

# **STATUS OF WALLEYE IN SOUTHERN GREEN BAY AND THE FOX RIVER, 2021**

## **BACKGROUND**

Walleye stocks in southern Green Bay were decimated during the early to mid-1900s by habitat destruction, pollution, interactions with invasive species and over-exploitation. Following water quality improvements in the early 1970s, the Wisconsin DNR began to stock fry and fingerling fish to rehabilitate the Walleye population. This stocking program was so successful in re-establishing natural reproducing Walleye in southern Green Bay and the lower Fox River that stocking was discontinued in Green Bay and the Fox River in 1984 and in the Sturgeon Bay area in 2012. Since 1984, surveys have been conducted to assess adult and young of the year (YOY) Walleye in the Fox River, Green Bay and other tributaries.

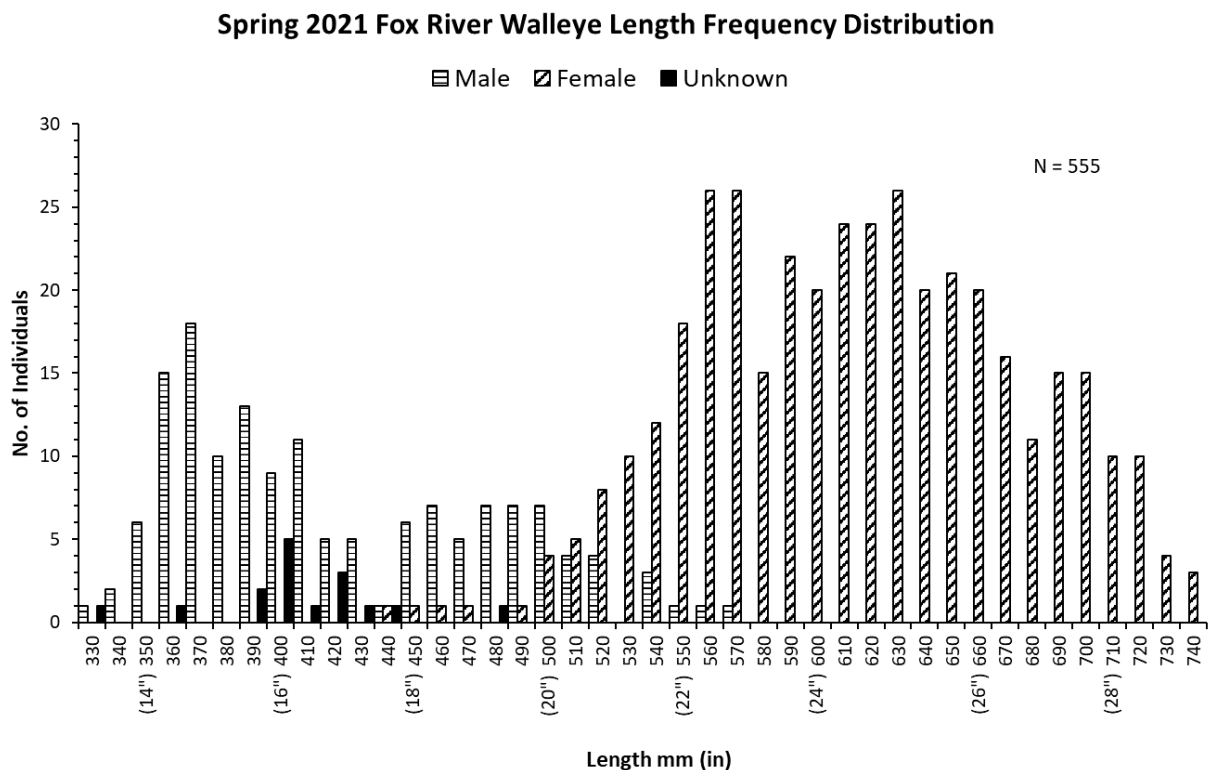
This report aims to summarize data collected during the 2021 field season on the southern Green Bay and Fox River Walleye stocks and to describe long-term trends in YOY production and angler catch and harvest.

