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, 2011 THROUGH JUNE 30, 2012
REPORT PERIOD: MARCH 1, 2011 THROUGH FEBRUARY 29, 2012


## ABSTRACT

Fort Peck Reservoir reached peak elevation on June 15th, 2011 at 2252.3 feet from a minimum elevation on February 12th, 2011 at 2235.16 feet, a spring rise of 17.14 feet. Spawning walleye populations were sampled in the upper Big Dry Arm with frame traps from April 19th to May 6th. Walleye were spawned and the fertilized eggs were sent to Fort Peck and Miles City fish hatcheries. Trap netting captured 1,134 walleye for a catch rate of 2.8 per net night in 2011 which was down from the previous year of 5.1 per net night. Due to lower catch rates of walleyes and unfavorable spawning conditions, only 40 million eggs were collected in 2011. A total of 5.4 million fry and 2.6 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 26th to August 11th. Yellow perch, northern pike, and walleye were the most abundant species captured overall, with catch rates of 3.5, 2.9, and 2.8 per net night, respectively. Gill net catch rates of walleye in 2011 decreased to 2.8 per net night which is below the long term average of 3.6 per-net for the period from 1983 to 2011. Gill-netted walleye averaged 14.9 inches and 1.7 pounds. In 2011, catch rates of quality size walleye decreased while catch rates of all other length groups remained stable. Relative weights of walleye increased for all length groups. Northern pike catch rates increased in 2011 to 2.9 per net with an average size of 23.2 inches and 3.6 pounds. Overall, abundance of shoreline forage decreased in 2011 but was still similar to those observed in the mid to late 1990's. The most notable decrease in shoreline forage occurred for spottail shiners from 184 to 66 per seine haul. In June of 2011, 255,492 chinook salmon at an average weight of 60 per pound were stocked at Duck Creek, Pines Bay, and Rock Creek. An additional 38,605 chinook salmon at eight per pound, which were adipose fin-clipped, were released in Marina Bay in November of 2011. Young-of-year cisco relative abundance increased to144 per net night in 2011.

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 Results and Discussion sections of this 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 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 fishery and was presented to North and South Dakota fisheries personnel during annual Missouri River mainstem reservoir meetings. This information was also presented to Corps of Engineers to make recommendations for Annual Operating Plan (AOP). Staff attended the Montana American Fisheries Society meeting. The 2001-2011 Fort Peck Reservoir Fisheries Management Plan was updated. The new plan 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. Forty-four volunteers assisted with the annual walleye and northern pike egg-taking operation at Nelson Creek. Reservoir staff assisted with the Home Run Pond kids fishing clinics. Staff also assisted the 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. In addition, eight open house meetings (Miles City, Glendive, Wolf Point, Glasgow, Havre, Billings, Lewistown, and Great Falls) were held to inform and gather input for the 2012-2022 Fort Peck Fisheries Management Plan. 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, 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 2011 on June 15th, 2011 at 2252.3 feet from a minimum elevation on February 12th, 2011 at 2235.16 feet, a spring rise of 17.14 feet (Figure 2). Since July, reservoir elevation has decreased to 2235.00 feet. Reservoir elevations are predicted to rise approximately 5 feet from March through June and fall beginning in August of 2012 based on the March 2011 basic forecast (USACE 2011).

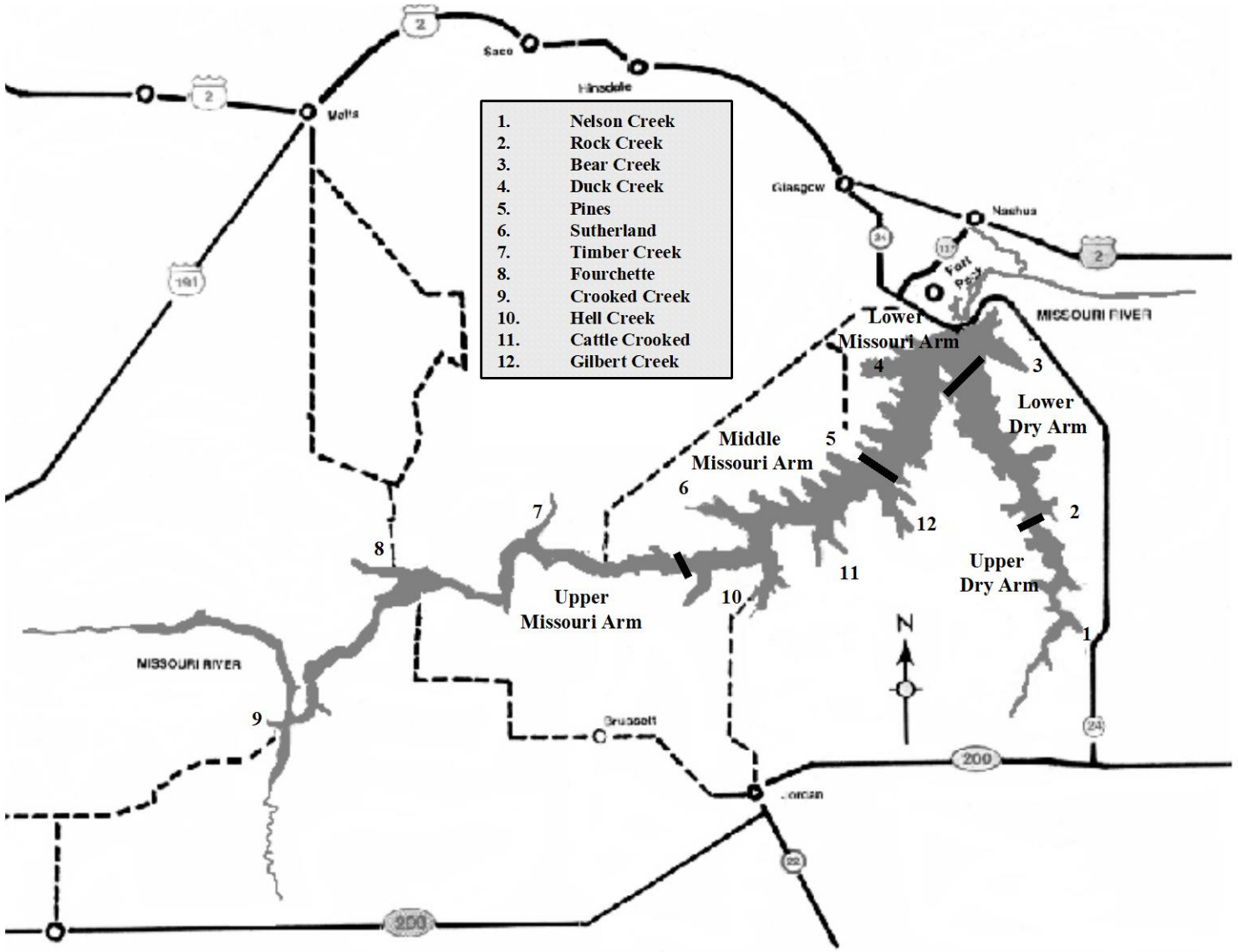



Figure 1. Fort Peck study area describing major sampling zones and select specific locations.

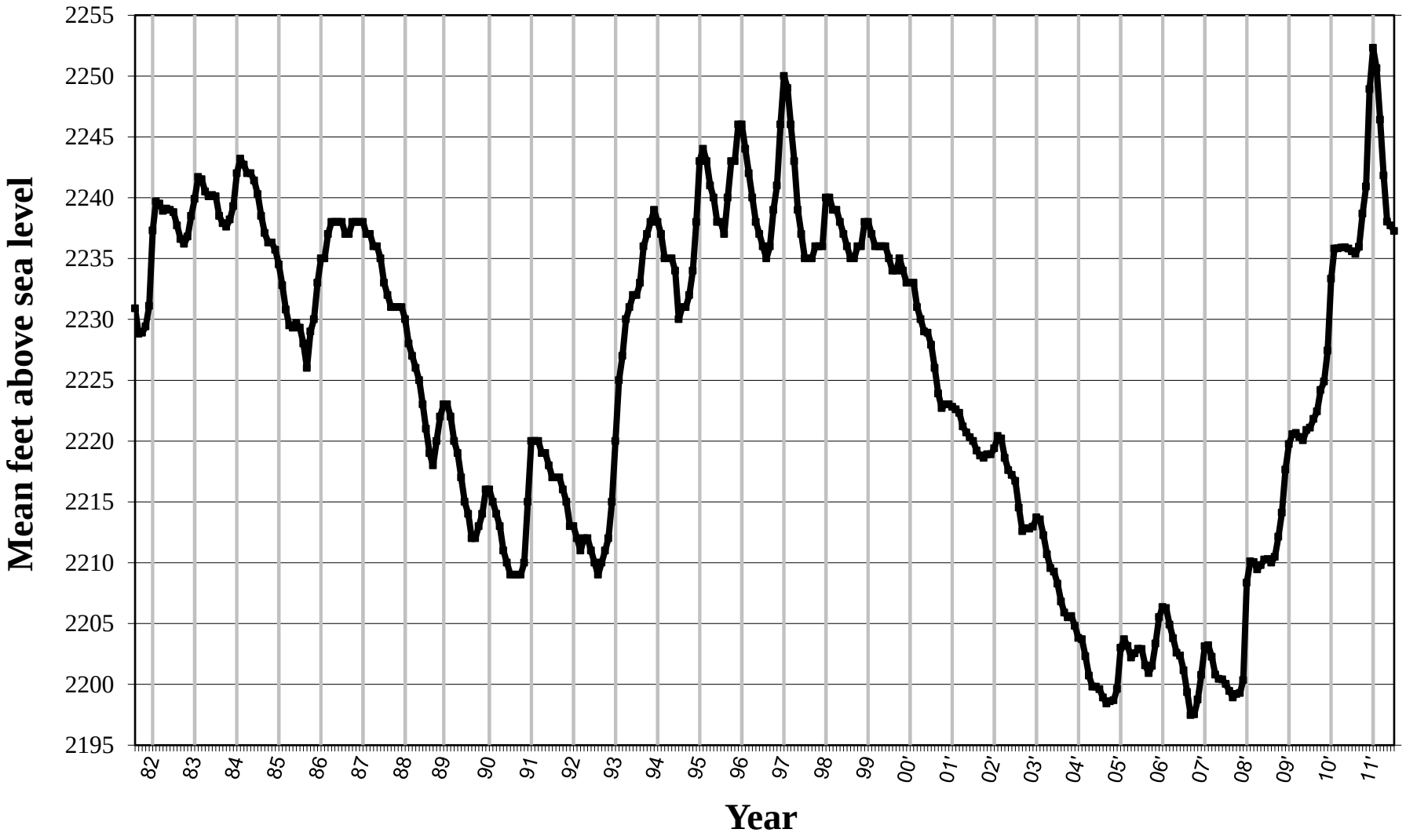



Figure 2. Peak monthly elevations on Fort Peck Reservoir from January 1982 to January 2011. Gray lines indicate maximum reservoir elevation in June of each year (Data provided by the U.S. Army Corps of Engineers).

## SAMPLING METHODS

### Data Collection

- Spring trap-net sampling was conducted from April 18th to May 6th, 2011 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 and northern pike to provide an egg source to meet the stocking requests for Fort Peck Reservoir and other sport fisheries in and out of the state. A subsample of 299 walleye were weighed due to rough conditions experienced during the spawn.
- 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. Gill netting occurred from July 26th to August 11th, 2011 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 8th to September 8th, 2011 using a 100-ft x 9-ft beach seine of 3/16-in square mesh at 100 locations throughout the reservoir, to determine relative 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 13th to September 23rd, 2011. 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 19.
- Electrofishing was used during October 3rd to October 25th, 2011 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 Fort Peck dam on November 2nd , 2011 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. Only 3 net nights were completed in 2011 due to rough conditions experienced during this time. Due to low sample size and limited netting effort, lake trout are not presented in the results and discussion section of this report.

**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.

## 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 19th to May 6th, 2011. Eighteen species were captured with walleye being the most abundant with an average catch-rate of 2.8 fish per trap-night (Table 2). Walleye were spawned and fertilized eggs were sent to the Fort Peck and Miles City Fish Hatcheries. Northern pike were also spawned in 2011 and the fertilized eggs were sent to the Fort Peck Hatchery. A total of 2 million eggs were collected to meet the 2011 egg request. An effort of 399-trap days was committed to walleye spawning efforts in 2011. Compared to previous years, netting effort was slightly lower due to late ice cover, which substantially shortened the number of days. Ice cover has typically receded by the first week in April and the walleye spawning operation has concluded in three to four weeks.

Warmer temperatures in late March and early April triggered large amounts of prairie runoff to occur in tributaries of the Big Dry arm. However, ice cover was still present on the reservoir in the Nelson Creek area and much of the Big Dry until April 19th, 2011. Typically, this is when a majority of the walleye spawning activity takes place in the Big Dry arm of Fort Peck Reservoir. Initial trap netting efforts collected spent females during the first few days of the operation suggesting some had already spawned. It is likely that adult walleye ascended the Big Dry Creek prior to this when flows were high and temperatures were conducive to spawning. Fewer ripe female walleyes collected resulted in only 40 million eggs which was far less than the egg-take goal of 90 million.

#### Walleye

Trap netting captured 1,134 walleye, of which 299 were measured. The total number of walleye handled was low compared to previous years (Figure 3). Walleye catch rates in 2011 were 2.8per-trap, bringing them under the average of 7.6 per-trap night making them the second lowest on record (period of 1982 to 2011; Figure 4; Table 3). Average weight for spawning walleye in 2011 was 6.6 pounds for females and 2.5 pounds for males which was a decrease from previous years due to a large group of smaller fish recruiting into the population (Table 4). In 2008, 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 20 to 22 inches suggesting improved growth in the spawning population. Improved numbers of walleye greater than 25 inches in 2011 indicated large fish were continuing to grow and survive.

#### Northern Pike

Relative abundance of northern pike captured increased slightly from 1.8 per-net night in 2010 to 2.3 in 2011 (Table 3). The higher relative abundance in 2011 is 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 2011 decreased with fish averaging 27.9 inches and weighing 5.7 pounds due to smaller fish recruiting into the population. Subsampled females averaged 31.7 inches and 8.6 pounds, while males averaged 26.9 inches and 4.9 pounds (Table 2). In 2011, length frequency distributions showed improved numbers of smaller fish in the 20 to 26 inch range (Figure 7). This trend should continue due to inundated shoreline vegetation over the last several years which have increased the amount of 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 18th to May 6th, 2011. N is total number collected and n is number subsampled for length and weight measurements.

| Species | N | CPUE | Length | n | Weight | n |
|---|---|---|---|---|---|---|
| Bigmouth buffalo | 76 | 0.2 | 11.5 | 1 | 0.9 | 1 |
| Black bullhead | 17 | <0.1 | -- | -- | -- | -- |
| Black crappie | 294 | 0.7 | 8.0 | 16 | 0.3 | 16 |
| Burbot | 2 | <0.1 | 29.4 | 2 | 6.0 | 2 |
| Channel catfish | 142 | 0.4 | 30.8 | 1 | 13.8 | 1 |
| Cisco | 53 | 0.1 | 12.4 | 3 | 0.6 | 3 |
| Common carp | 775 | 1.9 | 12.0 | 6 | 0.9 | 6 |
| Goldeye | 90 | 0.2 | -- | -- | -- | -- |
| Northern pike | 911 | 2.3 | 27.9 | 214 | 5.7 | 214 |
| *Female* | 324 | 0.8 | 31.7 | 56 | 8.6 | 56 |
| *Male* | 559 | 1.4 | 26.9 | 149 | 4.9 | 149 |
| *Nonproductive* | 28 | 0.1 | 20.1 | 9 | 2.2 | 9 |
| Rainbow trout | 1 | <0.1 | -- | -- | -- | -- |
| River carpsucker | 754 | 1.9 | 23.5 | 2 | 6.1 | 2 |
| Smallmouth buffalo | 1,018 | 2.6 | 16.7 | 5 | 3.8 | 5 |
| Sauger | 4 | <0.1 | 20.5 | 3 | 3.0 | 3 |
| Shorthead redhorse | 26 | 0.1 | -- | -- | -- | -- |
| Smallmouth bass | 1 | <0.1 | -- | -- | -- | -- |
| Walleye | 1,134 | 2.8 | 23.2 | 299 | 5.3 | 296 |
| *Female* | 604 | 1.5 | 25.5 | 205 | 6.6 | 204 |
| *Male* | 446 | 1.1 | 18.5 | 87 | 2.5 | 85 |
| *Nonproductive* | 84 | 0.2 | 16.0 | 7 | 1.6 | 7 |
| White sucker | 62 | 0.2 | 16.4 | 26 | 1.9 | 26 |
| Yellow perch | 882 | 2.2 | 6.9 | 26 | 0.2 | 26 |

