Large Lake Monitoring Program Annual Completion Report:

Lake Pepin, 2008

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Reimbursed under Federal Aid by the Sport Fish Restoration Act to Minnesota, F-29-R(P)-28

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INTRODUCTION

Annual monitoring of fish populations is valuable in terms of detecting trends in population dynamics as well as being a useful tool in predicting the future of the fishery. The Large Lake Monitoring Program within the Minnesota Department of Natural Resources (MN DNR) was initiated in 1986 to provide long-term monitoring information of fish populations in Minnesota's ten largest lakes and Minnesota's portion of Lake Superior (Wingate and Schupp 1984). Lake Pepin is a natural impoundment of the Mississippi River created by the delta formed at the confluence of the Chippewa and Mississippi Rivers. The lake is part of Pool 4 of the Upper Mississippi River (UMR), which extends from Lock and Dam (LD) 3 near Red Wing, Minnesota, downstream to LD 4 at Alma, Wisconsin (Figure 1). The navigation pool is 43 miles-long and covers 39,255 acres. Lake Pepin is located in the middle of the pool and is about 21 miles-long, averages 1.7 miles-wide, and covers 25,295 acres. The upper and lower boundaries of Lake Pepin are Bay City, Wisconsin and the Chippewa River, respectively.

Lake Pepin has many characteristics of an inland lake including a fairly regular shoreline with few backwater bays and shoal water substrates comprised of sand, gravel, and rock. Much of the rock substrate is artificial bank protection where the railroad tracks border the lake. Deeper portions of the lake have predominantly silt substrates. Maximum depth is 60 ft and average depth is 21 ft (Table 1). Transparencies are generally less than 3.0 ft and are greater in the lower lake than in the upper lake.

The biological, chemical, and physical characteristics in Lake Pepin and Pool 4 have been sampled extensively. Submerged aquatic macrophytes are not abundant in Lake Pepin. Less than 1% of the surface acres of Lake Pepin contained submerged, floating leaf, or emergent aquatic

vegetation in 2006 or 2007 (Lake City Management files). The Long Term Resource Monitoring Program (LTRMP) has conducted annual monitoring of vegetation in Lake Pepin and Pool 4 backwaters using either vegetation transects or stratified random sampling since 1991 (Rogers and Owens 1995; Yin et al. 2000). They have also found submerged aquatic vegetation to be scarce in and above Lake Pepin and along the main and secondary channels; however, since 2004, LTRMP biologists have documented increasing trends of percent frequency of occurrence of submersed, floating-leaf, and emergent vegetation in upper and lower Pool 4. The isolated and contiguous backwaters below Lake Pepin are generally rich in submergent species. Pool wide, 21 submergent, 3 floating leaf, and 34 emergent species have been identified. The most common submergent species include sago pondweed *Potamogeton pectinatus*, wild celery *Vallisneria Americana*, curlyleaf pondweed *P. crispus*, and coon's tail *Ceratophyllum demersum* (Yin et al. 2008).

The MN DNR, Wisconsin DNR, LTRMP, and the Prairie Island Nuclear Generating Plant (PINGP) all conduct annual fish sampling on Pool 4. The MN DNR fish sampling has evolved to include all of Pool 4 as opposed to just the lake proper. Fixed gill net, shoreline seining, trawling, and electrofishing sites were established to assess the fish community. The MN DNR has sampled Lake Pepin with gill nets at 20 permanent locations during the fall (September-October) since 1965, and also gill netted in the summer of 1963, and in the spring of 1961 and 1962 (Lake City Management files). Fish were sampled via trawling from 1961-1963 and 1971-1972 (Lake City Management files) and by trapnetting in 1957, 1963, 1970, and 1977 (Ebbers and Hawkinson 1978). The shoreline was seined for young-of-the-year (YOY) walleye and sauger in the 1960's and in 1981 (Lake City Management files). The LTRMP was authorized under the Water Resources Development Act of 1986 as an element of the Environmental Management Program and has

conducted annual fish surveys in upper and lower Pool 4 since 1991 (Bartels et al. 2007). Both fixed and random sampling designs have been used with up to 12 gear types to assess Pool 4's fish community. The PINGP is required to monitor and assess the status of the fishery in the vicinity of the power plant and sampling occurs between river mile 787.5 and 802 (Mueller 1994). Electrofishing has been conducted since 1977 and trapnetting was conducted between 1977-1987 (Giese 2007). The Wisconsin DNR conducts annual fish assessments via fyke nets, hoop nets, and electrofishing (Brian Brecka, Wisconsin DNR, personal communication).

Rasmussen (1979) identified at least 85 species of fish in Lake Pepin. Ninety-nine species have been reported by Pitlo et al. (1995) and the Lake City LTRMP crew has collected 89 species and 5 hybrids since 1991 (Bartels et al. 2007). Important game fish include sauger *Sander canadense*, walleye *Sander vitreus*, white bass *Morone chrysops*, smallmouth bass *Micropterus dolomieu*, largemouth bass *Micropterus salmoides*, northern pike *Esox lucius*, black crappie *Pomoxis nigromaculatus*, and bluegill *Lepomis macrochirus*. Gizzard shad *Dorosoma cepedianum* and emerald shiner *Notropis atherinoides* are the most common forage species in the lake. Common carp *Cyprinus carpio*, smallmouth buffalo *Ictiobus bubalus*, bigmouth buffalo *Ictiobus cyprinellus*, channel catfish *Ictalurus punctatus*, flathead catfish *Pylodictus olivaris*, freshwater drum *Aplodinotus grunniens*, and gizzard shad have historically been important commercially fished species.

Commercial fishing on Lake Pepin is licensed by the Minnesota and Wisconsin DNR. Gear is restricted to seines, gill nets, and set lines. Common carp, buffalo spp., carpsucker spp., freshwater drum, and channel catfish are the most commonly harvested species (Michelle Marron, Wisconsin DNR, personal communication). Annual harvest of all species from 1976-89 and 1995-

2005 has ranged from 140,861 to 1.1 million pounds (Stevens 1993; Michelle Marron, Wisconsin DNR, personal communication). Sales restrictions due to PCBs greatly reduced commercial fishing effort and harvest in the past.

Recreational angler creel survey data are available for Pool 4 since 1944. Quantitative (estimates of total annual angling hours and catch) angler surveys of Pool 4 were conducted in 1962-63 (Daley and Skrypek 1964), 1967-68 (Sternberg 1969), 1972-73 (Sternberg 1974a), 1977-81 (Thorn 1984), 1987-89 (Stevens 1990), 1993-95 (Stevens 1996), 1999-2001 (Hoxmeier 2002), and 2005-2007 (Meerbeek 2008). The spring (March-April) open water fishery near LD 3 tailwaters was surveyed annually from 1968 to 1989: 1968-1974 (Sternberg 1974b), 1975-76 and 1982-87 by personnel from Northern States Power (Gustafson and Diedrich 1976, Geis and Gustafson 1977, Gustafson 1983, Donkers et al. 1984, Donkers 1985, Haroldson et al. 1986, Donkers 1987, and Hanson and Donkers 1988), 1977-81 (Thorn 1984), and 1988-89 (Stevens 1990). A three-year survey of winter catfish angling on Lake Pepin was conducted in 1962-65 (Skrypek 1965). Qualitative angler surveys (usually catch rates and length-frequency data only) for Pool 4 were conducted in 1944-46 (Greenbank 1957), April-October 1956 (Daley and Kuehn 1956), December 1956-November 1957 (Upper Mississippi River Conservation Committee 1958), 1958 in conjunction with smallmouth bass tagging (Kuehn 1959), winter of 1960-61 (Lake City Management files), and May and June 1965 (Lake City Management files). Aerial boat counts (or ice fishing) are available for winters of 1944-49, 1956-66, and 1989 (Lake City Management files).

Wisconsin initiated a continuous fishing season on its portion of the Mississippi River in 1967 as did Minnesota in 1969. A popular winter and spring tailwater fishery below LD 3 targeted at sauger and walleye has resulted. A five-year study (1977-1981) was initiated on Pool 4 in

response to controversy surrounding the continuous fishing season for sauger and walleye (Thorn 1984). This study included an annual access based non-uniform probability creel survey targeted at sauger and walleye fishing. Sauger and walleye were tagged during the study to determine movement and rates of exploitation. Data collected from 1957 through 1981 from creel surveys and fish sampling were analyzed to examine the effects of the continuous season on sauger and walleye populations. No adverse effects on walleye and sauger populations were identified due to the continuous fishing season. Perceived high winter hooking mortality of sauger on the Mississippi River in Iowa and Wisconsin prompted winter tailwater closures below LD 11, 12, and 13 (Michael Steuck, Iowa DNR, personal communication). In response, the MN DNR assessed winter hooking mortality of sauger in the tailwaters of Pool 4 by using telemetry and by holding caught and released sauger in a net pen (Meerbeek 2007). Release mortality ranged from 18-27% and was significantly influenced by depth of capture, but was not high enough to influence Pool 4 population.

Recently, walleye and sauger spawning locations in Pool 4 were investigated. Extensive use of the backwaters by spawning walleye in upper Pool 4 was documented (Ickes et al. 1999). The backwater sites consisted primarily of flooded reed canary grass *Phalaris arundinacea* and river bulrush *Scirpus fluviatilis* with moderate (< 1 ft/sec) flow, physically similar to areas described by Preigel (1970) for the Lake Winnebago, WI region. Spawning sauger exclusively used habitat associated with the main channel border and wing dams in the uppermost 3.1 miles of the pool (Ickes et al. 1999). A sauger telemetry project during 1986-87 also documented specific sauger spawning sites within the main channel in the upper reaches of the pool (Freiermuth 1987).

Estimating walleye and sauger year class strength (YCS) to predict trends in the fishery is the impetus of the Large Lake Program (Wingate and Schupp 1984). Stevens (1997) developed a multiple-age/gear approach that provided a fairly reliable measurement of YCS.

Various other fisheries studies have been conducted on Pool 4 including: smallmouth bass tagging study in 1958-59 and electrofishing survey; an age growth study on channel catfish (Lake City Management files); channel catfish tagging studies in 1962 and 1972-1975 (Hubley 1963; Lake City Management files); an evaluation of deep water trap nets as commercial gear (Merz and Holzer 1977); Great River Environmental Action Team (GREAT) studies during 1976-79 (GREAT I, 1978, 1980a, 1980b, 1980c, 1980d, 1980e, 1980f, 1980g, 1980h, 1980i); and observations of winter concentrations of catfish by Hawkinson and Grunwald (1979).

The LTRMP, Minnesota Pollution Control Agency (MPCA), and Wisconsin DNR have monitored the water quality in Pool 4. The LTRMP Pool 4 field station began collecting weekly water quality samples in 1990 (Burdis 1997). In 1993, LTRMP sampling design changed to include both stratified random and fixed site sampling, broader spatial coverage, and increased monitoring of tributaries (Soballe et al. 1999). The LTRMP findings classify Lake Pepin/Pool 4 as a moderately turbid, well oxygenated, and nitrogen and phosphorus rich system. The MPCA conducted water quality monitoring in Lake Pepin near Lake City, MN in 1933, 1965, 1976, 1978-80, 1988, 1990-2000, and 2007 and below LD 3 in 1967-68, 1976, 1977, 1989, 1991, 1992, and 2006 (MPCA website). The Wisconsin DNR conducted annual water quality monitoring below Camp Lacupolis between 1977 and the early 1990's (John Sullivan, Wisconsin DNR, personal communication).

Lake Pepin has a significant effect on water quality by acting both as a settling basin and a generating basin for suspended solids and nutrients. Approximately one-third of Lake Pepin's volume was filled-in between 1895 to 1976 (GREAT I, 1980d). Sedimentation rates are greater in the upper end of the lake than in the lower end (McHerry et al. 1984). The primary source of sediments is upland erosion caused by poor agricultural practices via the Minnesota River. Sedimentation rates have decreased slightly in recent years; however, habitat in the upper portion of the lake is still seriously threatened by filling. Lake Pepin was added to the Environmental Protection Agencies impaired waters list in 2004, and in accordance with the Clean Water Act, reasonable efforts must be conducted to clean up or restore impacted areas. The Lake Pepin Total Maximum Daily Load project was established by the MPCA to address these problems using a watershed approach. By 2010, an implementation plan is expected to be adopted that reduces phosphorus input.

Because of the connection with the Mississippi River, Lake Pepin is easily invaded by exotic species, and provides favorable habitat for zebra mussels *Dreissena polymorpha*, Eurasian water milfoil *Myriophyllum spicatum*, curlyleaf pondweed, purple loosestrife *Lythrum salicaria*, and reed canary grass. Potential invaders include bighead carp *Hypophthalmichthys nobilis*, silver carp *Hypophthalmichthys molitrix*, grass carp *Ctenopharyngodon idella*, round goby *Neogobius melanostomus*, and Eurasian ruffe *Gymnocephalus cernuus*. The impact of exotic species on future fishery trends will largely depend on the nature of the invasive species and the resiliency of the existing ecosystem.

This report provides summarized results of the 2008 MN DNR fish collection data on Pool 4. The reporting of historical and current year's data will always be part of the large lake report;

however, future reports will also focus on improving predictive models for Pool 4 as well as determining the possible impacts of likely invaders.

METHODS

Fish populations were sampled during summer and fall using four gear types: seining, trawling, electrofishing, and gill netting. The lake was divided into six sampling stations on the basis of habitat characteristics and geographical area (Figures 1-6). Sampling was expanded in 1987 to incorporate the riverine sections of Pool 4 that are up and downstream from the lake. The upper river, which extends upstream from the head of Lake Pepin (river mile 785.0) to LD 3 (river mile 796.9), was designated station 7 (Figure 7). The lower river, which flows from the base of Lake Pepin (river mile 765.0) downstream to LD 4 (river mile 752.8), was designated station 8 (Figure 8). Fixed sampling sites exist for each gear within each station located in Lake Pepin. Fixed seining and electrofishing sites were sampled in stations 7 and 8. Stations were set up spatially based on river miles and macrohabitats (e.g., riverine, up-lake, and down-lake). In the text, references are made to Lake Pepin (stations 1 to 6) and Pool 4 (station 1 to 8).

To estimate relative abundances of YOY gamefish and forage fish, shoreline seining was conducted from July 7-24, 2008 with a 100-foot bag seine (6' depth; 1/4" mesh), utilizing the fixed pole seining technique (Wingate and Schupp 1985). The outer Braille was weighted with a chain and pulled by boat except when seining in heavily vegetated or very shallow areas, where, seining was done by wading. Three hauls were made at each station and combined to represent one haul. There are three fixed sites in each station for a total of 24 seine haul estimates. Total lengths and weights were taken on a subsample (N = 25 per station) of YOY gamefish species and gizzard shad

each week to calculate Fulton's condition factor (k) and growth increment analysis. The formula used for K factor was:

$$K = [(100{,}000)(W)]/L^3$$

where, W is the weight in grams and L is the total length in millimeters (Ricker 1975). Remaining fish were identified in the field and counted. Counts were separated into YOY, juveniles, or adults. Lengths of adult and juvenile gamefish were collected. Because Lake Pepin is the only Large Lake to conduct three arcs for each seine haul, seine data is reported as number of fish per acre (in addition to number/haul) to make valid comparisons with other large lakes.

Bottom trawling was conducted as specified in the Large Lake Sampling Guide (Wingate and Schupp 1985) at 20 fixed sites from August 26 to September 5 when water temperatures were between 72 and 75 °F. Two, ten minute trawl hauls were made in stations 1-6 for two consecutive weeks, for a total of four, ten minute hauls at each station. Each ten minute haul was made up of two, five-minute runs to avoid catching unmanageable numbers of fish. All gamefish were identified, measured and counted; non-gamefish were counted, but not measured. Catch-per-unit-effort was expanded to represent catch per hour.

Daytime boat electrofishing was used to collect adult walleye, smallmouth bass, and largemouth bass. Electrofishing was conducted from September 12-29, with water temperatures ranging from 65 to 68 °F. A Smith-Root pulsed DC electrofishing boat was used for all collections. Electrofishing continued until a representative number of fish were collected for length measurement and aging. Not all transects therefore were sampled.

Since 1977, annual gill netting on Lake Pepin had taken place around the first week of October. In 2008, gill netting in Lake Pepin was conducted between October 5-10. Water

temperatures ranged from 57 to 60 °F. Twenty-four sets were made; four sets per stations 1, 2, 3, and 4, five sets for station 5, and three sets for station 6. All original (first set in 1965) fall gill netting sites (N = 20) in lake Pepin were sampled. Standardized MN DNR experimental gill nets were used for all sets (250' length; 5 mesh sizes). Gill nets were fished for a 24 hour period. Gamefish were measured and weighed individually, whereas, non-game species were either individually measured and weighed or measured and bulk weighed.

A portion of each station's shoreline (N = 8 sites) was electrofished with pulsed DC current during October 28-30 to sample YOY walleye and sauger. Since 1986, YOY electrofishing began when shoreline water temperature reached about 52 °F, and when near-shore abundance of adult walleye and sauger was low. Surface water temperatures in 2008 ranged from 46 to 48 °F. All sauger and walleye up to 11 inches were counted and a subsample of at least 25 of each species was measured per station. Catch per unit effort was reported as catch per hour.

Angling tournaments are popular on Pool 4 and on an annual basis, an average of 13 walleye/sauger tournaments are issued by the MN DNR. According to MN DNR policy, walleye tournaments held between Memorial Day and Labor Day in Southeast Minnesota are issued a harvest-only permit due to high hooking mortality in warm water temperatures. During two summer walleye tournaments on Pool 4, anglers were asked by MN DNR biologists to donate large (>20 inches) walleye so comparisons could be made among aging structures. Lengths, weights, and aging structures (scales, dorsal spines, and sagittal otoliths) were taken from each donated fish. In the laboratory, otoliths were cracked in half through the nucleus and the exposed section was burned to increase contrast of the annuli. The burned section was coated with mineral oil and placed under a binocular dissecting scope and read with side illumination. Two readers read otoliths using a

blind test and discrepancies between the two readers were reviewed and assigned an official age. Impressions of scales were made on acetate slides and read with a microfiche reader. Spines were prepared and read using the criteria provided by Logsden (2007). The spine to be inspected was first separated from the other spines. The cut end of the spine was sanded flat by wet sanding with 320-grit sandpaper. Wet sanding was accomplished by moving the cut end of the spine in a circular pattern against a sheet of sandpaper placed on top of a smooth table. The spine was then broken into two pieces so that approximately 2 cm remained on the basal section and the piece to be examined was embedded in a block of clay. The sanded end of the spine was coated with mineral oil to reduce the glare and then was examined under a binocular dissecting scope with side illumination. Both scales and spines were read using a blind test and two readers.

All walleye, sauger, and white bass captured in gill nets were sexed and a subsample of each species (10 male and 10 female fish/inch length group) was aged using otoliths. Otoliths were read in whole view on a black background with reflected light with a dissecting microscope. Whole view otoliths from walleye and sauger that had six or more annuli and all white bass otoliths were cracked in half through the nucleus and the exposed section was burned to increase contrast of the annuli. Gill netted northern pike were scale sampled and sexed. Impressions of scales were made on acetate slides and read with a microfiche reader. Ages from trawl and electrofished caught fish were estimated from both scales and spines. Spines and scales were prepared with the same methods provided above and were read using a blind test by one reader. Discrepancies in ages between the two structures were reviewed a second time and assigned an official age based on a second reading of spines and an age-length key. On occasion, annuli were not visible due to calcification on the spine and a second reading on the scale proved to be more accurate. Thus, both

spine and scales were used to assign official ages for each species. Back calculated growth was determined using the on-line MN DNR lake survey database.

Several indices previously developed were used to quantify sauger and walleye abundance. An index of abundance using the original 20 gill net set data from 1965 to 2008 was calculated by dividing the number collected at age (x) in year (y) by the mean catch of age (x) for all years. Another index that was used examines year-class strength using catch at age from seining, trawling, electrofishing, and gill netting (Stevens 1997).

RESULTS AND DISCUSSION

2008 Water Elevation and Temperature

Water levels in 2008 were on average 1.0 feet below the historic mean from January to mid-April, 1.9 feet above from mid-April to July, and 4.8 feet below the historic mean from July to December (Figure 9). Water levels peaked on May 8 and June 18 and were as much as 4.6 feet above the historic mean. Water temperatures in 2008 were near or below the historic mean from January to mid-July (average of 2.7 °F cooler), warmer from mid-July to early September (average of 1.7 °F warmer), cooler from early to mid-September (average of 2.5 °F cooler), warmer from mid-September to mid-November (average of 2.0 °F warmer), and cooler from mid-November to December (average of 1.8 °F cooler; Figure 10). Water temperatures in April were on average 5.6 °F lower than the historical mean and were 10.7 °F lower on April 13. The combination of low discharge and high water temperatures from July to early September increased the risk of fish kill events in backwater habitats due to low dissolved oxygen (DO) levels. No fish kill events were reported in Pool 4 in 2008. Periodically during the summer, fisheries crews measured DO in

various Mississippi River pools and backwater habitats and DO concentrations appeared to be suitable for fish survival. In addition, the LTRMP annually collects DO data during all seasons for Lake Pepin and associated Pool 4 backwaters and, in 2008, DO levels were mostly within or above the optimal range for fish survival. Isolated backwater habitats that were heavily vegetated in duck weed (*Lemna minor*) and/or filamentous algae were most susceptible to low (< 2mg/L) DO levels (Rob Burdis, LTRMP, personal communication).

2008 Fish Collection

Non-game species, particularly gizzard shad and emerald shiners, accounted for 84.8% of the YOY seine catch and 95.9% of the juvenile and adult seine catch (Tables 2 and 4). Catch rates of YOY gizzard shad and freshwater drum were near average. Catch rates of important commercial YOY fish species (i.e., common carp and buffalo spp.) were very low (Table 2). Near-shore, limnetic YOY gamefish species (i.e. centrarchids) are most effectively sampled using shoreline seining; however, some pelagic species (i.e. white bass, sauger, walleye) are also effectively sampled in Pool 4. In 2008, all YOY gamefish species except smallmouth bass were either considerably higher or lower than their historical mean (Table 3). 2008 was the fourth straight year in which bluegill catch was more than triple the historical mean and was the highest ever recorded. Bluegill catch was good in all stations and represented good pool-wide recruitment. Largemouth bass followed a similar pattern as bluegill with more than double the historical mean catch per seine haul since 2003. The bulk of the catch for largemouth bass YOY during the past several years has been mostly observed in stations 6, 7, and 8 and may only represent increases in those habitats rather than pool wide increases (Table 2). Yellow perch (*Perca flavescens*) YOY catch in 2008 was also more than double the historical mean and a general trend in more consistent recruitment has

been observed since 2000. In general, catch rates of vegetation sensitive species (e.g. bluegill, largemouth bass, yellow perch) has increased substantially since 2000. White bass YOY seine catch in 2008 was the third lowest recorded and remained well below the historic mean (Table 3). White bass catch has been low since 1999 (except for 2002; 61 fish/haul). Northern pike YOY catch in 2008 was the highest since 2001 and over four times the historic mean. Likewise, YOY crappie (both black and white crappie) mean catch per seine haul was the second highest recorded and was the highest since 2001. Both northern pike and crappie have shown significant patterns of boom-bust recruitment in Pool 4, which, are most likely related to water temperature and discharge during period of spawning. Walleye and sauger mean catch per seine haul in 2008 was lower than the historical mean. Electrofishing catch rates of YOY walleye (number/hr) were the ninth lowest and were typical of a poor/moderate year-class (Table 9). Young-of-the-year sauger catch rates (number/hr) were above the historical mean and ranked 8th in the 23-year database. Sauger catch rates have been above the historical mean four out of the past five years (Table 9). Water levels at the time of YOY electrofishing can influence sampling efficiency and consistency between years. Higher water levels generally improve sampling conditions because shoal areas are more accessible with electrofishing boats. In 2008, water levels were about one foot below normal; therefore decreasing electrofishing efficiency. Future sampling of the 2008 year-class via gillnets and trawling will provide more insight on the reproductive success of walleye and sauger.

Mean lengths of YOY gamefish and gizzard shad sampled via shoreline seining were below the historical mean for every time period sampled except for northern pike in the second sampling period and walleye in the first sampling period (Table 7). However, walleye and sauger mean length during the period of fall shoreline electrofishing was either at or above the historical mean

(7.3 inches for walleye; 5.9 inches for sauger; Table 10), thus suggesting good growing conditions in late summer and early fall. Cooler water temperatures and prolonged spring conditions were most likely responsible for the lower than average size in spring/early summer.

Trawling catch rates in 2008 were about 2 times greater than the historical mean for YOY black crappie, 3 times greater for YOY gizzard shad, and 7 times higher for white crappie (Table 12). Trawling catch rates for all other species were below the historical mean (Table 12). Overall catch of juvenile and adult fish was the fourth lowest recorded since 1986 (Table 14) and was mostly a reflection in the low catch rates of freshwater drum and not representative of the entire population (as observed in gill net catch). Freshwater drum are typically the bulk of the juvenile/adult trawl sample, but catch rates since 2006 have been only one-half to one-third of the historical mean.

Most adult gamefish populations were abundant as evidenced through gill net and electrofishing samples. Walleye gill net catch rates in 2008 were above the interquartile range for the eighth straight year, however they have been gradually declining since 2002 (Figure 12). The decline in walleye catch rates is partially due to the naturally decreasing abundance of the 2001 year-class. However, several good year-classes since 2001 have maintained catch rates above historic averages. Fall electrofishing for adult fish revealed good numbers of large walleye (Table 26). Walleye from the 2001 year-class averaged 25.2 inches in total length from electrofishing samples. Sauger gill net catch rates in 2008 remained within the interquartile range for the ninth straight year (Figure 13). Similar sauger catch rates have been observed since 2005; however, the mean weight of sauger in the gill nets has increased substantially (Table 31). Good growing

conditions with an ample supply of forage coupled with relatively consistent 2000-2005 year-classes were most likely responsible for the increased sauger size and condition.

White bass gill net catch of 4.9 was slightly below the historical mean (5.9 fish/net; Table 30). Subsamples of white bass are periodically aged to evaluate growth and year-class patterns. Otoliths removed from white bass in 2008 revealed a much older population than previously recorded. Prior to this sample, the oldest white bass aged from scales was age 7 and came from a 15.4 inch female captured in 1988. Otoliths obtained in 2008 revealed a much older population with 5 fish older than age 6 and one fish recorded as age 15 (Table 43). White bass grew extremely fast until age 3 or about 14.0 inches.

Channel catfish gill net catch has declined since 2004, but has remained above or near the historical mean. Mean length of 16.6 inches for channel catfish in 2008 was considered excellent (Table 30 and 32). Northern pike gill net catch rates in 2008 were slightly above the historical mean and also represented good size and age structure (Table 30, 41, and 42). Largemouth bass electrofishing catch rates in 2008 were the lowest observed since 2003 (Table 28). Several good largemouth bass year-classes were produced in recent years, but the 2005 year-class was exceptional (Table 22). Electrofishing catch rates in 2008 of smallmouth bass were the third highest since 1992 (Table 28). Based on age frequency distribution, there has been consistent smallmouth bass recruitment (Table 24). In summary, sampling from all gear types combined revealed excellent populations of walleye, sauger, and smallmouth bass.