## **SPRING ELECTROFISHING SURVEYS**

Between 2013 and 2019, the DNR collected data on the adult spawning Walleye population in the Fox River, a tributary to southern Green Bay, using daytime electroshocking. This survey was not conducted in 2020 due to COVID restrictions but resumed in 2021. Each year, electrofishing surveys were conducted just below the dam in De Pere to capture Walleye during the estimated peak of the spring spawning run. The survey's goal is to collect biological data on at least 500 Walleye. Data collected includes total length, sex and a fin spine to estimate the age composition of the adult spawning population.

Electrofishing surveys of the Fox River in 2021 were conducted on March 25 and April 1. Water temperatures ranged from 39-42°F depending on location and date. A total of 4.42 hours of electrofishing effort was expended to capture 555 Walleyes for a catch rate of 125.6 Walleyes per hour of electrofishing. Captured Walleyes ranged in length from 331 to 741 mm (13.0 in. to 29.2 in.) and had an average length of 561 mm (22.1 in.).

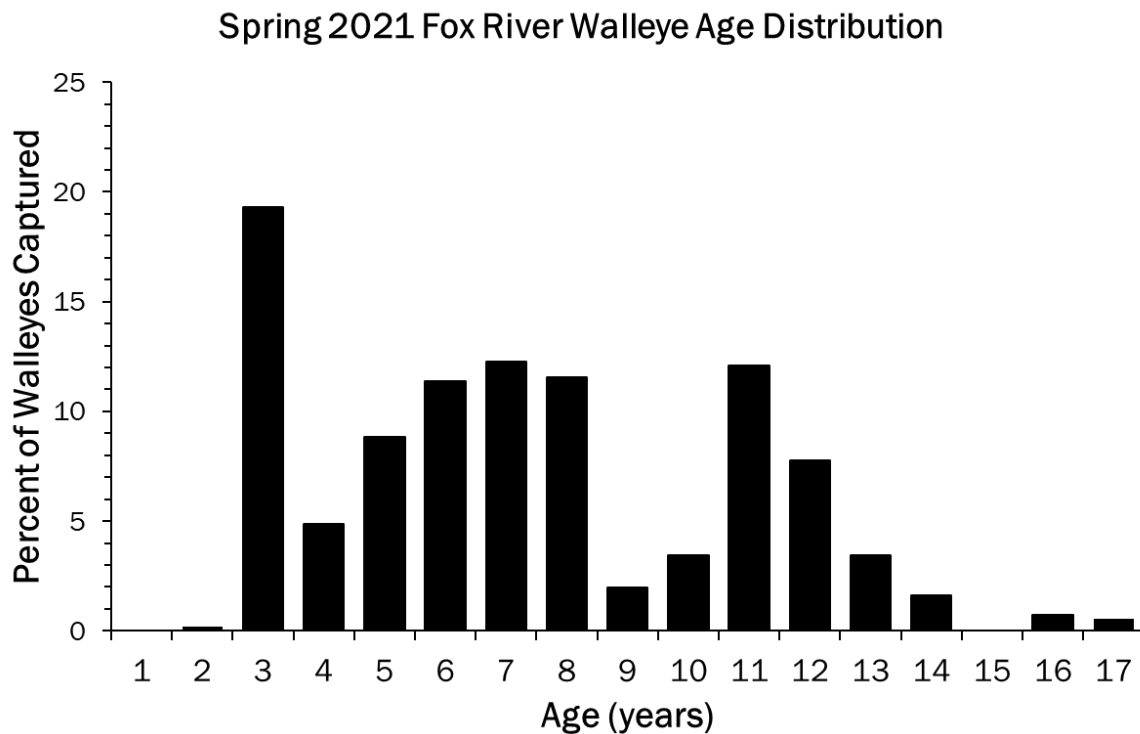
Over the two days of electrofishing, 390 female Walleyes were captured, ranging in size from 440 to 741 mm (17.3 in. to 29.2 in.) with an average length of 618 mm (24.3 in.; Figure 1). The vast majority (i.e., 89%) of the female Walleyes that were captured were  $\geq 550$  mm (21.7 in.; Figure 1). A total of 149 male Walleyes were captured, ranging in size from 331 to 570 mm (13.0 in. to 22.4 in.) with an average length of 425 mm (16.7 in.; Figure 1). Less than 13% of the males captured were  $\geq 500$  mm or 19.7 in. (Figure 1). Only 16 Walleyes of unknown sex were captured, all of which were  $\leq 485$  mm (19.1 in.; Figure 1).