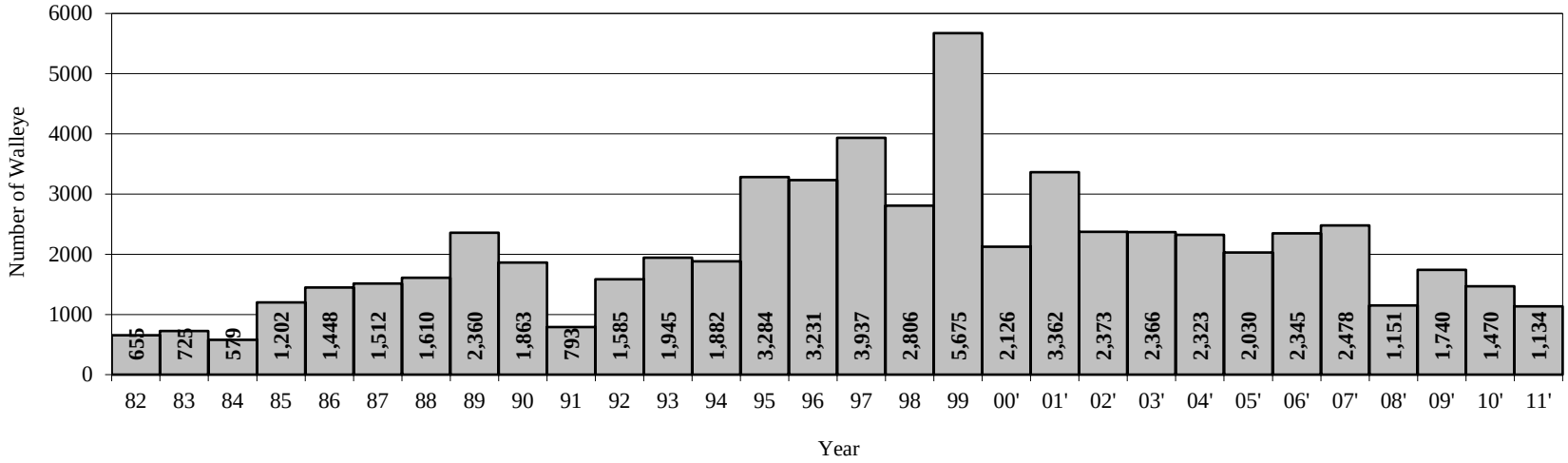



Figure 3. Number of walleye captured during spring trapping in the upper Big Dry Arm of Fort Peck Reservoir from 1982-2011.

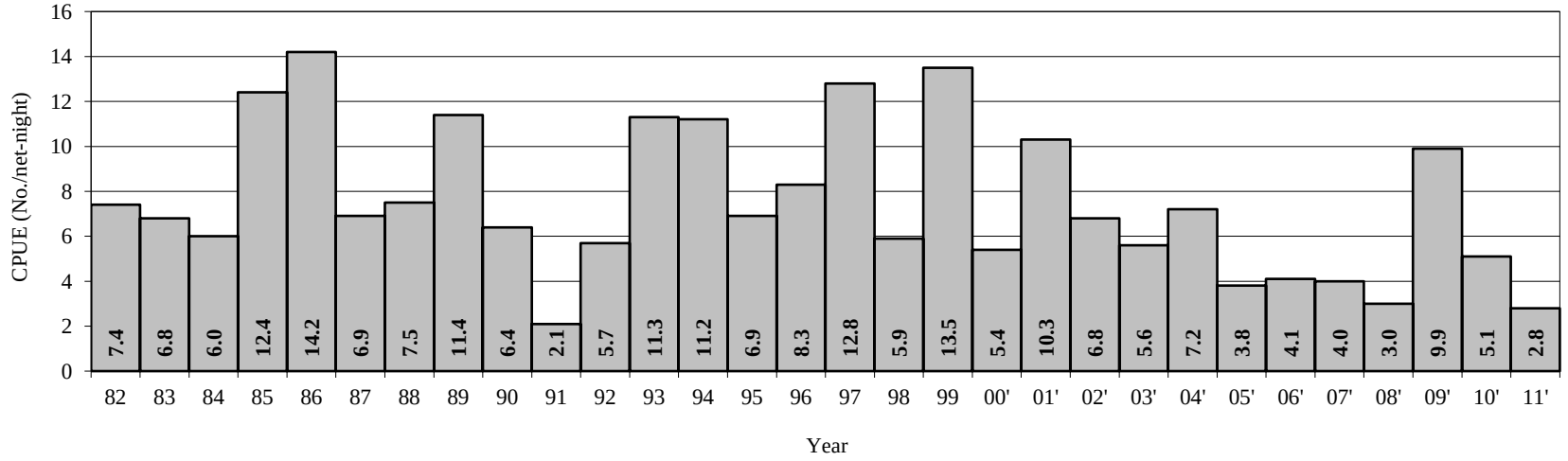



Figure 4. Walleye trap net CPUE during spring tapping in the upper Big Dry Arm of Fort Peck Reservoir from 1982-2011.

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, 1982-2011.

| 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 |
| 2011 | (4/18-5/6) | 399 | 1,341 | 2.8 | 911 | 2.3 |

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, 1982-2011.

| | Male | | Female | | |
|---|---|---|---|---|---|
| Year | Weight | n | 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 |
| 2011 | 2.5 | 85 | 6.6 | 204 | 1:2 |

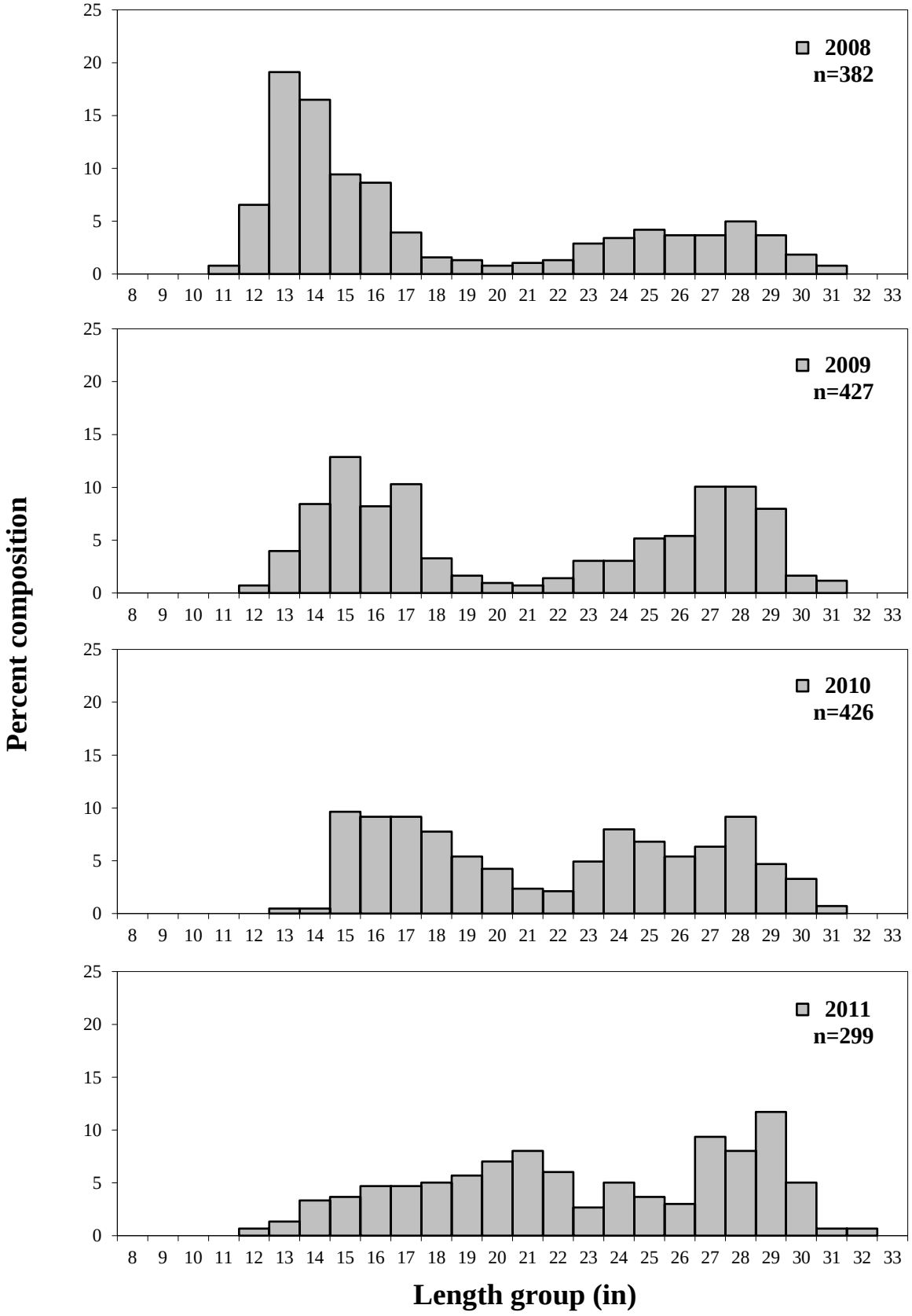



Figure 5. Length frequency of subsampled walleye collected during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 2008-2011.

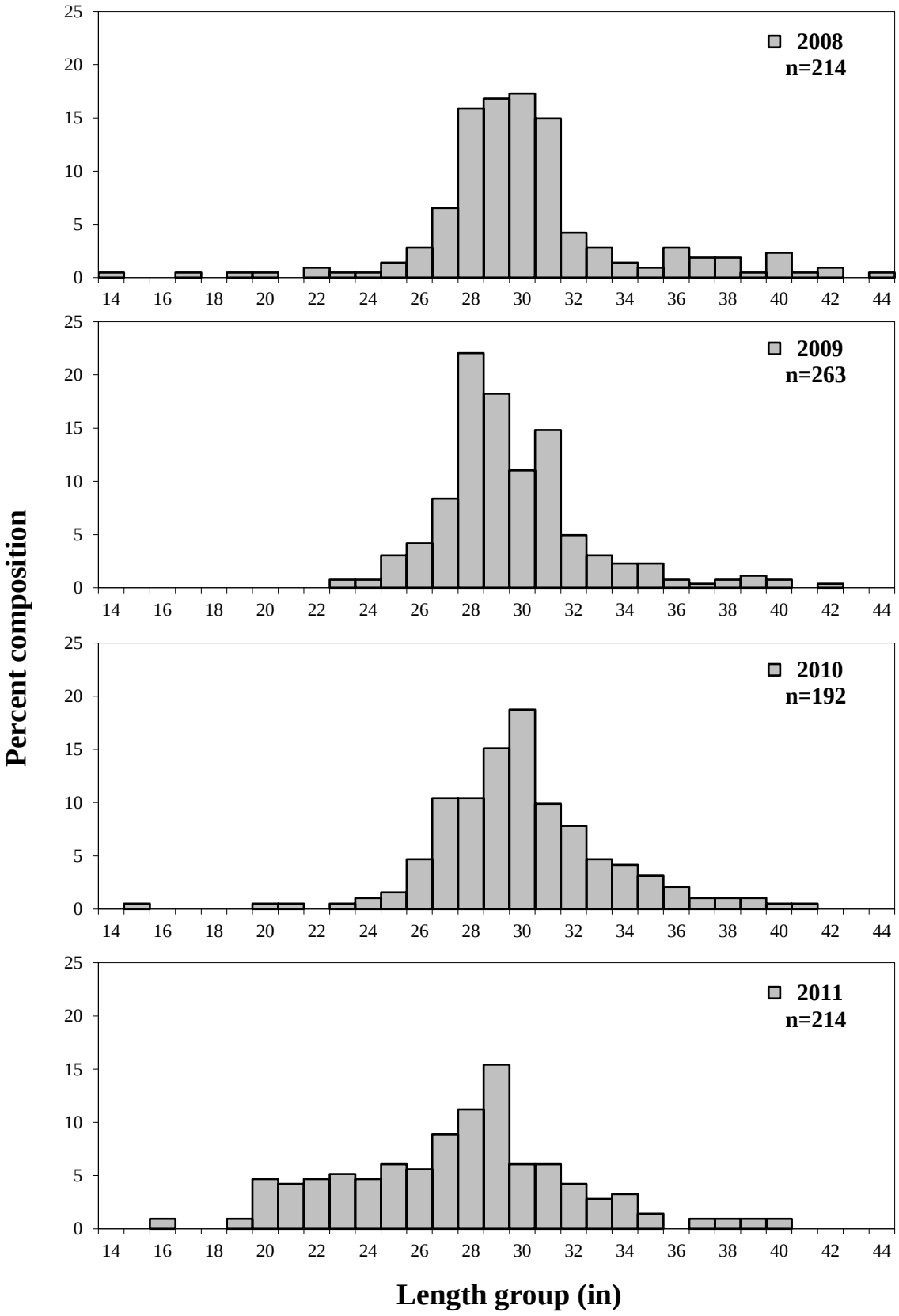



Figure 6. Length frequency of subsampled northern pike collected during spring trap netting in the upper Big Dry Arm of Fort Peck Reservoir, 2008-2011.

## 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 2011. This was due to more favorable environmental and biological conditions (i.e., increasing reservoir elevation, improved relative abundance of shoreline forage fish, and improved relative weights of walleye). However, fewer fry and fingerlings were released due to fewer eggs collected and less than average pond production at Miles City State Fish Hatchery and Fort Peck State Fish Hatchery. As a result, a total of and 5.4 million fry and 2.6 million fingerlings were stocked in 2011 (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 2011. 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 able to supplement statewide stocking of walleye in 2011.

No request for smallmouth bass fingerlings for Fort Peck Reservoir was placed in 2011; however, 20,000 surplus fingerlings from MCSFH were released. Similarly, no request for northern pike fry or fingerlings was placed in 2011 but 373,000 fry from FPSFH were released. Fort Peck Reservoir receives any unallocated smallmouth bass and /or northern pike according to the six-year statewide stocking plan.

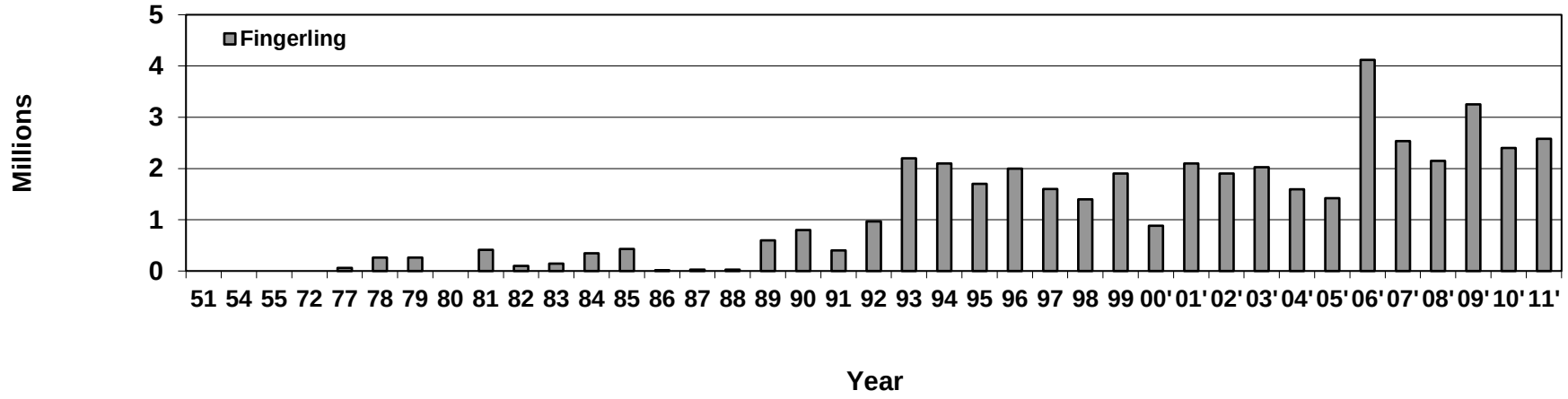



Figure 10. Number of walleye fingerlings stocked in Fort Peck Reservoir from 1951-2011.

