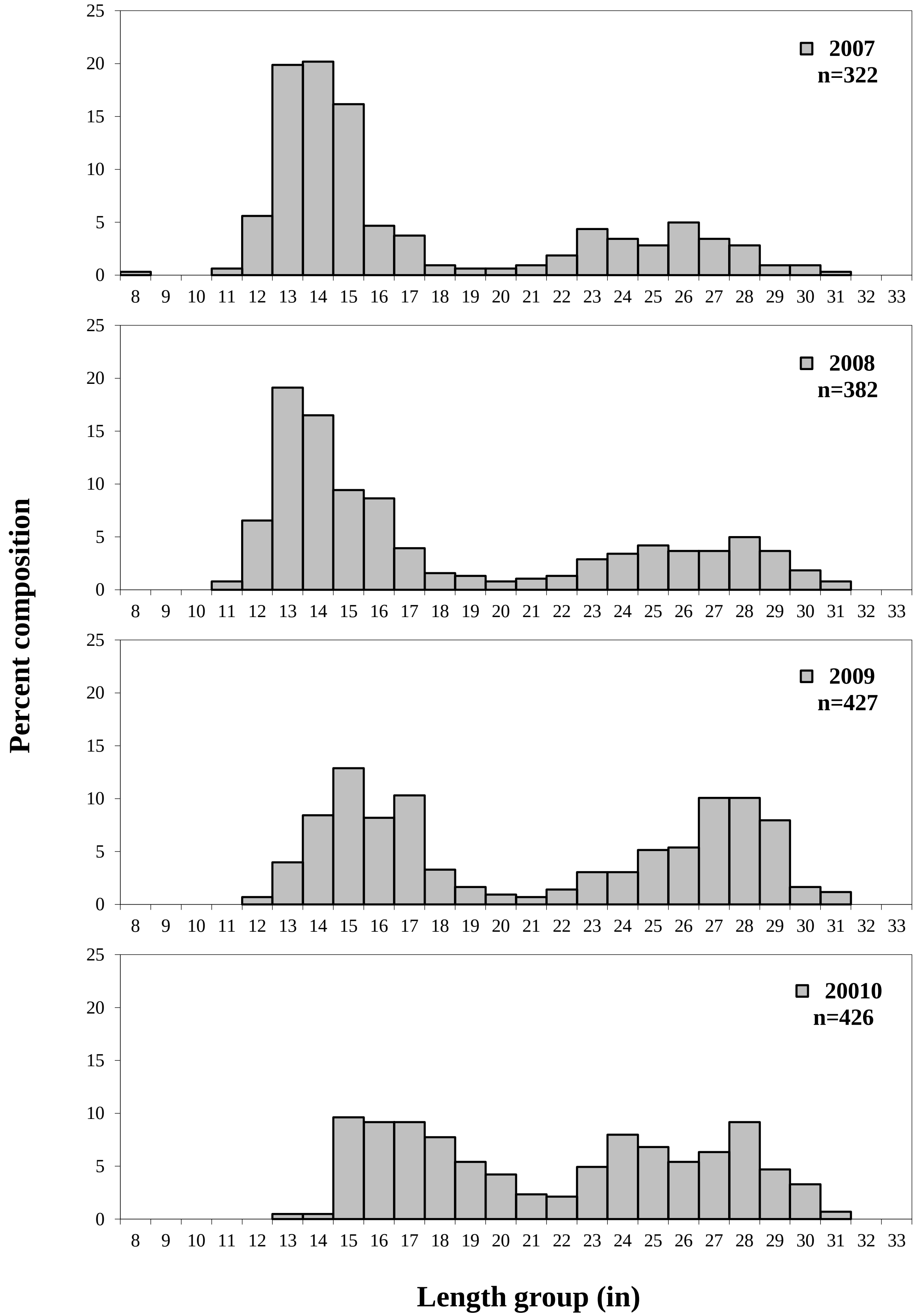


Figure 5. Length frequency of subsampled walleye collected during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 2007-2010.

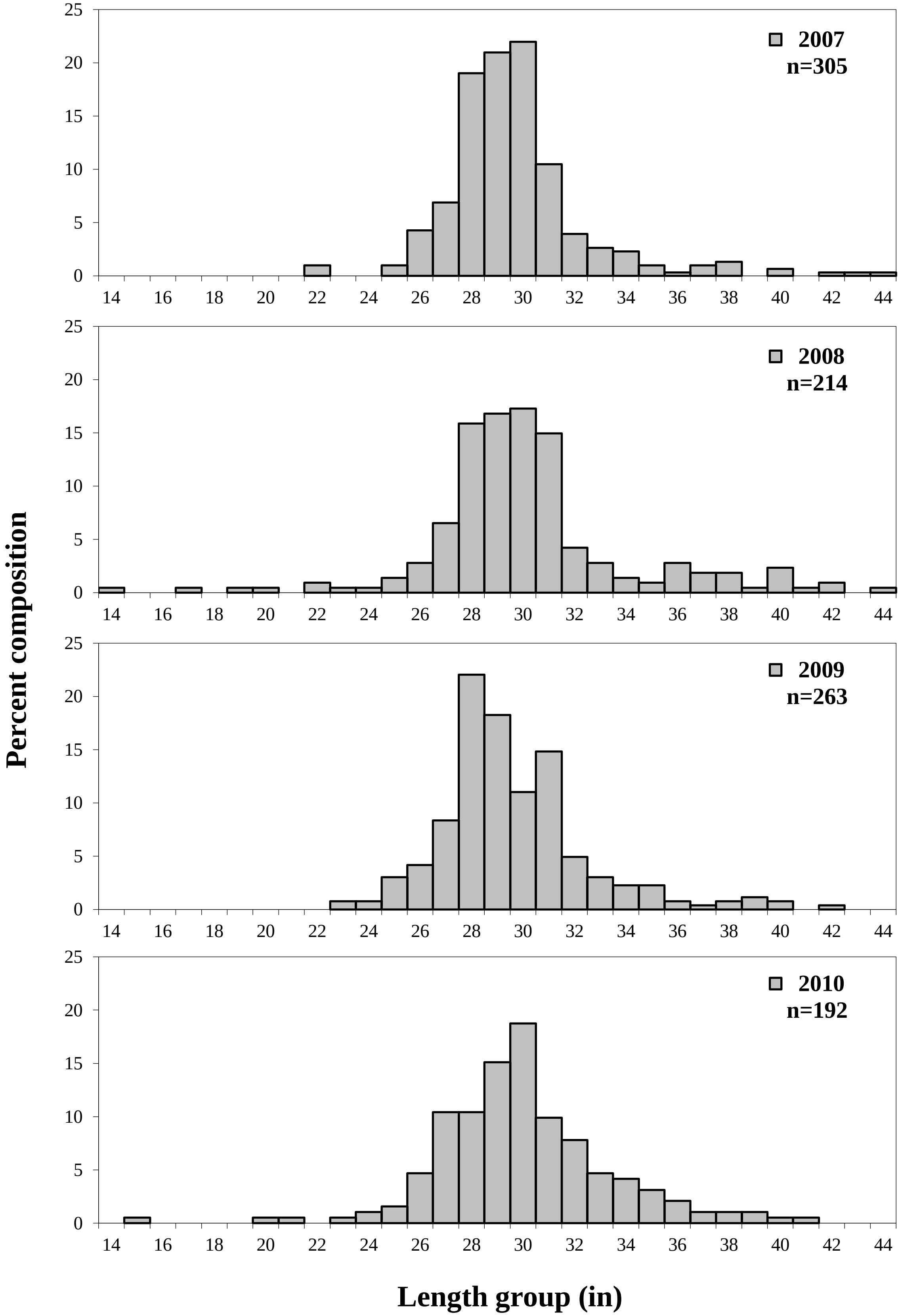


Figure 6. Length frequency of subsampled northern pike collected during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 2007-2010.

WALLEYE AND OTHER WARMWATER SPECIES STOCKING

Based on the Fort Peck Reservoir management plan, a request to increase the amount of walleye fingerling and fry was made for 2010. This was due to more favorable environmental conditions and a surplus amount of eggs. However, due to unseasonably cool conditions, pond production was poor at both Miles City State Fish Hatchery and Fort Peck State Fish Hatchery. As a result, a total of 2.4 million fingerlings and 28.6 million fry were stocked in 2010 (Figures 10, 11). Stocking of fry and fingerling occurred in areas downstream of Snow Creek and in the Dry Arm (Table 6). Miles City State Fish Hatchery (MCSFH) and Fort Peck State Fish Hatchery (FPSFH) produced all the walleye stocked in Fort Peck in 2010. The stocking request of 3+ million fingerlings and 30+ million walleye fry for Fort Peck was not met. The Fort Peck Hatchery and Miles City Hatchery were also able to supplement statewide stocking of walleye in 2010.

Smallmouth bass were not stocked in Fort Peck in 2010. No request for northern pike fingerlings was placed in 2010.

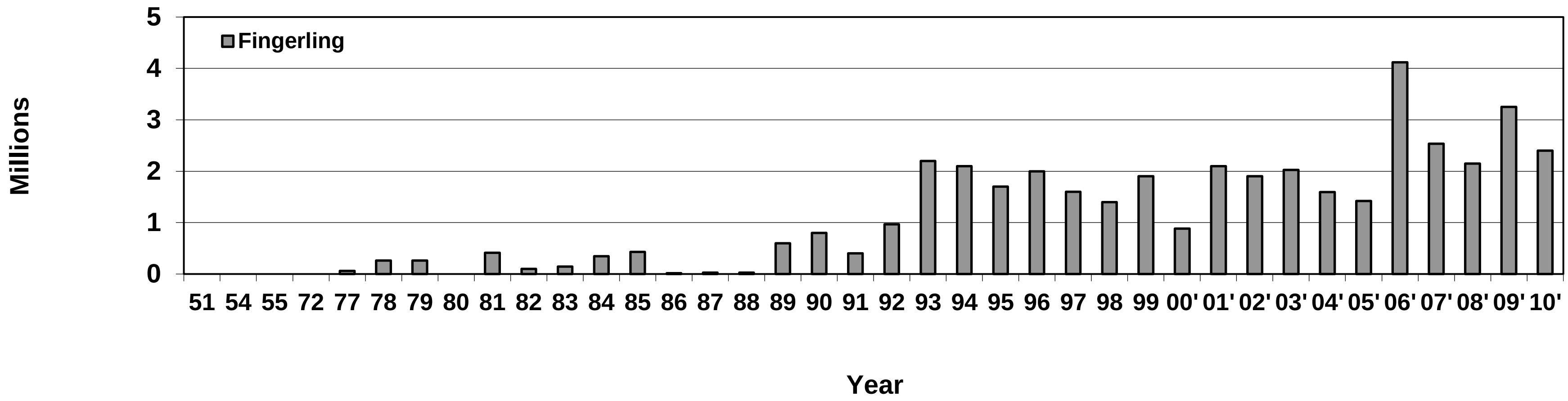


Figure 10. Number of walleye fingerlings stocked in Fort Peck Reservoir from 1951-2010.

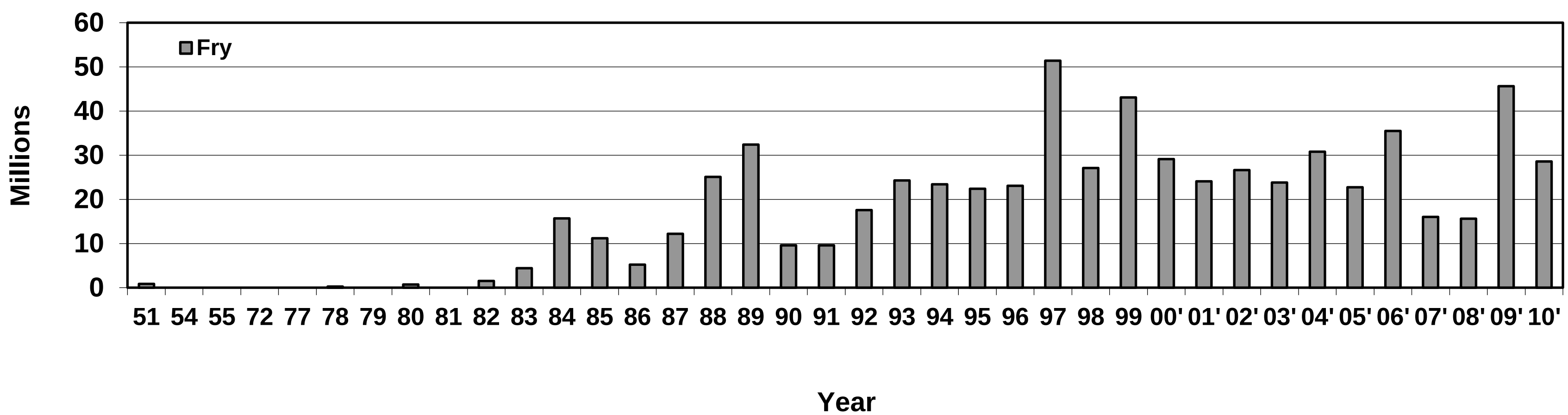


Figure 11. Number of walleye fry stocked in Fort Peck Reservoir from 1951-2010.

Table 6. Number of walleye stocked in Fort Peck Reservoir during 2010 by region, location, and date.

Date	Location	Region[1]	Fry	Fingerling	Hatchery
5/7/2010	Nelson Creek	UBD	1,700,000		Miles City
5/13/2010	Nelson Creek	UBD	2,600,000		Miles City
6/17/2010	Nelson Creek	UBD		82,984	Miles City
6/21/2010	Lone Tree Creek	UBD		39,116	Miles City
6/21/2010	McGuire Creek	UBD		39,116	Miles City
6/21/2010	Lost Creek	UBD		39,116	Miles City
6/21/2010	Bug Creek	UBD		39,117	Miles City
5/11/2010	Rock Creek - St Ramp	LBD	3,300,000		Fort Peck
6/18/2010	Rock Creek	LBD		156,350	Miles City
6/23/2010	Bobcat Creek	LBD		91,286	Fort Peck
6/23/2010	Box Creek	LBD		53,096	Miles City
6/23/2010	Rock Creek/Sand Arroyo	LBD		53,097	Miles City
6/23/2010	Sand Arroyo	LBD		53,000	Miles City
6/24/2010	Box Elder	LBD		40,089	Fort Peck
6/24/2010	Haxby	LBD		40,089	Fort Peck
6/24/2010	Spring Creek	LBD		40,089	Fort Peck
5/10/2010	North Fork Duck Creek	LMA	3,970,048		Fort Peck
5/11/2010	Spillway	LMA	4,800,000		Fort Peck
5/24/2010	Duck Creek	LMA	3,700,000		Fort Peck
6/24/2010	Bear Creek	LMA		40,089	Fort Peck
6/25/2010	Sage Creek	LMA		47,515	Fort Peck
6/25/2010	Youth Camp Bay	LMA		47,514	Fort Peck
6/29/2010	Milk Coulee	LMA		31,688	Miles City
6/30/2010	Third Coulee	LMA		56,458	Fort Peck
6/30/2010	Skunk Coulee	LMA		56,457	Fort Peck
7/1/2010	Marina	LMA		146,461	Fort Peck
7/6/2010	Main Duck	LMA		252,409	Fort Peck
7/7/2010	Face of Dam	LMA		32,117	Fort Peck
7/7/2010	Sturgeon Bay	LMA		32,117	Fort Peck
7/8/2010	Haxby	LMA		37,201	Fort Peck
7/8/2010	Catfish Bay	LMA		37,201	Fort Peck
7/8/2010	Bear Creek	LMA		93,684	Fort Peck
7/8/2010	Milk Coulee	LMA		57,134	Fort Peck
7/29/2010	Marina	LMA		4,986*	Fort Peck
5/5/2010	Hell Creek	MMA	1,200,000		Miles City
5/14/2010	Hell Creek	MMA	1,400,000		Miles City
5/17/2010	Hell Creek	MMA	1,200,000		Miles City
5/21/2010	Pines	MMA	4,784,334		Fort Peck
6/25/2010	Sutherland	MMA		61,658	Miles City
6/25/2010	Duck Coulee	MMA		61,658	Miles City
6/25/2010	Hell Creek	MMA		61,660	Miles City
6/28/2010	Hell Creek	MMA		193,601	Miles City
6/28/2010	Gilbert Creek	MMA		32,994	Fort Peck
6/28/2010	Cattle/Crooked Creek	MMA		32,994	Fort Peck
6/28/2010	Seventh Coulee	MMA		65,989	Fort Peck
7/1/2010	Eigth Coulee	MMA		90,000	Miles City
7/9/2010	Pines	MMA		95,680	Fort Peck
Total			28,654,382	2,435,810	

[1]Upper Big Dry (UBD), Lower Big Dry (LBD), Lower Missouri Arm (LMA), Middle Missouri Arm (MMA).
*Indicates advanced fingerling walleye.