Aging Structure Comparisons

The mean size of walleye donated from the two walleye kill-tournaments on Pool 4 was 22.9 inches and ranged from 2-15 years old (Table 46). For otoliths, both readers assigned 80% of aged

walleye the same age. Those that were not assigned the same age were all under aged by one reader because of the difficulty in seeing the edge annuli due to season of collection. Those nine fish that differed were reviewed and assigned an official age. Percent agreement of walleye spines and scales with consensus otolith age was highest for spines and nearly all fish were aged within two years of the consensus otolith age (Table 47). Precision of scales was less and both readers didn't have high precision until within four years of the consensus otolith age. Spines proved to be a more precise way of aging large walleye on Lake Pepin. According to previous studies, spines are also more time efficient (Isermann et al. 2003). Therefore, spines will be used to age large walleye in Lake Pepin in future electrofishing samples.

Spines had the highest agreement with the official age and all spines aged were within 3 years of the official age for walleye, smallmouth bass, and largemouth bass collected in the fall electrofishing samples (Table 48). Scales had substantially lower agreement for walleye and smallmouth bass, and didn't achieve 100% precision until within 4 years of official age. Precision was low with both largemouth bass spines and scales (< 68%), but all fish aged with spines were aged within 1 year of the official age. The reduction in precision for largemouth bass was primarily due to the difficulty in detecting the first annuli. The first annulus was frequently undetectable due to calcification or build up in the anterior portion of the spine. This was particularly true for 2-3 year old fish and somewhat more common in largemouth bass. Tables 49-51 were created to detect tendencies in over/under aging fish by age-class. Ages that differed from the official age extracted from spines were always underaged. Scales showed no tendency to under/over age, except for walleye where both structures tended to overage fish. Scales were relatively precise on all species up to age 3 and fewer under/over aging occurred than for young fish aged with spines. Except for

largemouth bass, spines were substantially more precise than scales on older (4 +) fish. Spines proved to be a more precise way of aging older walleye, largemouth bass, and smallmouth bass in Lake Pepin. Since it is difficult to view the inner most annuli on spines from young bass, I recommend the use of scales for fish less than twelve inches and a combination of scales and spines on fish greater than twelve inches. Because spines were more precise on all ages of walleye, I recommend that spines should be the only structure taken for walleye except in circumstances where back-calculation is necessary.

Year-Class Strength Index

The relative year-class strength index was within the interquartile range for both walleye and sauger in 2008 (Figure 11). Gill net samples in 2008 indicated a good number of age 1 and 2 walleye and these fish averaged 13.4 and 16.9 inches, respectively. Based on the index of abundance, the 2006 year class was the largest since the strong 2001 year class and the 2007 year class was above average (Table 45). These fish are growing fast and many of them will be available to harvest in the 2009 fishing season. Based on age 1 sauger gill net catch rates, the 2006 and 2007 year class were both above average (Figure 11; Table 43). In fact, age 1 sauger catch rates have been above the average six out of the last eight years and represents very consistent recruitment.

Angling Forcast

Angling should continue to be excellent for largemouth bass, smallmouth bass, walleye and sauger during 2009 based on the numbers of adult fish sampled and fast growth rates observed in juvenile walleye. White bass fishing success should remain good. Crappie spp., northern pike, bluegill, and yellow perch populations should benefit from the explosive reproduction observed in 2008.

Exotic Species

Numerous exotic species exist in Pool 4 because of disturbed habitats and easy accessibility. Zebra mussels demonstrated a marked decline in the summer of 2001 due to above average water temperatures. However, sampling in 2003 indicated that two year-classes of zebra mussels were present and that they were again increasing in abundance. Warm water temperatures in the summer of 2006 did contribute to a small die-off, but overall densities remain stable. There were no reports of die-offs in 2007 or 2008, but visual observations of specimens below several locks and dams suggested that numbers were increasing. Continued trends in increasing water temperatures could potentially hinder the success of these animals.

Bighead and silver carp invaded the lower Mississippi River system in the early 1980's and have grown to extremely large populations in the river below LD 19. Currently bighead carp are known to have established populations as far north as Pool 15 of the Mississippi River. The first bighead carp captured in Minnesota was a single specimen from the St. Croix River in 1996. In October of 2003, a commercial fisherman captured a 23 lb bighead carp in lower Lake Pepin making this the first confirmed record of bighead carp in Pool 4. A second confirmed adult bighead carp (29 lbs) was captured in October 2008 in the middle portion of Lake Pepin by the same commercial fisherman. In November 2008, five Asian carp were captured by one Wisconsin licensed commercial fisherman in Pool 8 of the Mississippi River. Of those five fish, two were bighead carp, two were grass carp, and one was confirmed to be a silver carp. This was the first confirmed silver carp found in Minnesota's portion of the Mississippi River. In January 2009, a commercial fisherman caught a bighead carp and seventeen grass carp in Pool 5A and a single bighead carp in Pool 9.

Another exotic species recently discovered in Pool 4 is the zooplankter, *Daphnia lumholtzi* (Burdis and Hirsch 2005). Native to Africa and southern Asia, this zooplankter differs from native *Daphnia* spp. in North America by having extended helmet and tail spines. Negative impacts of this invasion could include a reduction of native zooplankton through direct competition and a decrease in larval fish survival and growth (Kolar et al. 1997). The LTRMP is continuing to monitor the distribution and population levels of *D. lumholtzi* in Pool 4.

RECOMMENDATIONS

Walleye, sauger, white bass, largemouth and smallmouth bass, bluegill, and crappie populations appear healthy in Pool 4, therefore no changes in management strategies are recommended or warranted at this time. We should continue to strengthen and test predictive models of fish abundance (specifically sauger, walleye, and white bass) in Pool 4 by incorporating biotic factors as well as data collected by LTRM and the Major River Survey program. In addition, more emphasis on the potential impacts of global climate change on walleye recruitment should be examined (i.e. thermal threshold, gonadal somatic index, etc.). Exotic species monitoring should continue to be coordinated with LTRM because of the additional gears used in this program.

ACKNOWLEDGMENTS

Thanks to Randy Binder, Dan Dieterman, Doug Dieterman, John Hoxmeier, Kevin Stauffer, and Jeff Weiss for help in the field and laboratory. Parts of the introduction were adapted from the original version written by Steve Hirsch. Kevin Stauffer and Dan Dieterman helped with administrative and editorial details of this report.

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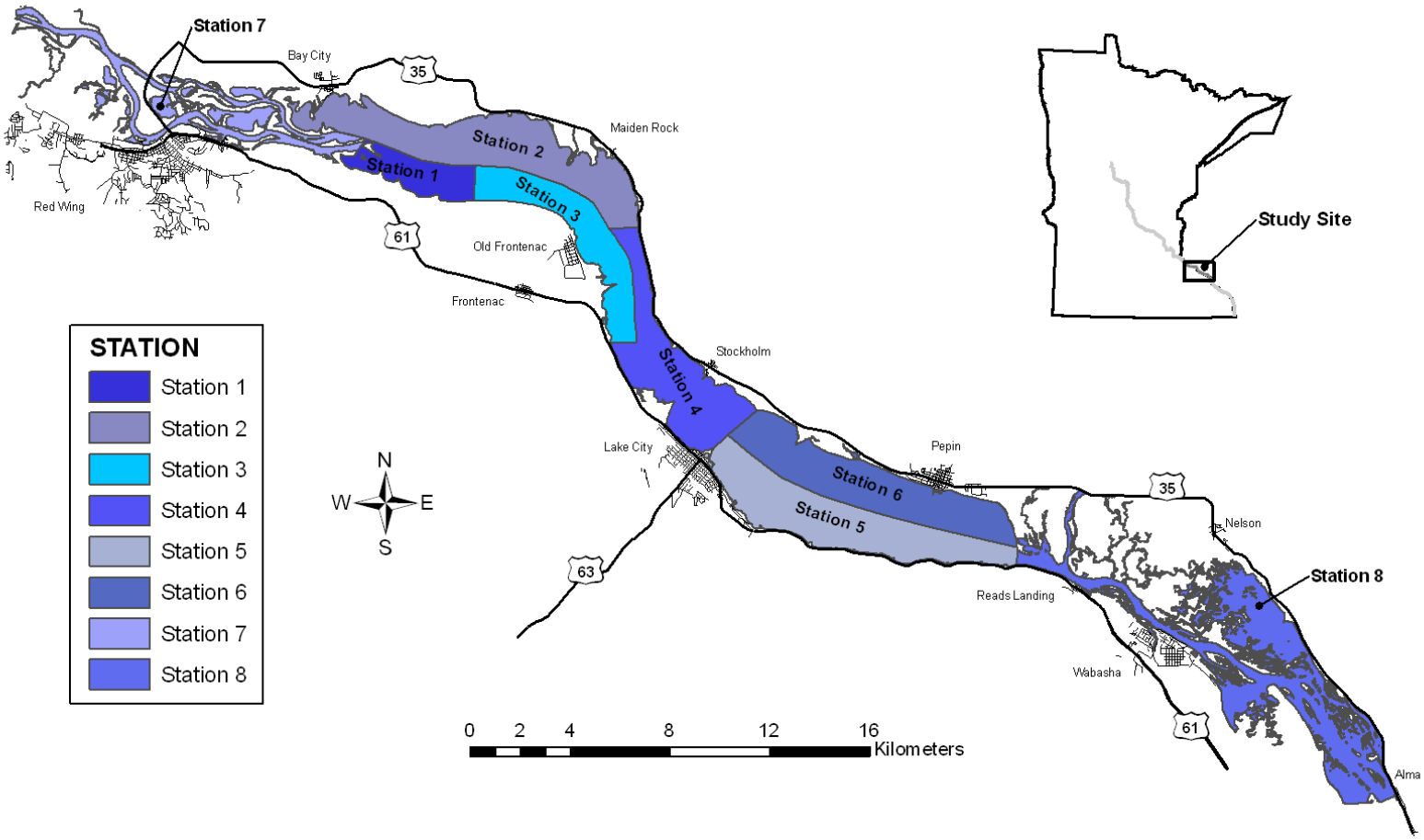


Figure 1. Locations and boundaries of stations 1-8, Pool 4, Mississippi River.

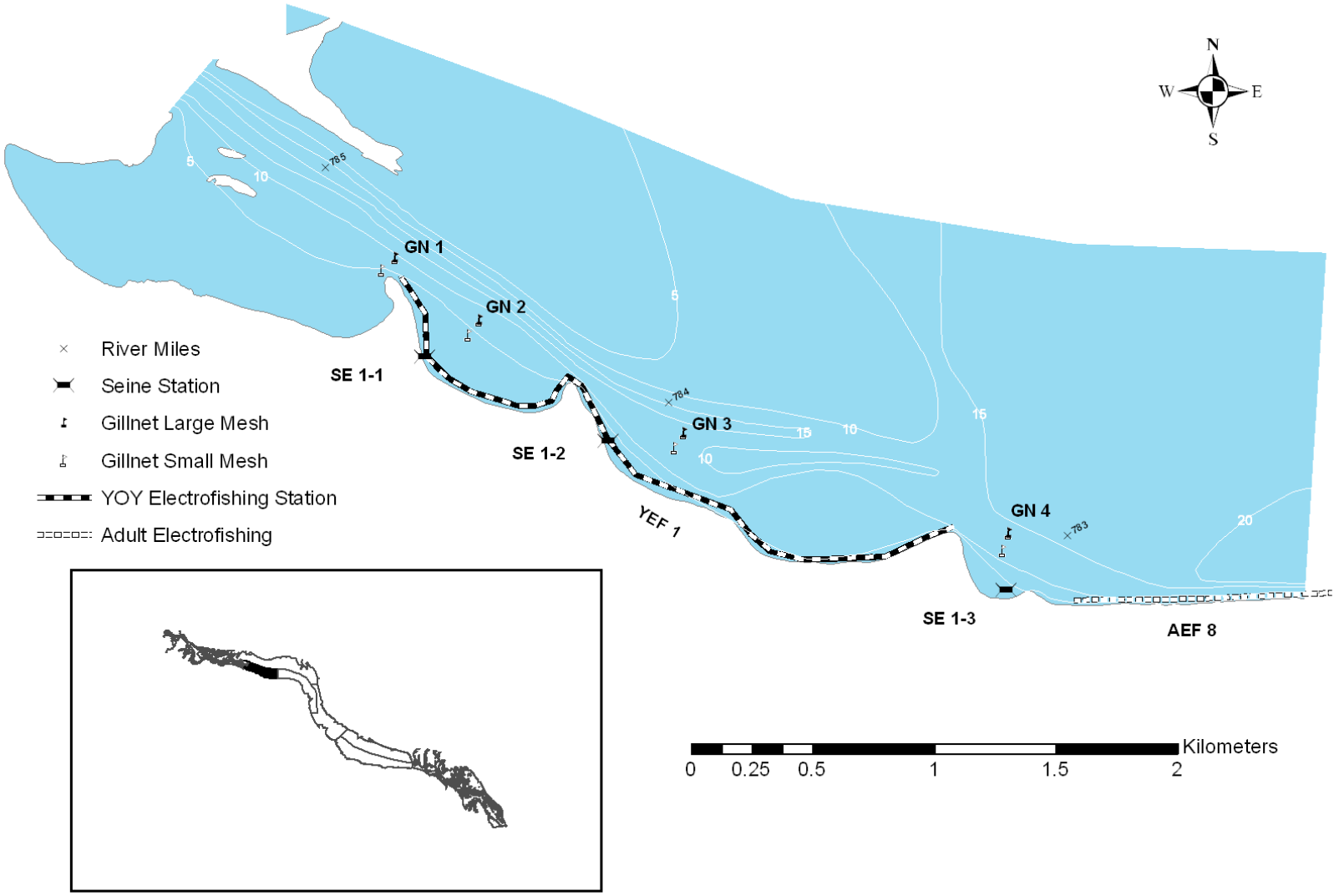


Figure 2. Station 1 sampling locations, Pool 4, Mississippi River.

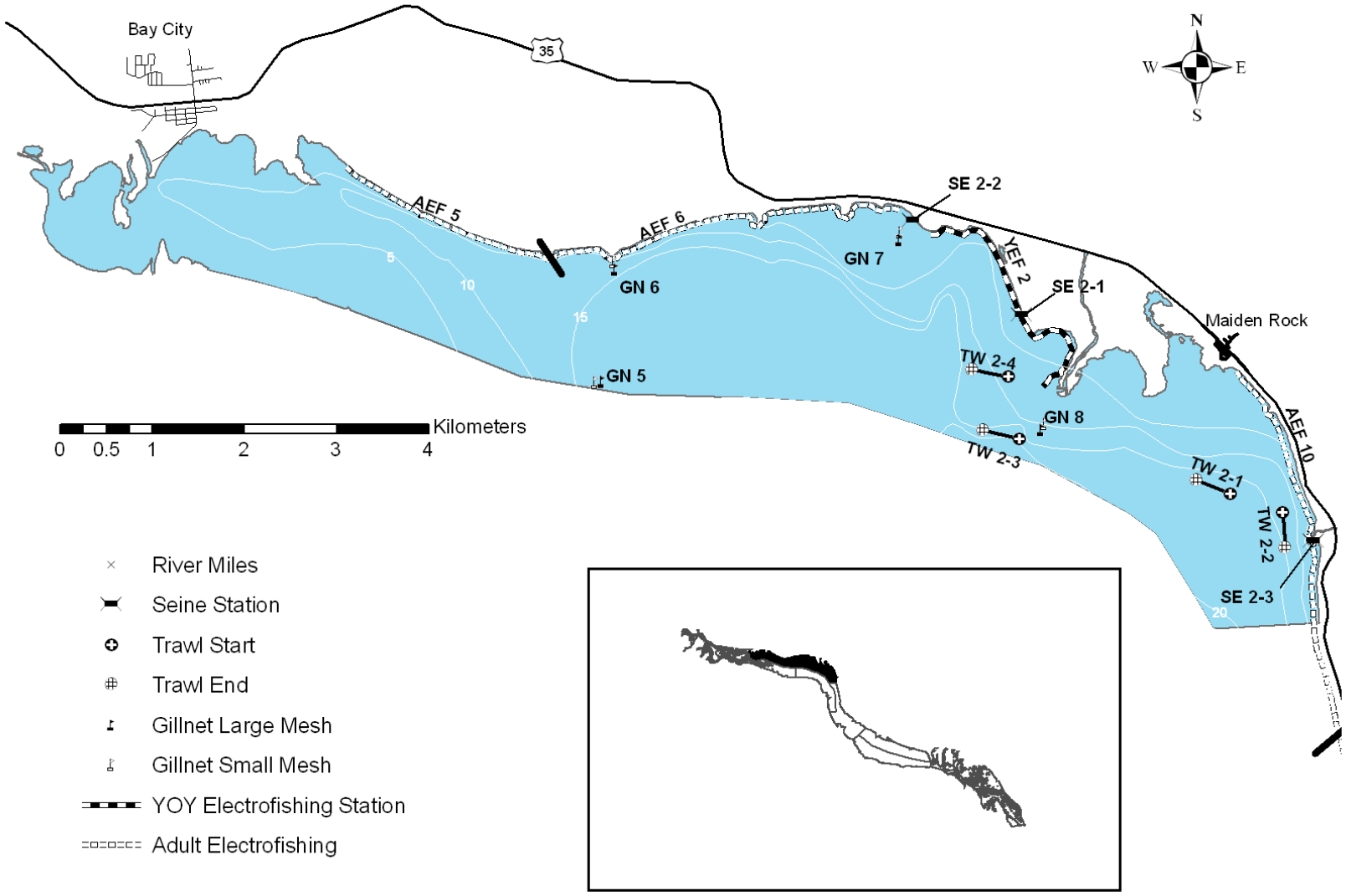


Figure 3. Station 2 sampling locations, Pool 4, Mississippi River.

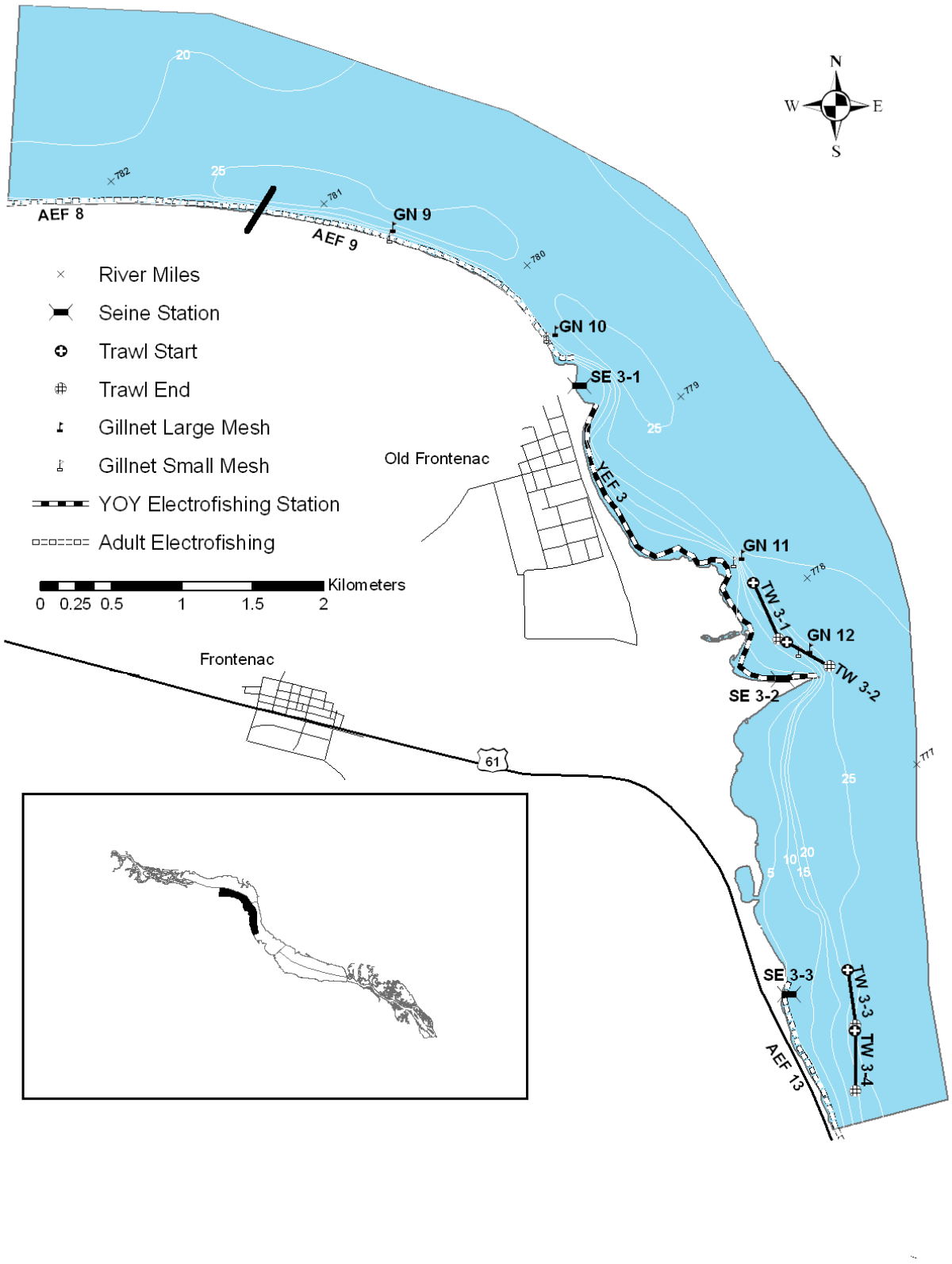
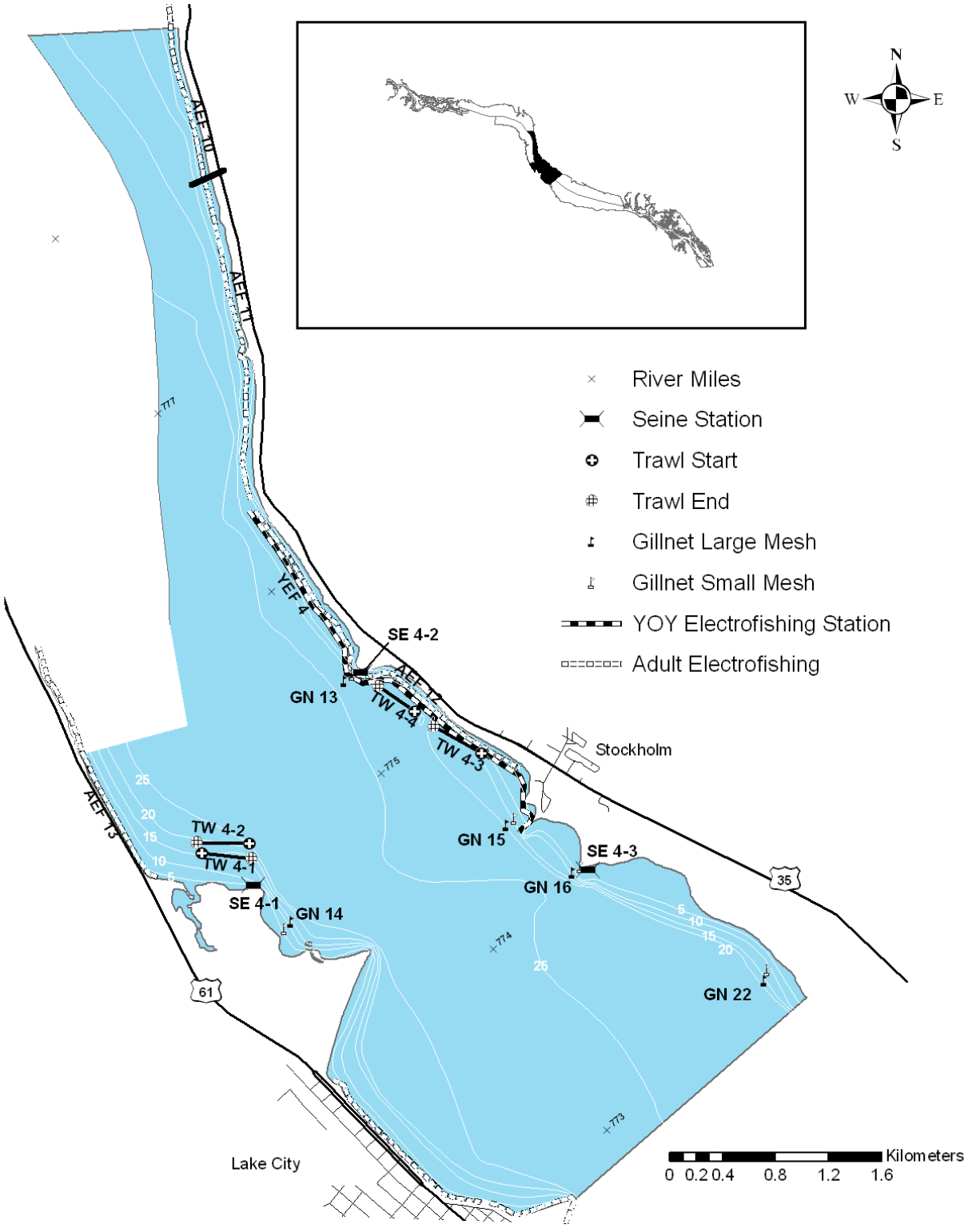


Figure 4. Station 3 sampling locations, Pool 4, Mississippi River.