**FIGURE 1.** The length distribution of Walleyes captured during the 2021 spring electrofishing survey on the Fox River.

During the 2021 spring Fox River survey, a dorsal fin spine was removed from all captured Walleyes for age analysis and ages were estimated from fin spines for 554 of the 555 Walleyes captured. The percentage of each age class in the adult spawning population is shown in Figure 2. Age three Walleyes were the largest year class in the spring adult spawning population, making up approximately 19% of the Walleyes captured (Figure 2). It is not surprising that age-3 Walleyes were the largest age class in the adult spawning population since age-3 is typically the age when Walleyes begin to mature and the 2018 year class (i.e., the age-3 adults) was the largest year class

recorded in fall young of year (YOY) electrofishing surveys. It is highly likely that not all Walleyes from the 2018 year class were mature by age-3, so this year's class will likely make up a larger percent of the spawning adult population in upcoming years. Ages 6, 7, 8 and 11 were the next largest year classes, with each of these age classes making up just over 10% of the adult spawning Walleye population (Figure 2). All age classes from 3-17 were present except for age-15 Walleyes, meaning at least 14 age classes contribute to the adult spawning population of Walleyes in the Fox River (Figure 2).



*FIGURE 2. Age-frequency distribution of Walleyes captured during the spring spawning run from the Fox River in 2021. Male and female ages are pooled to determine the percentage of the run represented by each year class. The data are presented as the percentage of each age class in the sample.*

## **FALL ELECTROFISHING INDEX SURVEYS**

During the fall of 2021, a total of 10 hours was spent electrofishing 17.02 miles of shoreline between lower Green Bay (8.84 miles and 4.6 hours) and the Fox River (8.14 miles and 5.4 hours) as part of the annual fall YOY Walleye index electrofishing survey. A total of 724 Walleyes ranging in size from 198 to 641 mm (7.8 in. to 25.2 in.)

with an average length of 420 mm (16.5 in.) were captured (Figure 3). Twenty-six YOY Walleyes and 698 adults were captured. All but one of the YOY Walleyes were captured in the Fox River.

Dorsal fin spines were collected from up to 10 Walleyes per 10mm length bin to estimate the age composition of the Walleyes sampled. An age-length key was used to assign ages to all Walleyes that did not have a fin spine collected based on an individual Walleye's Length. Walleyes between the age 0-10 were collected in the 2021 fall electrofishing survey (Figure 4). Greater than 80% of the Walleyes captured in Fox River and Lower Green Bay were estimated to be age-3 from the 2018 year class. Catch rates of YOY Walleye in the fall of 2018 were the highest ever recorded in annual fall electrofishing surveys since 1993. The fact that over 80% of the Walleyes captured in the fall 2021 survey were from the 2018 year class shows how strong that year class was and how dominant that year class will likely be in adult surveys in the coming years.