LAKE-WIDE GILL NETTING

Standard experimental gill nets were set in throughout the reservoir from July 13th to August 5th, 2010 when water surface temperatures ranged from 67°F to 77°F. Gill netting provides information on species distribution; composition, relative abundance, population parameters, and game species stomach contents. Eighteen species were captured for a total of 2,349 fish (Table 7). Goldeye, walleye, and shorthead redhorse were the most abundant species captured with catch rates of 5.1, 3.6 and 3.0 per-net night, respectively. Fish with catch rates equal to or greater than 1.0 per-net night include: common carp, freshwater drum, northern pike, river carpsucker, and smallmouth bass. Other less common species in order of declining relative abundance include; yellow perch, white sucker, sauger, cisco, smallmouth buffalo, black crappie, white crappie, paddlefish, and pallid sturgeon.

Walleye

Three hundred sixty-one walleye were captured, measured and weighed during the 2010 lake wide netting series. The lake-wide average catch rate was 3.6 walleye per net, which was has been gradually increasing since 2006 (Figure 12) and has finally met the long term average of 3.6 per net. Relative abundance of walleye was greatest in the middle Missouri arm with a catch rate of 5.0 per net (Table 8, Figure 13). The lowest catch rate of 2.5 walleye per-net was documented in the upper Big Dry arm. The second highest catch rate was observed in the lower Missouri arm at 4.5 walleye per-net followed by the upper Missouri arm and lower Big Dry arm with catch rates of 3.7 and 2.6 walleye per-net, respectively. Once again, capture of substock length walleye was highest in the upper Missouri Arm. No supplemental stocking is conducted in this region suggesting a large amount of natural reproduction takes place in the Missouri River upstream. In addition, when compared to other regions of the reservoir, a greater abundance of shoreline forage seems to be contributing to the survival of these juveniles. Lake-wide length frequencies indicated 13 to 17 inch walleye were the most dominate in the catch with a slight increase in catch rates of quality size walleye in 2010 (Figure 14). It should also be noted that there appears to be a strong group of fish in the 10 inch range suggesting a large year class.

Relative weights continued to increase for both quality and preferred length groups in 2010 while stock and memorable length walleyes were similar to the previous year (Figure 15). Stable to increasing shoreline forage beginning in 2007 contributed to the increase in relative weights for stock and quality length fish as small to medium sized prey became more available. In addition, the large year class of cisco produced in 2009 appears to be benefiting the preferred length walleye because this is the size group which has been shown to feed more effectively on age 1+ cisco (Mullins 1991). However, *Wr* values of memorable length and greater walleye remained similar to the previous year despite the large year class of cisco produced in 2009. It is uncertain what is forcing this trend, but it could be attributed to factors such as reduced abundance of adult cisco due to heavy predation by coldwater predators and/or timing and utilization of young-of-year cisco as a forage item.

Mean walleye lengths-at-capture for 2006-2010 are presented in Table 9. Higher mean lengths of age-2 to through age-7 indicate improved growth of fish collected in 2010. This corresponds with higher *Wr* values observed the last two years for both stock and quality length groups (Figure 15). The strong 2005 year class was apparent once again in 2010 as indicated by the large number of fish aged as five year olds. This age class comprised up to23% of the walleye collected during annual 2010 gill netting survey. Further analysis of age and growth information also revealed a strong group of two year old fish which comprised 28% of the walleye aged in 2010. This correlates to the first year of improved reservoir elevations and an increase in shoreline forage fish relative abundance which have likely resulted in improved growth and survival. In contrast, both numbers and mean lengths of fish greater than age-10 have declined compared to previous years. These decreases in growth were also reflected in *Wr* values of preferred length fish and greater from 2006-2010.

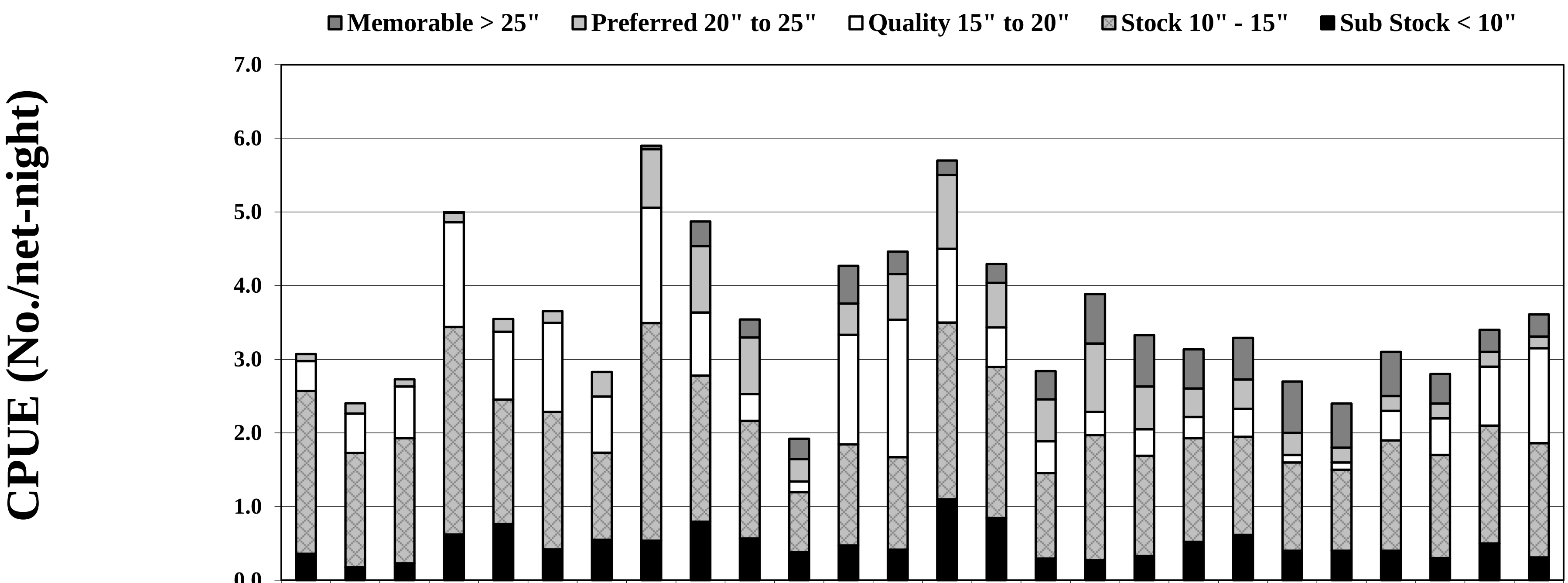
Table 7. Mean CPUE (No./net-night), mean length (in), and mean weight (lb) of fish captured by standard experimental gill nets in Fort Peck Reservoir during, July-August 2010. N is total number collected and n is number subsampled for length and weight measurements.

			Average			
			Length		Weight	
Species	Number	CPUE	Inches	*N*	Pounds	*N*
Black crappie	11	0.1	7.4	11	0.3	11
Channel catfish	104	1.0	18.4	104	2.4	104
Cisco	40	0.4	10.0	40	0.3	40
Common carp	155	1.6	19.9	155	3.6	155
Freshwater drum	164	1.6	13.7	164	1.3	164
Goldeye	514	5.1	12.8	514	0.7	514
Northern pike	191	1.9	23.4	191	3.9	191
Paddlefish	1	<0.1	--	--	--	--
Pallid sturgeon	1	<0.1	16.7	1	0.4	1
River carpsucker	176	1.8	20.4	176	4.4	176
Smallmouth buffalo	30	0.3	25.6	30	9.1	30
Sauger	44	0.4	13.1	44	0.6	44
Shorthead redhorse	298	3.0	14.5	298	1.4	298
Smallmouth bass	133	1.3	11.2	133	1.0	133
Walleye	361	3.6	15.4	361	1.7	361
White crappie	6	0.1	10.2	6	0.6	6
White sucker	48	0.5	15.7	48	1.7	48
Yellow perch	72	0.72	7.7	72	0.2	72

Table 8. Number (N) and mean catch per unit effort (CPUE; No./net-night) of fish species captured by standard experimental gill nets in Fort Peck Reservoir during, July-August 2010.

	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	--	--	--	--	--	--	2	0.1	9	0.5	11	0.1
Channel catfish	37	1.9	12	0.6	6	0.3	14	0.7	35	1.8	104	1.0
Cisco	13	0.7	--	--	20	1.0	1	0.1	6	0.3	40	0.4
Common carp	17	0.9	16	0.8	42	2.1	34	1.7	46	2.3	155	1.6
Freshwater drum	9	0.5	11	0.6	26	1.3	48	2.4	70	3.5	164	1.6
Goldeye	80	4.0	75	3.8	88	4.4	94	4.7	177	8.9	514	5.1
Northern pike	38	1.9	29	1.5	39	2.0	54	2.7	31	1.6	191	1.9
Paddlefish	--	--	--	--	--	--	1	0.1	--	--	1	<0.1
Pallid sturgeon	--	--	--	--	--	--	--	--	1	0.1	1	<0.1
River carpsucker	32	1.6	11	0.6	11	0.6	39	2.0	83	4.2	176	1.8
Smallmouth buffalo	16	0.8	3	0.2	1	0.1	6	0.3	4	0.2	30	0.3
Sauger	1	0.1	7	0.4	12	0.6	11	0.6	13	0.7	44	0.4
Shorthead redhorse	10	0.5	11	0.6	9	0.5	67	3.4	201	10.1	298	3.0
Smallmouth bass	7	0.4	35	1.8	30	1.5	32	1.6	29	1.5	133	1.3
Walleye	49	2.5	52	2.6	86	4.3	100	5.0	74	3.7	361	3.6
White crappie	--	--	--	--	--	--	--	--	6	0.3	6	0.1
White sucker	3	0.2	3	0.2	14	0.7	15	0.8	13	0.7	48	0.5
Yellow perch	13	0.7	2	0.1	14	0.7	22	1.1	21	1.1	72	0.7
Total	325	16.3	267	13.4	398	19.9	540	27.0	819	41.0	2349	23.5

[1]Upper Big Dry (UBD): 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., Sandy Arroyo, Spring Cr.
[3]Lower Missouri Arm (LMA): Spillway Bay, Bear Cr., N.Fork Duck Cr., S. Fork Duck Cr., Main Duck Cr.
[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.



	82	83	84	85	86	87	88	89	92	93	94	95	96	98	99	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'
Memorable > 25"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.3	0.5	0.3	0.2	0.3	0.4	0.7	0.7	0.5	0.6	0.7	0.6	0.6	0.4	0.3	0.3
Preferred 20" to 25"	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.8	0.9	0.8	0.3	0.4	0.6	1.0	0.6	0.6	0.9	0.6	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2
Quality 15" to 20"	0.4	0.5	0.7	1.4	0.9	1.2	0.8	1.6	0.9	0.4	0.1	1.5	1.9	1.0	0.5	0.4	0.3	0.4	0.3	0.4	0.1	0.1	0.4	0.5	0.8	1.3
Stock 10" - 15"	2.2	1.5	1.7	2.8	1.7	1.9	1.2	3.0	2.0	1.6	0.8	1.4	1.3	2.4	2.1	1.2	1.7	1.4	1.4	1.3	1.2	1.1	1.5	1.4	1.6	1.6
Sub Stock < 10"	0.4	0.2	0.2	0.6	0.8	0.4	0.5	0.5	0.8	0.6	0.4	0.5	0.4	1.1	0.8	0.3	0.3	0.3	0.5	0.6	0.4	0.4	0.4	0.3	0.5	0.3

Year

Figure 12. Length structure, in terms of catch per unit effort (CPUE), of walleye collected in the standard experimental gill net survey in Fort Peck Reservoir during, July-August, 1982-2010.

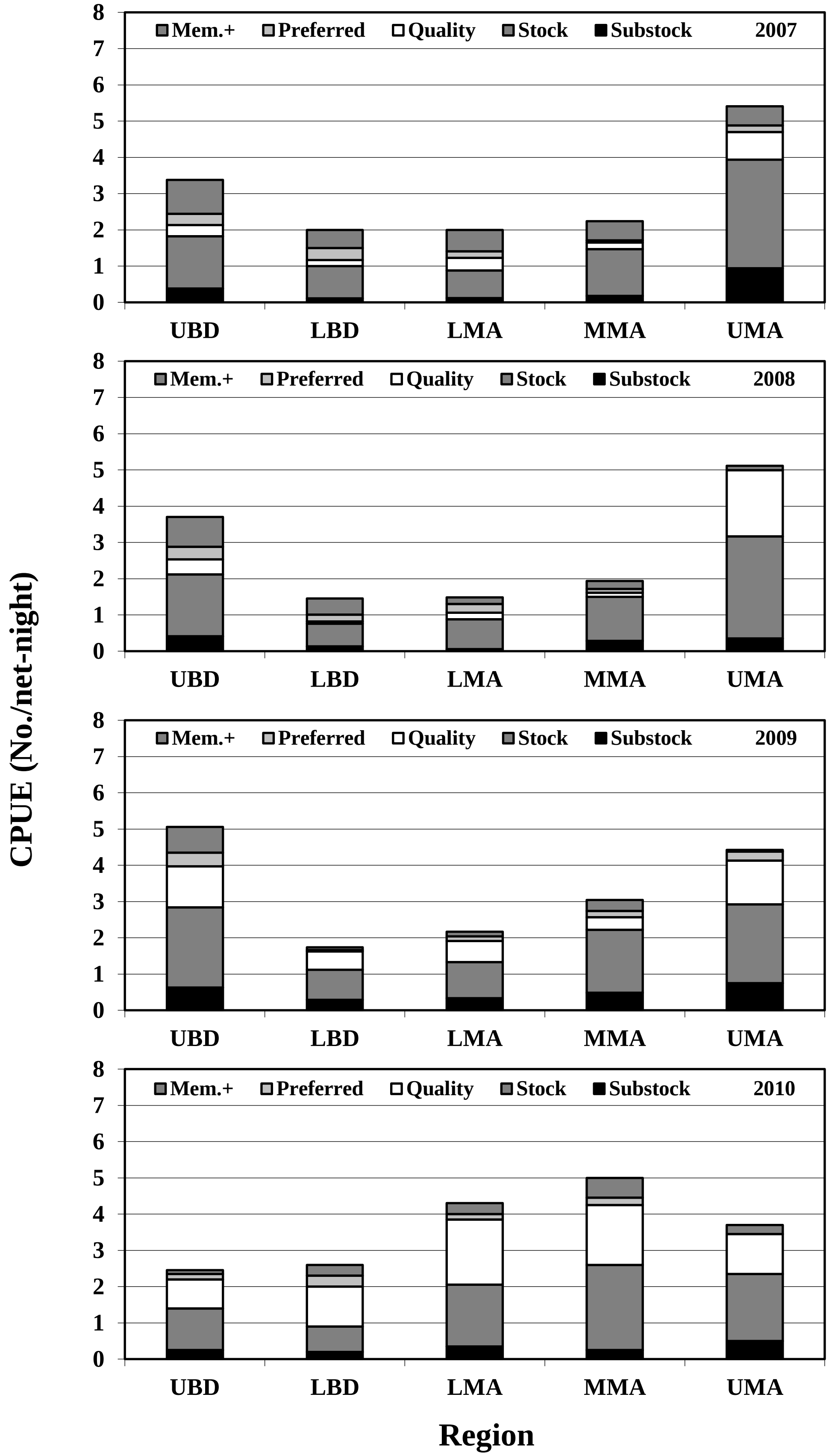


Figure 13. Size structure, in terms of catch per unit effort (CPUE), of walleye collected in standard gill net sets for the upper Big Dry (UBD), lower Big Dry (LBD), lower Missouri Arm (LMA), middle Missouri Arm, (MMA), and upper Missouri Arm (UMA) of Fort Peck Reservoir during July-August, 2007-2010.