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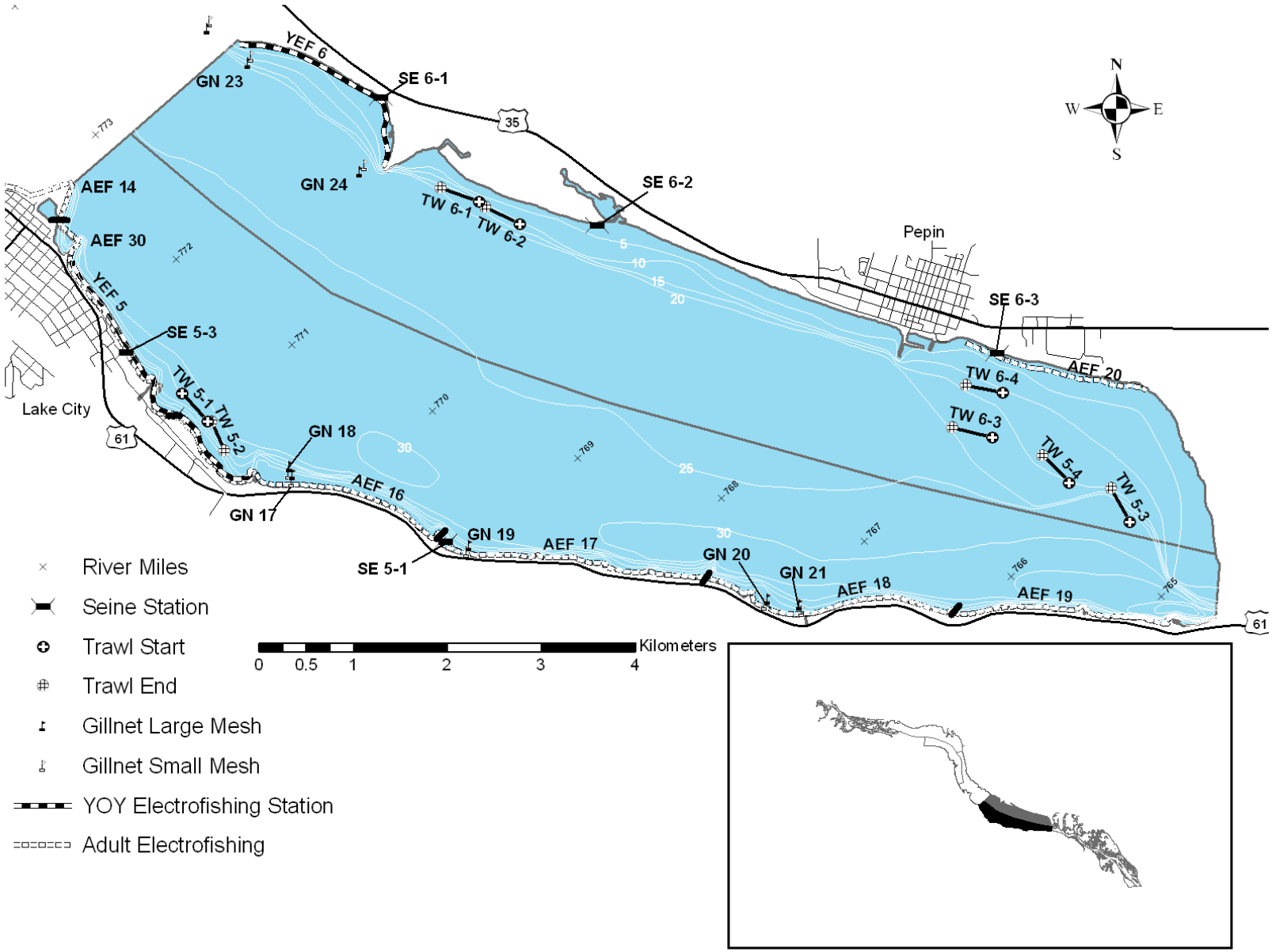
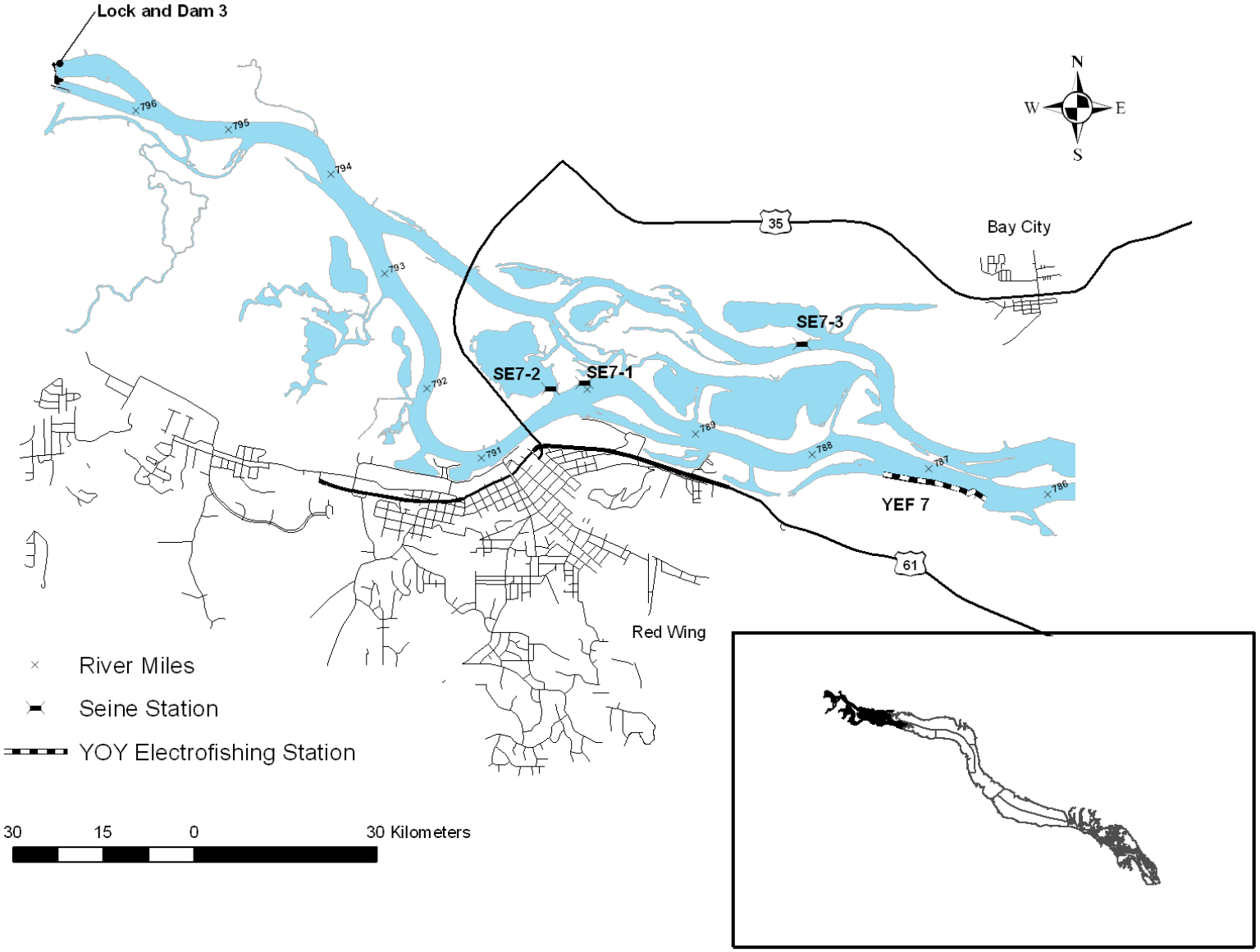


Figure 6. Station 5 and 6 sampling locations, Pool 4, Mississippi River.



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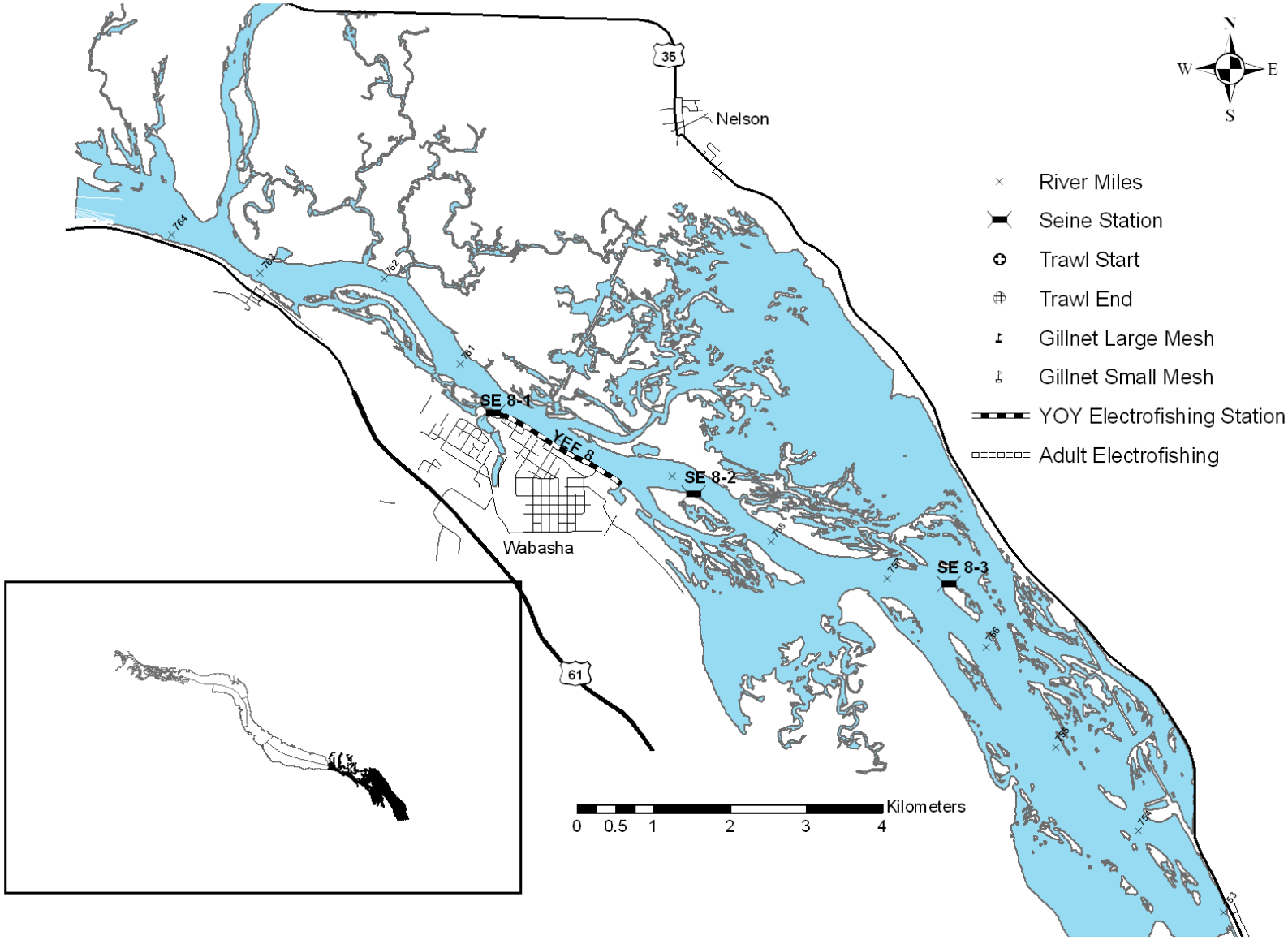

Figure 8. Station 8 sampling locations, Pool 4, Mississippi River.

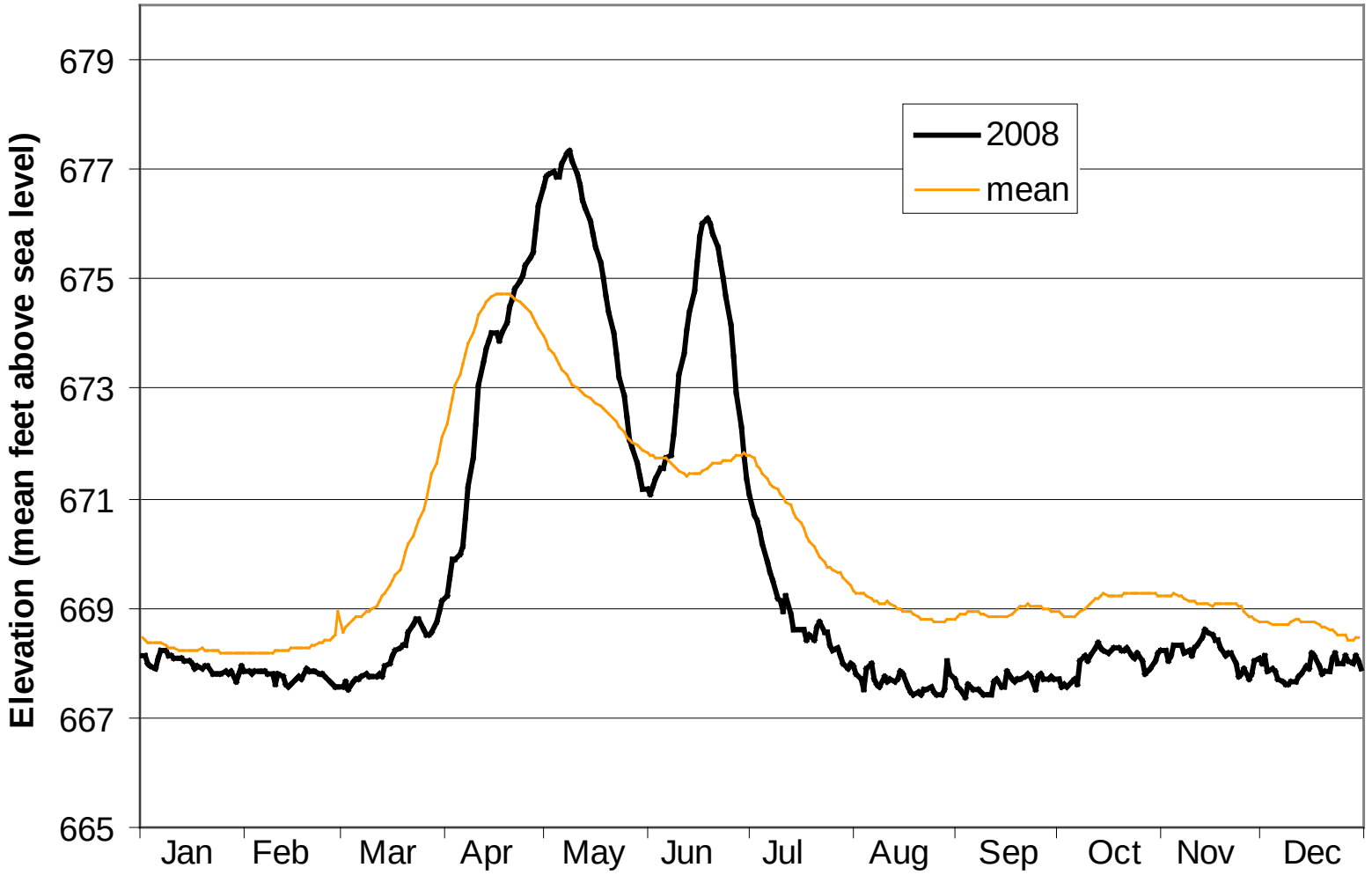

Figure 9. Water elevation at the tailwater of Lock and Dam 3 of the Mississippi River for 2008. Data from the US Army Corps of Engineers. Mean is from 1940-2007.

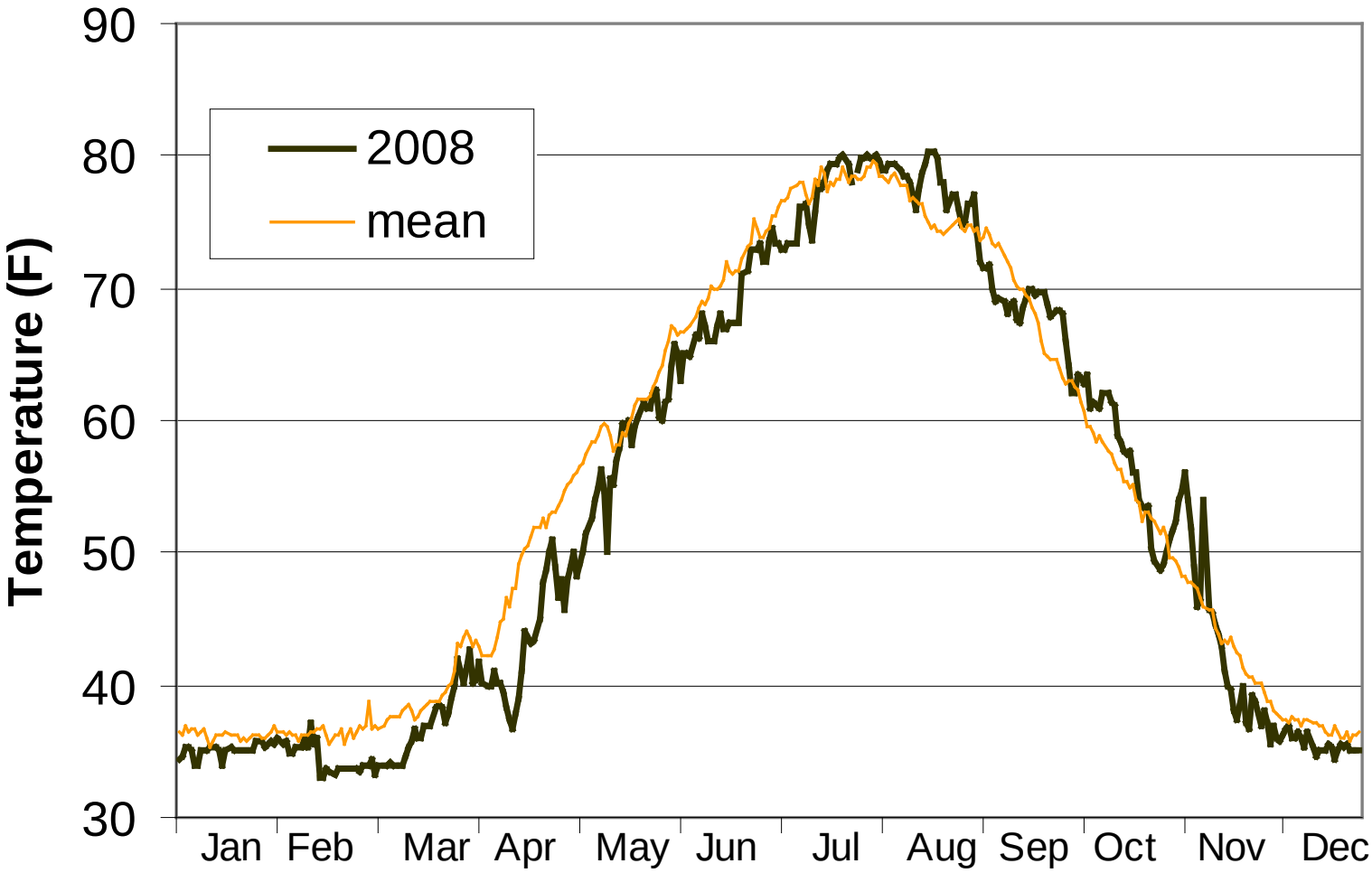

Figure 10. Water temperature at Lock and Dam 3 of the Mississippi River. Data from US Army Corps of Engineers. Mean is from 1998-2007.

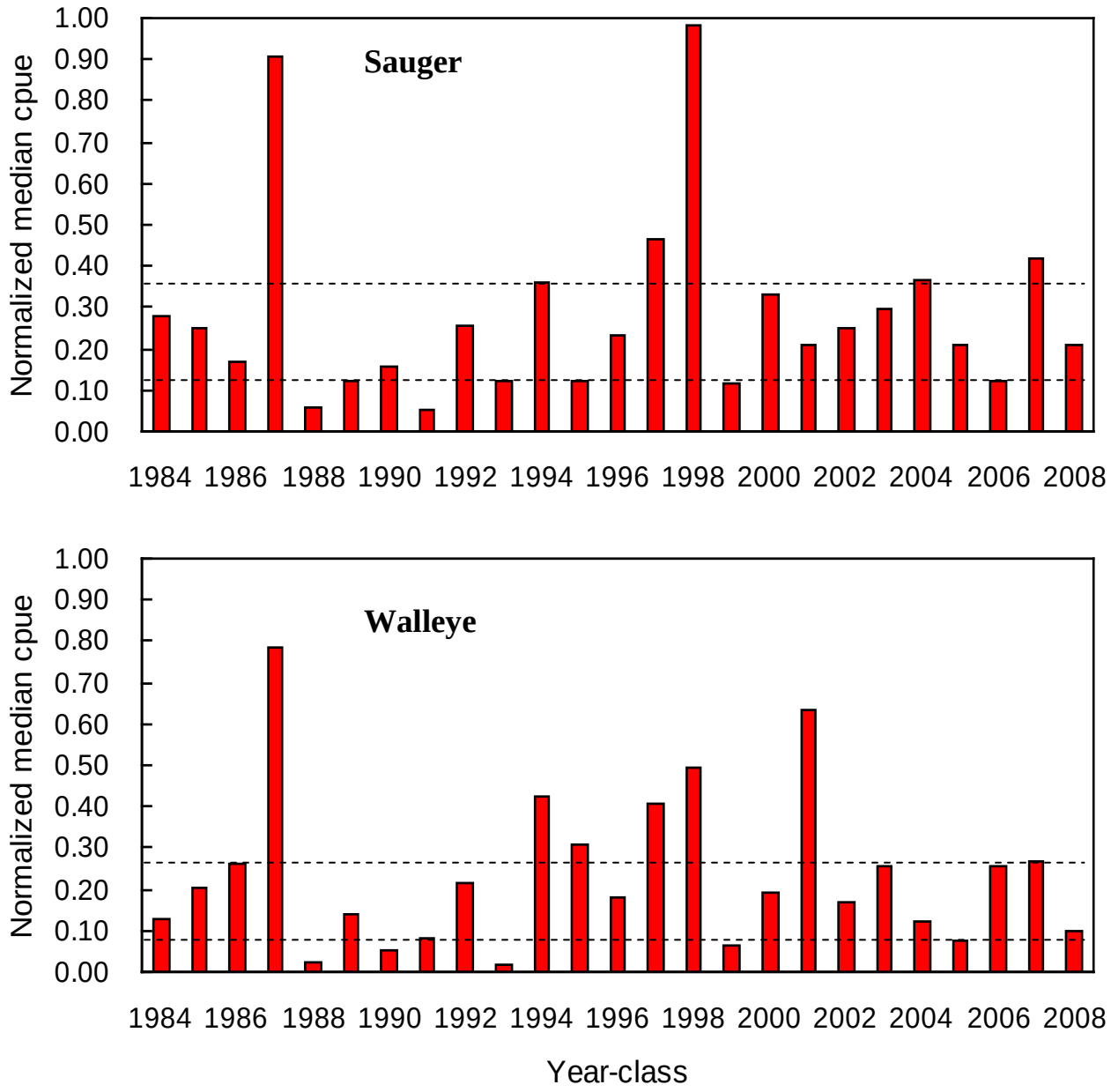

Figure 11. Relative year-class strength index for sauger (top) and walleye (bottom), Lake Pepin, 1984-2008. Index is the median, normalized cpue from year-classes sampled at age 0 by seine, trawl, and electrofish; ages 1 and 2 by trawl and gill net, and at age 3 by gill net, normalized to peak cpue within year-class. Dashed lines show 25 and 75 percent quartiles.

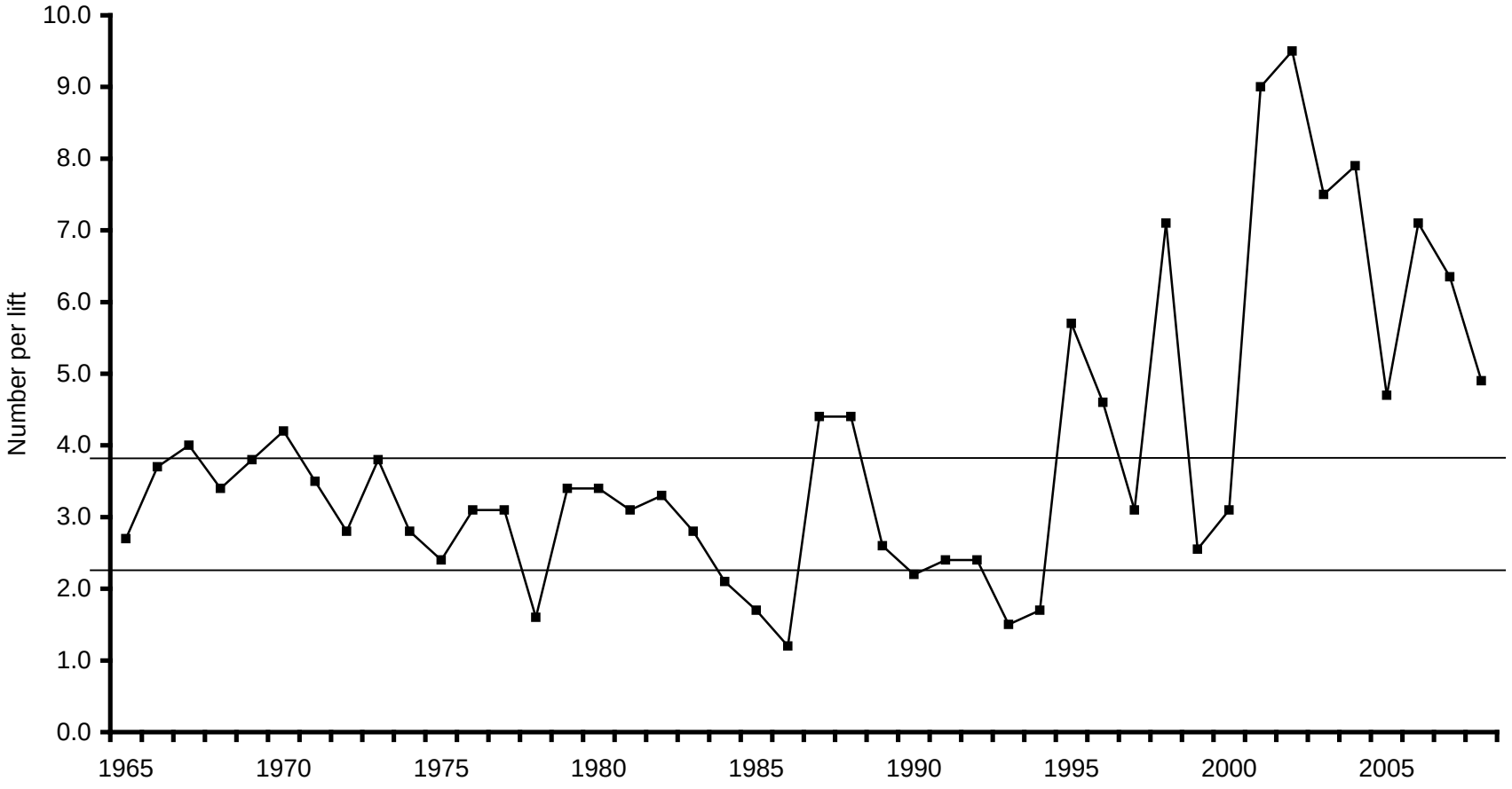

Figure 12. Mean number of walleye per gill net lift on Lake Pepin from 1965 to 2008. Horizontal lines represent 1st and 3rd quartiles.