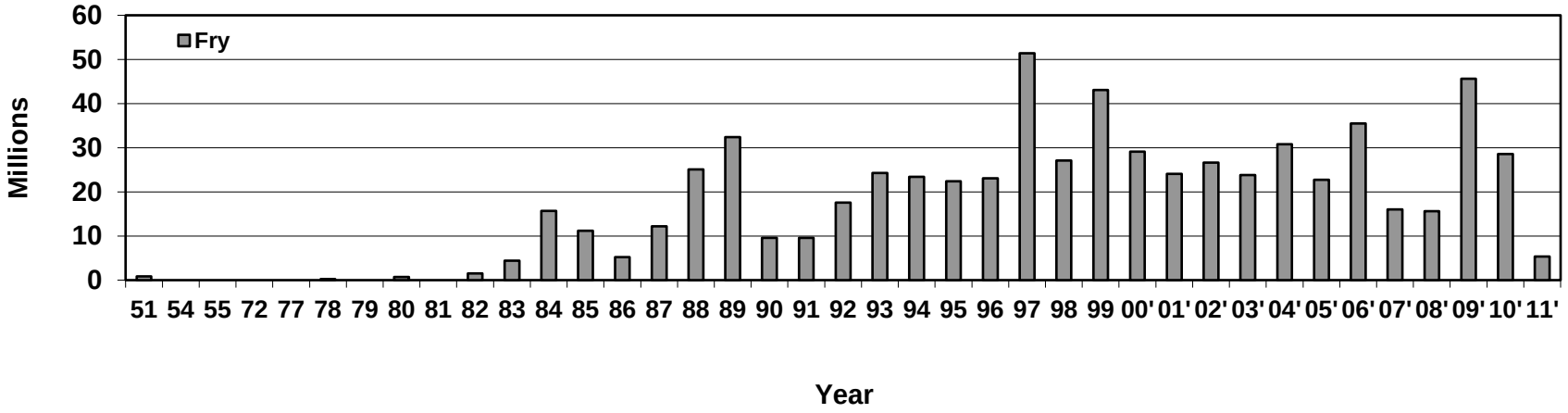



Figure 11. Number of walleye fry stocked in Fort Peck Reservoir from 1951-2011.

Table 6. Number of walleye stocked in Fort Peck Reservoir during 2011 by date, region, location, and size.

| Date | Location | Region[1] | Fry | Fingerling | Advanced | Hatchery |
|---|---|---|---|---|---|---|
| 6/23/2011 | Spring Creek | LBD | | 80,000 | | Miles City |
| 6/23/2011 | Sand Arroyo | LBD | | 144,972 | | Miles City |
| 6/28/2011 | Box Creek | LBD | | 61,020 | | Miles City |
| 6/28/2011 | Box Elder Creek | LBD | | 61,020 | | Miles City |
| 6/29/2011 | Bobcat Creek | LBD | | 59,411 | | Fort Peck |
| 6/29/2011 | Haxby | LBD | | 59,411 | | Fort Peck |
| 6/30/2011 | North Fork Rock Creek | LBD | | 97,604 | | Miles City |
| 7/19/2011 | Old Rock Creek State Ramp | LBD | | 148,135 | | Fort Peck |
| 6/1/2011 | Duck Creek | LMA | 3,650,000 | | | Fort Peck |
| 6/29/2011 | Duck Creek | LMA | | 49,518 | | Fort Peck |
| 6/29/2011 | Skunk Coulee | LMA | | 103,101 | | Fort Peck |
| 6/30/2011 | Mid Duck | LMA | | 77,647 | | Fort Peck |
| 6/30/2011 | South Fork Duck Creek | LMA | | 74,512 | | Fort Peck |
| 6/30/2011 | Main Duck | LMA | | 70,794 | | Fort Peck |
| 6/30/2011 | North Fork Duck Creek | LMA | | 48,950 | | Fort Peck |
| 7/5/2011 | Third Coulee | LMA | | 85,307 | | Fort Peck |
| 7/5/2011 | Main Duck | LMA | | 98,142 | | Fort Peck |
| 7/5/2011 | Fort Peck Marina | LMA | | 64,173 | | Fort Peck |
| 7/7/2011 | Youth Camp | LMA | | 65,589 | | Fort Peck |
| 7/7/2011 | Duck Creek | LMA | | 37,906 | | Fort Peck |
| 7/12/2011 | North Fork Rock Creek | LMA | | 65,905 | | Fort Peck |
| 7/13/2011 | Sage Creek | LMA | | 48,646 | | Fort Peck |
| 7/18/2011 | Haxby Point | LMA | | 36,356 | | Fort Peck |
| 7/18/2011 | Duck Creek Ramp | LMA | | 36,357 | | Fort Peck |
| 7/18/2011 | Marina | LMA | | 41,432 | | Fort Peck |
| 7/21/2011 | North of Sage Creek | LMA | | 24,679 | | Fort Peck |
| 8/4/2011 | Duck Creek | LMA | | | 4,301 | Fort Peck |
| 5/16/2011 | Hell Creek | MMA | 700,000 | | | Miles City |
| 5/18/2011 | Hell Creek | MMA | 700,000 | | | Miles City |
| 5/19/2011 | Hell Creek | MMA | 300,000 | | | Miles City |
| 6/21/2011 | Hell Creek | MMA | | 168,000 | | Miles City |
| 6/29/2011 | Sutherland Bay | MMA | | 164,861 | | Miles City |
| 7/1/2011 | Hell Creek | MMA | | 77,864 | | Miles City |
| 7/6/2011 | Pines Bay | MMA | | 77,757 | | Fort Peck |
| 7/7/2011 | Seventh Coulee | MMA | | 100,282 | | Fort Peck |
| 7/8/2011 | Duck Creek | MMA | | 72,502 | | Fort Peck |
| 7/13/2011 | Gilbert Creek | MMA | | 48,646 | | Fort Peck |
| 7/15/2011 | Cattle/Crooked Creek | MMA | | 43,019 | | Fort Peck |
| 7/15/2011 | Pines Ramp | MMA | | 43,020 | | Fort Peck |
| 7/15/2011 | Eighth Coulee | MMA | | 45,667 | | Fort Peck |
| Total | | | 5,350,000 | 2,582,205 | 4,301 | |

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

## RESERVOIR-WIDE GILL NETTING

Standard experimental gill nets were set in throughout the reservoir from July 26th to August 11th, 2011 when water surface temperatures ranged from 71°F to 79°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 2,262 fish (Table 7). Yellow perch, northern pike, and walleye, were the most abundant species captured overall, with catch rates of 3.5, 2.9, and 2.8 per net night, respectively. Fish with catch rates equal to or greater than 1.0 per-net night include: channel catfish, common carp, shorthead redhorse, smallmouth bass, and smallmouth buffalo. Other less common species in order of declining relative abundance include; river carpsucker, white sucker, black crappie, cisco, sauger, white crappie, bigmouth buffalo, shovelnose sturgeon, and pallid sturgeon.

### Walleye

Two hundred seventy-six walleye were captured, measured and weighed during the 2011 lake wide netting series. The lake-wide average catch rate was 2.8 walleye per net, which was a decrease from the previous year (Figure 12) and fell below the long term average of 3.6 per net. The large decrease is attributed to fewer walleyes collected in the quality length group. Relative abundance of walleye was greatest in the middle Missouri arm with a catch rate of 3.8 per net (Table 8, Figure 13). The lowest catch rate of 2.2 walleye per-net was documented in the upper Missouri arm.

Lake-wide length frequencies of walleye in 2010 indicated two year classes present with one in the 10 inch range and another in 12 to 14 to inch range (Figure 14). Length frequencies in 2011 showed a shift towards 11 to 13 to inches indicating a large year class was still present. However, fewer fish recruited in the 15 to 20 inch range. This is contrary to what was observed during spring trap netting efforts for walleye in 2011(Figure 5). It is uncertain what forced this trend, but it is hypothesized that medium to large walleye move to deeper water to feed on cisco summer progresses. By moving deeper, walleye would have less chance of being captured in gill nets set at standardized depths of 10 to 30 ft. Rawson (1956) observed movement of walleye into deeper water (>45 ft) of Lac La Ronge, Saskatchewan in response to distribution of cisco.

Age and growth information of walleye revealed a strong group of three year old fish which comprised 28% of the walleye aged in 2010 (Table 9). The strong 2008 year class was apparent again in 2011 as indicated by the large number of 3-year old fish. This age group comprised 45% of the walleyes sampled in 2011. This correlates to the first year of improved reservoir elevations and an increase in shoreline forage fish relative abundance which resulted in improved growth and survival. However, the strong 2005 year class was relatively absent in 2011 as indicated by fewer six-year olds. This age class comprised up to23% of the walleye collected in 2010 and only 12% in 2011. Higher mean lengths of age-3 through age-6 indicate improved growth of fish collected in 2011.

Relative weights continued to increase for all length groups of walleye in 2011 (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, large year classes of cisco produced in 2009 and 2011 are benefiting quality length and greater walleye. Mullins (1991) found that larger walleye (>15 in) in Fort Peck feed more effectively on age 1+ cisco.

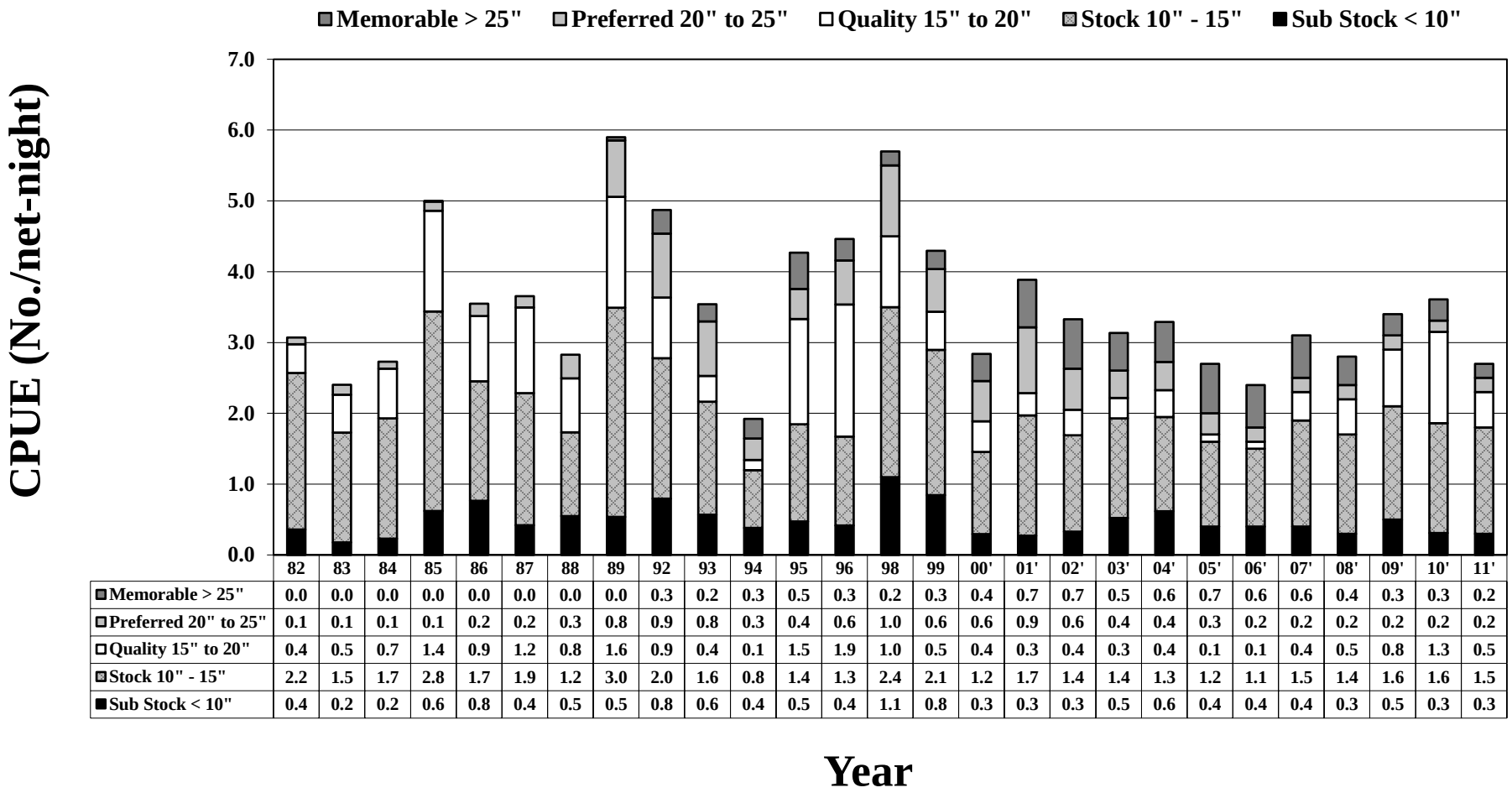
Table 7. Mean CPUE (No./net-night), mean length (in), and mean weight (lb) of fish captured by standard experimental gill nets in Fort Peck Reservoir during, July-August 2011. N is total number collected for length and weight measurements.

| | | | Average | | | |
|---|---|---|---|---|---|---|
| | | | Length | | Weight | |
| Species | Number | CPUE | Inches | *N* | Pounds | *N* |
| Bigmouth buffalo | 2 | <0.1 | 32.3 | 2 | 20.2 | 2 |
| Black crappie | 23 | 0.2 | 7.9 | 23 | 0.4 | 23 |
| Channel catfish | 241 | 2.4 | 17.9 | 241 | 2.3 | 241 |
| Cisco | 18 | 0.2 | 10.4 | 17 | 0.4 | 17 |
| Common carp | 226 | 2.3 | 19.9 | 226 | 3.9 | 226 |
| Freshwater drum | 49 | 0.5 | 14.9 | 49 | 1.8 | 49 |
| Goldeye | 240 | 2.4 | 12.9 | 238 | 0.8 | 238 |
| Northern pike | 293 | 2.9 | 23.2 | 293 | 3.6 | 293 |
| Pallid sturgeon | 1 | <0.1 | 17.7 | 1 | 0.4 | 1 |
| River carpsucker | 90 | 0.9 | 21.0 | 90 | 4.6 | 90 |
| Shovlenose sturgeon | 1 | <0.1 | 31.2 | 1 | 3.3 | 1 |
| Smallmouth buffalo | 105 | 1.1 | 25.2 | 105 | 9.8 | 105 |
| Sauger | 10 | 0.1 | 13.4 | 10 | 0.7 | 10 |
| Shorthead redhorse | 132 | 1.3 | 15.1 | 132 | 1.7 | 132 |
| Smallmouth bass | 171 | 1.7 | 11.2 | 171 | 0.9 | 171 |
| Walleye | 276 | 2.8 | 14.9 | 276 | 1.7 | 276 |
| White crappie | 3 | <0.1 | 3.9 | 3 | 0.1 | 3 |
| White sucker | 36 | 0.4 | 15.3 | 36 | 1.8 | 36 |
| Yellow perch | 345 | 3.5 | 6.6 | 344 | 0.2 | 344 |

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 2011.

| | 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 | 0 | -- | 2 | 0.1 | 0 | -- | 0 | -- | 0 | -- | 2 | <0.1 |
| Black crappie | 0 | -- | 0 | -- | 0 | -- | 0 | -- | 23 | 1.2 | 23 | 0.2 |
| Channel catfish | 36 | 1.8 | 19 | 1.0 | 12 | 0.6 | 22 | 1.1 | 152 | 7.6 | 241 | 2.4 |
| Cisco | 4 | 0.2 | 0 | -- | 11 | 0.6 | 3 | 0.2 | 0 | -- | 18 | 0.2 |
| Common carp | 28 | 1.4 | 35 | 1.8 | 48 | 2.4 | 49 | 2.5 | 66 | 3.3 | 226 | 2.3 |
| Freshwater drum | 2 | 0.1 | 10 | 0.5 | 13 | 0.7 | 8 | 0.4 | 16 | 0.8 | 49 | 0.5 |
| Goldeye | 49 | 2.5 | 9 | 0.5 | 20 | 1.0 | 57 | 2.9 | 105 | 5.3 | 240 | 2.4 |
| Northern pike | 73 | 3.7 | 53 | 2.7 | 59 | 3.0 | 79 | 4.0 | 29 | 1.5 | 293 | 2.9 |
| Pallid sturgeon | 0 | -- | 0 | -- | 0 | -- | 1 | 0.1 | 0 | -- | 1 | <0.1 |
| River carpsucker | 4 | 0.2 | 2 | 0.1 | 1 | 0.1 | 21 | 1.1 | 62 | 3.1 | 90 | 0.9 |
| Shovlenose sturgeon | 0 | -- | 1 | 0.1 | 0 | -- | 0 | -- | 0 | -- | 1 | <0.1 |
| Smallmouth buffalo | 36 | 1.8 | 19 | 1.0 | 10 | 0.5 | 10 | 0.5 | 30 | 1.5 | 105 | 1.1 |
| Sauger | 1 | 0.1 | 1 | 0.1 | 2 | 0.1 | 1 | 0.1 | 5 | 0.3 | 10 | 0.1 |
| Shorthead redhorse | 12 | 0.6 | 9 | 0.5 | 1 | 0.1 | 10 | 0.5 | 100 | 5.0 | 132 | 1.3 |
| Smallmouth bass | 20 | 1.0 | 23 | 1.2 | 36 | 1.8 | 72 | 3.6 | 20 | 1.0 | 171 | 1.7 |
| Walleye | 50 | 2.5 | 50 | 2.5 | 57 | 2.9 | 75 | 3.8 | 44 | 2.2 | 276 | 2.8 |
| White crappie | 0 | -- | 0 | -- | 0 | -- | 0 | -- | 3 | 0.2 | 3 | <0.1 |
| White sucker | 4 | 0.2 | 12 | 0.6 | 12 | 0.6 | 5 | 0.3 | 3 | 0.2 | 36 | 0.4 |
| Yellow perch | 139 | 7.0 | 51 | 2.6 | 16 | 0.8 | 76 | 3.8 | 63 | 3.2 | 345 | 3.5 |
| Total | 458 | 22.9 | 296 | 14.8 | 298 | 14.9 | 489 | 24.5 | 721 | 36.1 | 2,262 | 22.6 |

[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' | 11' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.2 |
| 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 | 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 | 0.5 |
| 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 | 1.5 |
| 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 | 0.3 |

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, 1982-2011 (no data for 1990-1991 and 1997).