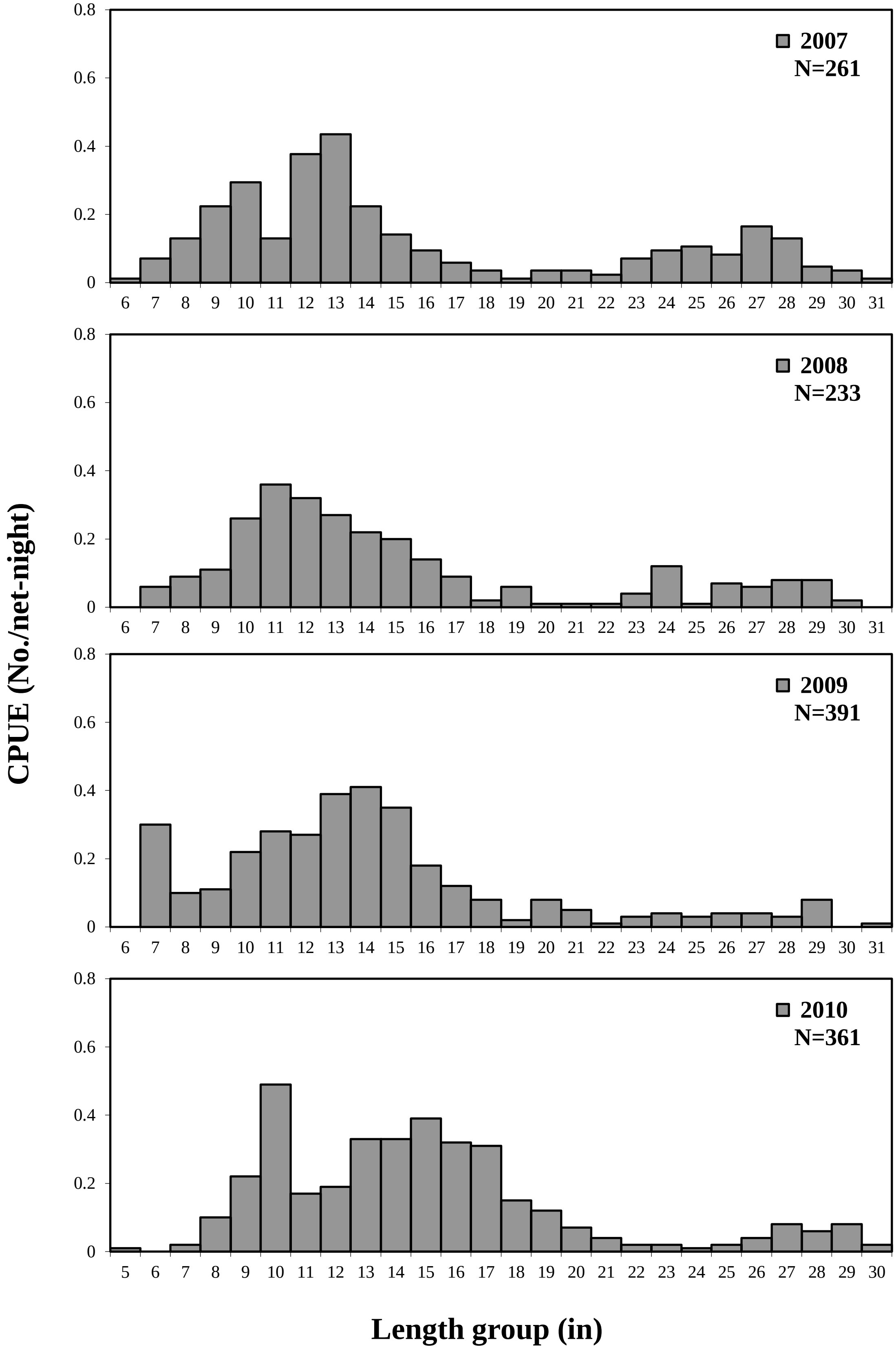
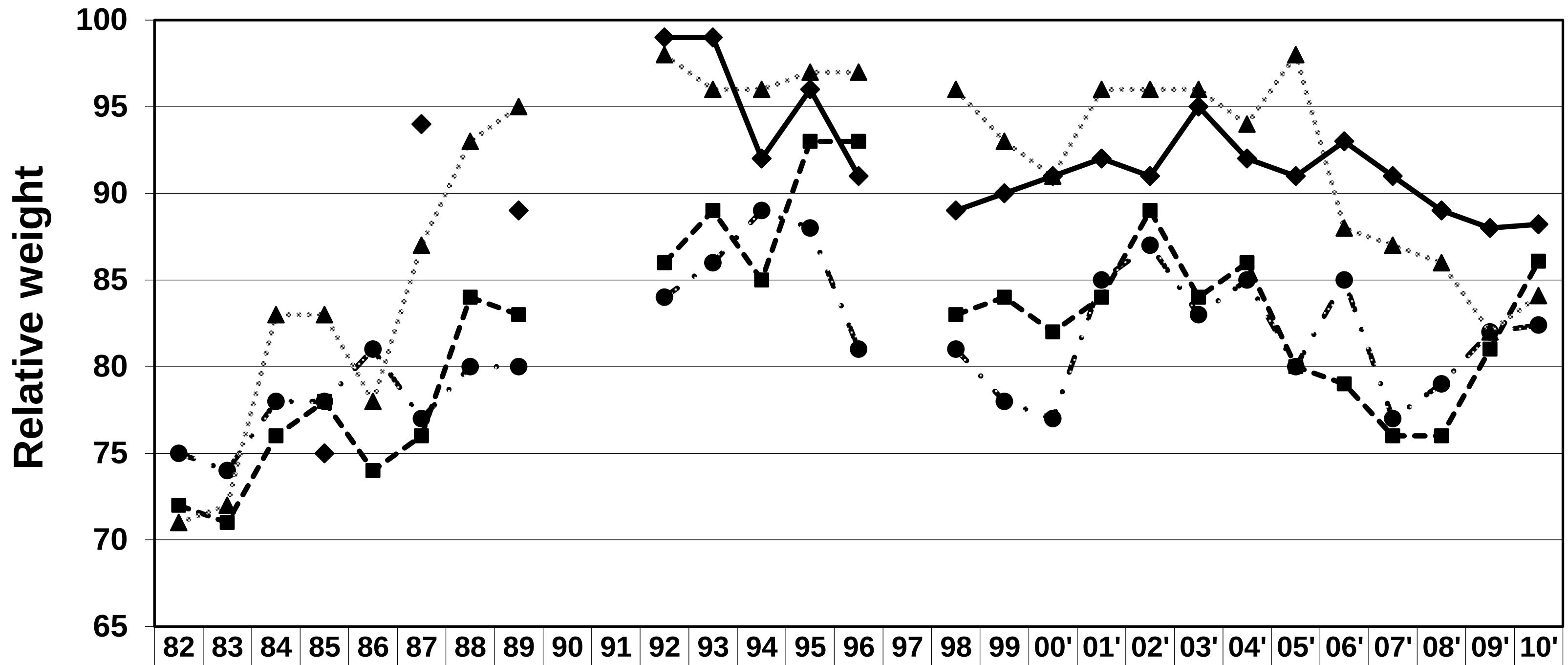


Figure 14. Length frequency, as catch per unit effort, of walleye collected in standard gill net sets in Fort Peck Reservoir during July-August, 2007-2010.



	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'
Stock	75	74	78	78	81	77	80	80			84	86	89	88	81		81	78	77	85	87	83	85	80	85	77	79	82	82
Quality	72	71	76	78	74	76	84	83			86	89	85	93	93		83	84	82	84	89	84	86	80	79	76	76	81	86
Preferred	71	72	83	83	78	87	93	95			98	96	96	97	97		96	93	91	96	96	96	94	98	88	87	86	82	84
Memorable				75		94		89			99	99	92	96	91		89	90	91	92	91	95	92	91	93	91	89	88	88

Figure 15. Relative weights of various length groups of walleye collected in standard gill nets in Fort Peck Reservoir, 1982-2010.

Table 9. Mean length-at-age at time of capture (in) for walleye collected in experimental gill nets, 2006-2010, 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
2006	Mean	7.9	9.9	11.2	12.6	12.5	14.3	12.7	26.5	20.7	22.7	26.9	26.7	28.2	25
	N	30	10	24	32	17	8	2	1	12	4	4	11	2	2
	SE	0.1	0.3	0.2	0.2	0.3	0.3	1.1	--	1.2	2.6	1.3	0.5	1.6	2
	Range	6.7-9.5	8.9-11.6	8.2-13.3	10.4-17.3	10.2-14.5	13.1-15.7	11.6-13.8	--	14.6-26.7	15.0-26.8	23.4-29.3	24.0-29.0	26.6-29.8	23.0-27.0
2007	Mean	8	9.9	12.1	13.1	14	15.7	15.6	13.5	20.9	20.3	24.4	27.5	27.4	27.5
	N	7	55	19	37	36	19	6	2	2	11	6	5	8	2
	SE	0.3	0.1	0.3	0.2	0.2	0.5	0.8	0.7	6.6	1.4	1.5	0.9	0.9	1.1
	Range	6.9-9.1	7.7-12.8	10.0-13.9	11.5-15.2	12.0-17.0	11.7-20.8	13.8-18.4	12.8-14.2	14.3-27.6	13.3-26.6	17.1-27.2	24.5-29.7	23.5-31.2	26.3-28.6
2008	Mean	8.1	10.6	11.9	13	14.3	14.9	17.5	15.8	16.4	19.5	23.9	24.2	25.6	26.3
	N	12	31	57	14	15	21	23	8	3	2	5	4	2	2
	SE	0.2	0.2	0.2	0.3	0.5	0.3	0.6	0.7	0.8	4.9	2.2	1.5	3	1.8
	Range	7.9-9.3	8.0-12.3	9.1-15.4	11.4-14.6	9.5-19.4	12.1-18.0	13.8-24.8	13.1-19.7	14.9-17.3	14.6-24.4	15.4-28.3	20.3-27.4	22.5-28.6	24.5-28.1
2009	Mean	7.8	10.8	12.7	14.5	15.1	16.2	17.3	17.8	19.5	15.7	23	15.6	26.7	26.4
	N	47	57	49	100	16	20	27	14	6	1	1	1	4	4
	SE	0.1	0.2	0.2	0.1	0.4	0.4	0.5	0.7	1.4	--	--	--	1.9	1
	Range	7.0-9.3	7.8-14.0	10.5-15.7	11.7-18.3	13.0-18.3	13.8-21.2	13.4-22.3	14.0-21.6	14.6-23.3	--	--	--	21.5-29.5	24.2-29.0
2010	Mean	7.4	10.3	13.3	14.9	16.1	16.5	17.8	19.1	18.7	23.6	--	--	27.8	26.3
	N	2	95	40	50	79	12	18	15	5	2	--	--	1	1
	SE	1.5	0.1	0.2	0.2	0.2	0.6	0.6	0.6	1.4	3.1	--	--	--	--
	Range	5.9-8.2	7.6-15.0	7.6-15.1	10.4-19.4	11.0-22.5	14.4-21.3	13.3-22.9	14.4-23.2	14.0-23.1	20.5-26.8	--	--	--	--
Mean of means		7.8	10.3	12.2	13.6	14.4	15.5	16.2	18.5	19.2	20.4	24.5	23.5	27.1	26.3

Walleye (continued)

Proportional stock density (PSD) and relative stock density-preferred (RSD-P) are measures of balance for fish populations (Gabelhouse 1984). The measures are percents of fish captured at substock (<10"), and numbers of fish of each size and larger for stock (> 10"), quality (>15"), preferred (>20"), and memorable (>25") size fish. Changes in value in each group can be from increases or decreases in recruitment and natural or fishing mortality. Anderson and Weithman (1978) models of walleye PSD's suggest a range of 30-60 as favorable values for walleye populations. Since 1987, Fort Peck would have fallen into the favorable category, with the exception of 1995 and 1996. The favorable trend resumed in 1998 and continued into 2010 with a value of 53. RSD-P was 13 indicating a greater abundance of stock and quality size walleye, needed for recruitment into the fishery. High values of RSD-P indicate an abundance of larger fish with a small stock size available (Table 10). A ratio between 10 and 20 is considered desirable as a RSD-P for a balanced population. The young to adult ratio (YAR) decreased from to 18 in 2009 to 9 in 2010. A ratio of 20 to 30 would be considered good for YAR. Since 2006, walleye recruitment has improved for the fish less than 10 inches as indicated by the number of stock length fish from 2007 to 2009.

Northern Pike

Since 2005, northern pike catch rates have continued to gradually increase as a result of limited natural reproduction following several consecutive years of drought conditions (Figure 17). One hundred ninety-one northern pike were captured in 2010 for a catch rate of 1.9 per net-night which up slightly from the previous year (Table 11). Average length and weight in 2009 was 23.4 inches and 43.9 pounds, which decreased from 2009 as a result of smaller individuals recruiting into the population. The highest length and weight averages were measured in 2002 at 29.5 inches and 7.2 pounds as a result of fewer, smaller individuals recruiting into the population. In 2010, 62% of the northern pike captured were less than 25 inches further indicating improved recruitment. This is an improvement from 2005-2006 when gill net catches contained less than 20% of the pike less than 25 inches (Figure 18). Overall relative weights increased from 93 in 2009 to 100 in 2010.

Northern pike PSD and RSD-P were 73 and 39, respectively in 2009. In 2010, northern pike PSD was 68 and RSD-P was 24 indicating improved recruitment. In the previous several years, PSD ranged from 89 to 98 and RSD-P ranged from 55-71 indicating a population comprised of larger and older individuals. With increasing water levels over the last two years, terrestrial vegetation has become submerged throughout the reservoir. As a result, relative abundance of substock and stock sized northern pike has continued to increase as well.

Channel Catfish

A total of 104 channel catfish were captured in 2010 by gill netting, for a catch rate of 1.0-per net. This was down from 2009 but still higher than the 24-year average of 1.9 per net (Figure 19). The decrease in relative abundance could be explained by the upstream movement where more riverine habitat is available. Relative abundance was higher during the drought conditions experienced from 2001 to 2008. North Dakota fisheries personnel have observed a similar trend in Lake Sakakawea (Dave Fryda, personal communication. Average length increased to an all time high from 16.8 to 18.4 inches and average weight increased from 1.9 to 2.4 pounds in 2010 (Table 12). Catch rates continue to be highest in the riverine portions of the Upper Missouri Arm at 1.8 and Upper Big Dry at 1.9 per net (Table 8). Catch rates were lower in the other regions ranging from 0.3 to 0.7 per net. Relative weights decreased from the previous year at 88. Catfish PSD and RSD-P was 74 and 11, respectively, indicating a population comprised of good numbers of larger fish.

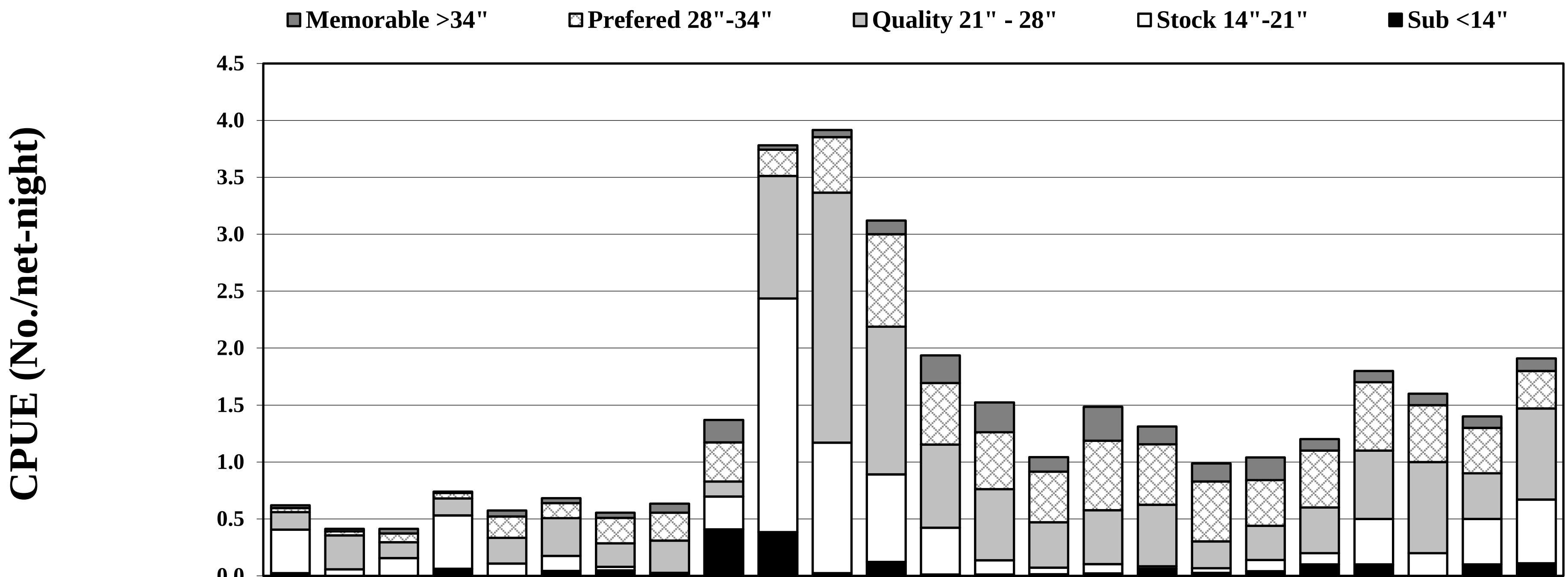
Table 10. Summary of mean catch per unit of effort (CPUE; No./net-night), mean length (in), mean weight (lb), mean *Wr*, and stock density indices of walleye captured in standard experimental gill nets statistics on Fort Peck Reservoir, 1983-2010 (no data for 1990-1991 and 1997).