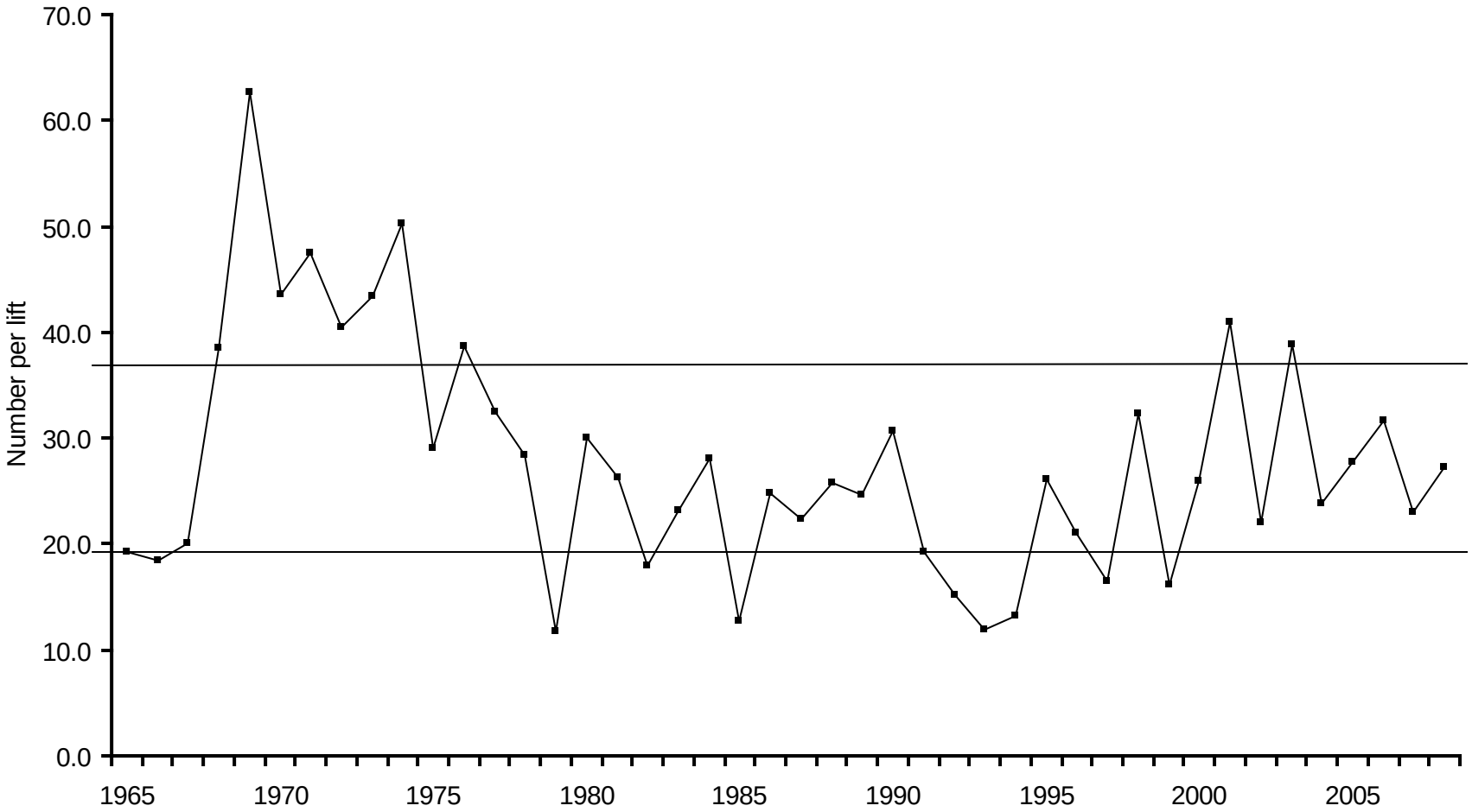

Figure 13. Mean number of sauger per gill net lift on Lake Pepin from 1965 to 2008. Horizontal lines represent 1st and 3rd quartiles.

Table 1. Selected characteristics of Lake Pepin and Pool 4 of the Mississippi River. Water chemistry data was obtained from the Long Term Resource Monitoring Program and represents summer (June-August) means (± SE) from 1991 through 2006. Water samples were collected 0.2 m below the water surface.

Characteristic	Lake Pepin	Pool 4
DOW number	25-1	79-5
Minnesota lake class	26	--
Total surface acres	25,295	39,255
Percent littoral area	32	--
Maximum depth	60	75
Mean depth	21	--
Secchi depth (cm)	67.5 (1.4)	--
Conductivity (µS)	515.2 (2.5)	--
Chlorophyll-*a* (µg/L)	23.1 (0.7)	--
Total phosphorus (mg/L)	0.16 (0.003)	--
Shoreline development index	2.03	--

Table 2. Mean catch (± SE) per seine haul (3 arcs) of young-of-year fish from Pool 4, 7-24 July, 2008.

	Station									
	1	2	3	4	5	6	7	8	Grand Mean	Percent of catch
Longnose gar		0 (0.1)				1 (0.5)	**0.8** (0.4)	**0.1** (0.1)	**0.2** (0.1)	0.0
Gizzard shad	**780.9** (309.6)	**163.3** (156.7)	**25.3** (17.0)	**242.2** (147.3)	**438.3** (314.6)	**81.8** (53.9)	**1984.4** (1351.2)	**395.4** (215.8)	**513.1** (188.1)	84.4
Carpsucker spp.		**0.1** (0.1)	**0.2** (0.1)	**1.3** (0.5)	**0.3** (0.2)	**0.1** (0.1)		**0.6** (0.6)	**0.3** (0.1)	0.1
Bigmouth buffalo		**0.1** (0.1)							**0.0** (0.0)	0.0
Redhorse spp.	**0.1** (0.1)	**0.2** (0.2)	**0.1** (0.1)	**0.2** (0.1)			**0.3** (0.3)	**0.1** (0.1)	**0.1** (0.1)	0.0
Northern pike	**1.4** (0.8)	**0.4** (0.2)	**0.7** (0.4)	**0.2** (0.2)	**0.7** (0.4)	**0.3** (0.2)	**7.2** (2.4)	**2.1** (1.1)	**1.7** (0.4)	0.3
White bass	**6.3** (3.4)	**6.9** (3.9)	**4.8** (3.2)	**1.1** (0.5)	**0.6** (0.2)	**0.3** (0.2)	**33.2** (15.7)	**0.2** (0.2)	**6.8** (2.4)	1.1
Rock bass			**0.3** (0.2)		**0.3** (0.2)	**0.1** (0.1)	**0.1** (0.1)	**0.6** (0.4)	**0.2** (0.1)	0.0
Bluegill	**5.4** (1.5)	**20.8** (7.9)	**39.0** (20.5)	**77.6** (38.2)	**70.2** (38.4)	**63.4** (26.0)	**43.2** (14.5)	**8.3** (4.9)	**41.5** (8.4)	6.7
Smallmouth bass		**0.1** (0.1)		**0.6** (0.4)	**3.4** (1.7)	**1.3** (0.6)		**0.1** (0.1)	**0.7** (0.3)	0.1
Largemouth bass	**0.4** (0.3)	**1.0** (0.6)	**1.6** (1.0)	**4.7** (1.6)	**1.1** (0.4)	**11.9** (5.2)	**6.6** (3.0)	**11.8** (6.7)	**4.6** (1.2)	0.8
Unidentified crappie	**0.3** (0.2)	**7.3** (3.3)	**19.7** (10.9)	**53.1** (23.4)	**22.1** (8.4)	**32.9** (12.8)	**44.7** (8.6)	**30.7** (18.3)	**26.1** (4.8)	4.3
Yellow perch		**13.1** (7.0)	**1.3** (0.5)	**15.5** (5.8)	**9.1** (3.2)	**12.3** (5.6)	**8.1** (1.8)	**21.6** (15.7)	**10.0** (2.4)	1.7
Sauger	**0.4** (0.2)	**0.6** (0.6)	**1.7** (0.7)		**0.6** (0.6)		**2.4** (1.2)		**0.7** (0.2)	0.1
Walleye	**0.1** (0.1)	**0.2** (0.2)	**0.9** (0.9)	**0.2** (0.2)			**1.4** (0.7)	**0.1** (0.1)	**0.4** (0.2)	0.1
Freshwater drum		**1.4** (1.4)	**4.3** (3.8)	**1.3** (1.2)			**7.4** (4.6)		**1.8** (0.8)	0.3
Number of hauls	9	9	9	9	9	9	9	9	72	

Table 2a. Mean catch (± SE) per acre seined of young-of-year fish from Pool 4, 7-24 July, 2008.

	Station									
	1	2	3	4	5	6	7	8	Grand Mean	Percent of catch
Longnose gar		**0.2** (0.2)				**1.4** (1.0)	**1.4** (0.8)	**0.2** (0.2)	**0.4** (0.2)	0.0
Gizzard shad	**1446.1** (573.3)	**302.5** (290.1)	**46.9** (31.5)	**448.5** (272.8)	**811.7** (582.5)	**151.4** (99.8)	**3674.8** (2502.2)	**732.3** (423.9)	**950.2** (350.7)	84.4
Carpsucker spp.		**0.2** (0.2)	**0.4** (0.3)	**2.4** (0.9)	**0.6** (0.4)	**0.2** (0.2)		**1.0** (1.1)	**0.6** (0.2)	0.1
Bigmouth buffalo		**0.2** (0.2)							**0.0** (0.0)	0.0
Redhorse spp.	**0.2** (0.2)	**0.4** (0.4)	**0.2** (0.2)	**0.4** (0.3)			**0.6** (0.6)	**0.2** (0.2)	**0.3** (0.1)	0.0
Northern pike	**2.7** (1.5)	**0.8** (0.4)	**1.2** (0.7)	**0.3** (0.3)	**1.2** (0.8)	**0.6** (0.4)	**13.4** (4.4)	**3.9** (2.2)	**3.1** (0.8)	0.3
White bass	**11.7** (6.3)	**12.8** (7.3)	**8.8** (6.0)	**2.0** (1.0)	**1.0** (0.4)	**0.6** (0.4)	**61.5** (29.0)	**0.4** (0.4)	**12.5** (4.4)	1.1
Rock bass			**0.6** (0.3)		**0.6** (0.4)	**0.2** (0.2)	**0.2** (0.2)	**1.0** (0.7)	**0.3** (0.1)	0.0
Bluegill	**10.1** (2.8)	**38.5** (14.5)	**72.2** (37.9)	**143.6** (70.7)	**130.0** (71.1)	**117.5** (48.2)	**80.0** (26.9)	**15.4** (9.6)	**76.8** (15.7)	6.7
Smallmouth bass		**0.2** (0.2)		**1.0** (0.7)	**6.4** (3.1)	**2.5** (1.1)		**0.2** (0.2)	**1.3** (0.5)	0.1
Largemouth bass	**0.8** (0.6)	**1.9** (1.2)	**2.9** (1.8)	**8.6** (3.0)	**2.1** (0.8)	**22.0** (9.6)	**12.1** (5.5)	**21.8** (13.2)	**8.6** (2.2)	0.8
Unidentified crappie	**0.6** (0.3)	**13.6** (6.2)	**36.4** (20.1)	**98.3** (43.4)	**40.9** (15.5)	**60.9** (23.6)	**82.7** (16.0)	**56.8** (36.0)	**48.4** (8.9)	4.3
Yellow perch		**24.3** (12.9)	**2.5** (1.0)	**28.7** (10.8)	**16.9** (5.9)	**22.8** (10.4)	**14.9** (3.3)	**40.0** (30.8)	**18.5** (4.6)	1.7
Sauger	**0.8** (0.4)	**1.0** (1.0)	**3.1** (1.3)		**1.0** (1.0)		**4.5** (2.2)		**1.3** (0.4)	0.1
Walleye	**0.2** (0.2)	**0.4** (0.4)	**1.6** (1.6)	**0.3** (0.3)			**2.7** (1.3)	**0.2** (0.2)	**0.7** (0.3)	0.1
Freshwater drum		**2.7** (2.7)	**8.0** (7.1)	**2.5** (2.1)			**13.8** (8.6)		**3.4** (1.5)	0.3
Number of hauls	9	9	9	9	9	9	9	9	72	

Table 3. Mean catch (± SE) per seine haul (3 arcs) and percent total catch of young-of-year fish during July from Pool 4, 2004-2008. Historical mean is from 1986 to 2007.

Species	2004	%	2005	%	2006	%	2007	%	2008	%	Mean
Longnose gar	**0.2** (0.1)	0.0	**0.2** (0.1)	0.1	**0.2** (0.1)	0.0	**0.1** (0.1)	0.0	**0.2** (0.1)	0.0	0.1
Skipjack herring											0.1
Gizzard shad	**685.0** (338.2)	95.5	**1011.7** (450.1)	95.6	**859.3** (335.1)	90.6	**617.0** (231.5)	92.0	**513.1** (188.1)	84.4	610.9
Mooneye											0.0
Common carp	**1.7** (1.1)	0.2	**0.1** (0.1)	0.1	**0.3** (0.2)	0.0	**4.7** (3.4)	0.7			1.3
Carpsucker spp.	**0.0** (0.0)	0.0	**0.2** (0.2)	0.1	**8.0** (2.9)	0.8	**6.5** (3.6)	1.0	**0.3** (0.1)	0.1	6.7
Sucker spp.											0.0
White sucker	**0.1** (0.1)	0.0	**0.1** (0.1)	0.1	**0.0** (0.0)	0.0	**0.0** (0.0)	0.0			0.2
Buffalo spp.											0.2
Smallmouth buffalo	**0.3** (0.1)	0.0	**0.2** (0.1)	0.1	**0.2** (0.1)	0.0	**0.6** (0.5)	0.1			1.4
Bigmouth buffalo	**0.8** (0.6)	0.1	**0.1** (0.1)	0.1	**0.0** (0.0)	0.0	**0.1** (0.0)	0.0	**0.0** (0.0)	0.0	0.4
Shorthead redhorse											0.0
Redhorse spp.	**0.2** (0.1)	0.0	**0.4** (0.3)	0.1	**3.3** (1.3)	0.3	**0.7** (0.2)	0.1	**0.1** (0.1)	0.0	0.6
Channel catfish			**0.4** (0.3)	0.1	**0.1** (0.0)	0.0					0.0
Flathead catfish											0.0
Northern pike	**0.6** (0.3)	0.1	**1.3** (0.4)	0.1	**0.5** (0.2)	0.1	**0.2** (0.1)	0.0	**1.7** (0.4)	0.3	0.4
Muskellunge											0.0
White bass	**7.5** (1.8)	1.0	**4.3** (1.3)	0.4	**17.9** (7.0)	1.9	**12.6** (6.3)	1.8	**6.8** (2.4)	1.1	69.9
Rock bass	**0.0** (0.0)	0.0	**0.1** (0.1)	0.1	**0.1** (0.0)	0.0	**0.1** (0.0)	0.0	**0.2** (0.1)	0.0	0.1
Green sunfish							**0.0** (0.0)	0.0			0.0
Bluegill	**2.0** (0.6)	0.3	**17.4** (5.7)	1.6	**25.9** (16.0)	2.7	**15.4** (4.0)	2.2	**41.5** (8.4)	6.7	5.4
Smallmouth bass	**0.1** (0.1)	0.0	**0.5** (0.2)	0.1	**0.8** (0.2)	0.1	**0.8** (0.3)	0.1	**0.7** (0.3)	0.1	0.5
Largemouth bass	**3.7** (1.8)	0.5	**8.3** (1.8)	0.8	**5.9** (2.7)	0.6	**3.1** (1.2)	0.4	**4.6** (1.2)	0.8	1.8
Crappie spp.									**26.1** (4.8)	4.3	0.1
White crappie					**0.3** (0.2)	0.0					0.3
Black crappie	**5.3** (1.8)	0.7	**3.2** (0.9)	0.3	**2.3** (0.8)	0.2	**2.0** (0.5)	0.3			4.8
Yellow perch	**8.0** (4.6)	1.1	**5.4** (3.2)	0.5	**1.7** (0.7)	0.2	**2.3** (0.8)	0.3	**10.0** (2.4)	1.7	3.8
Sauger	**1.0** (0.2)	0.1	**0.3** (0.2)	0.1	**1.3** (0.4)	0.1	**1.8** (0.5)	0.3	**0.7** (0.2)	0.1	1.4
Walleye	**0.5** (0.1)	0.1	**0.1** (0.1)	0.1	**0.6** (0.2)	0.1	**0.7** (0.2)	0.1	**0.4** (0.2)	0.1	1.1
Freshwater drum	**0.1** (0.1)	0.0	**4.2** (1.7)	0.4	**19.5** (5.9)	2.1	**3.2** (1.1)	0.5	**1.8** (0.8)	0.3	2.2
Total catch per haul	**728.5**		**1058.4**		**948.0**		**679.4**		**608.3**		
Number of hauls	65		63		71		72		72		

Table 4. Mean catch (± SE) per seine haul (3 arcs) of juvenile and adult fish from Pool 4, 7-24 July, 2008.

	Station																					
	1		2		3		4		5		6		7		8		Grand mean				Percent of	
Species																					catch	
Longnose gar	**0.1**	(0.1)													**0.1**	(0.1)	**0.0**	(0.0)			0.0	
Bowfin													**0.1**	(0.1)			**0.0**	(0.0)			0.0	
Mooneye	**0.8**	(0.8)	**0.1**	(0.1)													**0.1**	(0.1)			0.1	
Gizzard shad							**0.1**	(0.1)									**0.0**	(0.0)			0.0	
Spotfin shiner			**2.1**	(1.0)	**0.7**	(0.4)			**0.4**	(0.2)	**0.3**	(0.2)	**0.4**	(0.4)	**10.1**	(6.1)	**1.8**	(0.8)			1.4	
Common carp	**1.1**	(0.5)	**0.1**	(0.1)	**1.1**	(0.4)	**0.1**	(0.1)	**0.2**	(0.1)	**0.1**	(0.1)	**0.4**	(0.2)			**0.4**	(0.1)			0.3	
Emerald shiner	**11.0**	(3.4)	**24.2**	(12.6)	**17.0**	(8.5)	**264.3**	(148.9)	**213.0**	(169.2)	**13.8**	(4.8)	**122.9**	(27.1)	**120.3**	(27.3)	**98.3**	(29.3)			76.5	
River shiner									**0.2**	(0.2)							**0.0**	(0.0)			0.0	
Spottail shiner	**0.1**	(0.1)	**32.6**	(25.8)	**2.0**	(1.0)	**8.7**	(3.3)	**3.9**	(2.5)	**2.1**	(1.6)	**0.3**	(0.3)	**1.9**	(1.1)	**6.4**	(3.3)			5.0	
Weed shiner															**3.3**	(1.7)	**0.4**	(0.2)			0.3	
Mimic shiner			**0.8**	(0.8)											**2.0**	(1.4)	**0.3**	(0.2)			0.3	
Fathead minnow													**0.1**	(0.1)			**0.0**	(0.0)			0.0	
Bullhead minnow											**0.2**	(0.2)	**1.9**	(0.7)	**1.9**	(1.2)	**0.5**	(0.2)			0.4	
Quillback							**0.2**	(0.2)			**0.1**	(0.1)					**0.0**	(0.0)			0.0	
Carpsucker spp.			**0.1**	(0.1)	**0.1**	(0.1)	**0.4**	(0.4)									**0.1**	(0.1)			0.1	
White sucker									**0.1**	(0.1)							**0.0**	(0.0)			0.0	
Northern hog sucker									**0.2**	(0.2)							**0.0**	(0.0)			0.0	
Smallmouth buffalo	**0.2**	(0.1)															**0.0**	(0.0)			0.0	
Silver redhorse			**0.1**	(0.1)							**0.2**	(0.1)			**0.9**	(0.6)	**0.2**	(0.1)			0.1	
Shorthead redhorse	**0.8**	(0.4)			**0.1**	(0.1)							**0.3**	(0.3)	**0.8**	(0.7)	**0.3**	(0.1)			0.2	
Redhorse spp.							**0.1**	(0.1)									**0.0**	(0.0)			0.0	
Channel catfish	**0.2**	(0.1)			**0.1**	(0.1)							**0.6**	(0.4)			**0.1**	(0.1)			0.1	
Northern pike	**0.1**	(0.1)					**0.3**	(0.3)	**0.9**	(0.3)	**0.2**	(0.1)			**0.7**	(0.4)	**0.3**	(0.1)			0.2	
Trout perch													**2.6**	(2.2)			**0.3**	(0.3)			0.2	
Brook silverside			**0.1**	(0.1)	**0.2**	(0.2)	**0.2**	(0.2)			**2.1**	(1.1)	**0.1**	(0.1)	**0.3**	(0.3)	**0.4**	(0.2)			0.3	
Brook stickleback	**0.1**	(0.1)															**0.0**	(0.0)			0.0	
White bass	**0.6**	(0.4)	**0.1**	(0.1)									**0.4**	(0.3)			**0.1**	(0.1)			0.1	
Green sunfish															**0.1**	(0.1)	**0.0**	(0.0)			0.0	
Pumpkinseed													**0.2**	(0.2)			**0.0**	(0.0)			0.0	
Orangespotted sunfish													**0.9**	(0.5)	**0.1**	(0.1)	**0.1**	(0.1)			0.1	
Bluegill	**0.2**	(0.2)	**0.9**	(0.4)	**0.6**	(0.3)	**0.1**	(0.1)	**1.6**	(0.7)	**0.4**	(0.2)	**3.4**	(1.6)	**18.1**	(13.5)	**3.2**	(1.8)			2.5	
Smallmouth bass	**1.1**	(0.5)	**0.3**	(0.2)	**0.3**	(0.2)	**0.8**	(0.5)	**1.1**	(0.7)	**1.2**	(0.8)			**1.7**	(0.7)	**0.8**	(0.2)			0.6	
Largemouth bass	**0.1**	(0.1)	**0.2**	(0.1)	**0.1**	(0.1)	**1.0**	(0.6)	**0.8**	(0.5)	**0.3**	(0.3)	**0.2**	(0.1)	**0.8**	(0.5)	**0.5**	(0.1)			0.4	
Black crappie							**0.1**	(0.1)			**0.1**	(0.1)	**0.8**	(0.6)	**0.6**	(0.4)	**0.2**	(0.1)			0.2	
Johnny darter	**0.1**	(0.1)			**0.6**	(0.4)	**0.4**	(0.2)	**0.2**	(0.2)	**0.2**	(0.2)	**1.2**	(0.6)	**0.3**	(0.3)	**0.4**	(0.1)			0.3	
Yellow perch							**0.2**	(0.2)	**0.4**	(0.2)	**0.1**	(0.1)	**0.2**	(0.2)	**0.9**	(0.7)	**0.2**	(0.1)			0.2	
Logperch	**0.6**	(0.4)	**0.9**	(0.3)	**26.9**	(13.8)	**35.1**	(17.8)	**5.2**	(2.1)	**17.0**	(7.5)	**3.1**	(1.0)	**0.7**	(0.4)	**11.2**	(3.2)			8.7	
Slenderhead darter					**0.3**	(0.2)			**0.1**	(0.1)	**0.2**	(0.1)					**0.1**	(0.0)			0.1	
River darter	**0.1**	(0.1)			**0.1**	(0.1)	**3.4**	(2.8)			**0.1**	(0.1)	**0.2**	(0.1)			**0.5**	(0.4)			0.4	
Sauger					**0.1**	(0.1)							**1.3**	(0.5)			**0.2**	(0.1)			0.1	
Freshwater drum	**1.8**	(0.6)	**0.3**	(0.3)	**2.1**	(1.1)	**0.5**	(0.3)	**0.6**	(0.4)			**1.9**	(0.8)			**0.9**	(0.2)			0.7	
Number of hauls	9		9		9		9		9		9		9		9		72					

Table 4a. Mean catch (± SE) per acre seined of juvenile and adult fish from Pool 4, 7-24 July, 2008.

Species	Station 1	2	3	4	5	6	7	8	Grand mean	Percent of catch
Longnose gar	**0.2** (0.2)							**0.2** (0.2)	**0.1** (0.0)	0.0
Bowfin							**0.2** (0.2)		**0.0** (0.0)	0.0
Mooneye	**1.4** (1.4)	**0.2** (0.2)							**0.2** (0.2)	0.1
Gizzard shad				**0.2** (0.2)					**0.0** (0.0)	0.0
Spotfin shiner		**3.9** (1.8)	**1.2** (0.7)		**0.8** (0.4)	**0.6** (0.4)	**0.8** (0.8)	**18.6** (12.0)	**3.3** (1.5)	1.4
Common carp	**2.1** (0.8)	**0.2** (0.2)	**2.1** (0.8)	**0.2** (0.2)	**0.4** (0.3)	**0.2** (0.2)	**0.8** (0.4)		**0.7** (0.2)	0.3
Emerald shiner	**20.4** (6.4)	**44.9** (23.4)	**31.5** (15.7)	**489.5** (275.8)	**394.4** (313.4)	**25.5** (9.0)	**227.6** (50.3)	**222.8** (53.7)	**182.1** (54.7)	76.5
River shiner					**0.4** (0.4)				**0.1** (0.1)	0.0
Spottail shiner	**0.2** (0.2)	**60.3** (47.7)	**3.7** (1.9)	**16.0** (6.0)	**7.2** (4.6)	**3.9** (2.9)	**0.6** (0.6)	**3.5** (2.1)	**11.9** (6.2)	5.0
Weed shiner								**6.1** (3.3)	**0.8** (0.4)	0.3
Mimic shiner		**1.4** (1.4)						**3.7** (2.8)	**0.6** (0.4)	0.3
Fathead minnow							**0.2** (0.2)		**0.0** (0.0)	0.0
Bullhead minnow						**0.4** (0.4)	**3.5** (1.4)	**3.6** (2.3)	**0.9** (0.4)	0.4
Quillback				**0.3** (0.3)		**0.2** (0.2)			**0.1** (0.0)	0.0
Carpsucker spp.		**0.2** (0.2)	**0.2** (0.2)	**0.8** (0.8)					**0.2** (0.1)	0.1
White sucker					**0.2** (0.2)				**0.0** (0.0)	0.0
Northern hog sucker					**0.4** (0.4)				**0.1** (0.1)	0.0
Smallmouth buffalo	**0.4** (0.3)								**0.1** (0.0)	0.0
Silver redhorse		**0.2** (0.2)				**0.4** (0.3)		**1.6** (1.2)	**0.3** (0.2)	0.1
Shorthead redhorse	**1.4** (0.7)		**0.2** (0.2)				**0.6** (0.6)	**1.4** (1.3)	**0.5** (0.2)	0.2
Redhorse spp.				**0.2** (0.2)					**0.0** (0.0)	0.0
Channel catfish	(0.3)		**0.2** (0.2)				**1.1** (0.7)		**0.2** (0.1)	0.1
Northern pike	(0.2)			**0.6** (0.6)	**1.6** (0.6)	**0.4** (0.3)		**1.3** (0.8)	**0.5** (0.2)	0.2
Trout perch							**4.7** (4.1)		**0.6** (0.5)	0.2
Brook silverside		**0.2** (0.2)	**0.4** (0.4)	**0.3** (0.3)		**3.9** (2.1)	**0.2** (0.2)	**0.6** (0.7)	**0.7** (0.3)	0.3
Brook stickleback	**0.2** (0.2)								**0.0** (0.0)	0.0
White bass	**1.0** (0.8)	**0.2** (0.2)					**0.8** (0.6)		**0.3** (0.1)	0.1
Green sunfish								**0.2** (0.2)	**0.0** (0.0)	0.0
Pumpkinseed							**0.3** (0.3)		**0.0** (0.0)	0.0
Orangespotted sunfish							**1.6** (0.8)	**0.2** (0.2)	**0.2** (0.1)	0.1
Bluegill	**0.4** (0.4)	**1.6** (0.8)	**1.0** (0.5)	**0.2** (0.2)	**2.9** (1.2)	**0.8** (0.4)	**6.4** (3.0)	**33.5** (26.5)	**5.9** (3.3)	2.5
Smallmouth bass	**2.1** (0.8)	**0.6** (0.3)	**0.6** (0.4)	**1.4** (0.9)	**2.1** (1.2)	**2.3** (1.4)		**3.2** (1.4)	**1.5** (0.3)	0.6
Largemouth bass	**0.2** (0.2)	**0.4** (0.3)	**0.2** (0.2)	**1.9** (1.0)	**1.4** (1.0)	**0.6** (0.6)	**0.4** (0.3)	**1.5** (0.9)	**0.8** (0.2)	0.4
Black crappie				**0.2** (0.2)		**0.2** (0.2)	**1.5** (1.0)	**1.0** (0.7)	**0.4** (0.2)	0.2
Johnny darter	**0.2** (0.2)		**1.0** (0.7)	**0.8** (0.4)	**0.4** (0.4)	**0.4** (0.4)	**2.2** (1.2)	**0.6** (0.7)	**0.7** (0.2)	0.3
Yellow perch				**0.3** (0.3)	**0.8** (0.4)	**0.2** (0.2)	**0.3** (0.3)	**1.6** (1.3)	**0.4** (0.2)	0.2
Logperch	**1.0** (0.7)	**1.6** (0.5)	**49.8** (25.6)	**64.9** (33.0)	**9.7** (3.9)	**31.5** (14.0)	**5.8** (1.9)	**1.2** (0.7)	**20.7** (6.0)	8.7
Slenderhead darter			**0.6** (0.4)		**0.2** (0.2)	**0.4** (0.3)			**0.2** (0.1)	0.1
River darter	**0.2** (0.2)		**0.2** (0.2)	**6.3** (5.1)		**0.2** (0.2)	**0.4** (0.3)		**0.9** (0.7)	0.4
Sauger			**0.2** (0.2)				**2.5** (1.0)		**0.3** (0.2)	0.1
Freshwater drum	**3.3** (1.1)	**0.6** (0.6)	**3.9** (2.0)	**0.9** (0.5)	**1.0** (0.7)		**3.6** (1.5)		**1.7** (0.4)	0.7
Number of hauls	9	9	9	9	9	9	9	9	72	

Table 5. Mean catch (± SE) per seine haul (3 arcs) and percent total catch of juvenile and adult fish during July from Pool 4, 2004-2008. Historical mean is from 1986 to 2007.