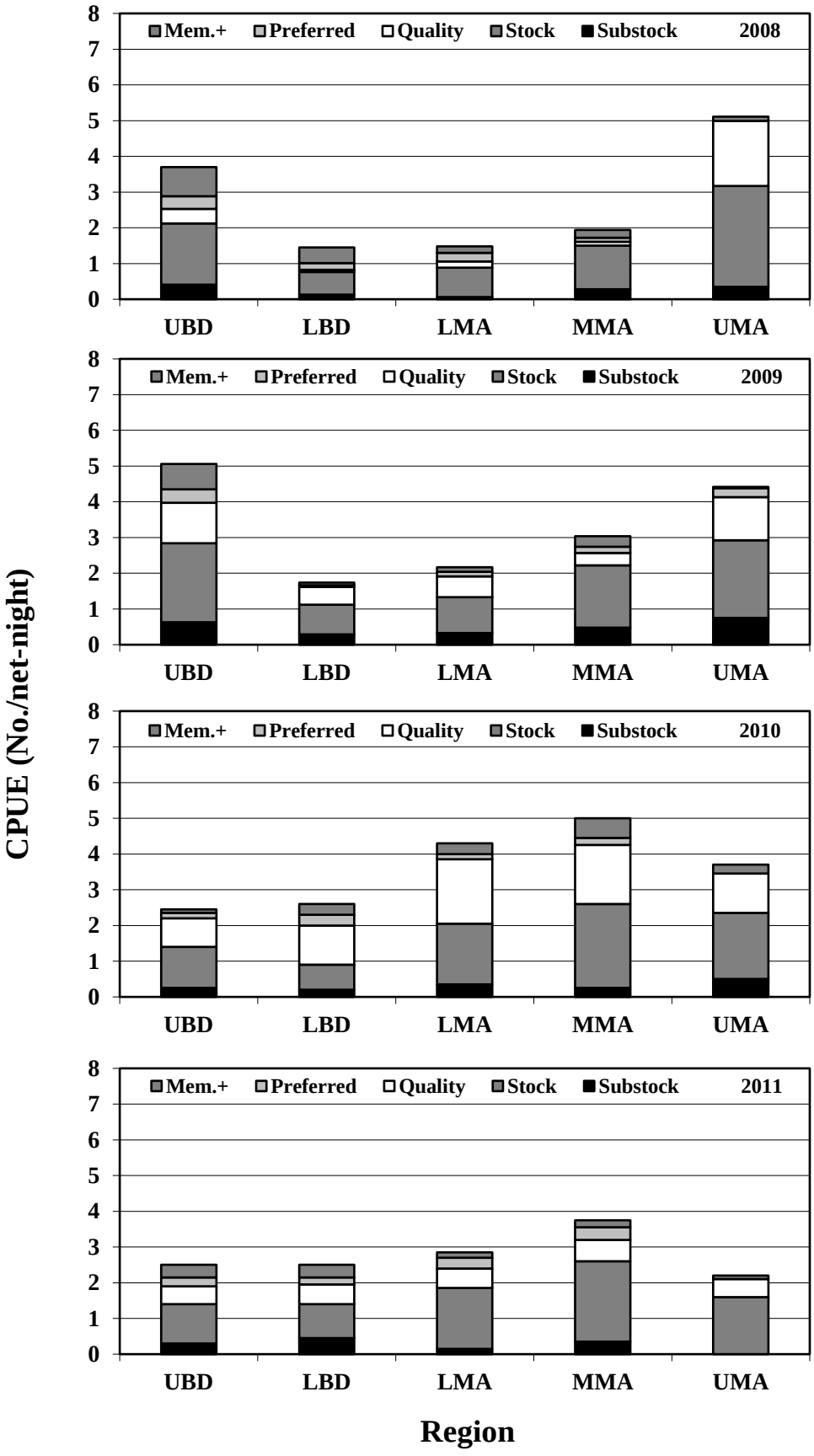



Figure 13. Size structure, in terms of catch per unit effort (CPUE), of walleye collected in standard gill net sets for the upper Big Dry (UBD), lower Big Dry (LBD), lower Missouri Arm (LMA), middle Missouri Arm, (MMA), and upper Missouri Arm (UMA) of Fort Peck Reservoir during July-August, 2008-2011.

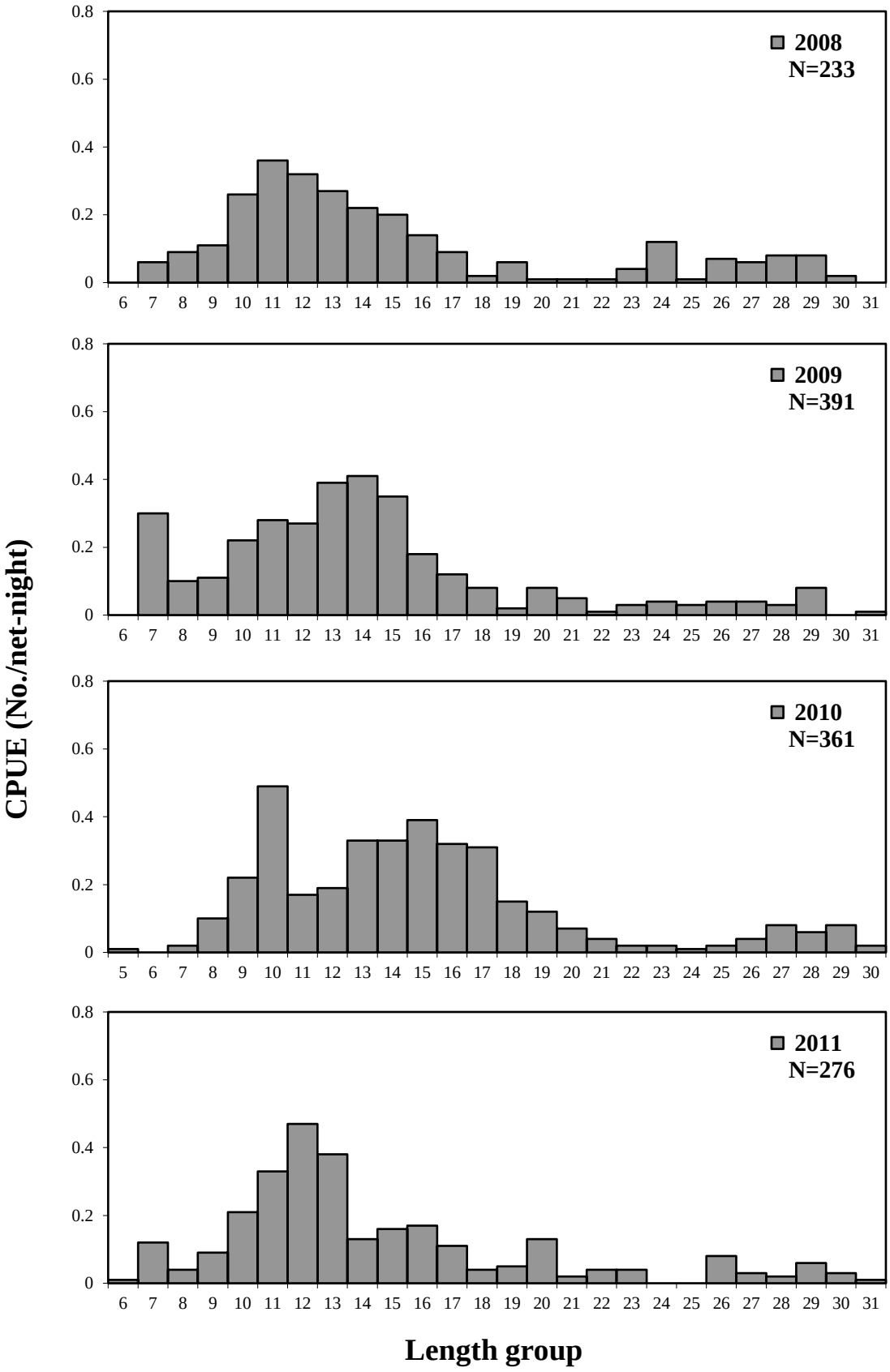
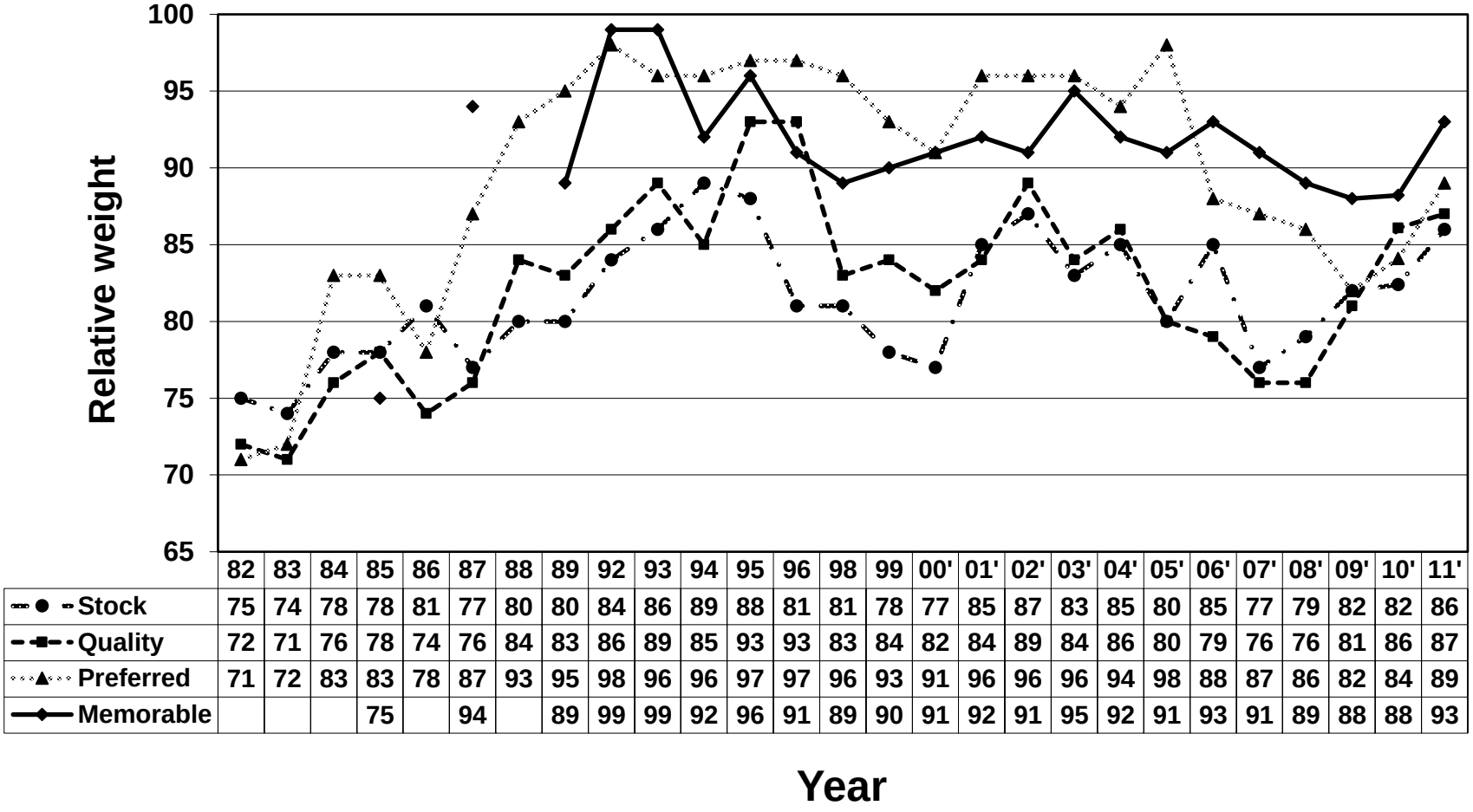



Figure 14. Length frequency, as catch per unit effort, of walleye collected in standard gill net sets in Fort Peck Reservoir during July-August, 2008-2011.




| | 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' | 11' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 86 |
| 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 | 87 |
| 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 | 89 |
| Memorable | | | | 75 | | 94 | | 89 | 99 | 99 | 92 | 96 | 91 | 89 | 90 | 91 | 92 | 91 | 95 | 92 | 91 | 93 | 91 | 89 | 88 | 88 | 93 |

Figure 15. Relative weights of various length groups of walleye collected in standard gill nets in Fort Peck Reservoir, 1982-2011 (no data for 1990-1991 and 1997).

Table 9. Mean length-at-age at time of capture (in) for walleye collected in experimental gill nets, 2006-2011, 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 | -- | -- | -- | -- |
| | | | | | | | | | | | | | | | |
| 2011 | Mean | 7.6 | 9.7 | 12.4 | 14.2 | 17.3 | 18.4 | 14.5 | 21.3 | 20.7 | 26.2 | 26.5 | -- | -- | 28.8 |
| | N | 11 | 22 | 120 | 36 | 17 | 32 | 1 | 5 | 5 | 2 | 1 | -- | -- | 2 |
| | SE | 0.2 | 0.3 | 0.1 | 0.3 | 0.5 | 0.5 | -- | 1.6 | 1.2 | 0.0 | -- | -- | -- | 1.2 |
| | Range | 6.5-8.7 | 7.3-12.2 | 9.3-17.7 | 11.6-16.9 | 13.8-22.4 | 12.9-22.9 | -- | 17.9-26.3 | 17.3-23.9 | 26.1-26.2 | -- | -- | -- | 27.6-30.1 |
| | | | | | | | | | | | | | | | |
| Mean of means | | 7.8 | 10.2 | 12.3 | 13.7 | 14.9 | 16.0 | 15.9 | 19.0 | 19.5 | 21.3 | 24.9 | 23.5 | 27.1 | 26.7 |

**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 2011 with a value of 45. RSD-P was 18 indicating a greater abundance of stock 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) increased slightly from to 9 in 2010 to 10 in 2011. 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 2010.

**Northern Pike**

Since 2006, 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). Two hundred ninety-three northern pike were captured in 2011 for a catch rate of 2.9 per net-night which was up from the previous year (Table 11). Average length and weight in 2011 continued to decrease to 23.2 inches and 3.6 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 2011, 67% 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 of northern pike in 2011 were 100 which were similar to 2010.

Northern pike PSD and RSD-P were 68 and 24, respectively in 2010. In 2011, northern pike PSD was 69 and RSD-P was 18 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 several years, terrestrial vegetation has become submerged throughout the reservoir. As a result, relative abundance of substock, stock, and quality sized northern pike has continued to increase as well.

**Channel Catfish**

A total of 241 channel catfish were captured in 2011 by gill netting, for a catch rate of 2.4 per net. This was an increase from 2010 and higher than the 24-year average of 1.9 per net (Figure 19). The increase in relative abundance could be explained by downstream movement due to record high flows in 2011. North Dakota fisheries personnel have observed a similar trend in Lake Sakakawea (Dave Fryda, personal communication). Average length decreased slightly from 18.4to 17.9 inches and average weight increased from 2.4 to 2.3 pounds in 2011 (Table 12). Catch rates continue to be highest in riverine portions of the Upper Missouri Arm at 7.6-per net (Table 8). Catch rates were lower in other regions ranging from 0.6 to 1.0 per net. Relative weights increased from the previous year to 91. Catfish PSD and RSD-P was 72 and 8, respectively, indicating a population comprised of good numbers of larger fish.