Year	No. walleye	No. nets	CPUE	Length	Weight	*Wr*	Substock[1]	Stock[2]	Quality[3]	Preferred[4]	PSD[5]	RSD-P[6]	YAR[7]
1984	279	85	3.3	13.9	0.9	78	20	216	68	6	31	3	9
1985	417	87	4.8	13.8	0.9	79	37	380	136	12	36	3	10
1986	176	51	3.5	13.4	0.9	79	37	139	53	9	38	7	27
1987	277	81	3.4	14.3	1.1	81	25	252	110	13	44	5	10
1988	207	75	2.8	14.3	1.2	83	36	171	82	21	48	15	21
1989	404	69	5.9	14.8	1.3	83	36	367	166	58	45	16	10
1992	297	63	4.7	15.8	2	88	39	257	132	78	51	30	15
1993	258	74	3.5	15.3	2	91	38	219	101	75	46	34	17
1994	139	76	1.8	15.9	2.4	92	23	116	54	43	47	37	20
1995	330	78	4.2	16.6	2.4	91	34	295	189	73	64	25	12
1996	361	82	4.4	16.5	2.1	89	31	327	228	75	70	23	9
1998	418	74	5.6	14.8	1.6	86	79	339	159	89	47	26	23
1999	329	78	4.2	14.4	1.5	90	63	266	108	67	41	25	24
2000	250	88	2.8	16.6	2.3	83	26	224	122	84	54	38	12
2001	272	70	3.9	17.4	2.8	88	19	253	134	112	53	44	8
2002	324	97	3.3	17.4	2.8	90	32	291	159	124	55	43	11
2003	301	96	3.1	17.3	2.8	88	38	263	156	105	59	40	14
2004	250	76	3.3	15.9	2.3	88	47	203	102	73	50	36	23
2005	227	84	2.7	16.3	2.6	85	37	190	88	78	46	41	19
2006	207	85	2.4	16.2	2.6	87	38	168	78	66	46	39	23
2007	261	85	3.1	16.2	2.3	81	36	225	100	70	44	31	16
2008	234	85	2.8	15.5	1.9	81	21	212	89	45	42	21	10
2009	393	119	3.3	14.6	1.4	83	59	332	143	53	43	16	18
2010	361	100	3.6	15.4	1.7	84	31	330	175	46	53	13	9

[1]Substock is the sum of all walleye less than 10inches, [2]Stock is the sum of all walleye greater than 10 inches, [3]Quality is the sum of all walleye greater than 15 inches, [4]Prefered is the sum of all walleye greater than 20 inches, [5]PSD is the proportional stock density (Quality/Stock), [6]RSD-P is the relative stock density, preferred (Preferred/Stock), [7]YAR is the ratio of young to adults (Substock/Stock).

Table 11. Summary of mean catch per unit of effort (CPUE; No./net-night), mean length (in), mean weight (lb), and mean *Wr* of northern pike captured in standard experimental gill nets on Fort Peck Reservoir, during July-August, 1984-2010.

Year	N	CPUE	Length	Weight	*Wr*
1984	52	0.6	20.8	2.4	94
1985	36	0.4	24.1	3.5	97.8
1986	21	0.4	23.7	3.6	94.3
1987	60	0.7	19.7	2.3	106.7
1988	43	0.6	26.4	5.3	107
1989	47	0.7	24.4	4.5	110.2
1992	35	0.6	26.6	5.5	112.3
1993	47	0.6	28.3	6.4	113.9
1994	104	1.4	22.6	4.4	107.3
1995	295	3.8	20.1	2.5	114.6
1996	321	3.9	23.3	3.7	112.8
1998	231	3.1	24.7	4.3	104.6
1999	151	1.9	26.5	5.1	103.2
2000	134	1.5	28	6	106.5
2001	73	1	28.6	6.5	110.6
2002	144	1.5	29.5	7.2	102
2003	126	1.3	28.1	6.2	101.1
2004	75	1	29.1	6.7	100.1
2005	86	1	28.4	6.5	100.3
2006	108	1.3	26.1	5.2	98.9
2007	147	1.7	24.8	4.6	101
2008	137	1.6	26.6	5.2	100
2009	176	1.5	24.5	4.3	93.1
2010	191	1.9	23.4	3.9	100



	84	85	86	87	88	89	92	93	94	95	96	98	99	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'
Memorable >34"	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.1	0.1	0.2	0.3	0.1	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Prefered 28"-34"	0.0	0.0	0.1	0.0	0.2	0.1	0.2	0.2	0.3	0.2	0.5	0.8	0.5	0.5	0.4	0.6	0.5	0.5	0.4	0.5	0.6	0.5	0.4	0.3
Quality 21" - 28"	0.2	0.3	0.1	0.1	0.2	0.3	0.2	0.3	0.1	1.1	2.2	1.3	0.7	0.6	0.4	0.5	0.5	0.2	0.3	0.4	0.6	0.8	0.4	0.8
Stock 14"-21"	0.4	0.1	0.2	0.5	0.1	0.1	0.0	0.0	0.3	2.1	1.1	0.8	0.4	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.4	0.2	0.4	0.6
Sub <14"	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.04	0.1	0.1	0	0.1	0.1

Year

Figure 17. Size structure, in terms of catch per unit effort (CPUE), of northern pike collected in the standard experimental gill net survey in Fort Peck Reservoir during, July-August, 1984-2010.

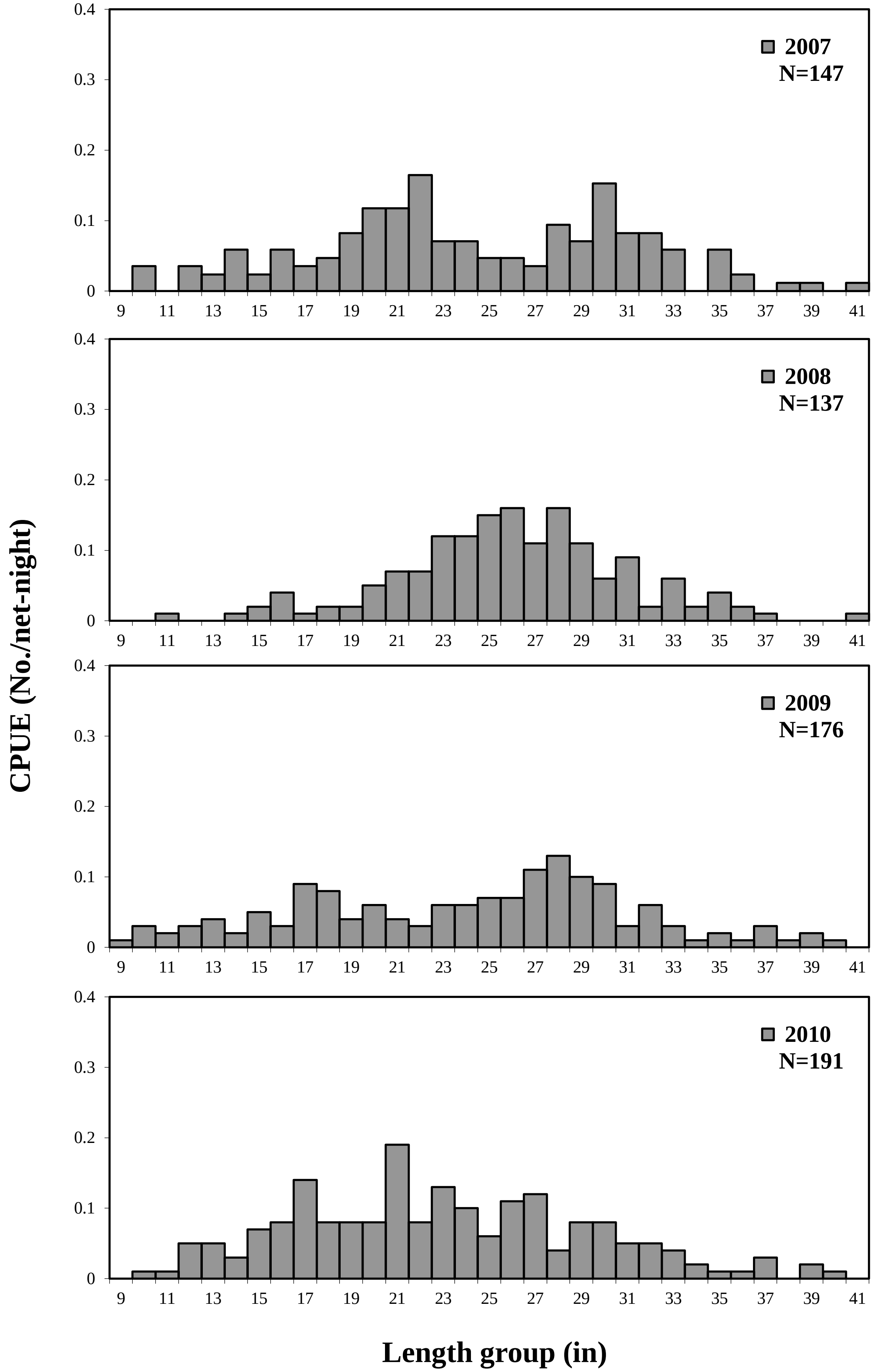
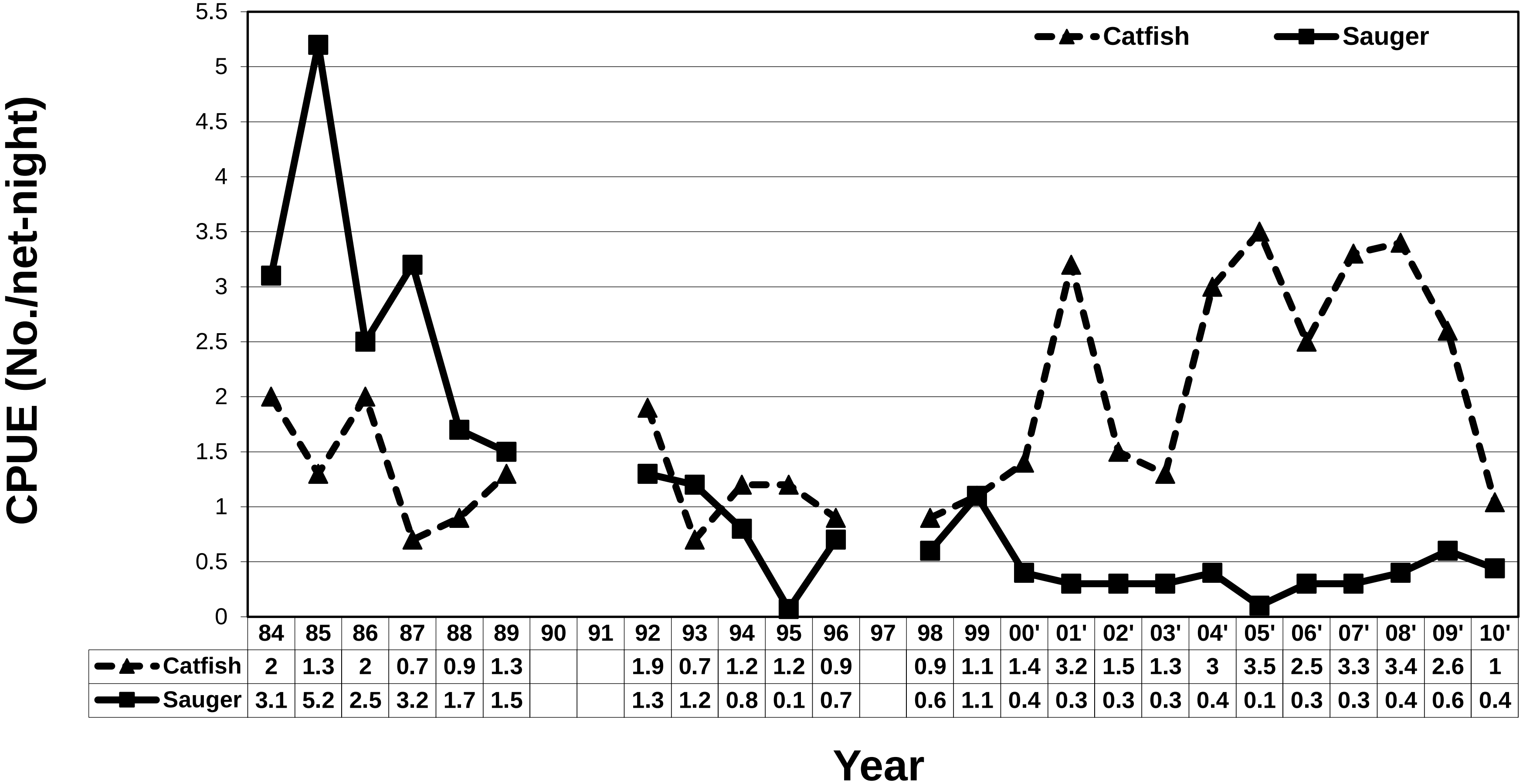


Figure 18. Length frequency, as catch per unit effort (CPUE), of northern pike collected in standard gill-net sets in Fort Peck Reservoir during July-August, 2006-2010.



	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'
Catfish	2	1.3	2	0.7	0.9	1.3			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
Sauger	3.1	5.2	2.5	3.2	1.7	1.5			1.3	1.2	0.8	0.1	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

Figure 19. Relative abundance of channel catfish and sauger collected in the standard gill net surveys in Fort Peck Reservoir, 1984-2010.

Table 12. Summary of mean catch per unit of effort (CPUE; No./net-night), mean length (in), mean weight (lb), and mean *Wr* of channel catfish captured in standard experimental gill nets on Fort Peck Reservoir, 1984-2010.

Year	N	CPUE	Length	Weight
1984	167	2.0	14.2	0.9
1985	115	1.3	14.5	1.1
1986	105	2.0	14.6	1.1
1987	53	0.7	15.3	1.2
1988	69	0.9	15.9	1.7
1989	99	1.4	16.5	1.5
1992	165	2.6	15	1.4
1993	68	0.9	14.9	1.4
1994	119	1.6	14.4	1.1
1995	123	1.6	16.3	1.6
1996	93	1.1	15.6	1.4
1998	91	1.2	18	2.3
1999	88	1.1	17.2	2.0
2000	122	1.4	17.5	2.0
2001	222	3.2	17.6	2.1
2002	145	1.5	18	2.1
2003	129	1.3	17.6	2.1
2004	227	3.0	15.7	1.8
2005	297	3.5	14.3	1.3
2006	215	2.5	15.1	1.4
2007	278	3.3	15.3	1.3
2008	289	3.4	14.2	1.1
2009	314	2.6	16.8	1.9
2010	104	1.0	18.4	2.4

Sauger

Sauger numbers have declined in Fort Peck Reservoir since 1985 and have remained low since this point in time (Figure 19). To date, there is no known cause for this large decline in relative abundance. The 2010 catch rate was 0.4 fish per net, which has been on a slight increase from 0.1 fish per net in 2005. Average size of sauger in 2010 was 13.1 inches and 0.6 pounds with a relative weight of 71. This population relies on natural reproduction from the Missouri River where more suitable spawning habitat is available (Bellgraph et al. 2008). Catch rates for sauger where similar in the lower, middle, and upper Missouri Arm (Table 8).

STOMACH CONTENTS OF GILL NETTED GAME FISH

Stomach contents of deceased walleye, northern pike, sauger, and smallmouth bass captured in experimental gill nets from July 13th to August 5th were examined for the presence of forage items. Walleye had the most diverse diet followed closely by pike (Table 13). Invertebrates were the most commonly identified items found in walleye, sauger, and smallmouth bass at 15.7%, 24.4%, and 22.2%. Cisco were the most commonly identified fish found in northern pike at 19.1%. As usual, empty stomach contents comprised a large portion of the walleye, northern pike, sauger, and smallmouth bass stomachs, which is sometimes attributed to purging of the stomach during stress.

Table 13. Percent frequency of occurrence for various forage items found in stomach contents of walleye, northern pike, sauger, and smallmouth bass captured in experimental gill nets in 2010. Sample size is given in parentheses.

Forage items	Walleye (338)	Northern pike (183)	Sauger (41)	Smallmouth bass (72)
Chinook salmon	--	1.1%	--	--
Cisco	4.4%	19.1%	--	2.8%
Crayfish	--	1.1%	--	5.6%
Empty	56.2%	69.4%	56.1%	51.4%
Freshwater drum	0.3%	--	--	--
Invertebrates	15.7%	1.1%	24.4%	22.2%
Northern pike	0.3%	--	--	--
Pomoxis spp.	0.3%	--	--	--
Smallmouth buffalo	0.9%	--	--	--
Smallmouth bass	0.6%	--	--	--
Unknown	21.3%	3.3%	17.1%	18.1%
Walleye	--	0.5%	--	--
Yellow perch	--	4.4%	2.4%	--

BEACH SEINING

Shoreline beach seining was conducted to determine reproductive success of age-0 game and non-game fish from August 2nd to August 14th, 2010. Seine hauls at 100 locations throughout the reservoir captured 20 species of young-of-year and forage fish for a total of 40,787 fish in 2010 (Table 15). Relative abundance of shoreline forage typically follows changes in reservoir elevations (Figure 21). In 2010, reservoir elevations increased slowly during April but jumped quickly beginning at the end of May (Figure 20). This slight delay in the early spring rise likely led to limited northern pike production as indicated by seine hauls in 2010. In contrast, spottail shiners and young-of-year crappie, which spawned later in the year, had higher abundances in seine hauls suggesting they benefited more from delayed spring rise.