Species	2004		%	2005		%	2006		%	2007		%	2008		%	Mean
Chestnut lamprey							**0.0**	(0.0)	0.0							0.0
Longnose gar													**0.0**	(0.0)	0.0	0.0
Shortnose gar																0.0
Bowfin	**0.1**	(0.0)	0.0				**0.0**	(0.0)	0.0	**0.0**	(0.0)	0.0	**0.0**	(0.0)	0.0	0.0
Gizzard shad	**0.2**	(0.1)	0.0	**0.4**	(0.2)	0.3	**1.8**	(0.8)	1.1	**0.2**	(0.1)	0.1	**0.0**	(0.0)	0.0	0.6
Mooneye	**0.3**	(0.3)	0.0	**0.1**	(0.1)	0.1	**0.1**	(0.0)	0.0	**0.1**	(0.1)	0.1	**0.1**	(0.1)	0.1	0.1
Spotfin shiner	**2.7**	(0.9)	0.3	**5.5**	(1.6)	3.3	**6.0**	(3.3)	3.6	**7.3**	(2.6)	4.0	**1.8**	(0.8)	1.4	9.1
Common carp	**0.4**	(0.1)	0.1	**0.5**	(0.1)	0.3	**1.0**	(0.2)	0.6	**0.9**	(0.2)	0.5	**0.4**	(0.1)	0.3	0.5
Silver chub	**0.2**	(0.2)	0.0	**0.2**	(0.1)	0.1	**0.1**	(0.0)	0.0	**0.1**	(0.1)	0.0				1.1
Horneyhead chub							**0.0**	(0.0)	0.0							0.0
Golden shiner							**0.0**	(0.0)	0.0							0.0
Emerald shiner	**742.7**	(517.5)	97.4	**144.3**	(49.9)	86.5	**123.8**	(25.1)	75.0	**136.4**	(21.8)	74.7	**98.3**	(29.3)	76.5	289.8
River shiner	**0.4**	(0.1)	0.0	**0.1**	(0.1)	0.1	**0.0**	(0.0)	0.0	**0.1**	(0.1)	0.0	**0.0**	(0.0)	0.0	2.6
Spottail shiner	**2.2**	(0.7)	0.3	**6.9**	(1.8)	4.1	**9.3**	(2.4)	5.7	**14.8**	(4.6)	8.1	**6.4**	(3.3)	5.0	7.1
Sand shiner							**0.0**	(0.0)	0.0							0.3
Weed shiner				**0.1**	(0.1)	0.1							**0.4**	(0.2)	0.3	0.0
Mimic shiner	**2.0**	(1.3)	0.3	**0.1**	(0.1)	0.1	**0.1**	(0.1)	0.1	**0.3**	(0.1)	0.2	**0.3**	(0.2)	0.3	0.9
Bluntnose minnow	**0.1**	(0.1)	0.0	**0.1**	(0.1)	0.1	**0.1**	(0.1)	0.1							0.2
Fathead minnow	**0.0**	(0.0)	0.0	**0.1**	(0.1)	0.1							**0.0**	(0.0)	0.0	0.0
Bullhead minnow	**0.7**	(0.4)	0.1	**0.4**	(0.2)	0.3	**2.9**	(1.0)	1.8	**3.1**	(1.5)	1.7	**0.5**	(0.2)	0.4	0.9
Quillback				**0.1**	(0.1)	0.1				**0.0**	(0.0)	0.0	**0.0**	(0.0)	0.0	0.0
Carpsucker spp.	**0.2**	(0.1)	0.0	**0.1**	(0.1)	0.1	**0.2**	(0.1)	0.1	**0.8**	(0.4)	0.4	**0.1**	(0.1)	0.1	0.4
White sucker				**0.1**	(0.1)	0.1	**0.0**	(0.0)	0.0				**0.0**	(0.0)	0.0	0.0
Northern hogsucker										**0.1**	(0.0)	0.0	**0.0**	(0.0)	0.0	0.0
Smallmouth buffalo	**0.0**	(0.0)	0.0	**0.1**	(0.1)	0.1	**0.0**	(0.0)	0.0	**0.1**	(0.0)	0.0	**0.0**	(0.0)	0.0	0.1
Bigmouth buffalo	**0.0**	(0.0)	0.0	**0.1**	(0.1)	0.1	**0.4**	(0.4)	0.2	**0.0**	(0.0)	0.0				0.0
Spotted sucker							**0.1**	(0.0)	0.0							0.0
Redhorse spp.				**0.1**	(0.1)	0.1	**0.0**	(0.0)	0.0	**0.0**	(0.0)	0.0	**0.0**	(0.0)	0.0	0.1
Silver redhorse	**0.2**	(0.1)	0.0	**0.1**	(0.1)	0.1	**0.4**	(0.1)	0.2	**0.3**	(0.1)	0.2	**0.2**	(0.1)	0.1	0.1
Golden rehorse	**0.4**	(0.1)	0.0	**0.2**	(0.1)	0.1	**0.0**	(0.0)	0.0	**0.1**	(0.1)	0.1				0.1
Shorthead redhorse	**0.6**	(0.1)	0.1	**0.2**	(0.1)	0.1	**0.2**	(0.1)	0.1	**1.0**	(0.2)	0.5	**0.3**	(0.1)	0.2	0.4
Greater redhorse																0.0
Channel catfish	**0.1**	(0.0)	0.0				**0.5**	(0.2)	0.3	**0.0**	(0.0)	0.0	**0.1**	(0.1)	0.1	0.2
Stonecat																0.0
Tadpole madtom	**0.0**	(0.0)	0.0													0.0
Flathead catfish										**0.0**	(0.0)	0.0				0.0
Northern pike	**0.7**	(0.4)	0.1	**0.3**	(0.1)	0.2	**0.4**	(0.1)	0.3	**0.3**	(0.1)	0.2	**0.3**	(0.1)	0.2	0.2
Muskellunge																0.0
Trout-perch	**0.9**	(0.6)	0.1	**0.1**	(0.1)	0.1	**0.0**	(0.0)	0.0				**0.3**	(0.3)	0.2	0.2

Table 5 continued on next page.

Table 5 continued. Mean catch (± SE) per seine haul (3 arcs) and percent total catch of juvenile and adult fish during July from Pool 4, 2004-2008. Historical mean is from 1986 to 2007.

Species	2004	%	2005	%	2006	%	2007	%	2008	%	Mean
Burbot											0.0
Brook silverside	**0.2** (0.1)	0.0	**0.4** (0.2)	0.2	**1.0** (0.8)	0.6	**0.7** (0.2)	0.4	**0.4** (0.2)	0.3	0.2
Brook stickleback									**0.0** (0.0)	0.0	0.0
White bass	**0.3** (0.1)	0.0	**0.2** (0.1)	0.1	**1.3** (0.7)	0.8	**0.1** (0.1)	0.1	**0.1** (0.1)	0.1	1.0
Rock bass	**0.0** (0.0)	0.0	**0.1** (0.1)	0.1	**0.2** (0.1)	0.1	**0.2** (0.1)	0.1			0.1
Green sunfish									**0.0** (0.0)	0.0	0.0
Pumkinseed									**0.0** (0.0)	0.0	0.0
Orangespotted sunfish									**0.1** (0.1)	0.1	0.0
Bluegill	**2.0** (0.7)	0.3	**2.0** (0.8)	1.2	**2.8** (1.3)	1.7	**2.6** (1.0)	1.4	**3.2** (1.8)	2.5	1.0
Hybrid sunfish											0.0
Smallmouth bass	**0.9** (0.4)	0.1	**0.6** (0.3)	0.4	**0.5** (0.2)	0.3	**0.7** (0.1)	0.4	**0.8** (0.2)	0.6	0.6
Largemouth bass	**0.7** (0.2)	0.1	**0.4** (0.1)	0.2	**1.2** (0.2)	0.7	**0.8** (0.2)	0.4	**0.5** (0.1)	0.4	0.3
White crappie					**0.2** (0.1)	0.1					0.0
Black crappie	**0.6** (0.3)	0.1	**0.8** (0.5)	0.5	**0.6** (0.3)	0.4	**0.3** (0.2)	0.2	**0.2** (0.1)	0.1	0.3
Crystal darter											0.0
Western sand darter											0.0
Mud darter			**0.1** (0.1)	0.1	**0.1** (0.1)	0.1	**0.0** (0.0)	0.0			0.0
Johnny darter	**0.8** (0.3)	0.1	**0.3** (0.1)	0.2	**0.6** (0.3)	0.4	**0.1** (0.1)	0.1	**0.4** (0.1)	0.3	0.2
Yellow perch	**0.2** (0.1)	0.0	**0.5** (0.3)	0.3	**0.8** (0.5)	0.5	**0.4** (0.1)	0.2	**0.2** (0.1)	0.2	0.2
Logperch	**1.6** (0.3)	0.2	**1.3** (0.4)	0.8	**6.1** (1.4)	3.7	**9.0** (2.5)	4.9	**11.2** (3.2)	8.7	4.3
Blackside darter											0.0
Slenderhead darter					**0.0** (0.0)	0.0			**0.1** (0.0)	0.1	0.0
River darter	**0.1** (0.1)	0.0	**0.1** (0.1)	0.1	**0.1** (0.1)	0.1	**0.0** (0.0)	0.0	**0.5** (0.4)	0.4	0.1
Sauger	**0.0** (0.0)	0.0	**0.1** (0.1)	0.1	**0.0** (0.0)	0.0	**0.0** (0.0)	0.0	**0.2** (0.1)	0.1	0.1
Walleye											0.0
Freshwater drum	**0.4** (0.1)	0.0	**0.6** (0.2)	0.4	**1.9** (0.6)	1.1	**1.6** (0.5)	0.9	**0.9** (0.2)	0.7	0.5
Total catch per haul	**762.7**		**166.8**		**165.0**		**182.5**		**128.5**		
Number of hauls	65		63		71		72		72		

Table 6. Total length (mm), weight (g), and k-factor of young-of-year fish from weekly seining, Pool 4, 7-24 July, 2008.

		Length				Weight				K-factor			
Species	Week*	Mean	SE	Range	N	Mean	SE	Range	N	Mean	SE	Range	N
White bass	1	**33**	0.6	22 - 46	99	**0.4**	0.0	0.1 - 1.2	88	**0.97**	0.02	0.57 - 1.39	88
	2	**41**	1.1	24 - 64	72	**1.0**	0.1	0.1 - 3.2	71	**1.13**	0.02	0.51 - 1.50	71
	3	**42**	0.9	28 - 64	86	**1.0**	0.1	0.3 - 3.1	86	**1.12**	0.02	0.58 - 1.37	86
Bluegill	1	**18**	0.3	12 - 25	77	**0.1**	0.0	0.1 - 0.2	4	**1.00**	0.10	0.82 - 1.28	4
	2	**19**	0.2	13 - 30	238	**0.2**	0.0	0.1 - 0.4	40	**1.08**	0.04	0.64 - 1.71	40
	3	**22**	0.2	22 - 22	253	**0.2**	0.0	0.1 - 0.5	137	**1.11**	0.02	0.57 - 1.92	137
Smallmouth bass	1	**37**	0.6	31 - 43	23	**0.7**	0.0	0.4 - 1.1	23	**1.32**	0.00	1.07 - 1.50	23
	2	**44**	1.5	30 - 52	16	**1.2**	0.1	0.4 - 1.9	16	**1.33**	0.03	1.17 - 1.64	16
	3	**48**	2.4	35 - 61	11	**1.6**	0.2	0.6 - 2.9	11	**1.39**	0.02	1.28 - 1.51	11
Largemouth bass	1	**34**	0.9	21 - 62	89	**0.6**	0.1	0.1 - 2.4	87	**1.28**	0.02	0.82 - 1.92	87
	2	**38**	0.8	25 - 70	93	**0.9**	0.1	0.1 - 5.7	93	**1.38**	0.02	0.64 - 1.76	93
	3	**42**	1.2	30 - 75	59	**1.2**	0.1	0.3 - 5.9	59	**1.36**	0.02	0.92 - 1.87	59
Crappie spp.	1	**33**	0.3	23 - 47	242	**0.4**	0.0	0.1 - 1.2	231	**1.13**	0.01	0.51 - 1.68	231
	2	**36**	0.5	24 - 55	183	**0.6**	0.0	0.1 - 2.2	181	**1.12**	0.01	0.51 - 1.60	181
	3	**41**	0.6	26 - 62	146	**1.0**	0.0	0.1 - 3.2	146	**1.22**	0.01	0.57 - 1.89	146
Yellow perch	1	**44**	0.3	35 - 58	134	**0.9**	0.0	35.0 - 58.0	122	**1.06**	0.01	0.82 - 1.38	122
	2	**47**	0.3	36 - 60	160	**1.2**	0.0	36.0 - 60.0	160	**1.06**	0.01	0.76 - 1.48	160
	3	**51**	0.4	39 - 67	124	**1.6**	0.0	39.0 - 67.0	124	**1.13**	0.01	0.98 - 1.31	124
Sauger	1	**61**	1.5	52 - 68	11	**1.7**	0.1	1.2 - 2.1	11	**0.73**	0.02	0.63 - 0.85	11
	2	**71**	1.0	63 - 80	22	**2.5**	0.1	1.8 - 3.7	22	**0.71**	0.01	0.61 - 0.78	22
	3	**76**	1.3	71 - 85	12	**3.2**	0.2	2.5 - 4.7	12	**0.72**	0.01	0.66 - 0.81	12
Walleye	1	**83**		83 - 83	1	**4.9**		4.9 - 4.9	1	**0.86**		0.86 - 0.86	1
	2	**76**	2.4	69 - 85	7	**3.3**	0.4	2.2 - 4.6	7	**0.72**	0.02	0.64 - 0.81	7
	3	**80**	1.7	73 - 89	12	**3.8**	0.2	2.8 - 5.3	12	**0.72**	0.01	0.64 - 0.80	12

* Dates were: week 1, 7-10 July; week 2, 15-18 July; week 3, 21-24 July 2008

Table 7. Mean (± SE) total length (mm) of young-of-year fish collected by shoreline seining in Pool 4. Means are given for 2008 sample and a historical mean from 1986 - 2007. Time period refers to the week of sampling noted in the footnotes.

		Time period				
Species		0	1	2	3	4
Gizzard shad	2008		41.8 (0.4)	48.6 (0.8)	47.5 (1.6)	
	mean	**48.0 (7.0)**	**44.0 (2.0)**	**50.0 (2.3)**	**55.5 (3.0)**	**55.0 (0.0)**
Northern pike	2008		119.0 (3.8)	136.1 (4.3)	139.8 (4.1)	
	mean		**126.2 (7.1)**	**134.9 (4.8)**	**148.5 (8.2)**	**169.0 (11.0)**
White bass	2008		32.9 (0.6)	41.4 (1.1)	42.5 (0.9)	
	mean	**46.5 (4.5)**	**44.7 (1.7)**	**50.9 (2.3)**	**57.3 (1.6)**	**68.8 (3.3)**
Bluegill	2008		17.8 (0.3)	19.3 (0.2)	22.0 (22.0)	
	mean		**21.4 (1.2)**	**23.9 (1.3)**	**25.5 (0.6)**	**29.4 (0.7)**
Smallmouth bass	2008		37.1 (0.6)	43.9 (1.5)	48.2 (2.4)	
	mean	**47.0 (5.0)**	**44.2 (1.9)**	**47.6 (2.2)**	**54.4 (1.4)**	**66.1 (4.8)**
Largemouth bass	2008		33.9 (0.9)	38.2 (0.8)	42.5 (1.2)	
	mean	**44.0 (2.0)**	**43.9 (1.4)**	**50.9 (2.2)**	**58.3 (2.0)**	**58.2 (2.6)**
Crappie spp.	2008		33.0 (0.3)	36.1 (0.5)	41.5 (0.6)	
	mean	**35.5 (1.5)**	**35.0 (1.0)**	**39.6 (1.2)**	**45.0 (1.1)**	**48.6 (4.2)**
Yellow perch	2008		43.6 (0.3)	47.4 (0.3)	51.1 (0.4)	
	mean	**47.5 (1.5)**	**45.1 (0.9)**	**48.6 (1.0)**	**53.8 (0.7)**	**54.1 (0.1)**
Sauger	2008		61.0 (1.5)	70.6 (1.0)	75.9 (1.3)	
	mean	**69.0 (6.0)**	**67.2 (1.9)**	**72.9 (1.9)**	**78.8 (1.7)**	**81.0 (2.1)**
Walleye	2008		83.0	76.4 (2.4)	80.3 (1.7)	
	mean	**79.5 (4.5)**	**77.3 (2.7)**	**84.6 (2.8)**	**91.4 (2.5)**	**99.0 (10.0)**

* Dates for each period are:

p0	p1	p2	p3	p4
6/29-7/2	7/2-10	7/10-15	7/15-22	7/22-28

Table 8. Temperature, effort, total catch (N), and catch per hour (N/hr) of young-of-year walleye and sauger by night electrofishing in Pool 4, 28 – 30 October 2008.

		Temp.	Effort	Walleye		Sauger	
Station	Date	(°F)	Hours	N	N/hr	N	N/hr
1	29	47	1.10	3	2.7	49	44.5
2	29	46	0.90	1	1.1	31	34.4
3	29	46	1.02	33	32.5	202	198.7
4	28	47	1.08	25	23.1	100	92.3
5	28	47	0.95	1	1.1	74	77.9
6	28	46	0.80	10	12.5	98	122.5
7	29	47	0.48	4	8.3	4	8.3
8	30	48	0.67	1	1.5	1	1.5
	Total		5.90	75		510	
	Mean of all stations				10.3		72.5
	SE				4.4		24.8

Table 9. Historical catch per hour of young-of-year walleye and sauger by night electrofishing during October and November in Pool 4, 2004 to 2008. Overall mean is calculated from 1986 to 2007 data. Stations 7 and 8 are within Pool 4 but outside of Lake Pepin.

WALLEYE

Station	2004	2005	2006	2007	2008	mean
1	12.6	24.3	0.0	104.2	2.7	24.3
2	13.8	14.1	15.0	255.4	1.1	30.1
3	9.4	13.7	1.8	75.3	32.5	22.8
4	18.1	36.0	31.2	145.1	23.1	47.0
5	7.9	68.9	39.2	78.6	1.1	44.1
6	21.3	32.3	29.1	88.6	12.5	36.2
7	5.8	17.5	30.0	3.9	8.3	18.6
8	6.5	38.8	5.0	65.3	1.5	35.8
Mean						
sta. 1-6	13.9	31.5	19.4	124.6	12.2	34.1
SE	2.1	8.3	7.3	30.8	5.9	8.5
sta. 1-8	11.9	30.7	18.9	102.1	10.3	32.9
SE	2.0	6.5	5.8	27.8	4.4	8.8

SAUGER

Station	2004	2005	2006	2007	2008	mean
1	270.5	184.5	2.9	116.8	44.5	100.5
2	86.2	67.4	69.6	92.6	34.4	42.7
3	296.2	121.9	12.9	121.4	198.7	80.5
4	196.4	100.0	25.4	112.7	92.3	71.3
5	227.0	317.2	49.0	165.4	77.9	98.6
6	261.7	225.8	3.4	181.8	122.5	69.3
7	21.2	57.1	5.6	9.7	8.3	47.8
8	0.0	11.9	0.0	67.1	1.5	17.3
Mean						
sta. 1-6	223.0	169.5	27.2	131.8	95.1	76.4
SE	30.9	37.7	10.1	15.3	26.8	15.7
sta. 1-8	169.9	135.7	21.1	108.4	72.5	69.5
SE	41.5	35.6	9.6	20.5	24.8	17.9

Table 10. Length-frequency of measured young-of-year walleye and sauger captured by electrofishing in Pool 4, 2004 to 2008.

WALLEYE					
Total length (in)	2004	2005	2006	2007	2008
3.5-3.9					
4.0-4.4					
4.5-4.9					
5.0-5.4	1				
5.5-5.9		2		3	
6.0-6.4		6	2	5	
6.5-6.9	6	3	4	17	3
7.0-7.4	7	21	8	27	10
7.5-7.9	19	36	21	29	17
8.0-8.4	17	42	22	31	27
8.5-8.9	9	22	15	27	20
9.0-9.4	3	13	12	25	1
9.5-9.9		5	15	10	
10.0-10.4		4	3	5	
10.5-10.9					
Number	62	154	102	179	78
Length					
mean	7.9	8.1	8.4	8.1	8.0
SE	0.09	0.07	0.09	0.07	0.07
min	5.4	5.7	6.2	5.5	6.7
max	9.2	10.3	10.4	10.3	9.0

SAUGER					
Total length (in)	2004	2005	2006	2007	2008
3.5-3.9					
4.0-4.4					1
4.5-4.9	4				10
5.0-5.4	32	2	3	16	67
5.5-5.9	49	35	18	58	104
6.0-6.4	41	68	26	58	58
6.5-6.9	26	39	30	29	38
7.0-7.4	8	29	13	18	6
7.5-7.9	1	12	4	1	4
8.0-8.4		1	1		1
8.5-8.9					
9.0-9.4					
Number	161	186	95	180	289
Length					
mean	6.0	6.5	6.4	6.2	5.9
SE	0.05	0.04	0.06	0.04	0.04
min	4.8	5.3	5.2	5.1	4.4
max	7.6	8.3	8.1	7.6	8.1

Table 11. Mean catch per hour (± SE) of young-of-year fish by trawling in Lake Pepin, 26-28 August and 3-5 September, 2008.

Species	Station 2	3	4	5	6	Grand Mean	Percent of total catch
Gizzard shad	**621.0** (223.4)	**300.0** (88.1)	**261.0** (91.8)	**109.5** (97.7)	**213.0** (74.8)	**300.9** (45.5)	73.6
White bass				**1.5** (1.5)		**0.3** (0.2)	0.1
Bluegill	**1.5** (1.5)	**1.5** (1.5)	**1.5** (1.5)	**1.5** (1.5)		**1.2** (0.4)	0.3
White crappie	**16.5** (7.5)	**49.5** (30.2)	**118.5** (101.9)		**1.5** (1.5)	**37.2** (16.1)	9.1
Black crappie	**13.5** (4.8)	**15.0** (5.4)	**43.5** (40.2)			**14.4** (6.1)	3.5
Sauger		**1.5** (1.5)	**1.5** (1.5)	**13.5** (8.6)	**1.5** (1.5)	**3.6** (1.4)	0.9
Walleye		**1.5** (1.5)		**1.5** (1.5)		**0.6** (0.3)	0.1
Freshwater drum	**36.0** (10.6)	**141.0** (88.0)	**25.5** (10.0)	**22.5** (16.3)	**27.0** (21.0)	**50.4** (14.3)	12.3
All species	**688.5** (221.1)	**510.0** (108.1)	**451.5** (206.3)	**150.0** (98.9)	**243.0** (73.3)	**408.6** (72.1)	
Number of hauls	8	8	8	8	8	40	
Hours trawled	0.67	0.67	0.67	0.67	0.67	3.33	

Table 12. Mean catch per hour (± SE) of young-of-year fish by trawling in Lake Pepin, August 2003–2008. Historical mean is from 1986-2007.

Species	2004		2005		2006		2007		2008		Historical mean	
Gizzard shad	**160.1**	(58.7)	**42.3**	(14.7)	**402.6**	(57.5)	**229.8**	(35.9)	**300.9**	(45.5)	**98.7**	(29.3)
Northern pike			**0.6**	(0.4)							**0.0**	(0.0)
Common carp											**0.8**	(0.7)
Smallmouth buffalo											**1.2**	(1.1)
Bigmouth buffalo											**0.0**	(0.0)
Channel catfish			**6.2**	(2.2)	**0.3**	(0.2)					**0.9**	(0.3)
Tadpole madtom											**0.0**	(0.0)
Flathead catfish			**0.3**	(0.3)	**0.3**	(0.3)					**0.1**	(0.0)
Trout-perch											**0.2**	(0.2)
White bass	**1.7**	(1.2)	**8.6**	(2.5)	**11.4**	(5.9)	**9.3**	(2.7)	**0.3**	(0.2)	**22.0**	(7.5)
Bluegill	**0.6**	(0.6)	**9.9**	(4.4)	**5.4**	(3.6)	**0.3**	(0.2)	**1.2**	(0.4)	**1.5**	(0.5)
White crappie	**5.2**	(3.0)	**1.9**	(1.0)	**1.2**	(0.4)	**1.8**	(0.6)	**37.2**	(16.1)	**5.1**	(1.1)
Black crappie	**11.3**	(4.3)	**14.8**	(4.1)	**15.6**	(3.2)	**3.9**	(1.0)	**14.4**	(6.1)	**6.9**	(1.8)
Yellow perch											**0.0**	(0.0)
Sauger	**7.8**	(2.6)	**7.1**	(1.8)	**2.4**	(0.7)	**2.7**	(0.8)	**3.6**	(1.4)	**5.9**	(1.3)
Walleye	**0.6**	(0.6)	**0.9**	(0.5)	**9.9**	(4.6)	**9.0**	(2.4)	**0.6**	(0.3)	**3.7**	(1.0)
Freshwater drum	**641.0**	(216.0)	**1284.8**	(191.9)	**212.4**	(91.0)	**99.0**	(24.8)	**50.4**	(14.3)	**322.0**	(63.9)
All species	**828.4**	(226.8)	**1377.8**	(196.7)	**662.1**	(143.4)	**356.1**	(65.4)	**408.6**	(72.1)	**423.2**	(69.1)
Number of hauls	23		39		40		40		40			
Hours trawled	1.87		3.26		3.33		3.33		3.33			

Table 13. Mean catch per hour (± SE) of juvenile and adult fish by trawling in Lake Pepin, 26-28 August and 3-5 September, 2008.