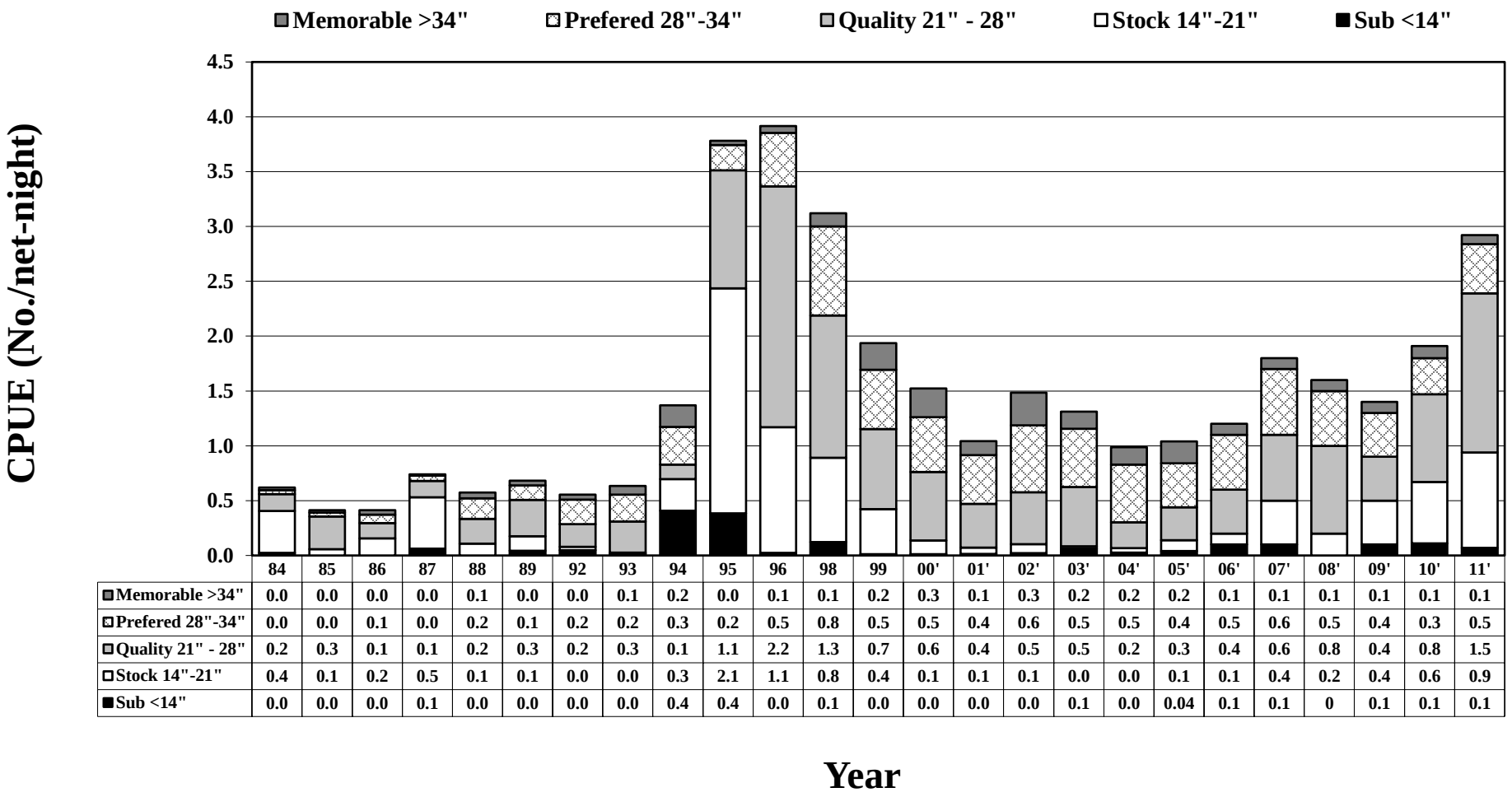
Table 10. Summary of mean catch per unit of effort (CPUE; No./net-night), standard error (SE), mean length (in), mean weight (lb), mean *Wr*, and stock density indices of walleye captured in standard experimental gill nets statistics on Fort Peck Reservoir, 1988-2011 (no data for 1990-1991 and 1997).

| Year | No. walleye | CPUE | SE | Length | Weight | *Wr* | Substock[1] | Stock[2] | Quality[3] | Preferred[4] | PSD[5] | RSD-P[6] | YAR[7] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | 207 | 2.8 | 0.3 | 14.3 | 1.2 | 83 | 36 | 171 | 82 | 21 | 48 | 15 | 21 |
| 1989 | 404 | 5.9 | 0.5 | 14.8 | 1.3 | 83 | 36 | 367 | 166 | 58 | 45 | 16 | 10 |
| 1992 | 297 | 4.7 | 0.4 | 15.8 | 2 | 88 | 39 | 257 | 132 | 78 | 51 | 30 | 15 |
| 1993 | 258 | 3.5 | 0.4 | 15.3 | 2 | 91 | 38 | 219 | 101 | 75 | 46 | 34 | 17 |
| 1994 | 139 | 1.8 | 0.2 | 15.9 | 2.4 | 92 | 23 | 116 | 54 | 43 | 47 | 37 | 20 |
| 1995 | 330 | 4.2 | 0.3 | 16.6 | 2.4 | 91 | 34 | 295 | 189 | 73 | 64 | 25 | 12 |
| 1996 | 361 | 4.4 | 0.4 | 16.5 | 2.1 | 89 | 31 | 327 | 228 | 75 | 70 | 23 | 9 |
| 1998 | 418 | 5.6 | 0.4 | 14.8 | 1.6 | 86 | 79 | 339 | 159 | 89 | 47 | 26 | 23 |
| 1999 | 329 | 4.2 | 0.3 | 14.4 | 1.5 | 90 | 63 | 266 | 108 | 67 | 41 | 25 | 24 |
| 2000 | 250 | 2.8 | 0.2 | 16.6 | 2.3 | 83 | 26 | 224 | 122 | 84 | 54 | 38 | 12 |
| 2001 | 272 | 3.9 | 0.4 | 17.4 | 2.8 | 88 | 19 | 253 | 134 | 112 | 53 | 44 | 8 |
| 2002 | 324 | 3.3 | 0.2 | 17.4 | 2.8 | 90 | 32 | 291 | 159 | 124 | 55 | 43 | 11 |
| 2003 | 301 | 3.1 | 0.3 | 17.3 | 2.8 | 88 | 38 | 263 | 156 | 105 | 59 | 40 | 14 |
| 2004 | 250 | 3.3 | 0.3 | 15.9 | 2.3 | 88 | 47 | 203 | 102 | 73 | 50 | 36 | 23 |
| 2005 | 227 | 2.7 | 0.3 | 16.3 | 2.6 | 85 | 37 | 190 | 88 | 78 | 46 | 41 | 19 |
| 2006 | 207 | 2.4 | 0.2 | 16.2 | 2.6 | 87 | 38 | 168 | 78 | 66 | 46 | 39 | 23 |
| 2007 | 261 | 3.1 | 0.3 | 16.2 | 2.3 | 81 | 36 | 225 | 100 | 70 | 44 | 31 | 16 |
| 2008 | 234 | 2.8 | 0.3 | 15.5 | 1.9 | 81 | 21 | 212 | 89 | 45 | 42 | 21 | 10 |
| 2009 | 393 | 3.3 | 0.3 | 14.6 | 1.4 | 83 | 59 | 332 | 143 | 53 | 43 | 16 | 18 |
| 2010 | 361 | 3.6 | 0.3 | 15.4 | 1.7 | 84 | 31 | 330 | 175 | 46 | 53 | 13 | 9 |
| 2011 | 267 | 2.8 | 0.3 | 14.9 | 1.7 | 88 | 25 | 251 | 99 | 45 | 39 | 18 | 10 |

[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, 1984-2011.

| 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 |
| 2011 | 293 | 2.9 | 23.2 | 3.6 | 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' | 11' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 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 | 0.5 |
| 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 | 1.5 |
| 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 | 0.9 |
| 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 | 0.1 |

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, 1984-2011, (no data for 1990-1991 and 1997) .

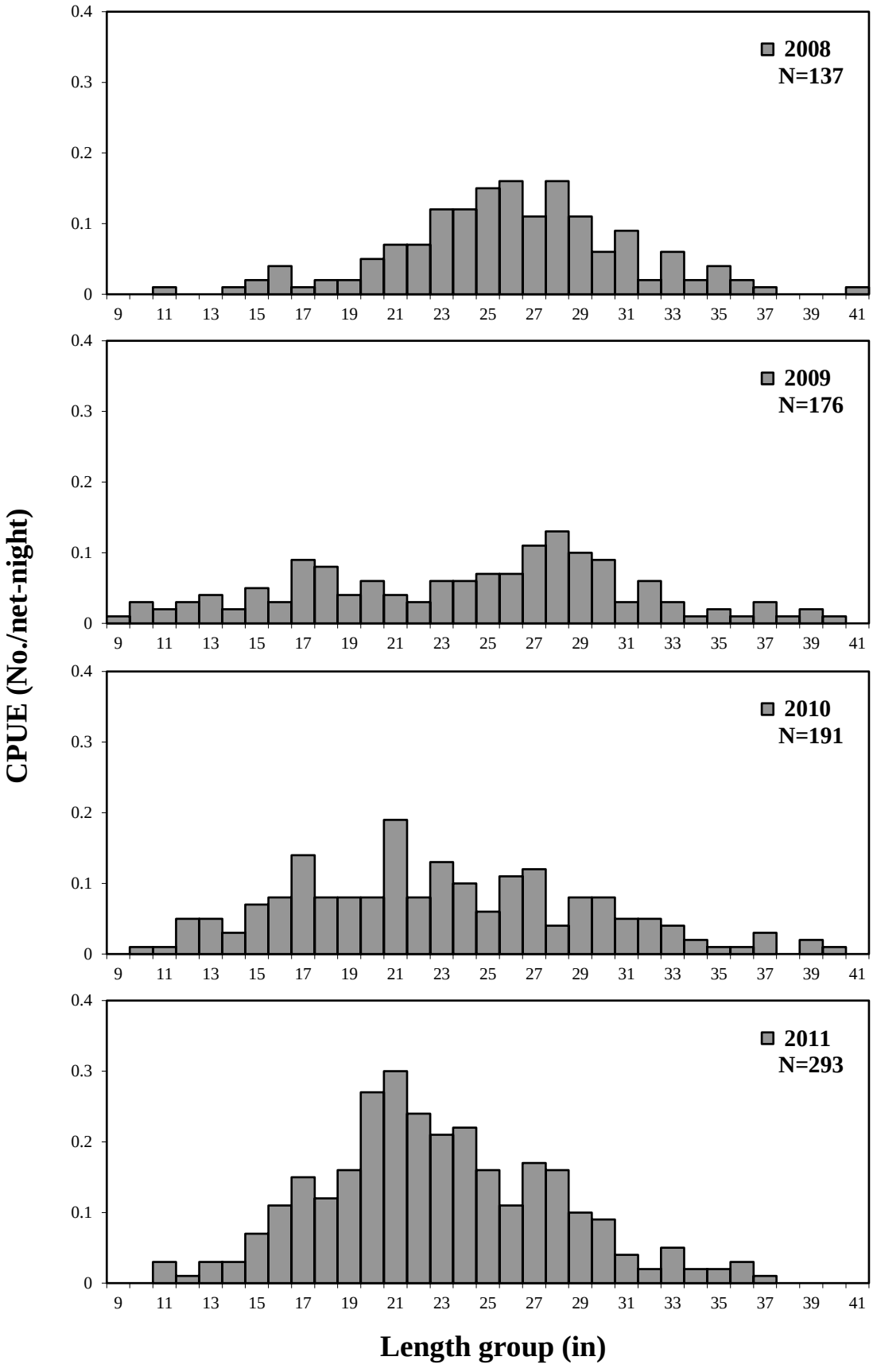
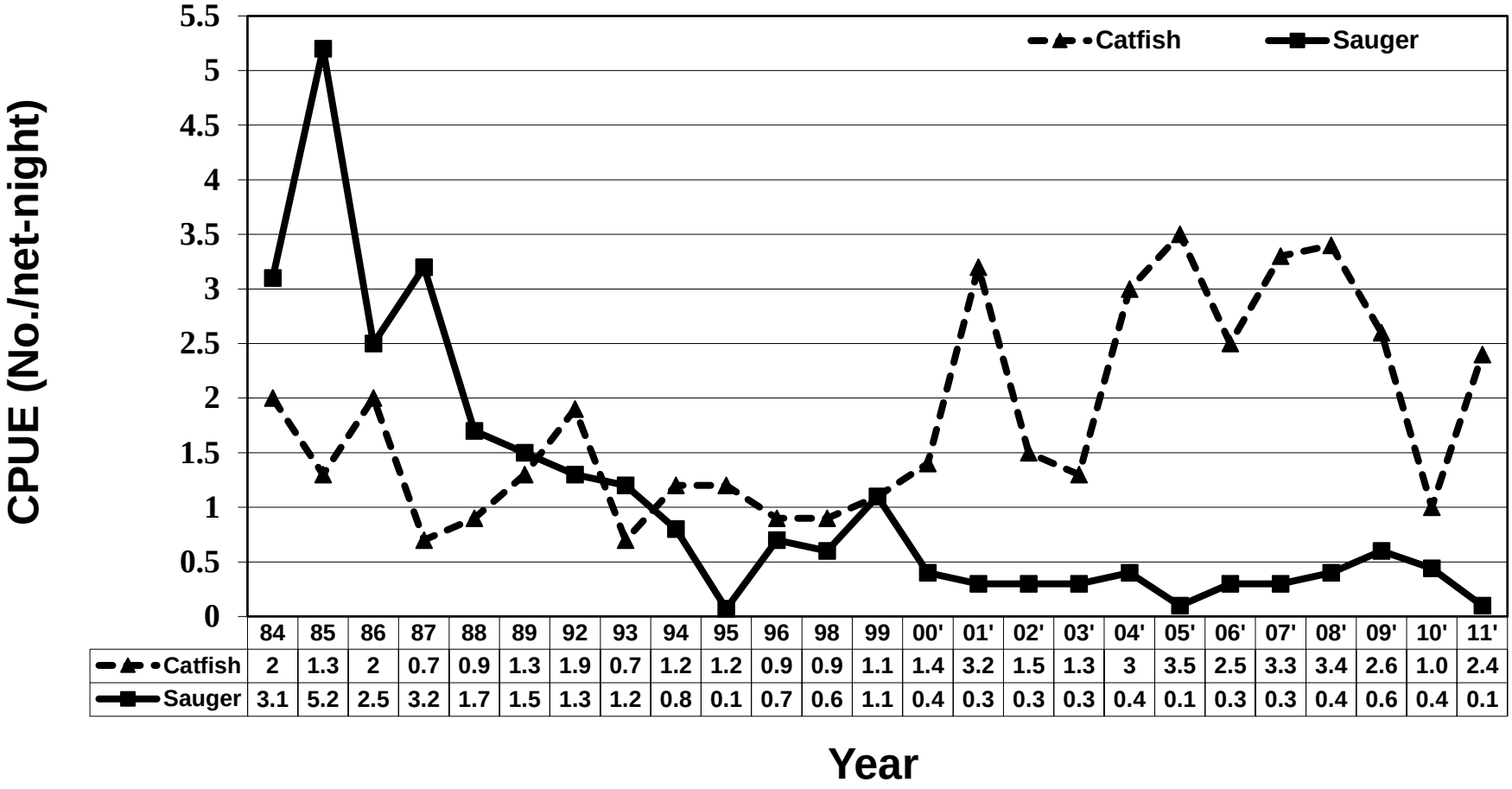



Figure 18. Length frequency, as catch per unit effort (CPUE), of northern pike collected in standard gill-net sets in Fort Peck Reservoir during July-August, 2008-2011.




| | 84 | 85 | 86 | 87 | 88 | 89 | 92 | 93 | 94 | 95 | 96 | 98 | 99 | 00' | 01' | 02' | 03' | 04' | 05' | 06' | 07' | 08' | 09' | 10' | 11' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 1.0 | 2.4 |
| 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 | 0.1 |

Figure 19. Relative abundance of channel catfish and sauger collected in the standard gill net surveys in Fort Peck Reservoir, 1984-2011, (no data for 1990-1991 and 1997).