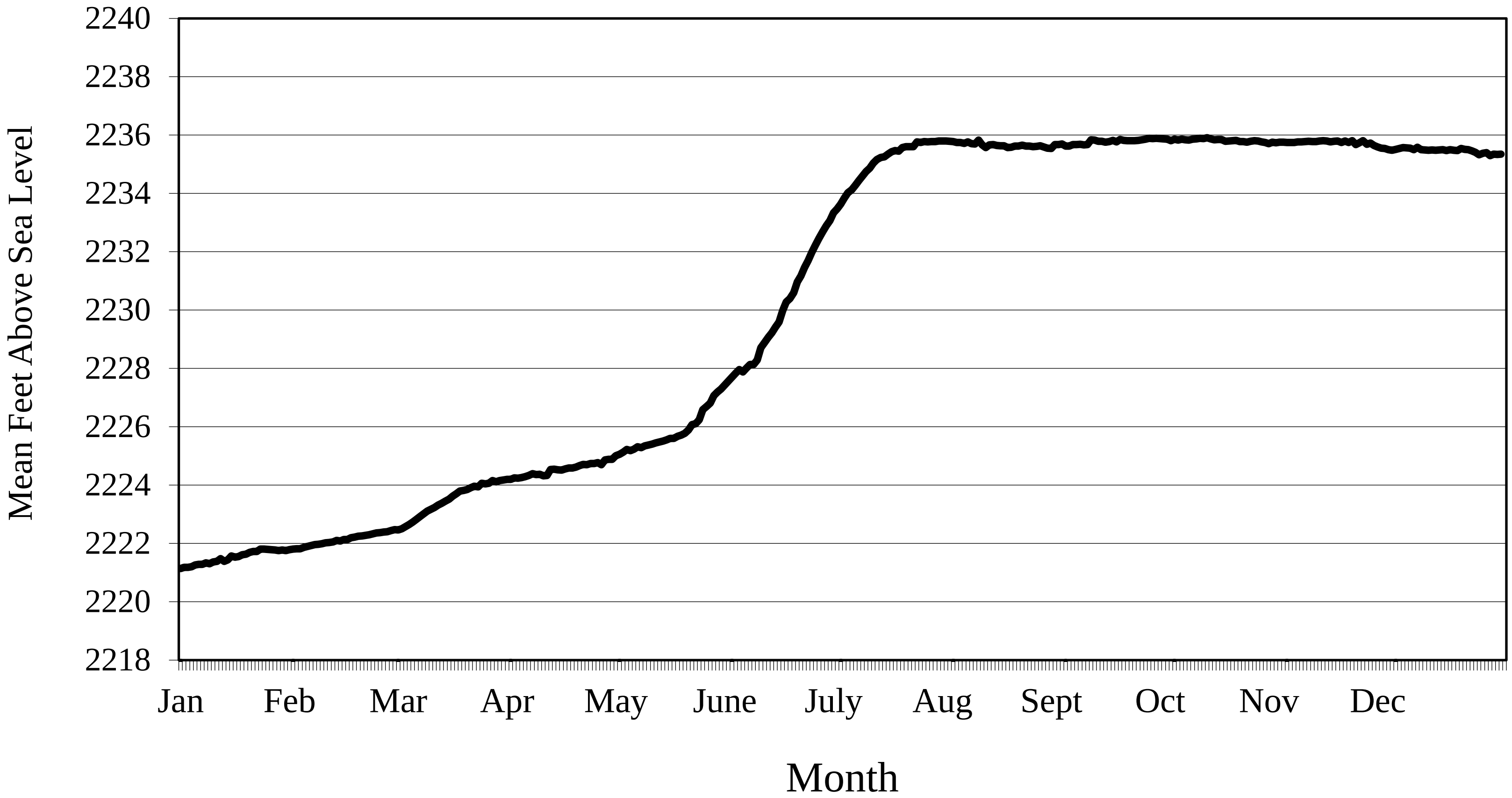


Figure 20. Daily average elevation from January 1, 2010 to December 31, 2010 (data provided by USACE).

Table 15. Number (N) and mean catch per unit effort (CPUE; No./haul) for fish species captured by seine hauls in Fort Peck Reservoir during, August 2010. 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
Bigmouth buffalo	1	0.1	59	3.0	27	1.4	1	0.1	1	0.1	89	0.9
Black Bullhead	--	--	904	45.2	--	--	--	--	--	--	904	9.0
Brassy minnow*	2	0.1	--	--	--	--	--	--	--	--	2	<0.1
Channel Catfish	1	0.1	--	--	--	--	--	--	--	--	1	<0.1
Common carp	23	1.2	--	--	0	0.0	4	0.2	1	0.1	28	0.3
Crappie	540	27.0	409	20.5	974	48.7	3,705	185.3	8,799	440.0	14,427	144.3
Creek chub*	3	0.2	--	--	--	--	--	--	--	--	3	<0.1
Emerald shiner*	4	0.2	3	0.2	3	0.2	41	2.1	167	8.4	218	2.2
Fathead minnow*	2	0.1	14	0.7	--	--	1	0.1	1	0.1	18	0.2
Freshwater drum	8	0.4	--	--	--	--	--	--	--	--	8	0.1
Goldeye	--	--	--	--	--	--	--	--	40	2.0	40	0.4
Hybognathus spp.*	7	0.4	--	--	--	--	--	--	1	0.1	8	0.1
Northern pike	6	0.3	16	0.8	14	0.7	4	0.2	3	0.2	43	0.4
River carpsucker	1	0.1	--	--	--	--	--	--	3	0.2	4	<0.1
Smallmouth buffalo	12	0.6	--	--	4	0.2	13	0.7	48	2.4	77	0.8
Smallmouth bass	21	1.1	17	0.9	22	1.1	26	1.3	53	2.7	139	1.4
Spottail shiner*	1690	84.5	6,024	301.2	4,597	229.9	5,430	271.5	695	34.8	18,436	184.4
Walleye	1	0.1	6	0.3	1	0.1	1	0.1	3	0.2	12	0.1
White sucker	1	0.1	2	0.1	2	0.1	--	--	--	--	5	0.1
Yellow perch	984	49.2	262	13.1	1,057	52.9	1,463	73.2	2,559	128.0	6,325	63.3
Total	3,307	165.4	7,716	385.8	6,701	335.1	10,689	534.5	12,374	618.7	40,787	407.9

*Includes all ages.
[1]Upper Big Dry (UBD): 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., Sandy 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.

Walleye

Relative abundance of young-of-year walleye in 2010 was similar to 2009 which was still at some their lowest levels over the 27-year sampling period (Figure 22). A total of 12 walleye fingerlings were caught with a catch rate of 0.1 per seine reservoir wide. However, with an increase in abundance of shoreline forage and inundated shoreline vegetation, it is possible a good year class of walleye could still be produced. In 2010, walleye fingerlings were captured in all five regions of the reservoir. The highest catch rate was in the lower Big Dry arm with a catch rate 0.3 per haul (Table 15). In previous years, the upper Missouri arm contained the highest catch rates. It is likely there was no difference in catch rates between regions because of the low sample sizes. The Missouri River above Fort Peck Reservoir has been shown to support walleye spawning activity (Billington et al. 2005; Bellgraph et al. 2008). In addition, no walleye fry or fingerlings are released in this area suggesting all fingerlings captured were a product of natural reproduction because dispersal of young-of-year walleye has been shown to be limited 2 to 3 months after release (Paragamian and Kingery 1992). Pyloric caecums were counted to identify *Sander spp.* in question.

Sauger

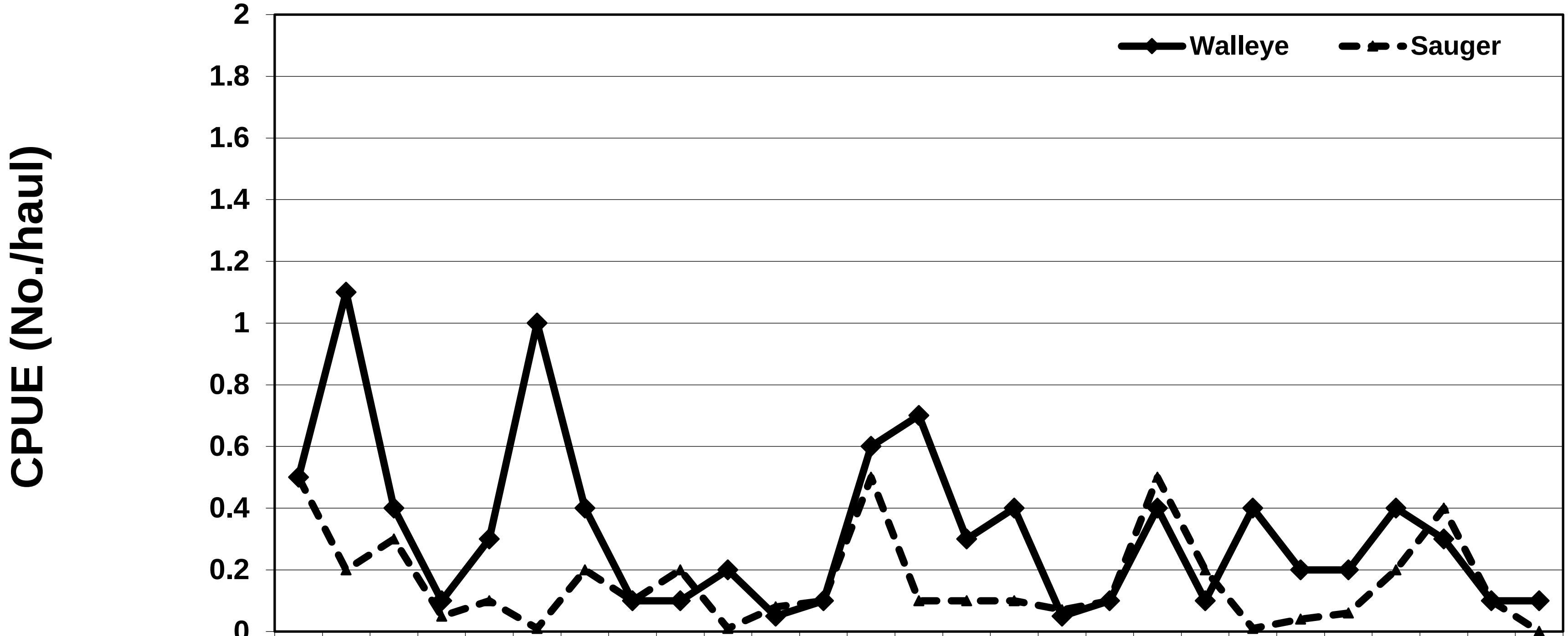
No sauger young-of-year were collected in 2010 during the annual seining survey which was the first time that they have not been captured during the sampling period. Record low relative abundances of young-of-year sauger were only observed during the years of 1987, 1989, 1993, and 2004 (Figure 22). These years of low relative abundances coincide with severe drought conditions (i.e., low reservoir elevations and low inflows) and have been suggested to be the reason for decline of sauger populations (McMahon and Gardner 2001). In contrast, the conditions experienced in 2010 were characterized by increased reservoir elevations and higher flows. Therefore, it is uncertain what is contributing to the lack of young-of-year sauger in the the upper stretches of the reservoir. The Missouri River above Fort Peck Reservoir serves as the only source of natural reproduction for sauger in the reservoir as they have been routinely sampled during annual shoreline seining surveys and no sauger fingerlings are planted in Fort Peck Reservoir.

Northern Pike

Northern pike young-of-year were captured by seine in 2010 for a catch rate of 0.4 per seine haul. This was a decrease from the previous year of 1.1 (Figure 23). They were captured in all sampling regions with the largest catch rate measured in the lower Missouri Arm at 0.7 per seine haul (Table 15). The decreased relative abundance in young-of-year northern pike in 2010 was likely due to a delayed spring rise. As stated earlier, reservoir elevations didn’t begin to rise until late May, which would be too late for northern pike to utilize the newly inundated shoreline vegetation during optimal spawning temperatures below 43°F (Frost and Kipling 1967). However, the spring rise in 2009 was more favorable as it began to ascend in early April and ice cover was late. Northern pike recruitment should continue to increase in the next few years as more shoreline vegetation has become inundated much like it did during mid 1990’s.

Smallmouth Bass

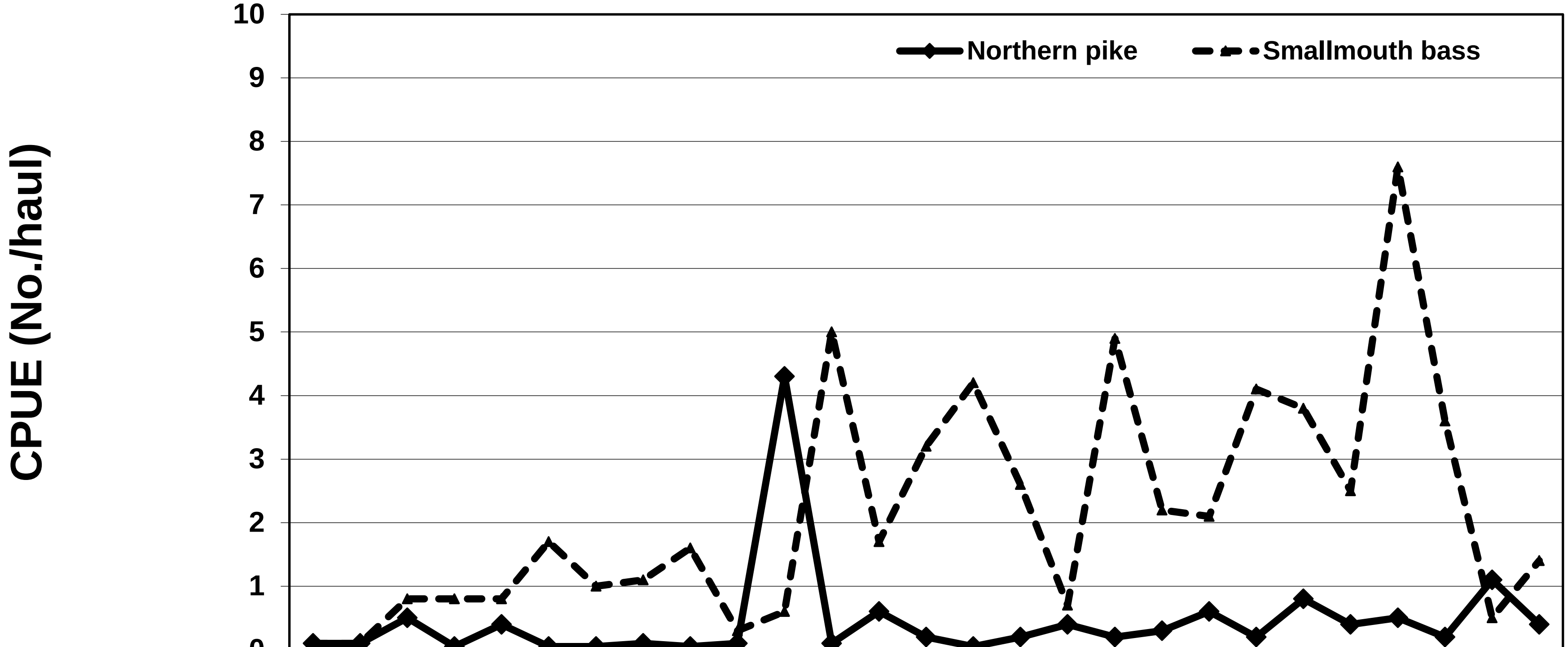
Smallmouth bass have been one of the most abundant game species captured during annual seine hauls. However, relative abundance dropped from an all time high catch rate of 7.6 per haul in 2007 to 0.5 in 2009. In 2010, relative abundance increased slightly to 1.4 per seine haul which resembles those of the early 1990’s before the population expanded (Figure 23). Smallmouth bass were captured in all regions with the highest catch rate in the upper Missouri Arm at 5.3 fish per haul (Table 15). This is consistent with previous years as this region contains better spawning substrate (i.e., gravel). As indicated by seining surveys, smallmouth bass have successfully spread to all areas of the reservoir. No smallmouth bass were stocked in Fort Peck during 2010 indicating all fingerlings captured were a product natural reproduction.



	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'
Walleye	0.5	1.1	0.4	0.1	0.3	1	0.4	0.1	0.1	0.2	0.1	0.1	0.6	0.7	0.3	0.4	0.1	0.1	0.4	0.1	0.4	0.2	0.2	0.4	0.3	0.1	0.1
Sauger	0.5	0.2	0.3	0.1	0.1	0	0.2	0.1	0.2	0	0.1	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.5	0.2	0	0	0.1	0.2	0.4	0.1	0

Year

Figure 22. CPUE of walleye and sauger young-of-year collected during annual seine hauls in Fort Peck Reservoir from 1981-2010.