Species	Station 2	3	4	5	6	Grand Mean	Percent of total catch
Lake sturgeon		**1.5** (1.5)			**1.5** (1.5)	**0.6** (0.4)	0.2
Gizzard shad			**13.5** (13.5)			**2.7** (2.7)	1.0
Spotfin shiner		**1.5** (1.5)				**0.3** (0.3)	0.1
Common carp	**6.0** (4.5)		**4.5** (3.2)	**3.0** (2.0)	**7.5** (6.0)	**4.2** (1.6)	1.5
Silver chub	**9.0** (5.9)	**10.5** (10.5)				**3.9** (2.4)	1.4
Emerald shiner	**1.5** (1.5)					**0.3** (0.3)	0.1
Carpsucker spp.				**3.0** (3.0)		**0.6** (0.6)	0.2
White sucker					**1.5** (1.5)	**0.3** (0.3)	0.1
Smallmouth buffalo	**4.5** (3.2)		**1.5** (1.5)			**1.2** (0.7)	0.4
Bigmouth buffalo		**3.0** (3.0)		**1.5** (1.5)		**0.9** (0.7)	0.3
Silver redhorse		**1.5** (1.5)		**4.5** (2.2)	**1.5** (1.5)	**1.5** (0.6)	0.6
Shorthead redhorse				**6.0** (3.9)		**1.2** (0.8)	0.4
Channel catfish	**1.5** (1.5)	**6.0** (3.2)	**1.5** (1.5)	**6.0** (3.2)	**6.0** (4.5)	**4.2** (1.3)	1.5
Northern pike				**1.5** (1.5)		**0.3** (0.3)	0.1
Trout perch	**13.5** (7.3)	**64.5** (45.0)	**33.0** (16.9)	**72.0** (45.8)	**30.0** (16.8)	**42.6** (13.5)	15.6
White bass		**1.5** (1.5)		**7.5** (4.5)	**1.5** (1.5)	**2.1** (1.0)	0.8
Bluegill	**3.0** (3.0)	**3.0** (3.0)	**1.5** (1.5)	**49.5** (31.5)	**3.0** (2.0)	**12.0** (6.8)	4.4
Smallmouth bass				**1.5** (1.5)	**1.5** (1.5)	**0.6** (0.4)	0.2
White crappie		**1.5** (1.5)				**0.3** (0.3)	0.1
Black crappie	**1.5** (1.5)	**1.5** (1.5)	**1.5** (1.5)	**3.0** (2.0)	**3.0** (2.0)	**2.1** (0.7)	0.8
Yellow perch		**3.0** (3.0)	**3.0** (2.0)	**3.0** (2.0)		**1.8** (0.8)	0.7
Sauger	(3.2)	**25.5** (5.3)	**18.0** (5.6)	**3.0** (2.0)	**6.0** (3.2)	**12.0** (2.2)	4.4
Walleye	**3.0** (3.2)	**10.5** (4.8)	**34.5** (17.8)	**13.5** (8.9)	**16.5** (10.6)	**16.2** (4.7)	5.9
Freshwater drum	**97.5** (17.8)	**214.5** (76.8)	**252.0** (106.7)	**118.5** (64.6)	**121.5** (61.7)	**160.8** (31.8)	59.0
All species	**151.5** (29.6)	**349.5** (115.1)	**364.5** (117.1)	**297.0** (98.8)	**201.0** (83.0)	**272.7** (42.9)	
Number of hauls	8	8	8	8	8	40	
Hours trawled	0.67	0.67	0.67	0.67	0.67	3.33	

Table 14. Mean catch per hour (± SE) of juvenile and adult fish by trawling in Lake Pepin, 2004-2008. Historical mean is from 1986-2007.

Species	2004	2005	2006	2007	2008	Historical mean
Chestnut lamprey						**0.1** (0.0)
Lake sturgeon	**0.5** (0.5)				**0.6** (0.42)	**0.1** (0.0)
Shortnose gar	**0.5** (0.5)					**0.2** (0.1)
American eel						**0.0** (0.0)
Bowfin			**0.3** (0.3)			**0.1** (0.0)
Mooneye						**0.0** (0.0)
Gizzard shad	**4.2** (1.6)		**0.6** (0.4)		**2.7** (2.70)	**1.1** (0.6)
Northern pike	**0.6** (0.6)	**0.6** (0.4)	**0.3** (0.3)	**0.3** (0.3)	**0.3** (0.30)	**0.3** (0.1)
Common carp	**16.3** (5.2)	**10.2** (2.6)	**7.5** (1.9)	**1.8** (0.7)	**4.2** (1.64)	**19.9** (3.0)
Silver chub	**6.9** (3.3)	**6.2** (3.3)	**3.3** (1.4)	**0.6** (0.4)	**3.9** (2.41)	**17.1** (6.2)
Emerald shiner	**0.5** (0.5)	**3.1** (1.3)	**9.9** (7.6)	**8.1** (6.9)	**0.3** (0.30)	**4.1** (1.5)
River shiner						**0.0** (0.0)
Spottail shiner	**0.5** (0.5)	**0.9** (0.7)				**0.3** (0.1)
Mimic shiner	**0.5** (0.5)					**0.9** (0.8)
Bluntnose minnow	**3.7** (3.7)	**207.0** (102.4)				**14.6** (9.9)
Bullhead minnow	**3.7** (2.7)		**0.6** (0.6)			**0.5** (0.2)
River carpsucker						**0.0** (0.0)
Quillback	**1.0** (0.7)	**0.6** (0.4)	**0.6** (0.4)			**0.9** (0.3)
Highfin carpsucker						**0.0** (0.0)
Unidentified carpsucker				**3.6** (1.4)	**0.6** (0.60)	**0.6** (0.2)
White sucker	**6.1** (2.9)	**0.9** (0.5)	**0.6** (0.4)	**1.5** (1.0)	**0.3** (0.30)	**5.1** (1.1)
Smallmouth buffalo	**16.0** (11.0)	**1.2** (0.6)		**0.6** (0.4)	**1.2** (0.72)	**2.0** (0.8)
Bigmouth buffalo	**0.5** (0.5)				**0.9** (0.66)	**0.1** (0.1)
Spotted sucker						**0.0** (0.0)
Silver redhorse	**6.4** (2.9)	**2.8** (1.5)	**3.3** (1.3)	**0.6** (0.4)	**1.5** (0.64)	**3.5** (0.6)
Golden redhorse	**1.0** (1.0)					**0.3** (0.1)
Shorthead redhorse	**0.5** (0.5)	**1.9** (0.9)	**0.6** (0.4)	**0.6** (0.4)	**1.2** (0.84)	**1.6** (0.6)
Channel catfish	**18.3** (5.9)	**7.1** (3.4)	**6.0** (1.8)	**1.5** (1.0)	**4.2** (1.33)	**6.7** (1.0)
Slender madtom						**0.0** (0.0)
Tadpole madtom			**0.3** (0.3)			**0.3** (0.1)
Flathead catfish	**2.7** (1.3)	**2.2** (1.0)	**0.6** (0.4)			**1.3** (0.2)
Trout-perch	**12.7** (4.4)	**30.0** (7.0)	**13.8** (3.9)	**24.9** (11.1)	**42.6** (13.52)	**42.6** (12.1)
Brook silverside						**0.0** (0.0)
White bass	**11.2** (3.6)		**1.2** (0.7)	**25.2** (20.3)	**2.1** (1.04)	**9.9** (3.0)
Rock bass		**0.3** (0.3)				**0.0** (0.0)
Hybrid sunfish						**0.0** (0.0)
Bluegill	**13.7** (7.6)	**4.3** (1.7)	**12.3** (4.5)	**9.9** (3.6)	**12.0** (6.75)	**7.5** (1.4)
Smallmouth bass	**0.5** (0.5)		**0.3** (0.3)		**0.6** (0.42)	**0.3** (0.1)
White crappie			**0.6** (0.4)		**0.3** (0.30)	**0.5** (0.2)
Black crappie	**41.4** (30.0)	**13.0** (3.2)	**7.5** (2.9)	**24.6** (10.8)	**2.1** (0.73)	**11.0** (2.0)
Mud darter						**0.0** (0.0)
Johnny darter						**0.2** (0.1)
Yellow perch	**1.0** (0.7)	**2.2** (0.9)	**1.8** (0.9)	**1.5** (0.6)		**6.0** (1.3)
Logperch	**2.1** (1.6)		**1.5** (0.8)	**1.2** (0.6)		**0.9** (0.4)
River darter	**1.8** (1.4)				**1.8** (0.81)	**0.6** (0.3)
Sauger	**29.9** (9.5)	**46.6** (7.3)	**9.6** (2.2)	**6.3** (1.7)	**12.0** (2.19)	**44.4** (8.7)
Walleye	**37.5** (11.1)	**10.8** (2.9)	**3.9** (1.2)	**6.0** (1.5)	**16.2** (4.68)	**21.6** (4.2)
Sauger x walleye hybrid		**0.6** (0.4)				**0.1** (0.1)
Freshwater drum	**637.4** (142.9)	**439.3** (76.3)	**120.9** (39.3)	**180.3** (41.2)	**160.8** (31.83)	**349.4** (41.5)
All species	**880.1** (152.7)	**792.1** (125.3)	**208.2** (40.9)	**299.1** (50.8)	**272.7** (42.91)	**541.9** (60.1)
Number of hauls	23	39	40	40	40	
Hours trawled	1.87	3.26	3.33	3.33	3.33	

Table 15. Length-frequency of fish captured by trawling in Lake Pepin, 26-28 August and 3-5 September, 2008.

Total Length (in)	Black crappie	Bluegill	Channel catfish	Lake sturgeon	White crappie	Northern pike	Sauger	Smallmouth bass	Walleye	White bass	Yellow perch	Gizzard shad
0.5-0.9												
1.0-1.4		3										
1.5-1.9		2			6							
2.0-2.4	5	1			33							2
2.5-2.9	5				36							3
3.0-3.4	22				14							9
3.5-3.9	14				3					1		3
4.0-4.4	2						1					14
4.5-4.9							5					104
5.0-5.4							5					128
5.5-5.9							2					46
6.0-6.4		1							1			25
6.5-6.9		8					1		1			5
7.0-7.4		17							2			
7.5-7.9		8									2	
8.0-8.4	1	6										
8.5-8.9	1						3				1	
9.0-9.4	1						4					
9.5-9.9	1						6			2	1	
10.0-10.4							4		2		1	
10.5-10.9	1		1				6	1	1		1	
11.0-11.4	1		2						4			
11.5-11.9	1		1						7			
12.0-12.9			1						12	2		
13.0-13.9			2		1		5		5	1		
14.0-14.9			3				4			2		
15.0-15.9			1				2	1	8			
16.0-16.9			2				2		4			
17.0-17.9							1		1			
18.0-18.9			1				1		2			
19.0-19.9							1		1			
20.0-20.9												
21.0-21.9									1			
22.0-22.9												
23.0-23.9									2			
24.0-24.9									1			
25.0-25.9									1			
26.0-26.9						1						
>27.0				2								
Total	55	46	14	2	93	1	53	2	56	8	6	339
LENGTH												
Mean	4.0	6.5	13.9	34.7	2.7	26.2	10.2	12.7	13.9	11.1	9.1	5.0
SE	0.3	0.3	0.6	6.8	0.1		0.5	2.2	0.6	1.3	0.5	0.0
min	2.2	0.9	10.8	28.0	1.5	26.2	4.3	10.5	5.9	3.5	7.8	5.0
max	11.8	8.2	18.1	41.5	13.8	26.2	19.1	15.0	25.8	14.8	10.4	6.7

Table 16. Age-length frequency and length at capture of sauger captured by trawling, Lake Pepin, 26-28 August and 3-5 September, 2008.

Total length (in)	Total number	Age					
		0	1	2	3	4	5
3.0-3.4							
3.5-3.9							
4.0-4.4	1	1					
4.5-4.9	5	5					
5.0-5.4	5	5					
5.5-5.9	2	2					
6.0-6.5							
6.5-6.9	1	1					
7.0-7.4							
7.5-7.9							
8.0-8.4							
8.5-8.9	3		3				
9.0-9.4	4		4				
9.5-9.9	6		6				
10.0-10.4	4		4				
10.5-10.9	6		6				
11.0-11.4							
11.5-11.9							
12.0-12.9							
13.0-13.9	5			5			
14.0-14.9	4			3	1		
15.0-15.9	2			2			
16.0-16.9	2			1	1		
17.0-17.9	1				1		
18.0-18.9	1					1	
19.0-19.9	1					1	
Total	53	14	23	11	3	2	0
Aged subsample							
Mean length		6.8	9.8	13.5	14.4		
SE			0.1	0.2			
Min length		6.8	8.7	13.3	14.4		
Max length		6.8	10.6	13.8	14.4		
N		1	23	4	1		

Table 17. Back calculated mean length at each annulus and mean increment between annuli of sauger captured by trawling, Lake Pepin, 26-28 August and 3-5 September, 2008.

Year class	Age	Number of fish	Total length (in) at each annulus			
			1	2	3	4
2007	1	23	5.7			
2006	2	4	6.0	11.5		
2005	3	1	5.7	11.0	13.5	
Number of fish			28	5	1	
Mean length			5.7	10.9	12.6	
Mean annual increment			5.7	5.1	3.1	

Table 18. Age-length frequency and length at capture of walleye captured by trawling, Lake Pepin, 26-28 August and 3-5 September, 2008.

Total length(in)	Total Number	Age 0	1	2	3	4	5	6	7	8
5.0-5.4										
5.5-5.9										
6.0-6.4	1	1								
6.5-6.9	1	1								
7.0-7.4	2	2								
7.5-7.9										
8.0-8.5										
8.5-8.9										
9.0-9.4										
9.5-9.9										
10.0-10.5	2		2							
10.5-10.9	1		1							
11.0-11.4	4		4							
11.5-11.9	7		7							
12.0-12.9	12		12							
13.0-13.9	5		3	2						
14.0-14.9										
15.0-15.9	8			8						
16.0-16.9	4			4						
17.0-17.9	1			1						
18.0-18.9	2			2						
19.0-19.9	1				1					
20.0-20.9										
21.0-21.9	1				1					
22.0-22.9										
23.0-23.9	2					1	1			
24.0-24.9	1							1		
25.0-25.9	1									1
26.0-26.9										
Total	56	4	29	17	2	1	1	1		1
Aged subsample										
Mean length		7.2	11.8	15.3						25.8
SE		0.2	0.1	0.3						
Min length		7.1	9.9	13.0						25.8
Max length		7.4	13.0	16.5						25.8
N		2	29	11						1

Table 19. Back calculated mean length at each annulus and mean increment between annuli of walleye captured by trawling, Lake Pepin, 26-28 August and 3-5 September, 2008.

Year class	Age	Number of fish	Total length (in) at each annulus							
			1	2	3	4	5	6	7	8
2007	1	29	8.0							
2006	2	11	7.9	13.4						
2005	3	0								
2004	4	0								
2003	5	0								
2002	6	0								
2001	7	0								
2000	8	1	10.6	13.7	17.5	21.2	22.4	23.5	24.4	25.2
Number of fish			41	12	1	1	1	1	1	1
Mean length			8.0	13.4	17.5	21.2	22.4	23.5	24.4	25.2

Table 20. Annual trawl catch per hour of sauger, by age, in Lake Pepin, August 1986-2008.

	Age (+)									
	All	0	1	2	3	4	5	6	7	8
1986 catch=273; hrs.=3.34	81.5	5.4	37.0	28.4	3.3	4.8	2.0	0.3	0.3	
1987 catch=350; hrs.=4.8	72.9	19.8	9.0	18.3	15.4	3.5	3.1	2.7	0.8	0.1
1988 catch=394; hrs.=3.25	121.2	0.6	84.6	16.0	9.8	6.2	1.2	1.8	0.9	
1989 catch=279; hrs.=3.32	84.0	2.1	2.7	74.4	3.0	1.2		0.3		
1990 catch=177; hrs.=3.32	53.3	3.0	11.7	4.8	33.1	0.6				
1991 catch=128; hrs.=3.23	39.6	0	14.2	9.6	4.0	11.4				
1992 catch=183; hrs.=3.30	55.4	19.1	3.0	13.6	4.5	7.9	6.7	0.3		
1993 catch=114; hrs.=3.30	34.5	3.6	17.0	6.1	4.2	1.2	1.2	1.2		
1994 catch=181; hrs.=3.34	54.3	10.2	10.2	22.8	4.5	3.0	0.9	2.4		
1995 catch=52; hrs.=3.34	15.6	1.8	9.3	3.0	1.2					
1996 catch=97; hrs.=3.34	29.0	1.2	5.4	19.2	1.8	1.2				
1997 catch=130; hrs.=3.34	38.9	16.2	6.3	5.1	9.9		0.9			

Continued next page.

Table 20. Continued.

	Age (+)									
	All	0	1	2	3	4	5	6	7	8
1998 catch=112; hrs.=3.29	34.0	7.0	13.4	4.6	5.8	2.7				0.3
1999 catch=527; hrs.=3.08	171.1	2.3	82.0	53.2	23.6	5.9	3.4	0.6		
2000 catch=68; hrs.=2.92	23.3	1.0	1.7	14.4	5.5	0.7				
2002 catch=73; hrs.=3.33	21.9	5.2	9.6	4.8	1.5	0.9				
2003 catch=61; hrs.=3.33	18.3	5.1	5.7	6.9	0.6					
2004 catch=69; hrs.= 1.87	36.9	7.5	7.5	16.6	3.7		1.1			
2005 catch=174; hrs.= 3.33	52.7	7.3	28.2	12.4	3.3					
2006 catch=40; hrs.= 3.33	12.0	2.4	3.0	4.8	1.5	0.6	0.6			
2007 catch=30; hrs.= 3.33	9.0	2.7	3.0	0.9	1.8	0.6				
2008 catch=53; hrs.= 3.33	15.9	4.2	6.9	3.3	0.9	0.6				
Mean 1986-2007	**50.4**	**6.2**	**17.4**	**16.2**	**6.8**	**2.5**	**1.0**	**0.5**	**0.1**	**<0.1**

Table 21. Annual trawl catch per hour of walleye, by age, in Lake Pepin, August 1986-2008.

	Age (+)									
	All	0	1	2	3	4	5	6	7	8
1986 catch=90; hrs.=3.34	26.9	6.3	9.3	6.9	1.2	1.8	0.9	0.6		
1987 catch=279; hrs.=4.80	58.1	20.4	26.5	6.0	2.3	0.8	1.0	0.8		0.2
1988 catch=202; hrs.=3.25	62.1	1.2	45.5	11.4	1.8	1.2	0.3	0.3	0.3	
1989 catch=67; hrs.=3.32	20.2		1.2	18.1	0.3					
1990 catch=40; hrs.=3.32	12.0	1.2	6.3	0.3	3.9		0.3			
1991 catch=20; hrs.=3.23	6.2	0.9	1.2	1.9	0.3	1.2			0.3	
1992 catch=45; hrs.=3.30	13.6	4.5	5.8	2.1	0.9		0.3			
1993 catch=27; hrs.=3.30	8.2	3.9	1.8	1.8	0.3			0.3		
1994 catch=33; hrs.=3.34	9.9	4.2		4.8	0.6					
1995 catch=82; hrs.=3.34	24.6	1.8	19.5		2.7					
1996 catch=104; hrs.=3.34	31.1	2.4	18.6	9.9						
1997 catch=70; hrs.=3.34	21.0	4.2	6.6	4.2	5.4	0.6				

Continued next page.

Table 21. Continued.

	Age (+)									
	All	0	1	2	3	4	5	6	7	8
1998										
catch=74; hrs.=3.29	22.5	3.0	12.8	4.0	2.1					
1999										
catch=246; hrs.=3.08	79.9	0.6	44.7	19.8	10.4	2.8	1.8			
2000										
catch=55; hrs.=2.92	18.8	1.0	2.1	13.0	2.7					
2002										
catch=97; hrs.=3.33	29.1	0.9	23.7	1.5		2.7				
2003										
catch=30; hrs.=3.33	9.0	1.8	0.3	6.0	0.9					
2004										
catch=68; hrs.=1.87	36.4	0.5	8.6	11.8	13.4		2.1			
2005										
catch=38; hrs.=3.33	11.5	0.9	2.4	6.4	1.2			0.3	0.3	
2006										
catch=46; hrs.=3.33	13.8	9.9	0.6	1.8	0.6		0.6	0.3		
2007										
catch=30; hrs.=3.33	14.4	8.7	3.6	0.9		0.9	0.3			
2008										
catch=56; hrs.=3.33	16.8	1.2	8.7	5.1	0.6	0.3	0.3	0.3		0.3
Mean, 1986-2007	**25.2**	**3.7**	**11.5**	**6.3**	**2.4**	**0.6**	**0.4**	**0.1**	**<0.1**	**<0.1**

Table 22. Age-length frequency and mean length at capture of adult and juvenile largemouth bass captured by electrofishing in Lake Pepin, 12-29 September, 2008.

		Age								
Total length (in)	Total Number	1	2	3	4	5	6	7	8	9
5.5-5.9										
6.0-6.4										
6.5-6.9										
7.0-7.4										
7.5-7.9										
8.0-8.4										
8.5-8.9	1	1								
9.0-9.4	1	1								
9.5-9.9	2		2							
10.0-10.4	1		1							
10.5-10.9	1		1							
11.0-11.4	3		3							
11.5-11.9	1		1							
12.0-12.9	7		4	3						
13.0-13.9	17			17						
14.0-14.9	9			5	4					
15.0-15.9	4				1	2	1			
16.0-16.9	2						2			
17.0-17.9	1								1	
18.0-18.9										
19.0-19.9	2									2
20.0-20.9										
Total	52	2	12	25	5	2	3	0	1	2
Aged subsample										
Mean length		8.9	11.8	13.4	15.4	15.6	16.0		17.0	19.5
SE		0.25	0.53	0.20	0.35	0.25	1.75			0.08
Min length		8.7	9.7	11.3	14.6	15.5	14.8		17.0	19.5
Max length		9.1	14.0	14.6	16.2	15.8	17.2		17.0	19.6
N		2	11	21	5	2	2		1	2

Table 23. Back calculated mean length at each annulus and mean increment between annuli of largemouth bass captured by electrofishing, Lake Pepin, 12-29 September, 2008.

Year class	Age	Number of fish	Mean calculated total length (in) at each annulus								
			1	2	3	4	5	6	7	8	9
2007	1	2	4.5								
2006	2	11	3.5	8.4							
2005	3	21	3.8	8.2	11.8						
2004	4	5	4.2	8.7	12.2	14.4					
2003	5	2	4.3	9.2	12.3	13.8	15.0				
2002	6	2	4.4	7.4	10.6	12.8	14.2	15.3			
2000	8	1	3.7	7.7	11.2	14.2	15.4	16.1	16.5	16.8	
1999	9	2	3.4	6.3	10.4	13.4	15.4	17.2	18.1	18.7	19.1
Number of fish			46	44	33	12	7	5	5	3	2
Mean length			3.8	8.2	11.7	13.9	14.9	16.2	17.6	18.1	19.1
Mean annual increment			3.8	4.5	3.5	2.3	1.5	1.3	0.8	0.5	0.4

Table 24. Age-length frequency and mean length at capture of adult and juvenile smallmouth bass captured by electrofishing in Lake Pepin, 12-29 September, 2008.

Total length (in)	Total no.	Age 0	1	2	3	4	5	6	7
3.5-3.9	1	1							
4.0-4.4									
4.5-4.9	3	3							
5.0-5.4	1		1						
5.5-5.9									
6.0-6.4									
6.5-6.9	2		2						
7.0-7.4	12		12						
7.5-7.9	26		26						
8.0-8.4	29		29						
8.5-8.9	21		21						
9.0-9.4	9		5	4					
9.5-9.9	13			13					
10.0-10.4	25			21	4				
10.5-10.9	28			25	3				
11.0-11.4	30			24	6				
11.5-11.9	28			21	7				
12.0-12.9	27			11	16				
13.0-13.9	31			3	19	5	4		
14.0-14.9	25				10	13	2		
15.0-15.9	9				1	2	4	2	
16.0-16.9	10						6	3	1
17.0-17.9	8					1	1	4	2
18.0-18.9	3							3	
19.0-19.9	3							1	2
Total	344	4	96	122	66	21	17	13	5
Aged subsample									
Mean length			7.9	10.8	13.0	14.7	15.8	17.7	18.0
SE			0.15	0.16	0.28	0.35	0.29	0.28	0.56
Min length			5.0	9.1	10.1	13.2	13.9	15.4	16.7
Max length			9.3	13.1	15.0	17.0	17.1	19.1	19.2
N			33	43	21	10	12	12	5

Table 25. Back calculated mean length at each annulus and mean increment between annuli of smallmouth bass captured by electrofishing, Lake Pepin, 12-29 September, 2008.

Year class	Age	Number of fish	Mean calculated total length (in) at each annulus						
			1	2	3	4	5	6	7
2007	1	29	4.5						
2006	2	38	4.2	8.2					
2005	3	19	4.1	8.2	11.5				
2004	4	10	4.6	8.3	11.4	13.5			
2003	5	12	4.3	8.1	11.1	13.4	15.0		
2002	6	11	4.3	8.2	11.3	13.7	15.6	17.0	
2001	7	4	5.1	9.1	11.8	13.8	15.4	16.8	17.7
Number of fish			123	94	56	37	27	15	4
Mean length			4.3	8.2	11.4	13.6	15.3	17.0	17.7
Mean annual increment			4.3	4.0	3.1	2.2	1.7	1.5	0.8

Table 26. Age-length frequency and mean length at capture of adult and juvenile walleye captured by electrofishing in Lake Pepin, 12-29 September, 2008.