Table 12. Summary of mean catch per unit of effort (CPUE; No./net-night), mean length (in) and mean weight (lb) of channel catfish captured in standard experimental gill nets on Fort Peck Reservoir, 1984-2011.

| 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 |
| 2011 | 241 | 2.4 | 17.9 | 2.3 |

**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 2011catch rate was 0.1 fish per net which has been on a gradual decrease from 2009. Average size of sauger in 2011 was 13.4 inches and 0.7 pounds with a relative weight of 77. 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 6th to August 11th , 2011 were examined for the presence of forage items. Walleye had the most diverse diet followed closely by smallmouth bass (Table 13). Yellow perch were the most commonly identified items found in walleye at 7.8%. Cisco were the most commonly identified fish found in northern pike at 8.7% followed closely by yellow perch at 8%. 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 northern pike, sauger, smallmouth bass, and walleye captured in experimental gill nets in 2010. Sample size is given in parentheses.

| Forage items | Northern pike (286) | Sauger (8) | Smallmouth bass (115) | Walleye (269) |
|---|---|---|---|---|
| Bigmouth buffalo | -- | -- | -- | 0.4% |
| Chinook salmon | 0.7% | -- | -- | -- |
| Cisco | 8.7% | -- | 2.6% | 4.5% |
| Common carp | -- | -- | -- | 0.7% |
| Crayfish | 2.1% | -- | 7.8% | -- |
| Empty | 67.8% | 50.0% | 30.4% | 52.4% |
| Freshwater drum | -- | -- | 0.9% | 0.4% |
| Invertebrates | -- | 12.5% | 15.7% | 6.7% |
| Northern pike | 0.7% | -- | 1.7% | -- |
| *Pomoxis spp.* | -- | 12.5% | -- | 1.9% |
| Smallmouth buffalo | -- | -- | 0.9% | -- |
| Smallmouth bass | 0.3% | -- | -- | -- |
| Spottail shiner | -- | -- | -- | 0.4% |
| Unknown | 11.5% | 25.0% | 31.3% | 24.5% |
| Walleye | -- | -- | -- | 0.4% |
| Yellow perch | 8.0% | -- | 8.7% | 7.8% |

## BEACH SEINING

Shoreline beach seining was conducted to determine reproductive success of age-0 game and non-game fish from August 8th to September 8th, 2011. Seine hauls at 100 locations throughout the reservoir captured 20 species of young-of-year and forage fish for a total of 27,641 fish in 2011 (Table 15). Relative abundance of shoreline forage typically follows changes in reservoir elevations (Figure 21). In 2011, reservoir elevations increased rapidly after April due to record amounts of spring precipitation and mountain snowpack (Figure 20). Reservoir elevations decreased sharply in July due to evacuation of flood waters.

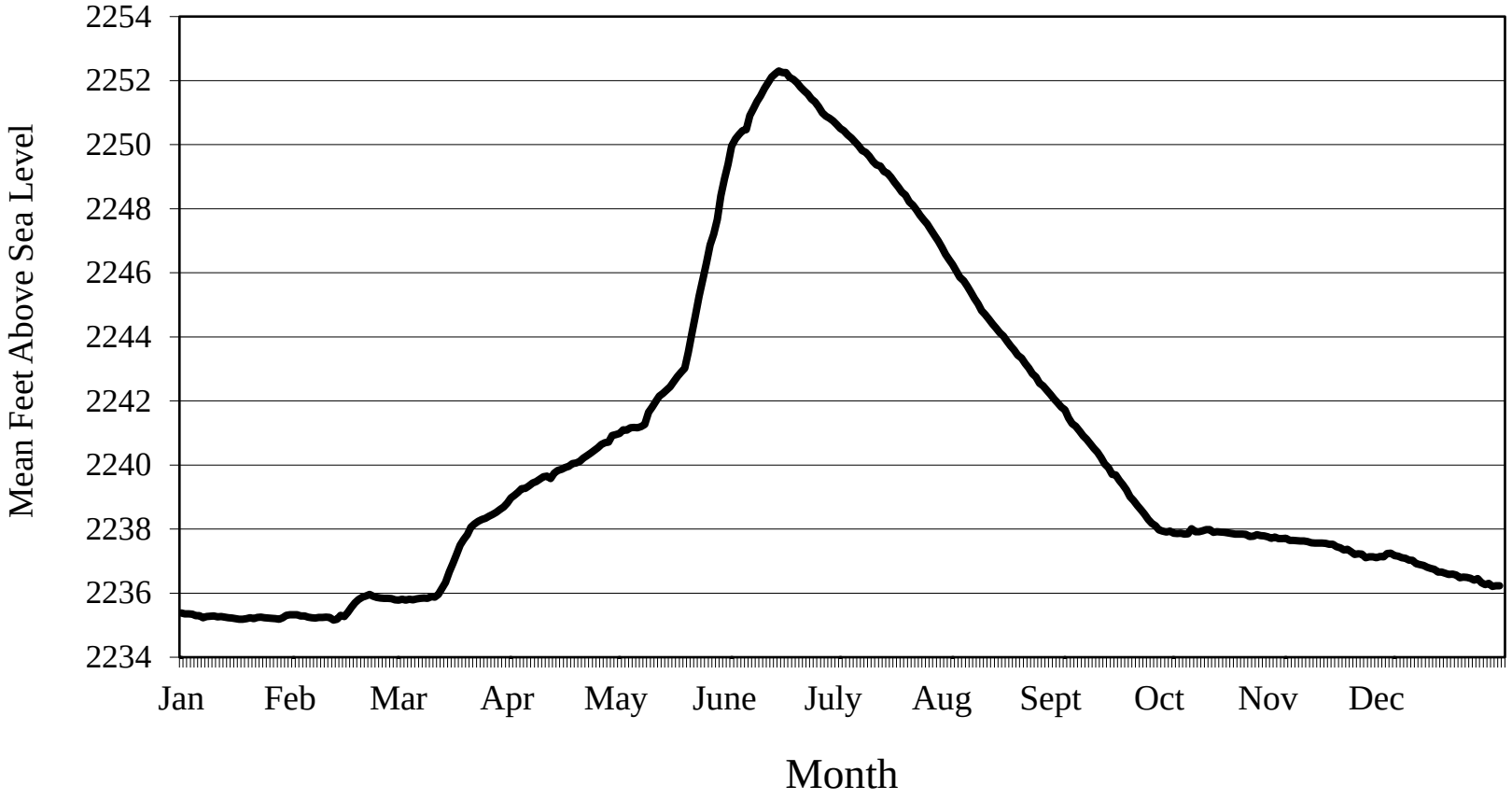



Figure 20. Average daily elevation from January 1, 2011 to December 31, 2011 (data provided by USACE).

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 2011. 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 | 0 | -- | 0 | -- | 5 | 0.3 | 1 | 0.1 | 169 | 8.5 | 175 | 1.8 |
| Black Bullhead | 122 | 6.1 | 0 | -- | 0 | -- | 0 | -- | 0 | -- | 122 | 1.2 |
| Common carp | 2 | 0.1 | 4 | 0.2 | 13 | 0.7 | 3 | 0.2 | 492 | 24.6 | 514 | 5.1 |
| Crappie | 885 | 44.3 | 1,130 | 56.5 | 464 | 23.2 | 810 | 40.5 | 3,437 | 171.9 | 6,726 | 67.3 |
| Emerald shiner* | 681 | 34.1 | 8 | 0.4 | 83 | 4.2 | 160 | 8.0 | 101 | 5.1 | 1033 | 10.3 |
| Fathead minnow* | 0 | -- | 2 | 0.1 | 2 | 0.1 | 0 | -- | 4 | 0.2 | 8 | 0.1 |
| Freshwater drum | 2 | 0.1 | 0 | -- | 13 | 0.7 | 21 | 1.1 | 620 | 31.0 | 656 | 6.6 |
| Goldeye | 0 | -- | 0 | -- | 0 | -- | 0 | -- | 473 | 23.7 | 473 | 4.7 |
| Green sunfish | 0 | -- | 3 | 0.2 | 0 | -- | 0 | -- | 2 | 0.1 | 5 | 0.1 |
| Hybognathus spp.* | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 0.1 | 181 | 9.1 | 182 | 1.8 |
| Northern pike | 30 | 1.5 | 81 | 4.1 | 109 | 5.5 | 40 | 2.0 | 25 | 1.3 | 285 | 2.9 |
| River carpsucker | 0 | -- | 0 | -- | 0 | 0.0 | 0 | -- | 1,521 | 76.1 | 1,521 | 15.2 |
| Smallmouth buffalo | 2 | 0.1 | 0 | -- | 3 | 0.2 | 2 | 0.1 | 83 | 4.2 | 90 | 0.9 |
| Smallmouth bass | 13 | 0.7 | 13 | 0.7 | 2 | 0.1 | 12 | 0.6 | 59 | 3.0 | 99 | 1.0 |
| Spottail shiner* | 1,033 | 51.7 | 407 | 20.4 | 285 | 14.3 | 2,628 | 131.4 | 2,212 | 110.6 | 6,565 | 65.7 |
| Walleye | 4 | 0.2 | 1 | 0.1 | 1 | 0.1 | 1 | 0.1 | 1 | 0.1 | 8 | 0.1 |
| White sucker | 0 | -- | 0 | -- | 1 | 0.1 | 0 | -- | 0 | -- | 1 | <0.1 |
| Yellow perch | 2,038 | 101.9 | 150 | 7.5 | 610 | 30.5 | 1,797 | 89.9 | 4,583 | 229.2 | 9,178 | 91.8 |
| Total | 4,812 | 240.6 | 1,799 | 90.0 | 1,591 | 79.6 | 5,476 | 273.8 | 13,963 | 698.2 | 27,641 | 276.4 |

*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 2011 was similar to 2010 which was still near an all time low during the sampling period (Figure 22). A total of 8 walleye fingerlings were caught for a catch rate of 0.1 per seine reservoir wide. In 2011, 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 0.2 per haul (Table 15). In previous years, the upper Missouri arm contained the highest catch rates. 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

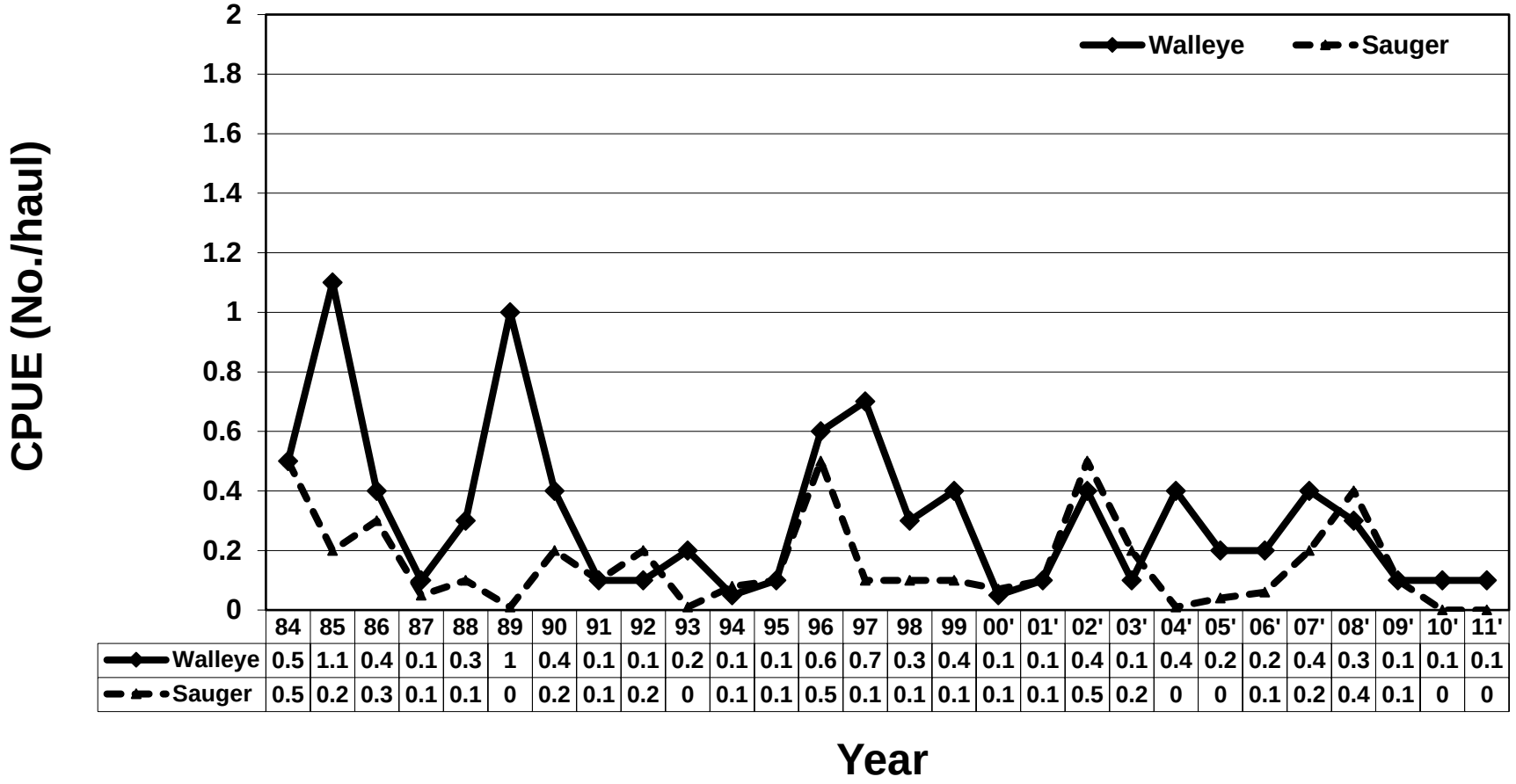
No young-of-year sauger were collected in 2011 during the annual seining survey. The only other time this occurred was in 2010. Record low relative abundances of young-of-year sauger have been observed during the years of 1987, 1989, 1993, and 2004 (Figure 22). These years of low relative abundances 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, conditions experienced in 2011were characterized by increased reservoir elevations and record high 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 and Musselshell Rivers above Fort Peck Reservoir have been identified as spawning areas for sauger (McMahon and Gardner 2001; Bellgraph et al. 2008). Once these fish hatch, it's likely these young fish drift downstream into the reservoir as they have been sampled during annual shoreline seining surveys and no sauger fingerlings are planted in Fort Peck Reservoir.

### Northern Pike

Young-of-year northern pike relative abundance increased from 0.4 per seine haul in 2010 to 2.9 per seine haul in 2011. This was the second largest year class observed during the sampling period (Figure 23). Young-of-year northern pike were captured in all sampling regions with the largest catch rate in the lower Missouri Arm at 5.5 per seine haul (Table 15). The increased relative abundance in young-of-year northern pike in 2011 is attributed to an early spring rise, which flooded large amounts of terrestrial vegetation, when water temperatures were below 43°F (Frost and Kipling 1967).