	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'
Northern pike	0.1	0.1	0.5	0.05	0.4	0.05	0.05	0.1	0.05	0.1	4.3	0.1	0.6	0.2	0.05	0.2	0.4	0.2	0.3	0.6	0.2	0.8	0.4	0.5	0.2	1.1	0.4
Smallmouth bass	0.1	0.1	0.8	0.8	0.8	1.7	1	1.1	1.6	0.3	0.6	5	1.7	3.2	4.2	2.6	0.7	4.9	2.2	2.1	4.1	3.8	2.5	7.6	3.6	0.5	1.4

Year

Figure 23. CPUE of northern pike and smallmouth bass young-of-year collected during annual seine hauls in Fort Peck Reservoir from 1984-2010.

Yellow Perch

Yellow perch recruitment has been limited from 2001 to 2005 with catch rates less than 5.5 per seine haul annually as a result of little shoreline vegetation being inundated. However, relative abundance of young-of-year yellow perch have gradually increased since 2006 due to stable and rising reservoir elevations that provided additional spawning and rearing habitat (Figure 21). Yellow perch relative abundance in 2010 was 63.3 per seine haul which was similar to 57.2 per seine haul in 2009. Although reservoir elevations didn't rise during the ideal spawning period for yellow perch in April (Scott and Crossman 1973; Figure 20), the continued reproductive success was likely due to the previously inundated vegetation of 2009. Yellow perch were most abundant in the upper Missouri Arm with a catch rate of 128 per seine haul (Table 15). Relative abundance of yellow perch should remain stable in 2011 as a result of the previously inundated shoreline vegetation in 2010.

Crappie

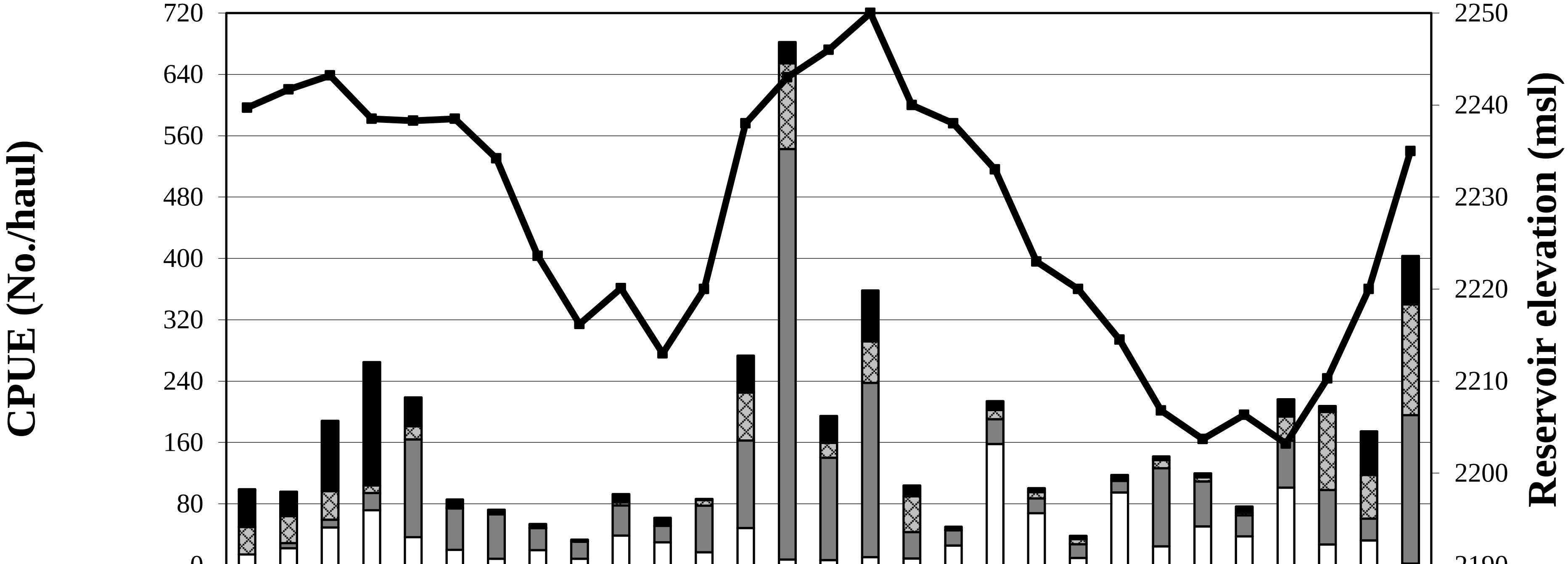
Young-of-year crappie abundances increased in 2010 to some of their highest levels at 144.3 per seine haul which was a large increase from 56.9 fish per seine haul in 2009. Relative abundances of young-of-year crappie now closely resemble those observed during the mid to late 1990's when the reservoir began to fill (Figure 21). Similar to previous years, a large percentage of crappie were collected in the upper Missouri Arm (Table 15). In 2007, 93% of the young-of-year crappie collected in seine hauls came from the upper Missouri Arm, which is not surprising considering this area contains more suitable spawning and rearing habitat than other regions of the reservoir. However, 61% of the total crappie were collected in the upper Missouri arm during the 2010 annual seining surveys indicating improved spawning and rearing habitat in other regions of the reservoir.

Emerald Shiner

Emerald shiner relative abundance in 2010 was 2.2 per seine haul, which was a decrease from to 2009 of 32.4 per seine haul. This marks one of the lowest catch rates for nearly a 30 year period. The only other period in which low relative abundances were documented was during the mid to late 1990's when reservoir elevations were increasing (Figure 21). A possible explanation for these decreases could be the upstream movement into a more riverine type environment. During annual seining surveys, the greatest concentrations of emerald shiners are typically found in the upper Missouri arm. In 2010, 77 % of emerald shiners were captured in the upper Missouri arm (Table 15). Similarly, 80 % of the emerald shiners captured in 2009 came from the upper Missouri Arm.

Spottail Shiner

Relative abundance of spottail shiners increased dramatically from 28.2 per seine haul in 2009 to 184.4 per seine haul in 2010. Similar to previous years, catch rates were highest in the main lake portions (lower Big Dry, lower Missouri arm, middle Missouri arm) of the reservoir with the lower Big Dry containing the most with 301.2 per seine. In 2010, 87% of spottail shiners were collected in the main lake portion of the reservoir (Table 15). The best catch rates of spottail shiners have been documented during rising pool years from 1993 to 1997, with catch rates ranging from 60.7 per seine to 535.4 per seine (Figure 21). This trend was evident in 2010 and should continue into 2011.



	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Perch	49.3	32	91.8	161	37.5	11.3	6	5.1	1.9	10.9	10	1.3	47.9	27.9	35.1
Crappie	35.7	35.1	37.4	9.7	17.1	0.2	0	0.1	0.7	4.1	0.4	7.6	62.6	112	19.3
Spottails	0	6.4	10.1	22.6	128	54.2	58	28.9	22	39.2	21.4	60.7	114	535	134
Emeralds	14.2	22.3	49.1	71.6	36.6	19.9	8.3	19.6	8.6	38.7	29.9	16.8	48.4	7.3	6.5
Elevation	2240	2242	2243	2239	2238	2239	2234	2224	2216	2220	2213	2220	2238	2243	2246

	97	98	99	00'	01'	02'	03'	04'	05'	06'	07'	08'	09'	10'
Perch	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
Crappie	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.
Spottails	228	34.4	20	32.6	19.1	17.7	15.2	102	58.8	27.4	61.1	70.8	28.2	193.
Emeralds	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
Elevation	2250	2240	2238	2233	2223	2220	2215	2207	2204	2206	2203	2210	2220	2235

Year

Figure 21. Maximum reservoir elevation compared to combined number of emerald, spottail, young-of-year yellow perch, and crappie from 1982-2010.

Chinook salmon

Chinook salmon were stocked in Fort Peck Reservoir in the spring and fall of 2010 (Table 16). A total of 143,966 spring-stocked fish were released in June averaging 34 per pound for a total weight of 4,223 pounds. An additional 23,801 fall-stocked fish were reared to 7 per pound for a combined weight of 3,365 pounds. Fall released fish in 2010 were reared at Big Springs Trout Hatchery because cooler at more constant temperatures could be maintained throughout the summer compared to the Fort Peck Hatchery. Both spring and fall stocked fish were reared to a larger size in an attempt to create salmon large enough to avoid predation. Both North and South Dakota Game and Fish have used this strategy in the past and have been successful in developing a return run from fewer, but larger spring and fall stocked chinook salmon (Lott et al. 1997; Figure 22 and 23). Montana has typically stocked fewer fingerlings and less total pounds than North and South Dakota, but since 2000, Montana has attempted to increase stocking numbers and/or size in efforts to try and create a more stable fishery and more fish for spawning (Figure 22 and 23).

Return of salmon to the release site has been minimal the past few years (Figure 24). However, 2010 marked the largest number of females spawned and eggs taken since the salmon program began in 1983. Fisheries personnel relied exclusively on electrofishing to obtain brood stock for the annual chinook salmon egg-take. This has proved 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 October 4th to October 25th in various embayments adjacent to the marina, spillway, off the face of the dam, and Bear Creek. The annual egg-take effort for Montana resulted in 610,230 green eggs, which averaged approximately 3,623 eggs per female. North Dakota and South Dakota were able to supplement eggs needed to approach the goal of 200,000 fingerlings needed for the 2010 stocking requirements because poor eye-up was experienced with the Montana eggs.

Biological data was collected from adult chinook salmon during spawning to provide more information on age, growth, and stocking-and-rearing history. In 2010, the majority of the spawn was composed of 3-year old females (84%) and the remaining were 4-year old females (16%; Table 18). In contrast, the majority of females spawned in 2009 were 4-year olds (94%) and the remaining were 3-year old females (5%) (Table 17). The large return from the 2007 brood year (3-year old) in 2010 was anticipated due to the larger size at spring stocking compared to previous years (30/pound;Table 16) and improved growing conditions (i.e., increases in reservoir elevations). In addition, stabilizing to increasing abundances of young-of-year cisco production since 2006 are likely playing a crucial role in their growth and survival rates as cisco have been found to be the primary forage item (Brunsing 1998; Headley 2010).

In 2010, the mean weight of pre-spawn female chinook salmon was 14.6 pounds which was slightly down from the mean weight of 15.6 in 2009. This was due to the larger number of 3-year old females which comprised a majority of the 2010 spawn. However, when examining the mean weight at each age, both male and female salmon collected in 2010 were higher than those collected in 2009 (Table 17; Table 18). Three and four year old males averaged 13.2 and 16.4 pounds, respectively in 2010 compared to 10.2 and 15.0 pounds in 2009. Similarly in 2010, three and four year old females averaged 14.1 and 17.0 pounds, respectively compared to 12.3 and 15.8 pounds in 2009. It is apparent that the higher abundance of cisco over the last few years and the record year class produced in 2009 is contributing to the increased weights at ages. These improved growth rates would explain the larger percentage of mature 3-year old fish in 2010 because increases in fish growth have been shown to mature at earlier ages. Chinook salmon in Lake Oahe have experienced a similar trend when growing conditions were favorable (Lott et al. 1997).

Table 16. Chinook salmon stocked by number, size, and location in Fort Peck Reservoir, 2001-2010.

Date	Number	Pounds Stocked	No./lb	Mark	Location
6/11/2001	88,283	2,207	40	None	Marina Bay
6/12/2001	46,247	575	80.5	None	Milk Coulee Bay
3/13/2002	22,021	202	108.8	None	Pines Bay
4/25/2002	93,465	1144	81.7	None	Marina Bay
4/25/2002	66,000	303	218	None	Marina Bay
4/25/2002	14,400	75	192	None	Marina Bay
5/31/2002	71,744	2,424	29.6	None	Pines Bay
6/13/2002	107,331	4,128	26	None	Marina Bay
4/22/2003	232,618	3,366	69.1	None	Marina Bay
6/13/2003	70,522	2,457	28.7	Adipose Clip	Marina Bay
6/14/2004	70,537	2,574	27.4	None	Marina Bay
10/5/2004	13,622	1,603	8.5	Adipose Clip	Marina Bay
6/30/2005	97,008	1,647	58.9	None	Marina Bay
9/28/2005	11,534	923	12.5	Adipose Clip	Marina Bay
6/7/2006	65,558	509	128.92	None	Marina Bay
6/14/2006	60,283	502	120	None	Milk Coulee Bay
6/15/2006	49,376	457	108	None	Marina Bay
10/13/2006	4,988	529	9.43	Adipose Clip	Marina Bay
6/18/2007	36,418	331	110	None	Marina Bay
10/25/2007	15,559	841	18.5	Adipose Clip	Marina Bay
6/5/2008	60,482	1,960	30.86	None	Marina Bay
6/11/2008	35,100	716	49	None	Marina Bay
6/12/2008	30,900	1,000	30.9	None	Marina Bay
8/12/2008	12,913	683	18.9	None	Marina Bay
8/12/2008	15,291	823	18.58	None	Marina Bay
11/18/2008	4,402	823	5.35	Adipose Clip	Marina Bay
6/16/2009	188,906	5,145	36.71	None	Marina Bay
11/4/2009	56,513	7,859	7.19	Adipose Clip	Marina Bay
6/10/2010	143,966	4,223	34.09	None	Marina Bay
10/22/2010	23,801	3,365	7.1	Adipose Clip	Marina Bay

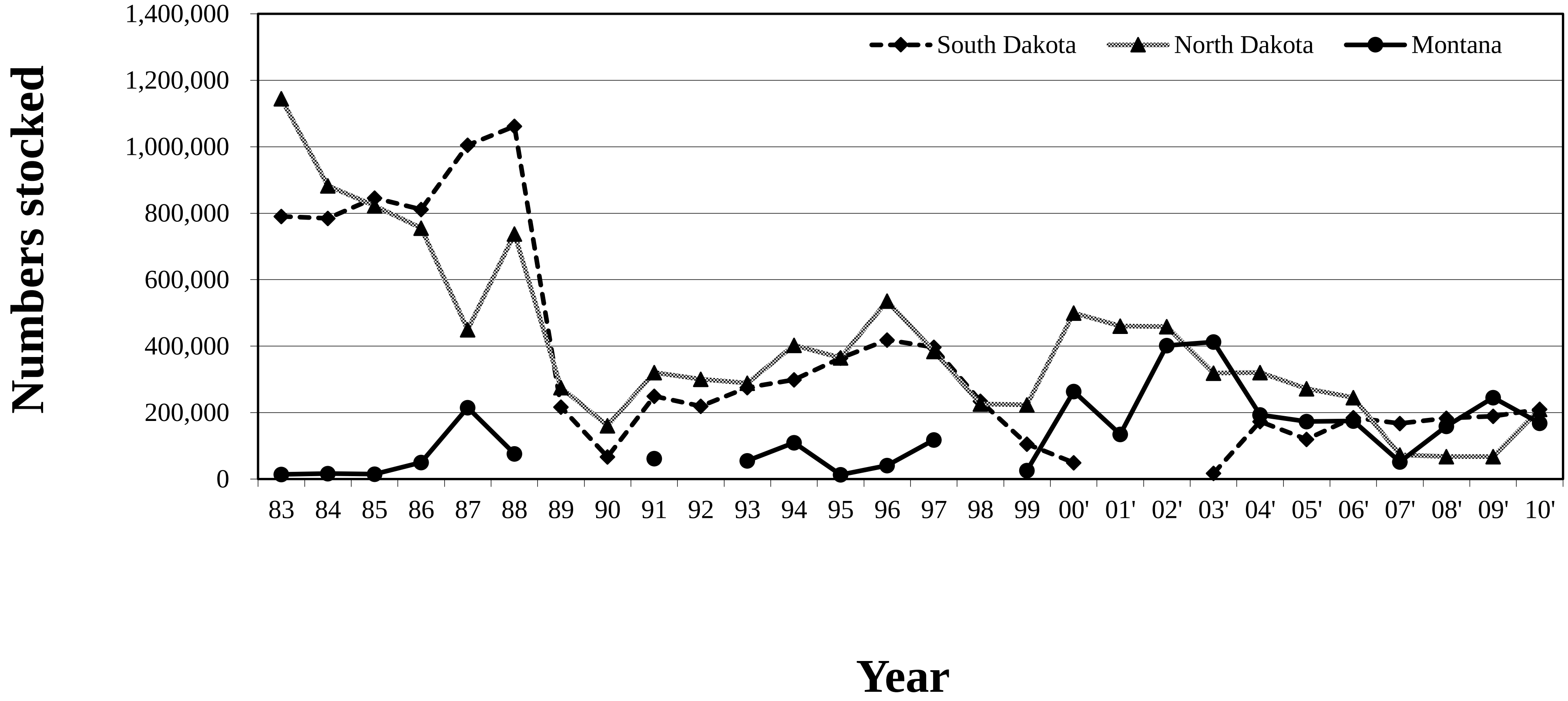


Figure 22. Annual comparison of chinook salmon numbers stocked in Oahe, Sakakawea, and Fort Peck Reservoir, 1983-2010**.**