		Age											
Total length (in)	Total Number	1	2	3	4	5	6	7	8	9	10	11	12
11.0-11.5	1	1											
11.5-11.9	1	1											
12.0-12.9	6	6											
13.0-13.9	9	9											
14.0-14.9	7	5	2										
15.0-15.9	7		7										
16.0-16.9	23		23										
17.0-17.9	27		23	4									
18.0-18.9	14		10	2		2							
19.0-19.9	5		3	2									
20.0-20.9	7			6			1						
21.0-21.9	4			3			1						
22.0-22.9	8				2	5	1						
23.0-23.9	9					2	4	2			1		
24.0-24.9	7					2	1	1	2				1
25.0-25.9	6					1	3	2					
26.0-26.9	9							1		4	3	1	
27.0-27.9	2									1		1	
28.0-28.9	4									1	2		1
29.0-29.9	1											1	
Total	157	22	68	17	2	12	11	6	2	6	6	3	2
Aged subsample													
Mean length		13.0	17.2	20.0	22.5	23.1	23.5	25.2	24.7	26.9	26.7	27.6	26.3
SE		0.28	0.19	0.38	0.11	0.59	0.55	0.50	0.17	0.44	1.08	0.96	2.37
Min length		11.1	14.9	17.3	22.4	18.9	20.8	23.9	24.6	26.0	23.6	26.3	24.6
Max length		14.1	19.5	21.5	22.6	25.4	25.7	26.3	24.8	28.8	28.9	29.0	28.0
N		11	37	14	2	10	10	5	2	6	5	3	2

Table 27. Back calculated mean length at each annulus and mean increment between annuli of walleye captured by electrofishing, Lake Pepin, 12-29 September, 2008.

Year class	Age	Number of fish	Mean calculated total length (in) at each annulus											
			1	2	3	4	5	6	7	8	9	10	11	12
2007	1	11	8.8											
2006	2	37	8.3	14.7										
2005	3	14	8.0	14.2	18.1									
2004	4	2	8.5	14.3	18.1	21.2								
2003	5	10	7.8	13.3	17.2	20.2	22.0							
2002	6	10	8.3	14.2	18.0	20.2	21.7	22.7						
2001	7	5	8.1	13.4	17.4	20.1	22.2	23.5	24.4					
2000	8	2	9.1	15.0	17.8	20.0	21.7	23.0	23.8	24.3				
1999	9	6	7.9	13.2	17.2	20.1	22.5	24.0	25.2	26.1	26.6			
1998	10	5	8.5	13.1	17.2	19.7	21.7	23.2	24.5	25.5	26.1	26.5		
1997	11	3	8.6	14.2	18.3	20.8	22.9	24.5	25.5	26.2	26.7	27.1	27.4	
1996	12	2	8.0	12.4	15.7	18.1	20.4	21.8	22.9	24.1	24.9	25.4	25.7	26.0
Number of fish			107	96	59	45	43	33	23	18	16	10	5	2
Mean total length			8.3	14.1	17.6	20.1	22.0	23.3	24.6	25.5	26.2	26.4	26.7	26.0

Table 28. Catch per hour of juvenile and adult smallmouth bass, largemouth bass, and walleye, by age, captured by electrofishing in Lake Pepin, September and October, 2004-2008.

			Age										
Year	Hours	All	1	2	3	4	5	6	7	8	9	10	11
						Smallmouth bass							
2004	5.2	33.5	10.8	12.9	6.3	0.8	1.1	0.8	0.8				
2005	6.7	64.6	13.0	33.7	12.1	3.7	1.3	0.4	0.1				
2006	6.2	17.1	5.2	2.1	5.0	2.6	1.1	0.6		0.3		0.2	
2007	5.3	64.7	25.3	14.8	10.4	8.0	4.2	1.3	0.2	0.6			
2008	7.6	45.4	0.5	16.1	8.7	2.8	2.2	1.7	0.7				
						Largemouth bass							
2004	5.2	22.3	0.4	3.3	11.7	3.5	2.9	0.6					
2005	6.7	10.6	1.9	2.0	2.0	3.3	0.9						
2006	6.2	26.2	11.6	5.2	2.9	3.6	1.6	0.6	0.3	0.3			
2007	5.3	20.3	1.1	10.1	4.4	3.2	1.3		0.2				
2008	7.6	6.9	0.3	1.6	3.3	0.7	0.3	0.4		0.1	0.3		
						Walleye							
2004	5.2	53.7	4.0	9.6	18.8	5.0	8.5	6.0	1.2	0.6			
2005	6.7	17.9	0.4	4.9	4.5	2.7	1.8	1.5	1.5	0.4	0.1		
2006	6.2	24.9	2.3	4.5	6.6	2.7	3.9	1.1	1.8	1.5	0.3	0.2	
2007	5.3	28.1	4.4	4.7	2.7	7.8	2.5	2.7	2.3	1.1			
2008	7.6	20.7	2.9	9.0	2.2	0.3	1.6	1.5	0.8	0.3	0.8	0.8	0.4

Table 29. Number and pounds per gill net lift in Lake Pepin, by station 5-10 October, 2008. One standard error in parentheses.

		Paddlefish		Longnose gar		Bowfin		Mooneye		Gizzard shad	
Station	No. sets	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift
1	4	0.25 (0.3)						0.25 (0.3)	0.20 (0.2)	25.25 (26.1)	1.29 (0.8)
2	4					0.25 (0.3)	0.69 (0.8)	0.50 (0.3)	0.35 (0.2)	19.50 (13.0)	1.33 (0.8)
3	4			0.25 (0.3)	0.08 (0.1)					10.75 (7.0)	0.84 (0.5)
4	4									20.25 (13.8)	0.75 (0.4)
5	5							0.20 (0.2)	0.14 (0.2)	10.00 (3.1)	2.80 (1.3)
6	3					0.33 (0.4)	1.23 (1.5)	1.00 (0.7)	0.69 (0.5)	29.67 (15.2)	2.35 (1.3)
Mean		**0.04 (0.0)**		**0.04 (0.0)**	**0.01 (0.0)**	**0.08 (0.1)**	**0.27 (0.2)**	**0.29 (0.1)**	**0.21 (0.1)**	**18.42 (4.8)**	**1.58 (0.3)**

		Common carp		Silver chub		River carpsucker		Quillback		White sucker	
Station	No. sets	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift
1	4	0.25 (0.3)	2.55 (2.9)	0.25 (0.3)	0.03 (0.0)						
2	4					0.25 (0.3)	1.09 (1.3)	1.00 (0.8)	1.04 (0.9)	0.25 (0.3)	0.36 (0.4)
3	4					0.25 (0.3)	0.21 (0.2)	0.25 (0.3)	0.29 (0.3)		
4	4					0.25 (0.3)	0.77 (0.9)	0.50 (0.3)	0.78 (0.7)		
5	5			0.20 (0.2)	0.02 (0.0)	0.20 (0.2)	0.66 (0.7)	0.20 (0.2)	0.17 (0.2)	0.20 (0.2)	0.18 (0.2)
6	3	0.33 (0.4)	3.96 (4.8)					0.67 (0.4)	0.86 (0.5)	1.00 (0.7)	1.77 (1.4)
Mean		**0.08 (0.1)**	**0.92 (0.7)**	**0.08 (0.1)**	**0.01 (0.0)**	**0.17 (0.1)**	**0.48 (0.3)**	**0.42 (0.1)**	**0.49 (0.2)**	**0.21 (0.1)**	**0.32 (0.2)**

		Smallmouth buffalo		Silver redhorse		Shorthead redhorse		Channel catfish		Flathead catfish	
Station	No. sets	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift
1	4			0.25 (0.3)	1.07 (1.2)	1.25 (0.7)	1.31 (0.7)	1.25 (0.9)	4.85 (3.9)		
2	4	0.25 (0.3)	0.21 (0.2)			2.75 (1.8)	4.95 (3.3)	2.50 (1.0)	4.77 (1.8)		
3	4			0.75 (0.9)	2.53 (2.9)	0.75 (0.6)	0.86 (0.9)	4.25 (3.4)	4.82 (4.1)	0.25 (0.3)	0.58 (0.7)
4	4	0.50 (0.6)	0.70 (0.8)	1.50 (1.0)	3.45 (2.6)	3.25 (0.3)	4.08 (0.8)	1.00 (0.8)	1.17 (0.9)		
5	5	0.20 (0.2)	0.17 (0.2)	2.00 (1.2)	5.97 (4.7)	3.00 (0.9)	3.60 (1.7)	4.20 (1.6)	6.37 (2.7)	0.20 (0.2)	0.11 (0.1)
6	3	0.33 (0.4)	0.23 (0.3)	1.00	3.48 (0.8)	4.00 (2.5)	5.08 (3.8)	3.00 (1.9)	6.17 (4.0)		
Mean		**0.21 (0.1)**	**0.22 (0.1)**	**0.96 (0.3)**	**2.85 (1.1)**	**2.46 (0.5)**	**3.25 (0.7)**	**2.75 (0.6)**	**4.70 (1.0)**	**0.08 (0.1)**	**0.12 (0.1)**

Table 29 continued on next page.

Table 29. Continued.

Station	No. sets	Northern pike		White bass		Rock bass		Bluegill		Smallmouth bass	
		No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift
1	4	0.50 (0.6)	3.32 (3.8)	0.75 (0.6)	0.87 (0.8)						
2	4	1.50 (1.0)	7.16 (4.9)	7.25 (2.5)	6.28 (2.0)			0.25 (0.3)	0.08 (0.1)		
3	4	0.50 (0.6)	2.77 (3.2)	3.75 (2.9)	3.27 (3.2)						
4	4	1.25 (1.1)	5.21 (3.8)	2.00 (1.2)	2.17 (1.3)	0.25 (0.3)	0.11 (0.1)				
5	5	0.60 (0.4)	1.72 (1.2)	6.40 (1.9)	6.42 (2.6)	0.60 (0.7)	0.21 (0.2)			0.40 (0.4)	0.62 (0.7)
6	3	1.33 (1.6)	8.90 (10.9)	10.33 (8.3)	11.34 (10.5)			0.67 (0.8)	0.20 (0.2)		
Mean		**0.92 (0.3)**	**4.55 (1.5)**	**4.92 (1.2)**	**4.85 (1.3)**	**0.17 (0.1)**	**0.06 (0.0)**	**0.13 (0.1)**	**0.04 (0.0)**	**0.08 (0.1)**	**0.13 (0.1)**

Station	No. sets	Largemouth bass		White crappie		Black crappie		Yellow perch		Sauger	
		No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift
1	4			0.50 (0.3)	0.02 (0.0)	0.25 (0.3)	0.17 (0.2)			30.75 (6.9)	38.62 (9.3)
2	4			0.50 (0.6)	0.32 (0.4)	3.25 (2.6)	1.59 (1.8)			45.75 (9.4)	51.15 (6.6)
3	4			1.25 (0.7)	0.07 (0.0)	3.00 (1.1)	0.76 (0.3)	0.25 (0.3)	0.14 (0.2)	24.00 (10.0)	28.97 (12.8)
4	4			0.25 (0.3)	0.01 (0.0)	7.75 (2.8)	0.87 (0.5)	2.25 (1.8)	1.04 (0.8)	36.25 (6.5)	41.75 (7.7)
5	5	0.20 (0.2)	0.36 (0.4)	0.20 (0.2)	0.01 (0.0)	3.80 (1.9)	0.56 (0.3)	1.60 (0.7)	0.43 (0.2)	20.20 (6.4)	27.82 (7.6)
6	3			0.33 (0.4)	0.11 (0.1)	4.33 (4.1)	0.27 (0.3)	7.00 (3.9)	3.25 (1.8)	26.33 (4.1)	35.25 (9.0)
Mean		**0.04 (0.0)**	**0.08 (0.1)**	**0.50 (0.2)**	**0.09 (0.1)**	**3.71 (0.9)**	**0.72 (0.3)**	**1.63 (0.6)**	**0.69 (0.3)**	**30.29 (3.1)**	**36.95 (3.4)**

Station	No. sets	Walleye		Walleye/sauger		Freshwater drum	
		No./lift	Lbs./lift	No./lift	Lbs./lift	No./lift	Lbs./lift
1	4	5.00 (1.8)	9.63 (3.4)			11.25 (4.9)	5.59 (2.3)
2	4	7.50 (4.8)	11.37 (8.1)			20.25 (5.4)	7.26 (2.1)
3	4	3.50 (1.8)	4.81 (3.0)	0.25 (0.3)	1.03 (1.2)	17.50 (5.8)	8.52 (2.6)
4	4	5.50 (2.4)	10.27 (4.3)			11.25 (5.4)	2.76 (1.0)
5	5	4.00 (1.3)	7.39 (1.9)			4.80 (2.4)	1.24 (0.6)
6	3	7.33 (2.3)	8.30 (3.2)			12.00 (4.3)	2.38 (1.3)
Mean		**5.33 (0.9)**	**8.59 (1.5)**	**0.04 (0.0)**	**0.17 (0.2)**	**12.54 (1.9)**	**4.58 (0.8)**

Table 30. Mean number per gill net lift from Pool 4, 2004-2008. One standard error in parentheses. The historical mean is from 1986-2007.

Species	2004	2005	2006	2007	2008	Historical Mean
Lake Sturgeon	0.2 0.08	0.1 (0.1)	<0.05 (<0.05)			<0.05
Shovelnose Sturgeon						<0.05
Paddlefish			<0.05 (<0.05)		<0.05 (<0.05)	<0.05
Longnose Gar					<0.05 (<0.05)	<0.05
Shortnose Gar	<0.05 (<0.05)					<0.05
Bowfin				0.1 (0.1)	0.1 (0.1)	0.1
Skipjack Herring						<0.05
Gizzard Shad	32.8 (7.2)	33.3 (8.1)	16.8 (4.2)	25.3 (6.4)	18.4 (4.8)	27.9
Goldeye						<0.05
Mooneye	0.9 (0.5)	0.5 (0.3)	4.3 (1.2)	1.8 (0.6)	0.3 (0.1)	1.1
Northern Pike	0.5 (0.2)	0.3 (0.1)	1.0 (0.2)	0.5 (0.2)	0.9 (0.3)	0.6
Common Carp	0.3 (0.1)	<0.05 (<0.05)	0.8 (0.1)	0.3 (0.2)	0.1 (0.1)	0.9
Silver Chub	0.2 (0.1)	<0.05 (<0.05)	0.8 (0.2)	0.2 (0.1)	0.1 (0.1)	0.3
River Carpsucker				0.1 (0.1)	0.2 (0.1)	<0.05
Quillback	0.1 (0.1)	<0.05 (<0.05)	0.3 (0.1)	0.5 (0.2)	0.4 (0.1)	0.5
Highfin Carpsucker	<0.05 (<0.05)					<0.05
Unidentified carpsucker			0.8 (0.1)	0.1 (0.1)		<0.05
White Sucker	0.1 (0.1)		0.2 (0.1)	0.3 (0.1)	0.2 (0.1)	0.4
Blue Sucker				0.1 (0.1)		<0.05
Northern Hogsucker			0.4 (0.2)	0.1 (0.1)		<0.05
Smallmouth Buffalo	0.5 (0.2)	0.3 (0.1)	0.5 (0.2)	0.4 (0.1)	0.2 (0.1)	0.6
Bigmouth Buffalo	0.1 (0.1)			<0.05 (<0.05)		0.1
Spotted Sucker						0.1
Silver Redhorse	0.5 (0.1)	0.7 (0.2)	0.4 (0.2)	1.3 (0.4)	1.0 (0.3)	0.6
Golden Redhorse	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	<0.05 (<0.05)		0.1
Shorthead Redhorse	1.0 (0.3)	1.1 (0.4)	2.3 (0.5)	3.4 (0.9)	2.5 (0.5)	1.4
Black Bullhead						<0.05
Yellow Bullhead						<0.05
Brown Bullhead						<0.05
Channel Catfish	10.4 (2.0)	7.4 (1.4)	4.5 (0.4)	4.1 (0.7)	2.8 (0.6)	4.0
Flathead Catfish	0.1 (0.1)	<0.05 (<0.05)	<0.05 (<0.05)		0.1 (0.1)	0.1
Burbot						<0.05
White Bass	3.8 (1.0)	9.1 (2.6)	8.3 (1.3)	6.9 (1.2)	4.9 (1.2)	5.9
Hybrid Sunfish						<0.05
Green Sunfish						<0.05
Pumkinseed						<0.05
Rock Bass	0.1 (0.1)	0.2 (0.1)	0.3 (0.2)	0.2 (0.1)	0.2 (0.1)	0.2
Orangespotted Sunfish						<0.05
Bluegill			0.2 (0.1)	<0.05 (<0.05)	0.1 (0.1)	<0.05
Smallmouth Bass	<0.05 (<0.05)		0.3 0.10	0.7 (0.4)	0.1 (0.1)	<0.05
Largemouth Bass				0.1 (0.1)	<0.05 (<0.05)	<0.05
Hybrid Crappie						<0.05
White Crappie	0.1 (0.1)	1.4 (0.8)	0.8 (0.2)	0.4 (0.2)	0.5 (0.2)	0.5
Black Crappie	2.0 (0.5)	3.4 (1.2)	1.0 (0.3)	0.5 (0.3)	3.7 (0.9)	0.9
Yellow Perch	0.8 (0.4)	2.0 (0.7)	2.9 (0.8)	2.4 (0.7)	1.6 (0.6)	3.4
Sauger	24.4 (2.8)	28.0 (4.5)	29.5 (2.8)	29.4 (4.2)	30.3 (3.1)	23.9
Walleye	7.8 (1.6)	5.7 (1.3)	8.6 (1.1)	6.8 (1.2)	5.3 (0.9)	5.1
Sauger x walleye hybrid					<0.05 (<0.05)	<0.05
Freshwater Drum	13.8 (1.6)	23.2 (4.8)	9.9 (1.6)	21.9 (4.5)	12.5 (1.9)	13.4
Number of lifts	24	24	24	24	24	

Table 31. Mean pounds per gill net lift from Pool 4, 2004-2008. One standard error in parentheses. The historical mean is from 1986-2007.

Species	2004	2005	2006	2007	2008	Historical mean
Lake Sturgeon	0.2 (0.1)	0.2 (0.1)	<0.05 (<0.05)			<0.05
Shovelnose Sturgeon						<0.05
Paddlefish			0.1 (0.1)			<0.05
Longnose Gar					<0.05 (<0.05)	<0.05
Shortnose Gar	<0.05 (<0.05)					<0.05
Bowfin				0.3 (0.2)	0.3 (0.2)	0.4
Skipjack Herring						<0.05
Gizzard Shad	7.0 (1.6)	7.3 (1.7)	4.7 (1.2)	8.0 (1.9)	1.6 (0.3)	5.5
Goldeye						<0.05
Mooneye	0.6 (0.3)	0.4 (0.2)	2.9 (0.8)	1.2 (0.4)	0.2 (0.1)	0.7
Northern Pike	2.3 (0.8)	1.3 (0.7)	5.4 (1.5)	2.5 (0.9)	4.6 (1.5)	2.4
Common Carp	2.5 (0.9)	0.3 (0.3)	0.3 (0.3)	1.0 (0.7)	0.9 (0.7)	2.7
Silver Chub	<0.05 (<0.05)	<0.05 (<0.05)	0.1 (<0.05)	<0.05 (<0.05)	<0.05 (<0.05)	<0.05
River Carpsucker				0.1 (0.1)	0.5 (0.3)	0.1
Quillback	0.4 (0.3)	0.1 (0.1)	0.3 (0.2)	0.7 (0.4)	0.5 (0.2)	0.7
Highfin Carpsucker	0.1 (0.1)					<0.05
Unidentified carpsucker			<0.05 (<0.05)	0.1 (0.1)		<0.05
White Sucker	0.2 (0.2)		0.2 (0.1)	0.4 (0.2)	0.3 (0.2)	0.6
Blue Sucker				0.6 (0.4)		<0.05
Northern Hogsucker			0.1 (0.1)	0.1 (<0.05)		<0.05
Smallmouth Buffalo	0.6 (0.2)	0.7 (0.4)	1.0 (0.7)	0.4 (0.3)	0.2 (0.1)	0.7
Bigmouth Buffalo	0.1 (0.1)			<0.05 (<0.05)		<0.05
Spotted Sucker						0.1
Silver Redhorse	1.3 (0.4)	2.1 (0.8)	1.1 (0.5)	3.3 (1.1)	2.9 (1.1)	1.4
Golden Redhorse	0.1 (0.1)	0.2 (0.1)	0.1 (0.1)	0.1 (0.1)		0.2
Shorthead Redhorse	1.2 (0.5)	1.4 (0.5)	2.0 (0.5)	3.6 (1.0)	3.3 (0.7)	1.5
Black Bullhead						<0.05
Yellow Bullhead						<0.05
Brown Bullhead						<0.05
Channel Catfish	8.5 (1.4)	10.3 (1.9)	9.7 (1.2)	7.5 (1.4)	4.7 (1.0)	5.4
Flathead Catfish	0.2 (0.2)	<0.05 (<0.05)	0.4 (0.4)		0.1 (0.1)	0.2
Burbot						<0.05
White Bass	4.0 (1.2)	7.9 (2.8)	9.1 (1.5)	7.8 (1.3)	4.9 (1.3)	4.6
Hybrid Sunfish						<0.05
Green Sunfish						<0.05
Pumkinseed						<0.05
Rock Bass	<0.05 (<0.05)	0.1 (0.1)	0.1 (0.1)	0.1 (<0.05)	0.1 (<0.05)	0.1
Orangespotted Sunfish						<0.05
Bluegill			<0.05 (<0.05)	<0.05 (<0.05)	<0.05 (<0.05)	<0.05
Smallmouth Bass	0.1 (0.1)		0.3 (0.1)	0.5 (0.2)	0.1 (0.1)	<0.05
Largemouth Bass				0.1 (0.1)	0.1 (0.1)	<0.05
Hybrid Crappie						<0.05
White Crappie	0.1 (0.1)	0.3 (0.1)	0.3 (0.1)	0.1 (<0.05)	0.1 (0.1)	0.1
Black Crappie	0.6 (0.2)	1.2 (0.4)	0.4 (0.2)	0.2 (0.1)	0.7 (0.3)	0.3
Yellow Perch	0.3 (0.2)	0.6 (0.2)	0.9 (0.3)	0.7 (0.2)	0.7 (0.3)	0.8
Sauger	28.0 (3.8)	31.3 (5.2)	46.7 (4.4)	43.8 (6.1)	37.0 (3.4)	27.5
Walleye	12.0 (2.6)	9.5 (2.2)	15.8 (2.6)	9.9 (1.7)	8.6 (1.5)	8.0
Sauger x walleye hybrid					0.2 (0.2)	<0.05
Freshwater Drum	5.4 (0.7)	8.4 (1.8)	4.1 (0.8)	7.4 (1.4)	4.6 (0.8)	5.3
Number of lifts	24	24	24	24	24	

Table 32. Length frequency distribution of fish captured with gill nets in Lake Pepin, 5-10 October, 2008.

Total Length (in)	Longnose gar	Bowfin	Mooneye	Gizzard shad	Common carp	Silver chub	River carpsucker	Quillback	White sucker
2.5-2.9									
3.0-3.4									
3.5-3.9									
4.0-4.4									
4.5-4.9				21					
5.0-5.4				92					
5.5-5.9				47					
6.0-6.4				35					
6.5-6.9				59		2			
7.0-7.4				31					
7.5-7.9				10					
8.0-8.4									
8.5-8.9									
9.0-9.4									
9.5-9.9									
10.0-10.4									
10.5-10.9								2	
11.0-11.4									
11.5-11.9							1		
12.0-12.9			7					1	
13.0-13.9								4	1
14.0-14.9								2	1
15.0-15.9	1			4					2
16.0-16.9				2					
17.0-17.9				1				1	1
18.0-18.9							2		
19.0-19.9							1		
20.0-20.9		1							
21.0-21.9									
22.0-22.9		1							
23.0-23.9									
24.0-24.9									
25.0-25.9									
26.0-26.9					1				
27.0-27.9					1				
28.0-28.9									
29.0-29.9									
30.0-30.9									
31.0-31.9									
33.0-33.9									
35.0-39.9									
Total	1	2	7	302	2	2	4	10	5
Length statistics									
Mean	15.4	21.3	12.5	6.2	27.0	6.8	17.3	13.3	15.3
SE		1.17	0.15	0.10	1.12	0.20	2.21	0.66	0.78
Min	15.4	20.5	12.1	4.7	26.2	6.7	11.6	10.6	13.4
Max	15.4	22.2	13.0	17.9	27.8	7.0	19.8	17.4	17.7

Table 32 continued on next page

Table 32. Continued.

Total Length (in)	Smallmouth buffalo	Silver redhorse	Shorthead redhorse	Channel catfish	Flathead catfish	Northern pike	White bass	Rock bass	Bluegill
2.5-2.9									
3.0-3.4									
3.5-3.9									
4.0-4.4									
4.5-4.9							1		
5.0-5.4							7		
5.5-5.9							2		
6.0-6.4							3		
6.5-6.9							2	1	
7.0-7.4								1	3
7.5-7.9									
8.0-8.4								1	
8.5-8.9		1	1					1	
9.0-9.4			1						
9.5-9.9			1				4		
10.0-10.4							8		
10.5-10.9	1		1				12		
11.0-11.4	1			1	1		4		
11.5-11.9	2	1	1	2			5		
12.0-12.9		1	8	2			21		
13.0-13.9		1	15	13			25		
14.0-14.9	1	1	5	10			19		
15.0-15.9			10	4			4		
16.0-16.9		1	6	6			1		
17.0-17.9		1	6	7	1				
18.0-18.9		3	3	3					
19.0-19.9		4	1	7					
20.0-20.9		4		6		1			
21.0-21.9		4		3					
22.0-22.9		1							
23.0-23.9						1			
24.0-24.9						2			
25.0-25.9				1		3			
26.0-26.9						4			
27.0-27.9				1		1			
28.0-28.9						2			
29.0-29.9						1			
30.0-30.9						1			
31.0-31.9						4			
33.0-33.9						1			
35.0-39.9						1			
Total	5	23	59	66	2	22	118	4	3
Length statistics									
Mean	12.0	18.2	14.6	16.6	14.3	28.0	11.8	7.6	7.1
SE	0.74	0.78	0.31	0.4	4.65		0.26	0.51	0.10
Min	10.9	8.5	8.6	11.3	11.1	20.9	4.8	6.5	7.0
Max	14.6	22.1	19.1	27.4	17.6	36.0	16.3	8.5	7.3

Table 32 continued on next page

Table 32. Continued.