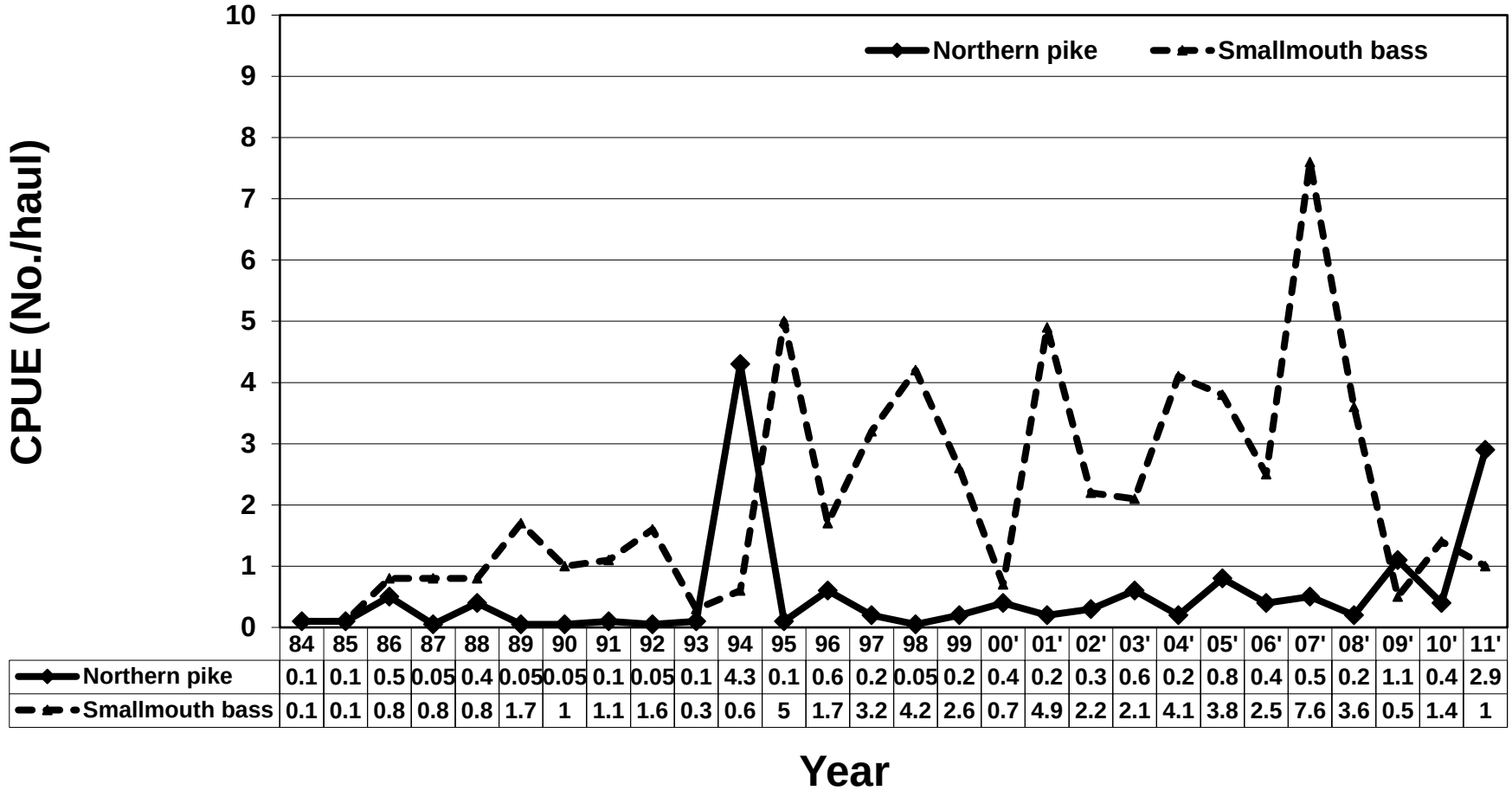
### Smallmouth Bass

Smallmouth bass have been one of the most abundant game species captured during annual seining surveys. However, relative abundance dropped from an all time high of 7.6 per seine haul in 2007 to 1.0 per seine haul in 2011. Over the last few years, relative abundance has remained relatively low and now 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 3.0 fish per haul (Table 15). This is consistent with previous years because this region contains more suitable spawning substrate (i.e., gravel) than other portions of the reservoir. As indicated by seining surveys, smallmouth bass have successfully spread to all areas of the reservoir.




| | 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' | 11' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 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 | 0 |

Figure 22. CPUE of walleye and sauger young-of-year collected during annual seine hauls in Fort Peck Reservoir from 1984-2011.




| | 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' | 11' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 2.9 |
| 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 | 1 |

Figure 23. CPUE of northern pike and smallmouth bass young-of-year collected during annual seine hauls in Fort Peck Reservoir from 1984-2011.

### 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 2007 due to stable and rising reservoir elevations that provided additional spawning and rearing habitat (Figure 21). Yellow perch relative abundance in 2011 increased to some of their highest catch rates at 91.8 per seine haul which was an increase from 63.3 per seine haul in 2010. Reservoir elevations rose in early April which is the ideal spawning period for yellow perch when water temperatures are between 44 and 51°F (Scott and Crossman 1973; Figure 20). In addition, continued reproductive success was due to previously inundated vegetation of 2010. Yellow perch were most abundant in the upper Missouri Arm with a catch rate of 229.2 per seine haul (Table 15). Relative abundance of yellow perch should remain stable in 2012 as a result of the previously inundated shoreline vegetation in 2011.

### Crappie

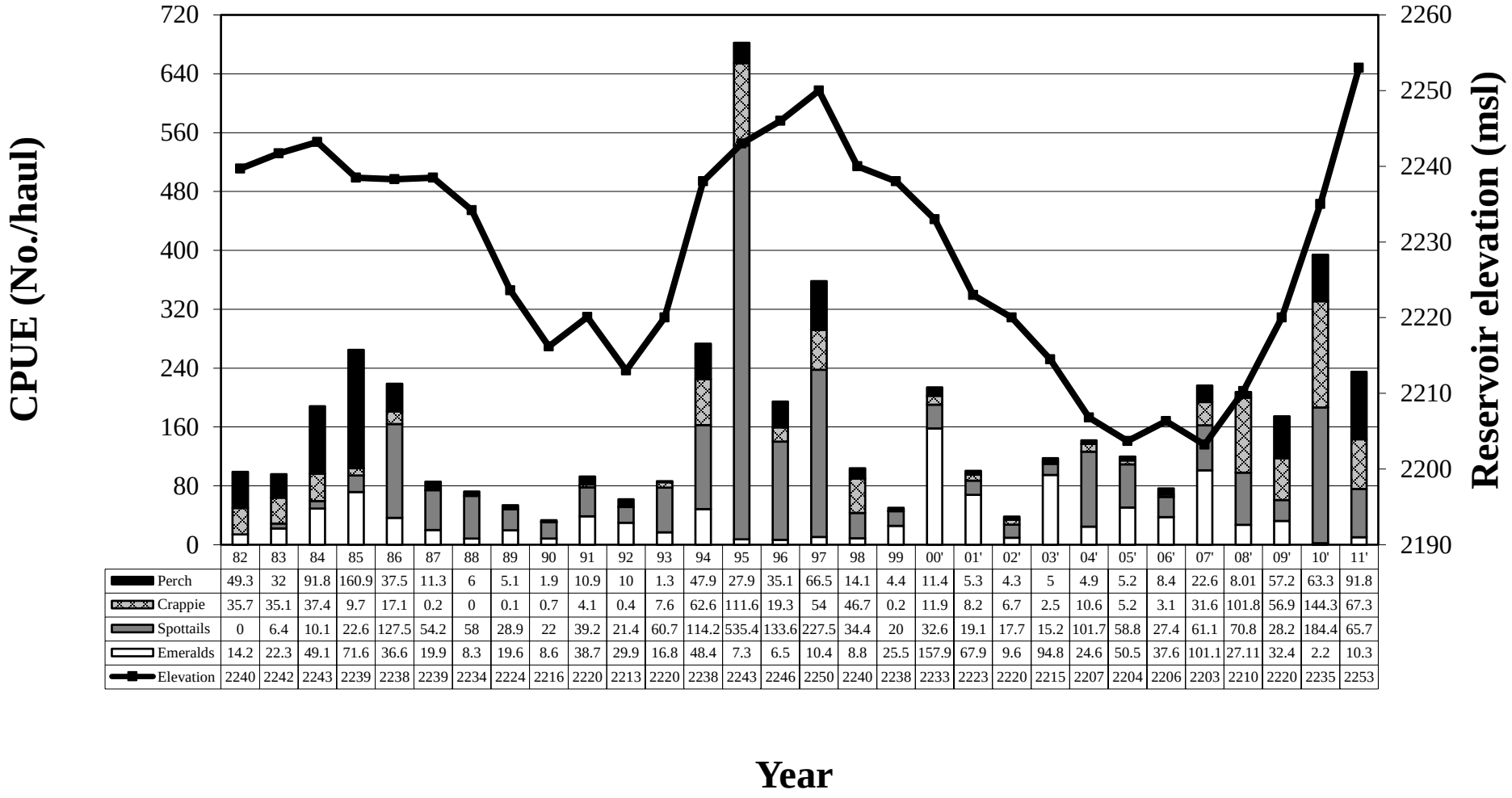
Young-of-year crappie relative abundance decreased in 2011 to 67.3 per seine haul from some of their highest levels at 144.3 per seine haul in 2010. However, relative abundance of young-of-year crappie still resembles those observed during the mid to late 1990's when the reservoir began to fill (Figure 21). Similar to previous years, a large percentage of crappie was collected in the upper Missouri Arm (51%; Table 15). However, 49% of the total crappie was collected in the other four regions during the 2011 annual seining surveys indicating improved spawning and rearing habitat in other portions of the reservoir. In the past, the upper Missouri arm contained +90% of the young-of-year crappie collected due to more suitable spawning and rearing habitat.

### Emerald Shiner

Emerald shiner relative abundance in 2011 was 10.3 per seine haul, which was a slight increase from 2.2 per seine haul in 2010. Relative abundance of emerald shiners has been relatively low over the last several years making them similar to the mid to late 1990's when reservoir elevations were increasing (Figure 21). A possible explanation for these decreases could be upstream movement into more riverine type habitat. In 2011, 67 % of emerald shiners were captured in the upper Big Dry arm (Table 15).

### Spottail Shiner

Relative abundance of spottail shiners decreased from 184.4 per seine haul in 2010 to 65.7 per seine haul in 2011. 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 middle Missouri arm containing the most with 131.4 per seine. In 2011, 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 2011 and should continue into 2012.




| | 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' | 11' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Perch | 49.3 | 32 | 91.8 | 160.9 | 37.5 | 11.3 | 6 | 5.1 | 1.9 | 10.9 | 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 |
| 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 | 111.6 | 19.3 | 54 | 46.7 | 0.2 | 11.9 | 8.2 | 6.7 | 2.5 | 10.6 | 5.2 | 3.1 | 31.6 | 101.8 | 56.9 | 144.3 | 67.3 |
| Spottails | 0 | 6.4 | 10.1 | 22.6 | 127.5 | 54.2 | 58 | 28.9 | 22 | 39.2 | 21.4 | 60.7 | 114.2 | 535.4 | 133.6 | 227.5 | 34.4 | 20 | 32.6 | 19.1 | 17.7 | 15.2 | 101.7 | 58.8 | 27.4 | 61.1 | 70.8 | 28.2 | 184.4 | 65.7 |
| 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 | 10.4 | 8.8 | 25.5 | 157.9 | 67.9 | 9.6 | 94.8 | 24.6 | 50.5 | 37.6 | 101.1 | 27.11 | 32.4 | 2.2 | 10.3 |
| Elevation | 2240 | 2242 | 2243 | 2239 | 2238 | 2239 | 2234 | 2224 | 2216 | 2220 | 2213 | 2220 | 2238 | 2243 | 2246 | 2250 | 2240 | 2238 | 2233 | 2223 | 2220 | 2215 | 2207 | 2204 | 2206 | 2203 | 2210 | 2220 | 2235 | 2253 |

Figure 21. Maximum annual reservoir elevation compared to combined number of emerald, spottail, young-of-year yellow perch, and crappie from 1982-2011.

**Chinook salmon**

Chinook salmon were stocked in Fort Peck Reservoir in the spring and fall of 2011 (Table 16). A total of 255,492 spring-stocked fish were released in June averaging 62 per pound for a total weight of 4,118 pounds. An additional 38,605 fall-stocked fish were reared to 5.6 per pound for a total weight of 6,893 pounds. 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 variable over the years. In 2011, the amount of females spawned and eggs collected dropped by half compared to the record egg-take in 2010 (Figure 24). This annual egg-take effort for Montana resulted in 254,579 green eggs which averaged approximately 3,394 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 2011 stocking requirements. 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 3rd to October 25th in various embayments adjacent to the marina, spillway, off the face of the dam, and Bear Creek.

Biological data was collected from adult chinook salmon during spawning to provide more information on age, growth, and stocking-and-rearing history. In 2011, the majority of females spawned were 4-year olds (66%) and the remaining were 3-year old females (34%) (Table 18). In contrast, the majority of females spawned in 2010 were 3-year old females (84%) and the remaining were 4-year old females (16%; 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 coldwater habitat due to increase 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 2011, the mean weight of pre-spawn female chinook salmon was 14.1 pounds which was slightly down from the mean weight of 14.6 in 2010. When examining the mean weight at each age, both male and female salmon collected in 2011 were lower than those collected in 2010 (Table 17; Table 18). Three and four year old males averaged 9.5 and 15.4 pounds, respectively in 2011 compared to 13.2 and 16.4 pounds in 2010. Similarly in 2011, three and four year old females averaged 10.2 and 16.1 pounds, respectively compared to 14.1 and 17.0 pounds in 2010. It is apparent that the higher abundance of cisco over the last few years and the record year class produced in 2009 contributed to the increased weights at ages in 2010. These improved growth rates would also 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, 2001-2011.

| 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 |
| 6/10/2011 | 108,760 | 1,729 | 62.9 | None | Duck Creek |
| 6/10/2011 | 108,706 | 1,828 | 59.4 | None | Pines Bay |
| 6/15/2011 | 38,026 | 561 | 67.8 | None | Rock Creek |
| 11/1/2011 | 38,605 | 6,893 | 5.6 | Adipose Clip | Marina Bay |

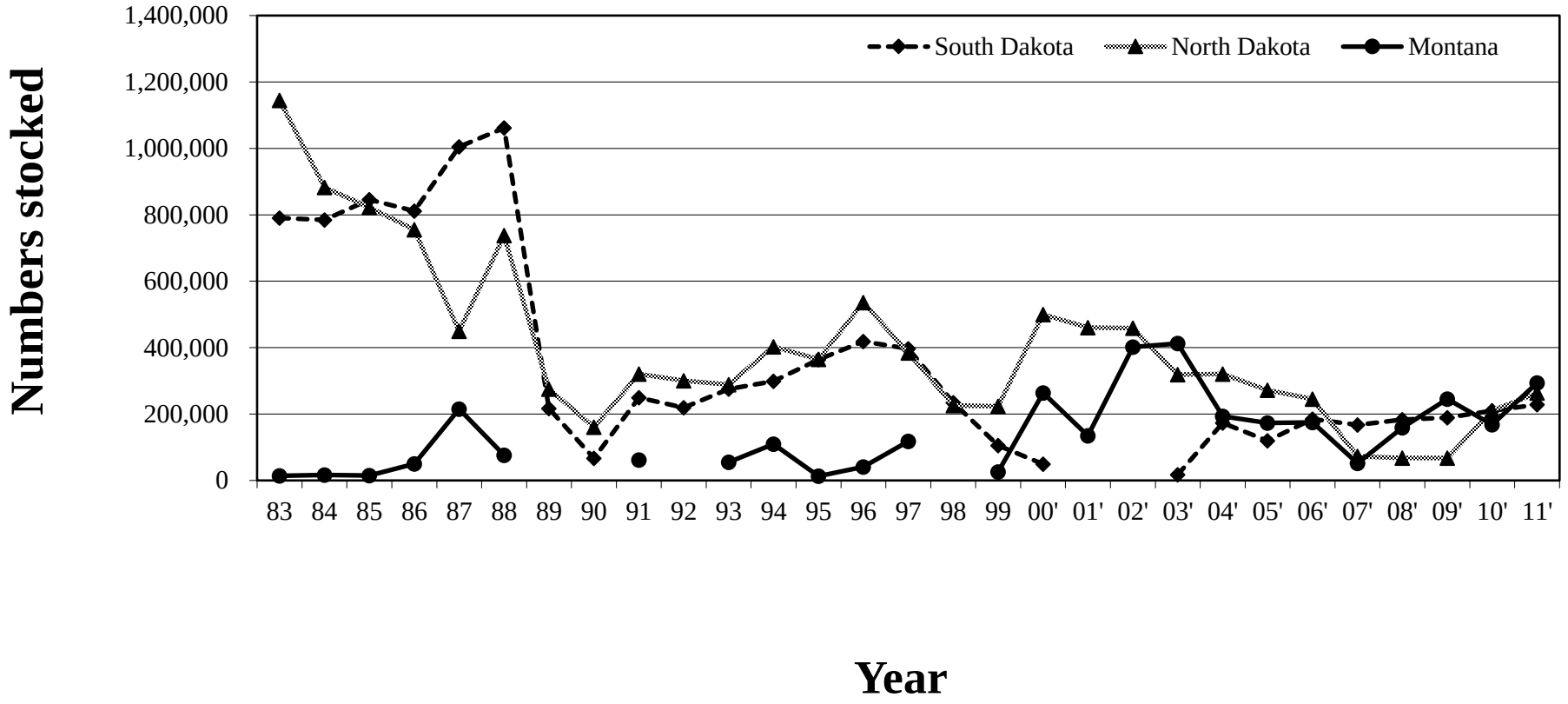



Figure 22. Annual comparison of chinook salmon numbers stocked in Oahe, Sakakawea, and Fort Peck Reservoir, 1983-2011.