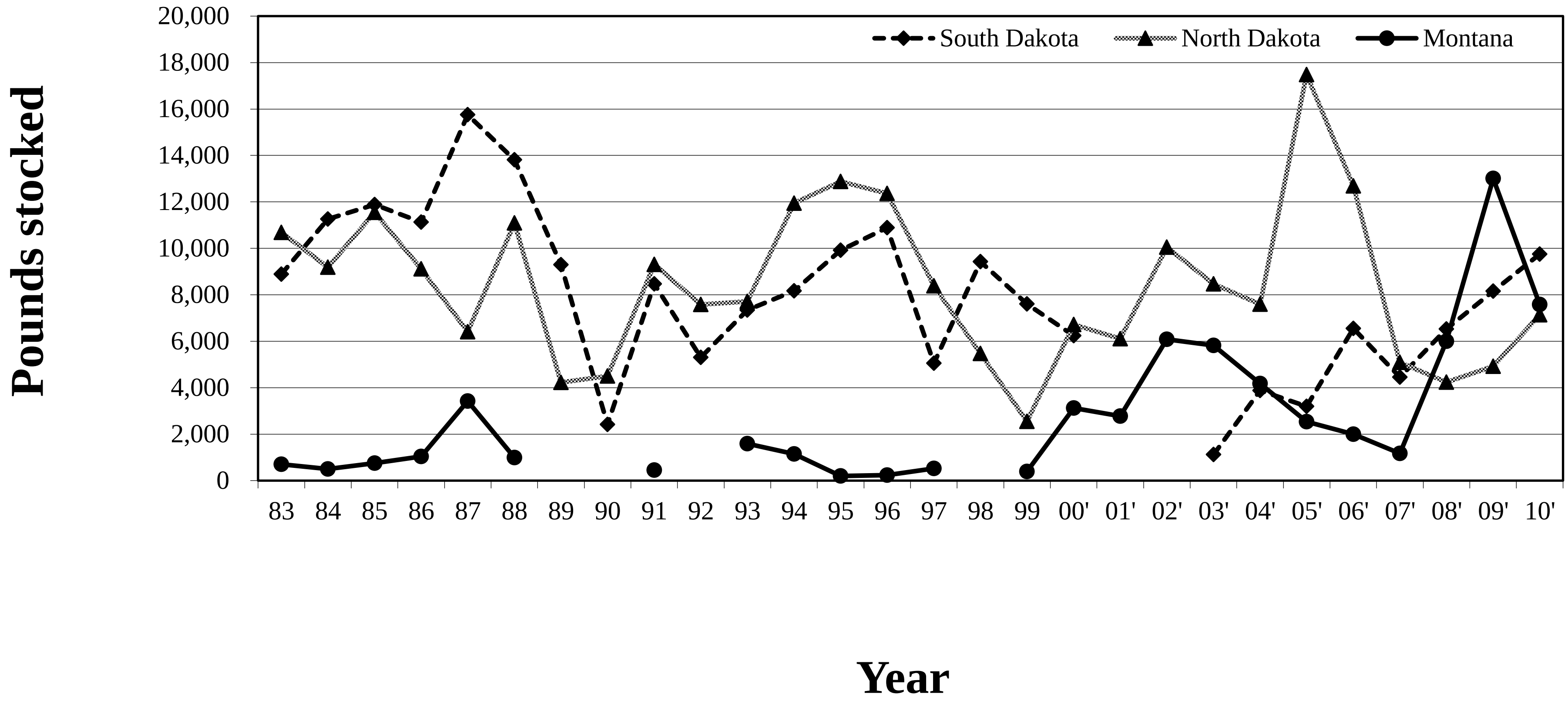


Figure 23. Annual comparison of chinook salmon pounds stocked in Oahe, Sakakawea, and Fort Peck Reservoir, 1983-2010.

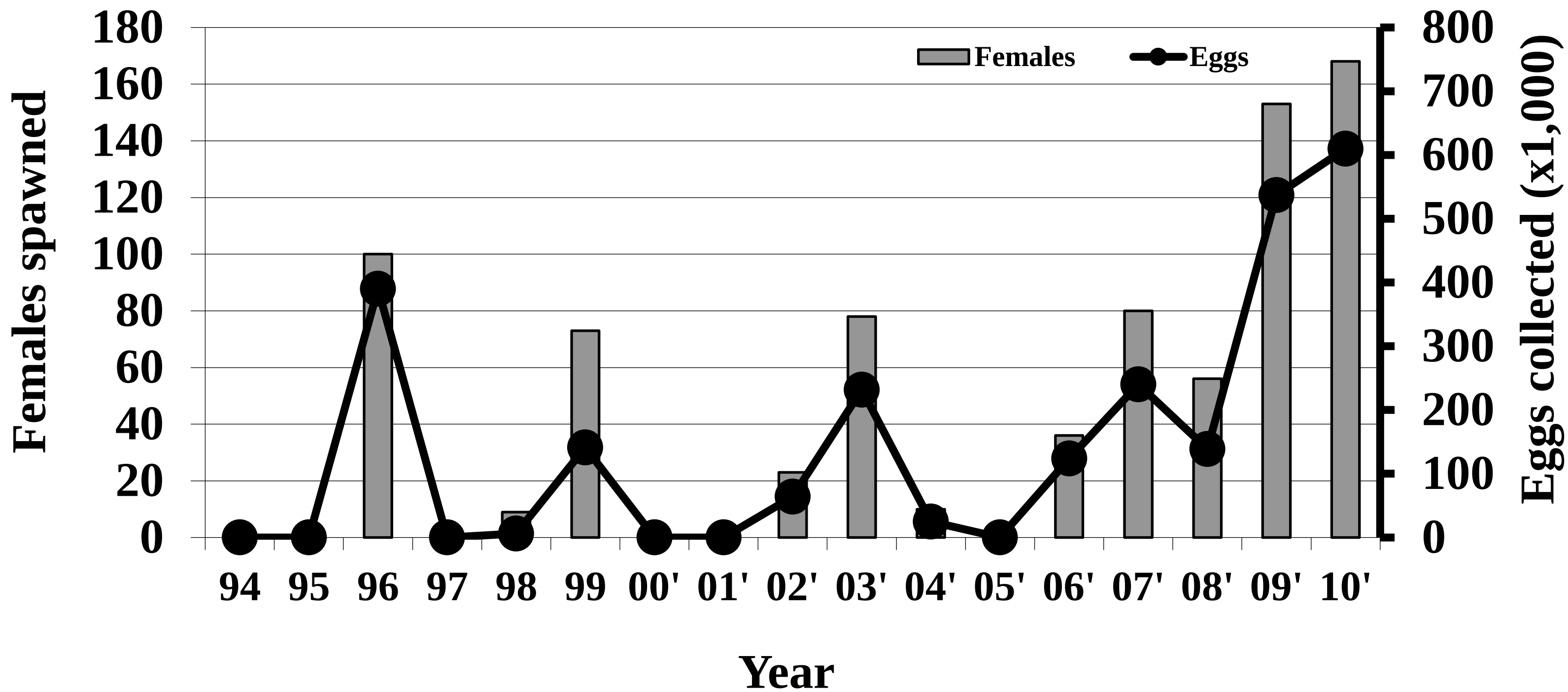


Figure 24. Annual comparison of female salmon spawned and eggs collected from Fort Peck Reservoir, 1994-2010.

Table 17. Age composition, length and weight of 327 chinook salmon collected by electrofishing, fall 2009.

Age	Sex	Brood year	Number	Mean length (in)	Range	Mean weight (lb)	Range
1	Male	2008					
	Female						
2	Male	2007	64	22.2	18.2-25.7	5.4	3.3-8.2
	Female						
3	Male	2006	52	27.4	21.3-33.1	10.2	4.2-16.3
	Female		9	28.5	25.9-31.8	12.3	8.1-18.7
4	Male	2005	41	31.7	26.5-35.5	15	5.5-20.3
	Female		158	31.3	22.4-34.5	15.8	6.4-23.6
5	Male	2004					
	Female		3	33	32.2-33.4	16.9	13.3-19.3

Table 18. Age composition, length and weight of 397 chinook salmon collected by electrofishing, fall 2010.

Age	Sex	Brood year	Number	Mean length (in)	Range	Mean weight (lb)	Range
1	Male	2009	0				
	Female						
2	Male	2008	9	21.9	18.9-24.4	4.9	2.7-6.9
	Female						
3	Male	2007	197	30.4	21.8-36.6	13.2	4.1-26.0
	Female		157	30.1	26.3-34.3	14.1	8.1-21.7
4	Male	2006	5	31.7	29.3-36	16.4	14.1-21.7
	Female		29	32.7	28.9-37.9	17.0	11.9-26.7
5	Male	2005					
	Female						

Lake trout

According to the current Fort Peck Reservoir Fisheries Management Plan, lake trout should be captured and spawned when the reservoir elevation falls below 2225 msl. At this elevation, there are approximately 51.4 acres of suitable lake trout spawning habitat along the face of the dam, which is 62% of the total spawning area when the reservoir elevation is at 2246 msl (data provided by USACOE). The face of the dam 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; Dux 2005). Currently, this is the only known lake trout spawning location. Therefore, decreases in reservoir elevation could pose a problem by limiting the amount of suitable spawning habitat and ultimately recruitment into the population. However, lake trout were not spawned in 2010 due to improved reservoir elevations near 2235 msl. In the past, conflicts have also emerged with the salmon broodstock collection and lack of hatchery facilities that will accept lake trout eggs.

Spawning lake trout were captured by gill nets off the face of the dam when water temperatures declined to48°F which is within the desired range for spawning (Gunn 1995). Similar to previous years, mortality of gill netted lake trout was low (12%). Lake trout have been captured with lake trout nets from 1990 to 1993 and again in 2003 to 2010 during spawning. Length frequencies continue to show few fish less than 23 inches captured during the spawn and the sizes of fish captured are similar over these years (Figure 25and 26; Ruggles 2005). This corroborates with our netting surveys conducted during the spawn because lake trout typically tend to mature once they reach 23 inches (Trippel 1993; Madenjian et al. 1998).

Salmon gill nets captured 166 lake trout for a catch rate of 27.7 per net-night which was up from 21.0 per net-night in 2009. The intent of these nets was to supplement the current netting program in hopes of capturing more and smaller lake trout. Relative abundance of lake trout captured in lake trout nets also increased slightly to 13.8 in 2010 from 10.5 in 2009. In terms of CPUE, the salmon gill nets captured more than the current lake trout nets (Table 19). Lengths frequencies of lake trout showed similar trends when comparing the salmon gill nets to the lake trout nets (Figure 26 and Table 20). Relative weights of lake trout continued to trend slightly upward in 2010 to 99.4 from 93.6 in 2009. This could be attributed to increased cisco abundance and ripe females collected during the start of the spawn.

Fort Peck lake trout mean length-at-age was variable at older ages, but similar variability occurs in other populations (Burnham-Curtis and Bronte 1996). When compared to other lake trout populations in Montana, Fort Peck Reservoir experienced higher growth rates than those of Flathead Lake and Lake McDonald. Previous mean lengths at age-5 for lake trout in Fort Peck Reservoir were 20.2 and current mean lengths at age-10 are 26.2 inches (Headley 2010; Table 20). Lengths at age-5 and 10 were approximately 15.7 and 23.6 inches in Flathead Lake (Beauchamp 1996) while growth rates in Lake McDonald were much slower with lengths at age-5 and 10 recorded at approximately 11.4 and 17.7 inches (Dux 2005). Despite the relatively low sample size of fish collected for age and growth information, numerous age classes were represented with individuals up to 28 years. It is noteworthy that younger and smaller lake trout have been captured during these drought years suggesting some limited recruitment prior to 2003.

Annual exploitation rates were calculated from 2004 through 2010 in which the netting and tagging survey was conducted. To date, a total of 794 lake trout have been tagged with 45tagged fish harvested. Annual exploitation rates ranged from a low of 0.9% in 2007 to a high of 4.8% in 2008 based on tag returns. An abundance of older fish in the population and a low total annual mortality rate of 3.3% suggest that angling exploitation is low in Fort Peck Reservoir. Mortality of 10-20% is typical in unexploited native lake trout populations (Shuter et al. 1998; Mills et al. 2002). Creel surveys conducted on Fort Peck Reservoir have shown that lake trout harvest is quite low with an estimated 0.05 kg/ha (Brooks and Headley 2009). Healey (1978) reported that exploitation rates of lake trout should not exceed 0.5 kg/ha.

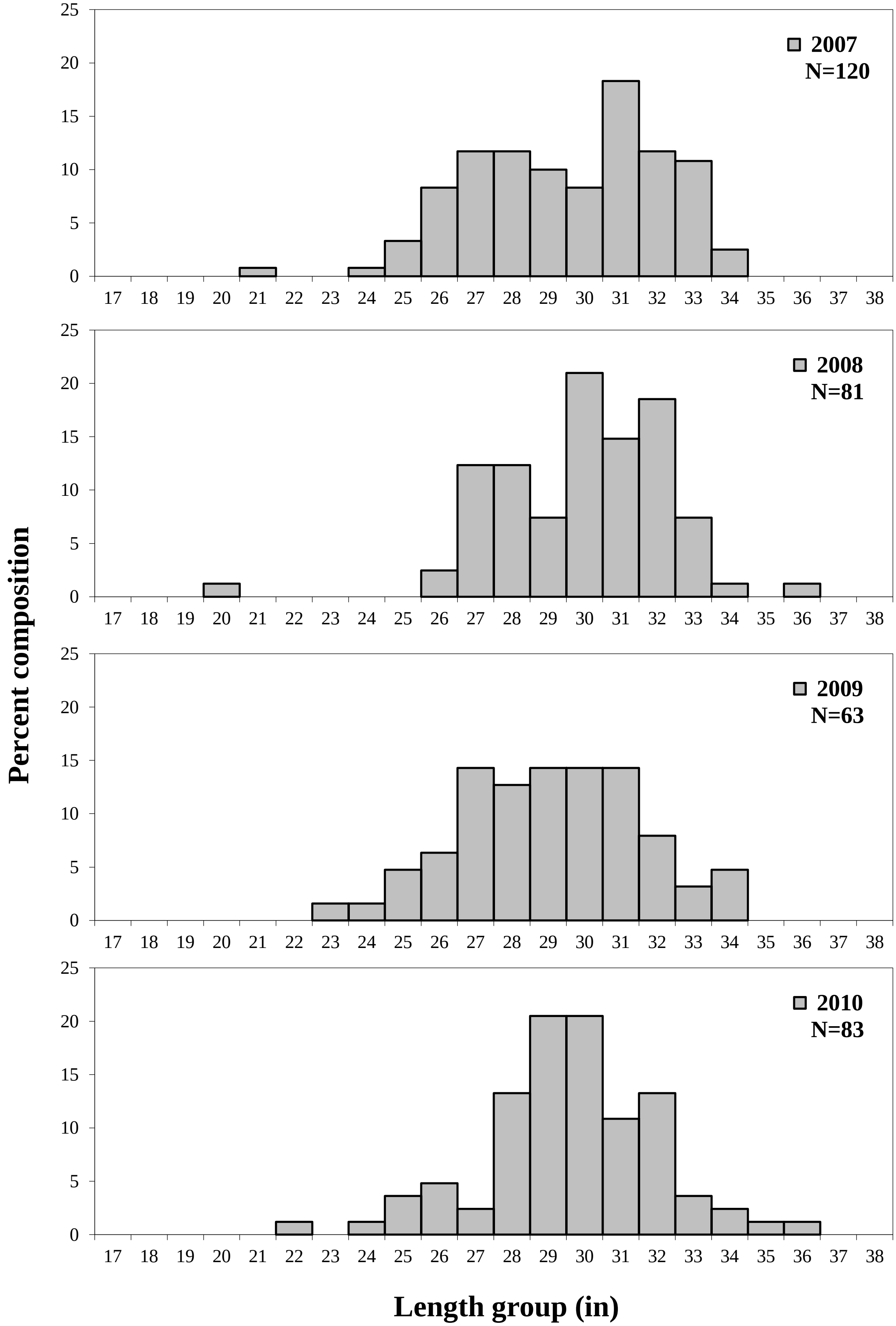


Figure 25. Length frequency of lake trout captured in lake trout gill nets in Fort Peck Reservoir during, 2006-2010.