Total Length (in)	Smallmouth bass	Largemouth bass	White crappie	Black crappie	Yellow perch	Sauger	Walleye	Walleye/sauger	Freshwater drum
2.5-2.9									
3.0-3.4									
3.5-3.9				7					1
4.0-4.4				53					4
4.5-4.9			5	7					13
5.0-5.4			4		1				25
5.5-5.9			1		1				4
6.0-6.4					1				
6.5-6.9				1	1	2			18
7.0-7.4				1	3	1	1		23
7.5-7.9				1	4	3	1		8
8.0-8.4				1	2	2	1		18
8.5-8.9					6	3	1		29
9.0-9.4			1	1	3	10			23
9.5-9.9				7	4	14			20
10.0-10.4				3	5	42			20
10.5-10.9				1		61	1		20
11.0-11.4				3	4	65			10
11.5-11.9				1	1	42	2		12
12.0-12.9			1	2	3	35	12		34
13.0-13.9		1				32	21		16
14.0-14.9	2					74	12		3
15.0-15.9						115	10		
16.0-16.9						68	26		
17.0-17.9						48	14		
18.0-18.9						37	10		
19.0-19.9						40	2		
20.0-20.9						20	4		
21.0-21.9						10	4	1	
22.0-22.9						2	3		
23.0-23.9						1	2		
24.0-24.9									
25.0-25.9									
26.0-26.9							1		
27.0-27.9									
28.0-28.9									
29.0-29.9									
30.0-30.9									
31.0-31.9									
33.0-33.9									
35.0-39.9									
Total	2	1	12	89	39	727	128	1	301
Length statistics									
Mean	14.3	14.0	6.0	5.7	9.1	14.4	15.9	21.3	9.1
SE	0.14		0.8	0.27	0.29	0.12	0.28		0.15
Min	14.2	13.98	4.6	3.7	5.4	6.61	7.36	21.3	3.9
Max	14.4	14.0	12.9	12.2	12.4	23.6	26.6	21.3	14.6

Table 33. Age-length frequency and mean length at capture of adult and juvenile sauger (sexes combined) captured with 24 gill nets in Lake Pepin, 5-10 October, 2008.

Total length (in)	Total no.	Age 0	1	2	3	4	5	6	7	8	9	10	11	12
6.5-6.9	2	2												
7.0-7.4	1	1												
7.5-7.9	3	3												
8.0-8.4	2		2											
8.5-8.9	3		3											
9.0-9.4	10		10											
9.5-9.9	14		14											
10.0-10.4	42		40	2										
10.5-10.9	61		61											
11.0-11.5	65		65											
11.5-11.9	42		42											
12.0-12.9	35		28	7										
13.0-13.9	32		2	30										
14.0-14.9	74			70	4									
15.0-15.9	115			101	14									
16.0-16.9	68			35	24	4	4	1						
17.0-17.9	48			9	26	9	2	2						
18.0-18.9	37			2	8	14	10	3						
19.0-19.9	40					16	10	10	2	2				
20.0-20.9	20					3	8	7		1		1		
21.0-21.9	10						1	4	1	2			1	1
22.0-22.9	2							1				1		
23.0-23.9	1											1		
Total	727	6	267	256	76	46	35	28	3	5		3	1	1
Aged subsample														
Mean length		7.5	10.9	14.9	16.8	18.9	19.2	20.3	20.3	20.5		22.1	21.3	21.9
SE		0.2	0.1	0.1	0.2	0.2	0.3	0.3	1.4	0.4		1.2		
Min length		6.9	8.2	10.4	14.0	17.1	16.2	17.7	19.3	19.6		20.3	21.3	21.9
Max length		7.9	13.1	18.7	18.5	20.7	21.2	22.6	21.3	21.1		23.6	21.3	21.9
N		5	127	97	32	24	19	18	2	4		3	1	1

Table 34. Mean length at age of sauger (sexes combined) captured with gill nets in Lake Pepin between 2004 and 2008. Historical means (1966-2008) and means for each decade are provided.

						Historical			By Decade		
Age	2004	2005	2006	2007	2008	Mean	1960's	1970's	1980's	1990's	2000's
0	7.1	7.6	8.4	8.2	7.5	7.4				6.7	7.8
1	10.9	11.2	12.3	12.3	10.9	10.4	9.8	10.3	9.9	10.2	11.4
2	13.9	14.1	15.1	15.5	14.9	13.2	12.1	13.0	12.9	13.1	14.4
3	16.1	16.5	17.0	17.4	16.8	15.5	14.4	15.4	15.4	15.1	16.6
4	18.4	17.7	18.0	17.9	18.9	17.0	16.4	17.2	16.8	16.4	17.9
5	18.5	19.0	19.5	19.6	19.2	18.3	18.2	18.0	18.4	17.9	19.1
6	19.6	19.2	19.8	19.3	20.3	19.3	19.8	19.3	19.6	18.8	19.5
7	19.9	19.7	19.2	20.4	20.3	20.0	20.6	19.8	20.5	19.4	19.8
8	20.5	20.9	20.9	19.6	20.5	20.7	21.5	20.8	21.2	20.1	20.6
9	20.6		20.5	20.9		21.0			20.9	21.0	21.1
10	21.6		21.5	19.8	22.1	21.6			22.4	21.9	21.3
11			20.0		21.3	20.4					20.4
12					21.9	21.9					21.9

Table 35. Mean length at age of female sauger captured with gill nets in Lake Pepin between 2004 and 2008. Historical means (1987-2008) and means for each decade are provided.

						Historical	By Decade		
Age	2004	2005	2006	2007	2008	Mean	1980's	1990's	2000's
0		7.2	8.5	8.2	7.7	7.9			7.9
1	11.1	11.3	12.8	12.5	10.7	10.8	10.8	10.1	11.4
2	14.3	14.2	15.4	16.0	15.2	14.2	14.2	13.5	14.8
3	16.4	16.7	17.1	18.0	17.3	16.4	17.0	15.5	17.1
4	19.0	18.8	18.8	19.4	19.5	17.9	18.1	16.9	18.7
5	20.0	19.8	20.4	20.6	20.0	19.2	19.3	18.4	19.9
6	20.5	20.2	20.8	21.5	21.3	20.2	20.2	19.9	20.5
7	21.6	20.6	19.8	20.8	21.3	20.8	21.1	20.8	20.6
8	20.7	21.5	21.7		21.1	21.3	21.6	20.6	21.5
9	21.5		22.3	21.7		21.6	21.2	21.1	22.0
10					23.0	22.5	22.4	22.2	23.0
11									
12									

Table 36. Mean length at age of male sauger captured with gill nets in Lake Pepin between 2004 and 2008. Historical means (1987-2008) and means for each decade are provided.

						Historical	By Decade		
Age	2004	2005	2006	2007	2008	Mean	1980's	1990's	2000's
0	8.2		8.4		7.6	8.3			8.3
1	10.8	11.1	12.1	12.2	11.1	10.7	10.0	10.1	11.4
2	13.3	13.7	14.4	15.0	14.4	13.4	13.5	12.9	13.9
3	15.5	15.9	16.7	16.6	16.4	15.3	15.3	14.5	15.9
4	17.6	16.9	17.2	17.3	18.1	16.6	16.7	15.9	17.3
5	18.1	18.0	18.8	18.4	18.3	18.0	18.1	17.7	18.2
6	19.0	18.3	19.1	18.8	19.3	18.8	18.9	18.7	18.9
7	19.3	19.1	19.0	20.0	19.3	19.3	19.2	19.0	19.5
8	20.3	21.2	20.7	19.6	19.8	19.9	19.8	19.7	20.1
9	19.6		20.2	20.4		20.2	20.6	20.1	20.1
10			21.5	19.8	20.3	20.8		21.5	20.5
11			20.0		21.3	20.4			20.4
12	21.6				21.9	21.8			21.8

Table 37. Age-length frequency and mean length at capture of adult and juvenile walleye (sexes combined) captured with 24 gill nets in Lake Pepin, 5-10 October, 2008.

Total length (in)	Total Number	Age (+) 0	1	2	3	4	5	6	7	8	9	10	11	12
7.0-7.4	1	1												
7.5-7.9	1	1												
8.0-8.4	1	1												
8.5-8.9	1	1												
9.0-9.4														
9.5-9.9														
10.0-10.4														
10.5-10.9	1		1											
11.0-11.4														
11.5-11.9	2		2											
12.0-12.9	12		12											
13.0-13.9	21		21											
14.0-14.9	12		11	1										
15.0-15.9	10		1	9										
16.0-16.9	26			26										
17.0-17.9	14			14										
18.0-18.9	10			8	2									
19.0-19.9	2					2								
20.0-20.9	4				1		3							
21.0-21.9	4				3			1						
22.0-22.9	3						2	1						
23.0-23.9	2					1		1						
24.0-24.9														
25.0-25.9														
26.0-26.9	1													1
27.0-27.9														
28.0-28.9														
Total	128	4	48	58	6	3	5	3						1
Aged subsample														
Mean length		8.1	13.4	16.9	20.3	20.7	21.3	22.6						26.6
SE			0.13	0.13	0.73	1.51	0.57	0.59						
Min length		8.1	10.6	14.8	18.2	19.3	20.3	21.9						26.6
Max length		8.1	15.6	18.9	21.8	23.2	22.6	23.5						26.6
N		1	46	55	6	3	5	3						1

Table 38. Mean length at age of walleye (sexes combined) captured with gill nets in Lake Pepin between 2004 and 2008. Historical means (1966-2008) and means for each decade are provided.

						Historical	By Decade				
Age	2004	2005	2006	2007	2008	Mean	1960's	1970's	1980's	1990's	2000's
0	8.5	8.6	9.6	9.9	8.1	8.1			8.0	7.7	8.7
1	13.4	13.9	14.5	14.3	13.4	12.7	12.2	12.4	12.6	12.9	13.2
2	16.5	16.5	17.1	16.9	16.9	15.7	14.6	15.7	15.5	15.7	16.4
3	18.5	18.4	19.2	19.9	20.3	18.0	17.6	17.9	17.8	17.8	18.7
4	19.5	19.2	21.6	21.6	20.7	19.6	19.7	20.0	19.2	19.4	19.8
5	20.5	22.2	21.2	21.4	21.3	21.0	21.9	21.4	21.6	20.3	20.5
6	20.0	24.7	22.2		22.6	21.7	22.6	20.6	23.3	21.2	21.9
7	23.8	19.4		23.4		23.9		24.9	24.3	24.0	23.2
8			22.0	23.4		24.5	22.0	25.5	27.4	27.4	22.3
9		21.0	21.6	24.3		23.6		27.4			22.3
10			22.6	21.9		24.3		28.4			22.2
11											
12					26.6						26.6

Table 39. Mean length at age of female walleye captured with gill nets in Lake Pepin between 2004 and 2008. Historical means (1987-2008) and means for each decade are provided.

						Historical	By Decade		
Age	2004	2005	2006	2007	2008	Mean	1980's	1990's	2000's
0	7.4	8.2	9.6	9.6		8.2	8.1	7.7	8.5
1	13.6	14.1	15.0	14.3	13.5	13.2	12.3	12.8	13.8
2	16.9	17.2	17.8	17.4	17.4	16.6	15.8	16.1	17.3
3	19.5	19.6	20.3	20.8	21.3	19.3	19.4	18.6	19.9
4	21.2		21.9	21.7	23.2	20.9	21.2	20.4	21.2
5		23.2	23.9		22.6	21.4	21.6	20.9	21.9
6		24.7	24.3		22.6	23.6	23.6	22.7	24.1
7	25.2			25.2		25.8	24.8	26.4	25.7
8						27.4	27.4		
9				24.3		24.3			24.3
10									
11									
12					26.6	26.6			26.6

Table 40. Mean length at age of male walleye captured with gill nets in Lake Pepin between 2004 and 2008. Historical means (1987-2008) and means for each decade are provided.

						Historical	By Decade		
Age	2004	2005	2006	2007	2008	Mean	1980's	1990's	2000's
0	8.8	9.0	9.5			8.3	7.9	7.8	8.9
1	13.2	13.7	14.1	14.3	13.4	13.2	12.7	12.8	13.8
2	15.9	16.1	16.5	16.4	16.5	15.8	15.5	15.5	16.2
3	17.6	17.6	18.2	17.6	18.3	17.6	18.0	17.2	17.9
4	19.0	19.2	19.6	21.2	19.5	18.9	18.8	18.6	19.2
5	20.5	20.2	20.0	21.4	21.0	19.8	19.2	19.5	20.2
6	20.0		20.1			20.1	21.0	20.1	19.9
7	22.4	19.4		21.5		20.4		18.5	21.1
8			22.0	23.4		22.3			22.3
9		21.0	21.6			21.3			21.3
10			22.6	21.9		22.3			22.3
11									
12									

Table 41. Age-length frequency and mean length at capture of adult and juvenile northern pike (sexes combined) captured with 24 gill nets in Lake Pepin, 5-10 October, 2008.

Total length (in)	Total Number	1	2	3	4	5	6
17.0-17.9							
18.0-18.9							
19.0-19.9							
20.0-20.9	1		1				
21.0-21.9							
22.0-22.9							
23.0-23.9	1			1			
24.0-24.9	2			2			
25.0-25.9	3		1	1			
26.0-26.9	4		1	3	1		
27.0-27.9	1				1		
28.0-28.9	2			1	1		
29.0-29.9	1			1			
30.0-30.9	1					1	
31.0-31.9	4				4		
33.0-33.9	1					1	
35.0-35.9	1						1
Total	22		3	9	7	2	1
Aged subsample							
Mean length			24.4	25.9	30.3	30.9	
SE			2.19	0.70	0.91		
Min length			20.9	23.3	26.7	30.9	
Max length			26.5	29.3	33.7	30.9	
N			3	9	8	1	

Table 42. Back calculated mean length at each annulus and mean increment between annuli of northern pike captured with 24 gill nets in Lake Pepin, 5-10 October, 2008.

Year class	Age	Number of fish	Mean calculated total length (in) at each annulus				
			1	2	3	4	5
2006	2	3	11.4	21.0			
2005	3	9	9.2	17.6	23.4		
2004	4	8	8.1	16.2	23.8	27.7	
2003	5	1	6.7	13.2	18.2	25.2	28.6
Number of fish			21	21	18	9	1
Mean length			9.0	17.3	23.3	27.4	28.6
Mean annual increment			9.0	8.4	6.5	4.2	3.4

Table 43. Age-length frequency and mean length at capture of adult and juvenile white bass (sexes combined) captured with 24 gill nets in Lake Pepin, 5-10 October, 2008.

Total length (in)	Total Number	Age (+) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4.0-4.4																	
4.5-4.9	1	1															
5.0-5.4	7	7															
5.5-5.9	2	2															
6.0-6.4	3	3															
6.5-6.9	2	2															
7.0-7.4																	
7.5-7.9																	
8.0-8.4																	
8.5-8.9																	
9.0-9.4																	
9.5-9.9	4		4														
10.0-10.4	8		8														
10.5-10.9	12		12														
11.0-11.4	4		4														
11.5-11.9	5		5														
12.0-12.9	21			21													
13.0-13.9	25			18	3	3	1										
14.0-14.9	19				6	6	1	2	2	2							
15.0-15.9	4					1	1	1									1
16.0-16.9	1											1					
17.0-17.9																	
Total	118	15	33	39	9	10	3	3	2	2		1					1
Aged subsample																	
Mean length		5.7	10.7	12.8	14.2	14.5	15.3	15.2	14.4	14.6		16.3					15.0
SE		0.2	0.1	0.1	0.2	0.3	0.5	1.1									
Min length		4.8	9.9	12.1	13.5	13.2	15.0	14.4	14.4	14.6		16.3					15.0
Max length		6.7	11.7	13.6	14.6	15.4	15.6	15.9	14.4	14.6		16.3					15.0
N		15	25	18	5	6	2	2	1	1		1					1

Table 44. Index of abundance of age 1, 2, and 3 sauger from original 20 gill net sites in Lake Pepin. Index calculated by dividing catch at age (x) by mean catch of age (x).

Year	Total catch	Catch			Index of abundance		
		Age 1	Age 2	Age 3	Age 1	Age 2	Age 3
1965	388	52	169	112	0.44	0.93	0.78
1966	368	68	63	141	0.58	0.35	0.98
1967	362	119	157	35	1.01	0.87	0.24
1968	760	45	346	315	0.38	1.91	2.20
1969	1253	117	184	757	0.99	1.02	5.28
1970	873	271	86	172	2.30	0.47	1.20
1971	952	262	404	83	2.23	2.23	0.58
1972	807	170	294	229	1.44	1.62	1.60
1973	869	148	341	253	1.26	1.88	1.77
1974	1005	432	243	182	3.67	1.34	1.27
1975	580	53	326	118	0.45	1.80	0.82
1976	771	166	162	300	1.41	0.89	2.09
1977	649	186	189	53	1.58	1.04	0.37
1978	568	35	318	123	0.30	1.76	0.86
1979	234	39	29	117	0.33	0.16	0.82
1980	598	184	126	99	1.56	0.70	0.69
1981	523	202	145	71	1.72	0.80	0.50
1982	465	83	63	213	0.71	0.35	1.49
1983	359	13	207	61	0.11	1.14	0.43
1984	561	120	173	125	1.02	0.95	0.87
1985	254	72	50	48	0.61	0.28	0.33
1986	496	108	162	95	0.92	0.89	0.66
1987	444	51	155	126	0.43	0.86	0.88
1988	514	231	138	92	1.96	0.76	0.64
1989	493	15	410	32	0.13	2.26	0.22
1990	611	76	84	411	0.65	0.46	2.87
1991*	366	117	98	24	0.99	0.54	0.17
1992	302	19	93	50	0.16	0.51	0.35
1993*	262	30	74	75	0.25	0.41	0.52
1994	238	29	107	29	0.25	0.59	0.20
1995	521	123	54	166	1.04	0.30	1.16
1996	421	46	157	55	0.39	0.87	0.38
1997	328	64	71	113	0.54	0.39	0.79
1998	337	10	179	231	0.08	0.99	1.61
1999	324	110	118	52	0.93	0.65	0.36
2000	749	55	492	126	0.47	2.72	0.88
2001[a]	820	167	76	420	1.42	0.42	2.93
2002	442	106	179	29	0.90	0.99	0.20
2003	776	183	328	124	1.55	1.81	0.87
2004	475	131	192	92	1.11	1.06	0.64
2005	556	187	206	79	1.59	1.14	0.55
2006	638	96	244	131	0.82	1.35	0.91
2007	489	195	87	85	1.66	0.48	0.59
2008	544	194	192	61	1.65	1.06	0.43
Mean	**553.3**	**117.7**	**181.2**	**143.3**	**1.00**	**1.00**	**1.00**
SD	**227.3**	**85.1**	**109.4**	**133.8**	**0.7**	**0.6**	**0.9**
CV	**0.41**	**0.72**	**0.60**	**0.93**	**0.72**	**0.60**	**0.93**

* 19 sets in 1991, 1993. a = numbers from 11 sets were extrapolated to 20 sets for comparison

Table 45. Index of abundance of age 1, 2, and 3 walleye from original 20 gill net sites in Lake Pepin. Index calculated by dividing catch at age (x) by mean catch of age (x).

Year	Total catch	Catch			Index of abundance		
		Age 1	Age 2	Age 3	Age 1	Age 2	Age 3
1965	53	11	16	15	0.40	0.73	1.14
1966	69	40	16	5	1.47	0.73	0.38
1967	72	17	37	9	0.62	1.69	0.68
1968	66	14	36	10	0.51	1.65	0.76
1969	75	6	17	41	0.22	0.78	3.10
1970	80	28	6	17	1.03	0.27	1.29
1971	71	22	26	5	0.81	1.19	0.38
1972	55	24	13	14	0.88	0.60	1.06
1973	73	40	20	1	1.47	0.92	0.08
1974	54	34	13	6	1.25	0.60	0.45
1975	47	13	16	9	0.48	0.73	0.68
1976	62	29	7	15	1.06	0.32	1.14
1977	60	18	25	7	0.66	1.14	0.53
1978	31	3	13	9	0.11	0.60	0.68
1979	68	17	17	21	0.62	0.78	1.59
1980	68	39	5	8	1.43	0.23	0.61
1981	61	36	16	4	1.32	0.73	0.30
1982	63	11	33	14	0.40	1.51	1.06
1983	54	16	14	15	0.59	0.64	1.14
1984	42	20	8	5	0.73	0.37	0.38
1985	33	7	5	6	0.26	0.23	0.45
1986	24	4	8	4	0.15	0.37	0.30
1987	88	38	29	11	1.39	1.33	0.83
1988	87	48	23	11	1.76	1.05	0.83
1989	51	3	40	2	0.11	1.83	0.15
1990	43	10	3	25	0.37	0.14	1.89
1991*	46	9	23	1	0.33	1.05	0.08
1992	47	13	10	8	0.48	0.46	0.61
1993*	29	8	8	8	0.29	0.37	0.61
1994	34	1	16	13	0.04	0.73	0.98
1995	113	62	12	16	2.28	0.55	1.21
1996	91	18	56	1	0.66	2.56	0.08
1997	62	10	15	27	0.37	0.69	2.04
1998	142	50	21	30	1.83	0.96	2.27
1999	51	19	18	8	0.70	0.82	0.61
2000	70	9	31	18	0.33	1.42	1.36
2001[a]	180	38	12	51	1.39	0.55	3.86
2002	189	137	17	11	5.03	0.78	0.83
2003	149	28	95	9	1.03	4.35	0.68
2004	158	72	30	34	2.64	1.37	2.57
2005	93	23	43	12	0.84	1.97	0.91
2006	151	37	24	32	1.36	1.10	2.42
2007	129	77	21	6	2.83	0.96	0.45
2008	98	40	47	7	1.47	2.15	0.53
Mean	**76.9**	**27.3**	**21.8**	**13.2**	**1.01**	**1.01**	**1.00**
SD	**40.6**	**24.8**	**16.4**	**10.9**	**0.9**	**0.8**	**0.8**
CV	**0.53**	**0.91**	**0.75**	**0.82**	**0.90**	**0.75**	**0.83**

* 19 sets in 1991, 1993. a = numbers from 11 sets were extrapolated to 20 sets for comparison

Table 46. Age-length frequency and mean length at capture of adult walleye (sexes combined) donated from two summer angling tournaments on Pool 4 of the Mississippi River.

Total length (in)	Total Number	Age (+)															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
15.0-15.9	1			1													
16.0-16.9																	
17.0-17.9	2				1		1										
18.0-18.9																	
19.0-19.9	5				3	1		1									
20.0-20.9	3					1	2										
21.0-21.9	9					3	5					1					
22.0-22.9	5					1	3					1					
23.0-23.9	7						2	3	1				1				
24.0-24.9	5							1	1	2	1						
25.0-25.9	3									1	1	1					
26.0-26.9	5											1	2	1			1
27.0-27.9	3										1	1				1	
28.0-28.9																	
29.0-29.9	1													1			
Total	49			1	4	6	13	5	2	3	3	5	3	2		1	1
Aged subsample																	
Mean length				15.7	19.0	21.2	21.4	23.0	24.1	24.7	25.7	24.7	25.4	28.0		27.0	26.9
SE					0.6	0.4	0.4	0.9	0.6	0.3	1.3	1.3	1.3	1.6			
Min length				15.7	17.4	19.6	17.4	19.8	23.7	24.3	24.3	21.4	23.2	26.9		27.0	26.9
Max length				15.7	19.8	22.0	23.9	24.2	24.5	25.2	27.7	27.4	26.6	29.1		27.0	26.9
N				1	4	6	13	5	2	3	3	5	3	2		1	1

Table 47. Percent agreement of walleye spines and scales with consensus otolith age.

			Percent agreement with consensus otolith age					
Structure	Reader	Exact	1 year	2 years	3 years	4 years	5 years	6 years
Spines								
	1	61	92	98	100	100	100	100
	2	58	85	94	96	96	96	100
Scales								
	1	43	80	94	98	98	100	100
	2	39	73	80	88	92	98	100

Table 48. Percent agreement between official age and walleye, smallmouth bass, and largemouth bass spines and scales.

			Percent agreement with second reading (official age)				
Species	Number	Structure	Exact	1 year	2 years	3 years	4 years
Walleye	107						
		Spines	86	96	100	100	100
		Scales	71	85	93	99	100
Smallmouth Bass	122						
		Spines	90	98	100	100	100
		Scales	77	96	99	99	100
Largemouth Bass	44						
		Spines	68	100	100	100	100
		Scales	66	84	98	100	100
Combined	273						
		Spines	85	98	100	100	100
		Scales	73	90	97	99	100

Table 49. Percent agreement of largemouth bass spines and scales with official age, by age class.

Official Age	Structure	N	Exact (%)	Overaged	Underaged
1		2			
	Spine		100	0	0
	Scale		100	0	0
2		10			
	Spine		90	0	10
	Scale		60	40	0
3		20			
	Spine		55	0	45
	Scale		80	10	10
4		5			
	Spine		80	0	20
	Scale		60	20	20
5		2			
	Spine		50	0	50
	Scale		50	50	0
6		2			
	Spine		50	0	50
	Scale		50	0	50
7		0			
	Spine		.	.	.
	Scale		.	.	.
8		1			
	Spine		100	0	0
	Scale		0	0	100
9		2			
	Spine		50	0	50
	Scale		0	50	50
All ages		44			
	Spine		68 (N = 30)	0	32 (N = 14)
	Scale		66 (N = 29)	20 (N = 9)	14 (N = 6)

Table 50. Percent agreement of smallmouth bass spines and scales with official age, by age class.

Official Age	Structure	N	Exact (%)	Overaged	Underaged
1		28			
	Spine		100	0	0
	Scale		100	0	0
2		38			
	Spine		97	0	3
	Scale		79	18	3
3		19			
	Spine		84	0	16
	Scale		84	5	11
4		10			
	Spine		90	0	10
	Scale		70	10	20
5		12			
	Spine		75	0	25
	Scale		50	33	17
6		11			
	Spine		64	0	26
	Scale		36	18	45
7		4			
	Spine		100	0	0
	Scale		75	0	25
All ages					
	Spine	122	90 (N = 110)	0	10 (N = 12)
	Scale		77 (N = 94)	12 (N = 15)	11 (N = 13)

Table 51. Percent agreement of walleye spines and scales with official age, by age class.

Official Age	Structure	N	Exact (%)	Overaged	Underaged
1		11			
	Spine		100	0	0
	Scale		100	0	0
2		37			
	Spine		92	8	0
	Scale		95	2.5	2.5
3		14			
	Spine		100	0	0
	Scale		86	0	14
4		2			
	Spine		100	0	0
	Scale		50	50	0
5		10			
	Spine		90	0	10
	Scale		70	0	30
6		10			
	Spine		70	10	20
	Scale		70	0	30
7		5			
	Spine		80	20	0
	Scale		20	0	80
8		2			
	Spine		0	100	0
	Scale		0	0	100
9		6			
	Spine		50	33	17
	Scale		20	0	80
10		5			
	Spine		80	20	0
	Scale		20	0	80
11		3			
	Spine		66	33	0
	Scale		0	0	100
12		2			
	Spine		100	0	0
	Scale		0	0	100
All Ages		107			
	Spine		86	3	11
	Scale		71	2	27

Large Lake Sampling Program Annual Completion Report:

Lake Pepin, 2008

Prepared by: _____ 3-30-09
Large Lake Specialist — Date

Approved by: _____ 3-30-09
Area Fisheries Supervisor — Date

Approved by: _____ _____
Regional Fisheries Supervisor — Date