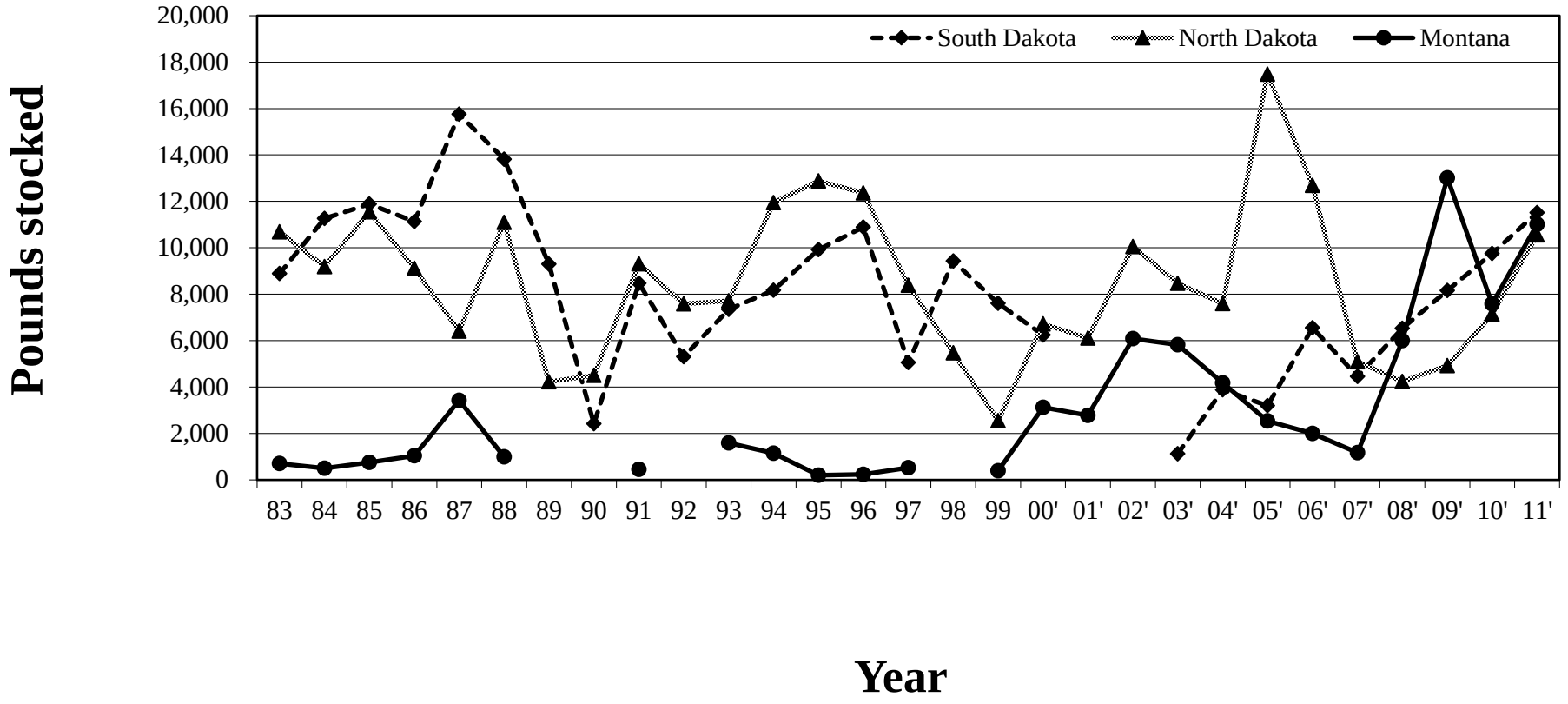



Figure 23. Annual comparison of chinook salmon pounds stocked in Oahe, Sakakawea, and Fort Peck Reservoir, 1983-2011.

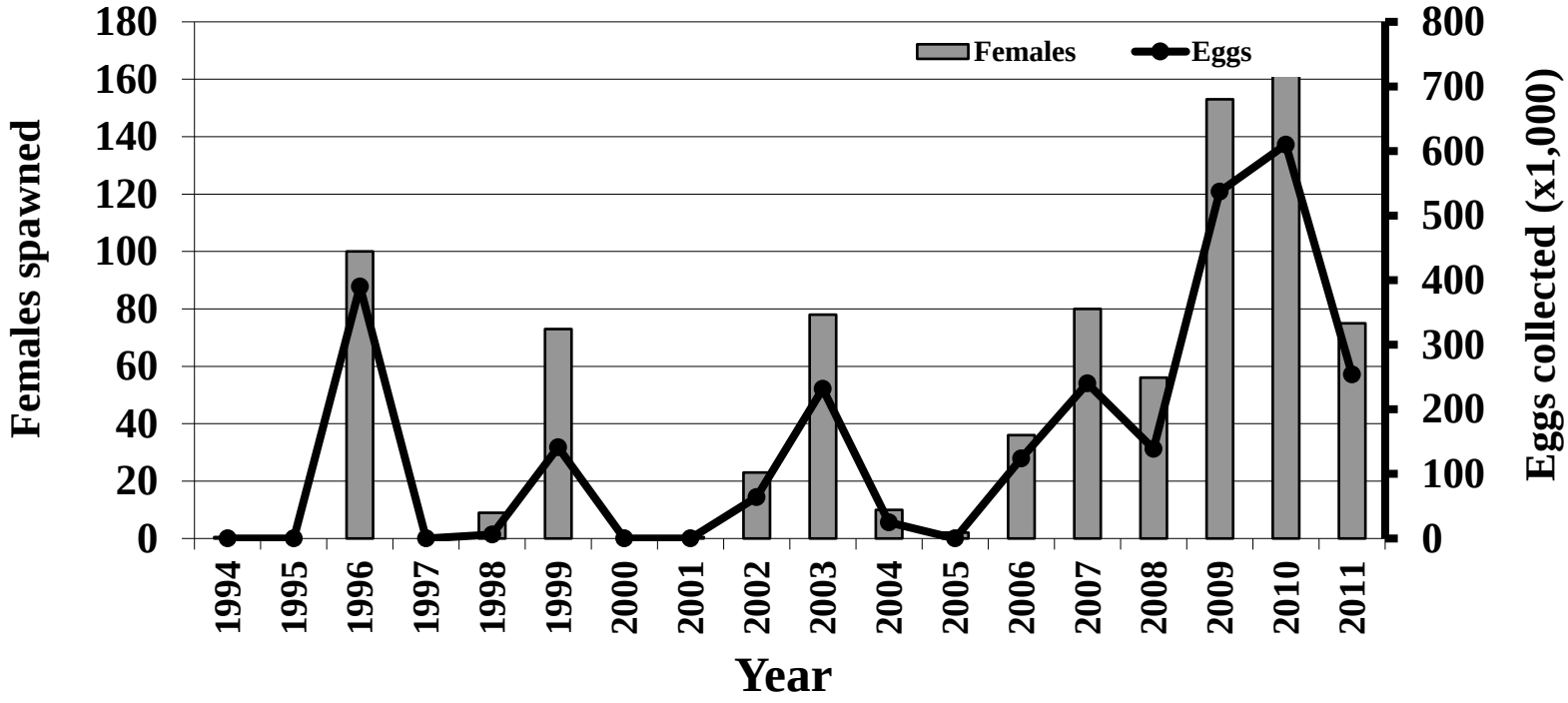



Figure 24. Annual comparison of female salmon spawned and eggs collected from Fort Peck Reservoir, 1994-2011.

Table 17. 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 | | 0 | -- | -- | -- | -- |
| 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 | 29.3-36.0 | 16.4 | 14.1-21.7 |
| | Female | | 29 | 32.7 | 28.9-37.9 | 17.0 | 11.9-26.7 |
| 5 | Male | 2005 | 0 | -- | -- | -- | -- |
| | Female | | 0 | -- | -- | -- | -- |

Table 18. Age composition, length and weight of 162 chinook salmon collected by electrofishing, fall 2011.

| Age | Sex | Brood year | Number | Mean length (in) | Range | Mean weight (lb) | Range |
|---|---|---|---|---|---|---|---|
| 1 | Male | 2010 | 0 | -- | -- | -- | -- |
| | Female | | 0 | -- | -- | -- | -- |
| 2 | Male | 2009 | 18 | 21.5 | 19.0-23.6 | 4.4 | 3.0-5.6 |
| | Female | | 2 | 25.9 | 24.5-27.3 | 8.3 | 6.0-10.7 |
| 3 | Male | 2008 | 53 | 27.3 | 23.5-31.7 | 9.5 | 4.4-14.2 |
| | Female | | 25 | 27.4 | 24.1-31.1 | 10.2 | 6.7-16.8 |
| 4 | Male | 2007 | 11 | 32.6 | 28.4-36.0 | 15.4 | 9.0-20.6 |
| | Female | | 53 | 32.9 | 26.0-36.9 | 16.1 | 6.9-25.8 |
| 5 | Male | 2006 | 0 | -- | -- | -- | -- |
| | Female | | 0 | -- | -- | -- | -- |

## Cisco netting

### Young-of-year cisco

Relative abundance of young-of-year cisco increased in 2011 to 144 per net, which doubled from the previous year of 70 per net, to their second largest year class within the last 10 years. Catch rates were 113, 274, and 70 in 2008, 2009, and 2010, respectively. In contrast, overall catch rates in 2003, and 2002 were low, at 3 and 6 young-of-year per-net, respectively (Table 19). A total of 1,769 young-of-year cisco and 23 adults were caught in 2011. Mean length for age-0 cisco was 5.1 inches in 2011.

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. When compared to previous years, ice cover occurred relatively early on January 1st, 2011 resulting in a large year class.

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 26). 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. Similarly, a large year class was produced in 2011 when reservoir elevations rose slightly over the winter.

Table 19. Mean CPUE (No./net-night) of young-of-year cisco with vertical gill-nets and netting location on Fort Peck Reservoir during September-October 2002-2011.

| | Young-of-year cisco CPUE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Location** | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| **Lower Big Dry** | | | | | | | | | | |
| Bear Creek West | 1 | 1 | 18 | 0 | 37 | 26 | 44 | 155 | 12 | 24 |
| Sandy Arroyo | -- | 3 | -- | -- | -- | -- | -- | -- | -- | -- |
| Spring Creek | -- | 3 | 13 | 16 | -- | -- | -- | -- | -- | -- |
| Bobcat | -- | -- | 2 | 3 | 100 | 13 | 16 | 221 | 11 | 11 |
| **Lower Missouri Arm** | | | | | | | | | | |
| Duck Creek | 6 | 13 | 31 | 321 | 139 | 102 | 263 | 185 | 53 | 36 |
| Fifth Coulee | -- | -- | -- | -- | 200 | 42 | 281 | 201 | 152 | 51 |
| Marina | 3 | 1 | 2 | 26 | 256 | 5 | 17 | 7 | 39 | 31 |
| Milk Coulee | 18 | 19 | -- | 121 | -- | 117 | 174 | 366 | 60 | 77 |
| Sage Creek | -- | 1 | 1 | 82 | 201 | 13 | 33 | 188 | 44 | 67 |
| Shaft Houses | 11 | 1 | 86 | -- | 70 | -- | -- | -- | -- | -- |
| Bear Creek | 5 | 11 | 213 | 261 | 58 | 58 | 225 | 897 | 120 | 249 |
| **Middle Missouri Arm** | | | | | | | | | | |
| Cattle Crooked Creek | -- | 7 | 2 | 77 | 67 | 5 | 107 | -- | 96 | 879 |
| Pines Bay | -- | 2 | 14 | 55 | 225 | 12 | 76 | 239 | 122 | 102 |
| Gilbert Creek | -- | 2 | 9 | 22 | 270 | 51 | 20 | 285 | 21 | 119 |
| Hell-Sutherland | -- | 14 | -- | -- | -- | -- | -- | -- | -- | -- |
| 7th Point | -- | -- | 8 | 32 | -- | -- | -- | -- | -- | -- |
| 8th Point | -- | -- | 8 | 82 | 27 | 8 | 108 | -- | 107 | 81 |
| Mean CPUE | 6 | 3 | 31 | 84 | 137 | 37 | 113 | 274 | 70 | 144 |

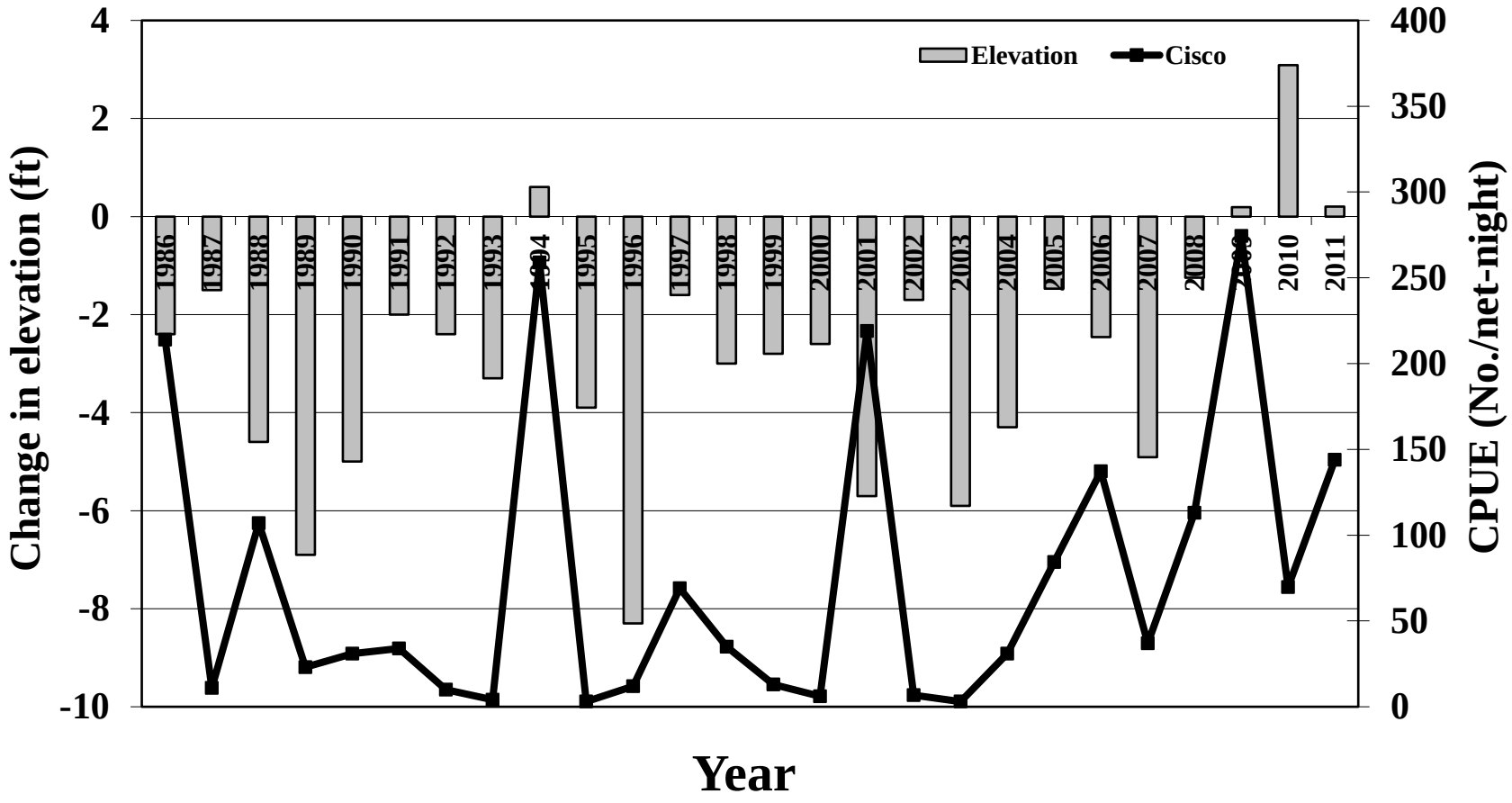



Figure 26. Change in reservoir elevation from December high to March low in contrast to young-of-year cisco CPUE in Fort Peck Reservoir, 1986-2011.

RECOMMENDATIONS

- Spring trapping of walleye and northern pike will continue to provide an egg sources for sustaining 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.

- 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 2013.

- 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 2011, plans are in place to produce larger spring 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 2012. Attempt spring gill netting surveys to determine relative abundance and population dynamics of lake trout.

- 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.

- Implement limnological sampling program for Fort Peck Reservoir and collect water samples for "baseline" information to use in conjunction with walleye otolith microchemistry.

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Prepared by: Heath Headley
Date: March 9th, 2012

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 2002-2011, 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 |
| 2011 | 69 | 18 | 100.5 | 293 |

| 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 |
| 2011 | 72 | 8 | 90.5 | 241 |