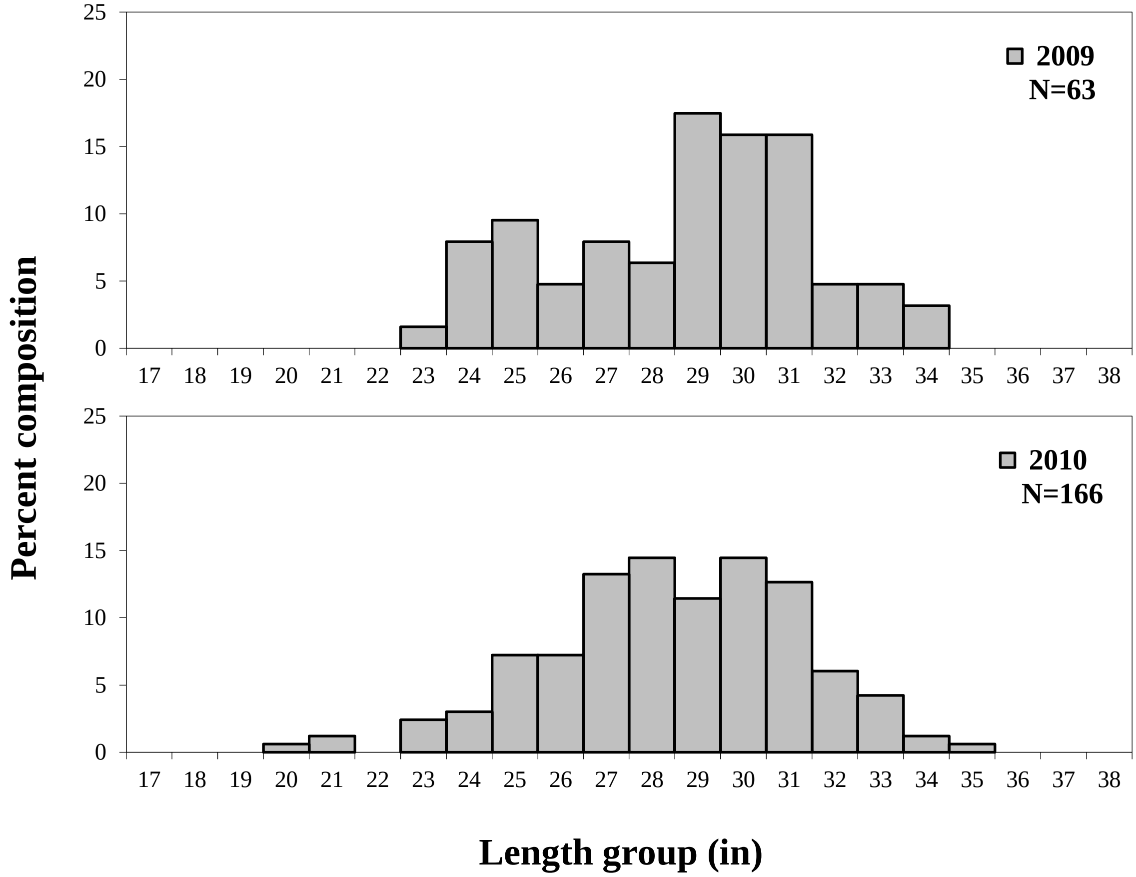


Figure 26. Length frequency of lake trout captured in chinook salmon gill nets in Fort Peck Reservoir during 2009-2010.

Table 19. Summary of lake trout captured during fall surveys using salmon gill nets and lake trout gill nets in 2010.

	Chinook salmon gill nets					Lake trout gill nets				
	N	CPUE	Length (In)	Weight (lbs.)	Wr	N	CPUE	Length (In)	Weight (lbs.)	Wr
Lake trout	166	27.7	28.9	9.3	98.6	83	13.8	30.1	10.6	99.4
Female	61	10.2	29.0	9.8	103.9	27	4.5	30.0	11.2	106.4
Male	105	17.5	28.9	9.0	95.6	56	9.3	30.1	10.3	96.0

Table 20. Mean length-at-age at time of capture (in) for lake trout collected in gill nets, 2009-2010, on Fort Peck Reservoir, and aged from sectioned otoliths.

Year		Length at age at capture (in)												
		5	6	7	8	9	10	11	12	13	14	15	16	17
2009	Mean							25.4	25.7				26.6	26.2
	N							1	3				3	1
	SE								0.8				1.8	
2010	Mean			21.8	21.7	27.0	26.2		31.1	28.5	27.9	28.6	30.5	26.7
	N			2	1	2	3		1	3	2	1	1	1
	SE			1.7		0.1	1.0			0.7	2.1			
Mean of means				21.8	21.7	27.0	26.2	25.4	28.4	28.5	27.9	28.6	28.6	26.4

Year		Length at age at capture (in)												
		18	19	20	21	22	23	24	25	26	27	28	29	30
2009	Mean	26.5	28.3	27.0			27.5					33.5		
	N	1	1	1			1					1		
	SE													
2010	Mean	29.6	31.9	29.3	30.9	32.5		29.6		33.3	30.0			
	N	1	2	1	1	1		3		2	1			
	SE		0.2					0.4		1.8				
Mean of means		28.0	30.1	28.1	30.9	32.5	27.5	29.6		33.3	30.0	33.5		

Cisco netting

Young-of-year cisco

Relative abundance of young-of-year cisco decreased in 2010 to 70 per net, which was down from the record year class of 274 per net in 2009 but still at moderate levels when examining the catch rate over the 25 year period. Catch rates were 137, 37, and 113 in 2006, 2007, and 2008, respectively. In contrast, overall catch rates in 2003, and 2002 were low, at 3 and 6 young-of-year per-net, respectively (Table 21). A total of 837 young-of-year cisco and 12 adults were caught in 2010. Mean length for age-0 cisco was 4.9 inches in 2010.

Early ice cover appears to correlate with increased young-of-year cisco abundance. Ice cover has been shown to reduce the wind and wave action, which decreases sedimentation over incubating eggs, and ultimately reducing mortality (Freeberg et al. 1990). 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. Likewise, early ice cover occurred on December 24th, 2008 and likely contributed to the record year class of cisco produced in 2009. Ice cover occurred on December 25th, 2009 but the year class produced was only a moderate one.

Another possible explanation for fluctuations in young-of-year cisco abundance could be attributed to declines in reservoir elevation, which have been shown to dewater incubating eggs (Gaboury and Patalas 1984; Zollweg and Leathe 2006). For example, ice cover occurred on January 12th, 2007 and again in 2008. Even with the late ice cover in 2008, the year class was a moderate to large one much like the one produced in 2006. This would suggest decreases in reservoir elevation during the incubation period, particularly greater than five feet, might be detrimental to cisco production (Figure 27). 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. A large year class was expected again in 2010 as reservoir elevations increased nearly 3.5 feet over the winter but, only a moderate one was produced. It is uncertain if the increase in reservoir elevation was too much, but it is possible that other factors may be influencing the decrease in young-of-year cisco abundance.

Despite the favorable conditions of early ice cover and stable to rising reservoir elevations for a large year class in 2010, one last explanation exists for the decrease in relative abundance of young-of-year cisco. Intraspecific competition has been suggested to suppress subsequent year classes within cisco populations (Wiedenheft 1989; Mullins 1991). The large year classes of 1986, 1994, and 2001 in which over 200 young-of-year cisco were captured, relative abundance of cisco following these years was less than 12 per net night. Additionally, a similar trend was observed when the number of cisco captured per net decreased from 274 in 2009 to 70 per net night in 2010. Although relative abundance decreased, it wasn’t as severe as those following the year classes of 1986, 1994, and 2001. This information further suggests that both ice cover and stable reservoir elevations during winter months play an important role in young-of-year cisco production.

Table 21. Mean CPUE (No./net-night) of young-of-year cisco taken by vertical gill-nets and site in Fort Peck Reservoir during September-October 1997-2010.

	Young-of-year cisco CPUE													
Location	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10
Upper Big Dry														
Bug Creek	0.5	3	2	6	--	--	--	--	--	--	--	--	--	--
Lower Big Dry														
Bear Creek West	29	6	5	4	143	1	1	18	0	37	26	44	155	12
Rock Creek	3	32	4	33	197	--	--	--	--	--	--	--	--	--
Sandy Arroyo	--	--	--	--	193	--	3	--	--	--	--	--	--	--
Spring Creek	--	--	--	--	370	--	3	13	16	--	--	--	--	--
Bobcat	--	--	--	--	--	--	--	2	3	100	13	16	221	11
Lower Missouri Arm														
Dam	81	--	--	--	--	--	--	--	--	--	--	--	--	--
Duck Creek	18	58	62	27	47	6	13	31	321	139	102	263	185	53
Fifth Coulee	--	--	--	--	185	--	--	--	--	200	42	281	201	152
Marina	4	0.5	35	18	77	3	1	2	26	256	5	17	7	39
Milk Coulee	--	70	19	33	123	18	19	--	121	--	117	174	366	60
Sage Creek	--	--	--	--	153	--	1	1	82	201	13	33	188	44
Shaft Houses	29	45	3	1	--	11	1	86	--	70	--	--	--	--
Bear Creek	12	139	24	66	143	5	11	213	261	58	58	225	897	120
Middle Missouri Arm														
Cattle Crooked Cr.	--	--	--	--	556	--	7	2	77	67	5	107	--	96
Pines-Gilbert Cr.	121	89	30	17	517	--	7	11	38	247	31	48	262	72
Hell-Sutherland	245	15	33	15	119	--	14	--	--	--	--	--	--	--
Snow Creek	--	--	--	16	185	--	--	--	--	--	--	--	--	--
7th Point	--	--	--	--	--	--	--	8	32	--	--	--	--	--
8th Point	--	--	--	--	--	--	--	8	82	27	8	108	--	107
Upper Missouri Arm														
Bonetrail	--	--	--	--	155	--	--	--	--	--	--	--	--	--
Devils Creek	34	--	--	--	--	--	--	--	--	--	--	--	--	--
Seven Blackfoot	--	1	--	11	--	--	--	--	--	--	--	--	--	--
Timber Creek	25	1	--	7	--	--	--	--	--	--	--	--	--	--
Wagon Creek	--	--	--	--	206	--	--	--	--	--	--	--	--	--
Mean CPUE	69	35	19	6	219	6	3	31	84	137	37	113	274	70

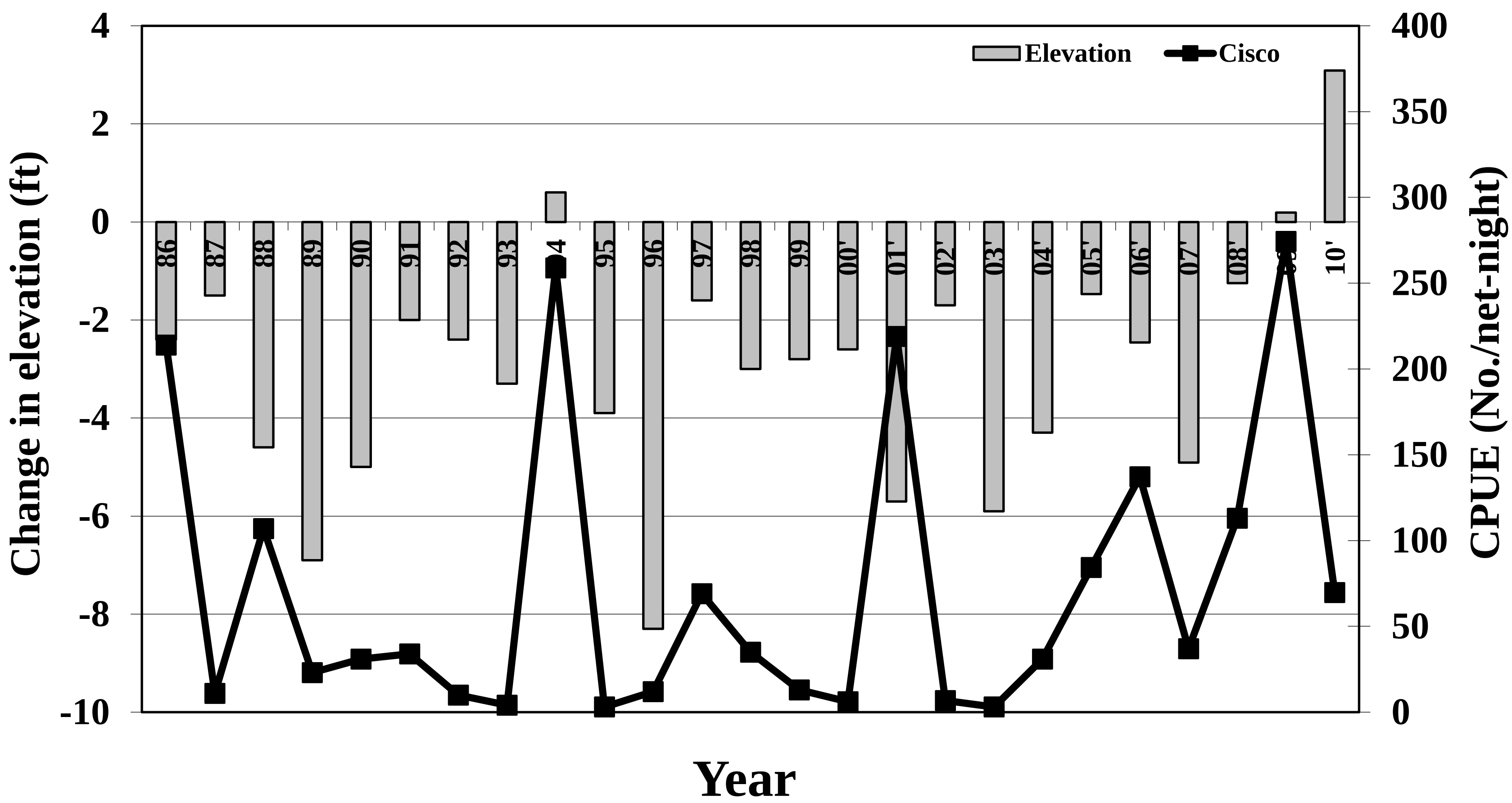


Figure 27. Change in reservoir elevation from December high to March low in contrast to young-of-year cisco CPUE in Fort Peck Reservoir, 1986-2010.

RECOMMENDATIONS

- Spring trapping of the walleye population will continue to provide an egg source for sustaining this and sport fisheries both in and out of the state.

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

- Routine sampling with frame traps, experimental gill nets, vertical gill nets and beach seines will continue to obtain information on game and forage fish distribution, abundance, production and condition.

- Evaluate native species (sauger, channel catfish, and 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 to secure funding for a lake wide creel survey every three years with the next creel survey scheduled for 2011.

- 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. In 2010, plans are in place to produce larger spring and fall stocked fingerlings.

- 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 tagging lake trout in 2011. Evaluate existing data from past creels and netting data to further evaluate recruitment or lack of recruitment.

- Incorporate additional mesh sizes during standard young-of-year cisco sampling to better monitor adult population dynamics.

- Continue annual public informational meetings to disseminate information from the previous years 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.

- Develop strategies for Fort Peck biological and Fort Peck hatchery staff to assist each other without detriments to either program.

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Prepared by: Heath Headley
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Appendix 1. Common and scientific names of fishes mentioned in this report.

Common Name	Scientific name
Bigmouth buffalo	*Ictiobus cyprinellus*
Black bullhead	*Ictalurus melas*
Black crappie	*Pomoxis nigromaculatus*
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 artedii*
Common carp	*Cyprinus carpio*
Creek chub	*Semotilus atromaculatus*
Emerald shiner	*Notropis atherionoides*
Fathead minnow	*Pimephales promelas*
Flathead chub	*Hybopsis gracilis*
Freshwater drum	*Aplodinotous grunniens*
Goldeye	*Hiodon alosoides*
Green sunfish	*Lepomis cyanellus*
Lake chub	*Couesius plumbeus*
Lake trout	*Salvelinus namaycush*
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	*Carpoides carpio*
Sauger	*Sander canadense*
Shorthead redhorse	*Moxostoma macrolepidotum*
Shovelnose sturgeon	*Scaphiryhynchus platorynchus*
Silvery minnow	*Hybognathus argyritis*
Smallmouth bass	*Micropterus dolemieu*
Smallmouth buffalo	*Ictiobus bubalus*
Spottail shiner	*Notropis hudsonius*
Walleye	*Sander vitreum*
White crappie	*Pomoxis annularis*
White sucker	*Catostomus commersoni*
Yellow perch	*Perca flavescens*

Appendix 2. Northern pike and channel catfish proportional stock density (PSD) relative stock density of preferred-length (RSD-P) fish and mean relative weight values (*Wr*), for 2002-2010, for fish collected in the standard July-August gill net survey, on Fort Peck Reservoir, Montana.

Northern pike				
Year	PSD	RSD-P	*Wr*	Sample size
2002	94	62	102	144
2003	98	55	101.1	126
2004	96	71	100.1	75
2005	93	59	100.3	86
2006	89	60	98.9	108
2007	75	41	101	147
2008	89	39	100	137
2009	73	39	93.1	176
2010	68	24	100	191

Channel catfish				
Year	PSD	RSD-P	*Wr*	Sample size
2002	74	3	89.9	145
2003	71	5	89.4	129
2004	57	11	98.1	227
2005	35	6	91.3	297
2006	46	10	95.1	215
2007	38	4	85.3	278
2008	35	2	88.2	289
2009	57	5	91.6	314
2010	74	11	88.2	104