### Fall 2021 Walleye Length Frequency Distribution

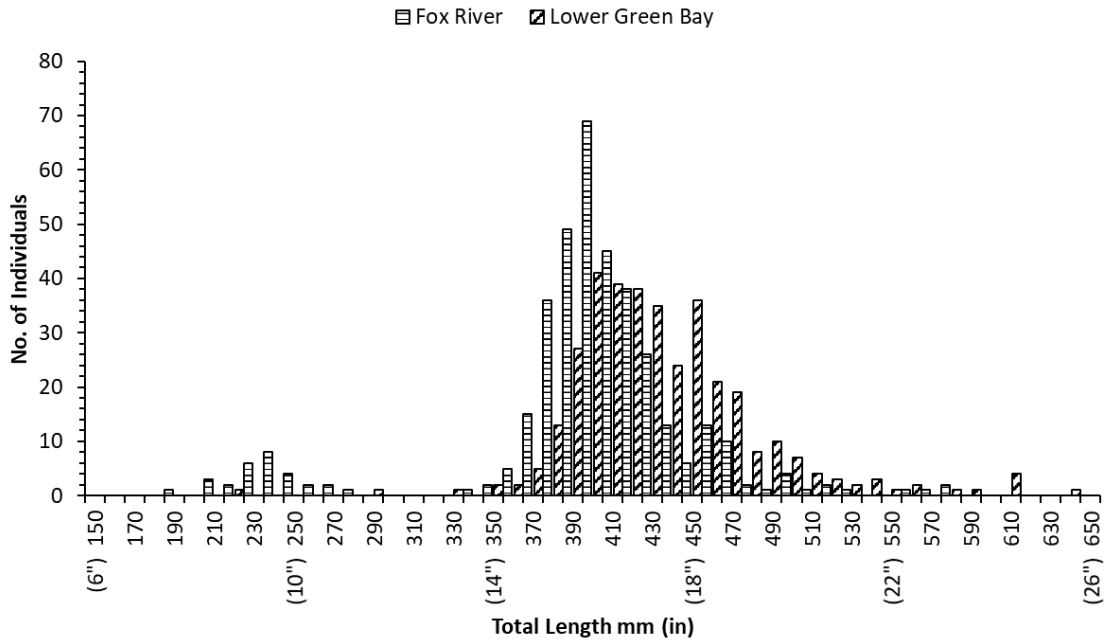


FIGURE 3. Length frequency distribution of Walleyes captured in the fall 2021 electrofishing surveys of Lower Green Bay and the Fox River.

### Fall 2021 Walleye Age Frequency Distribution

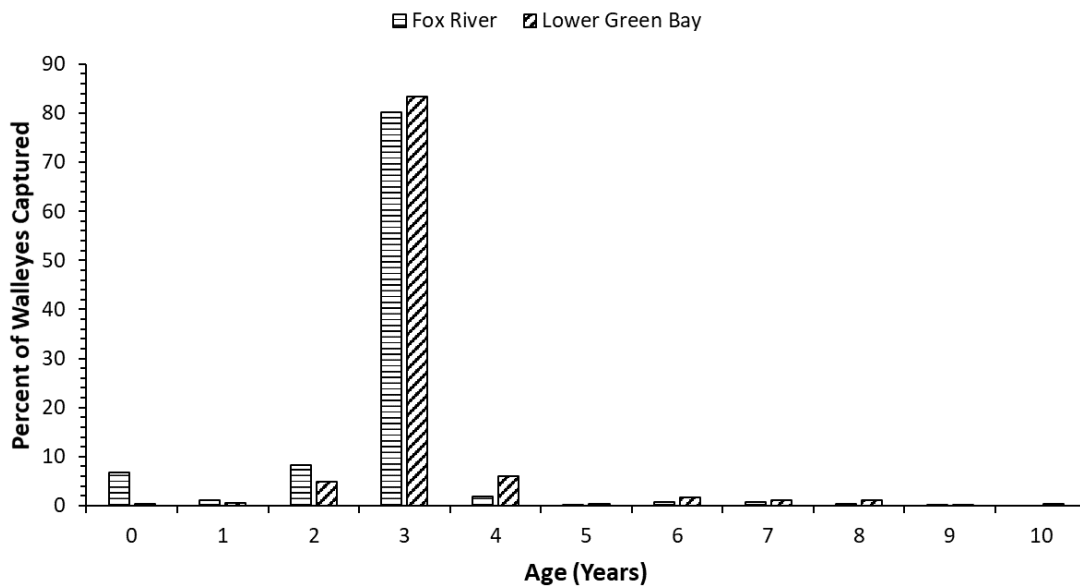
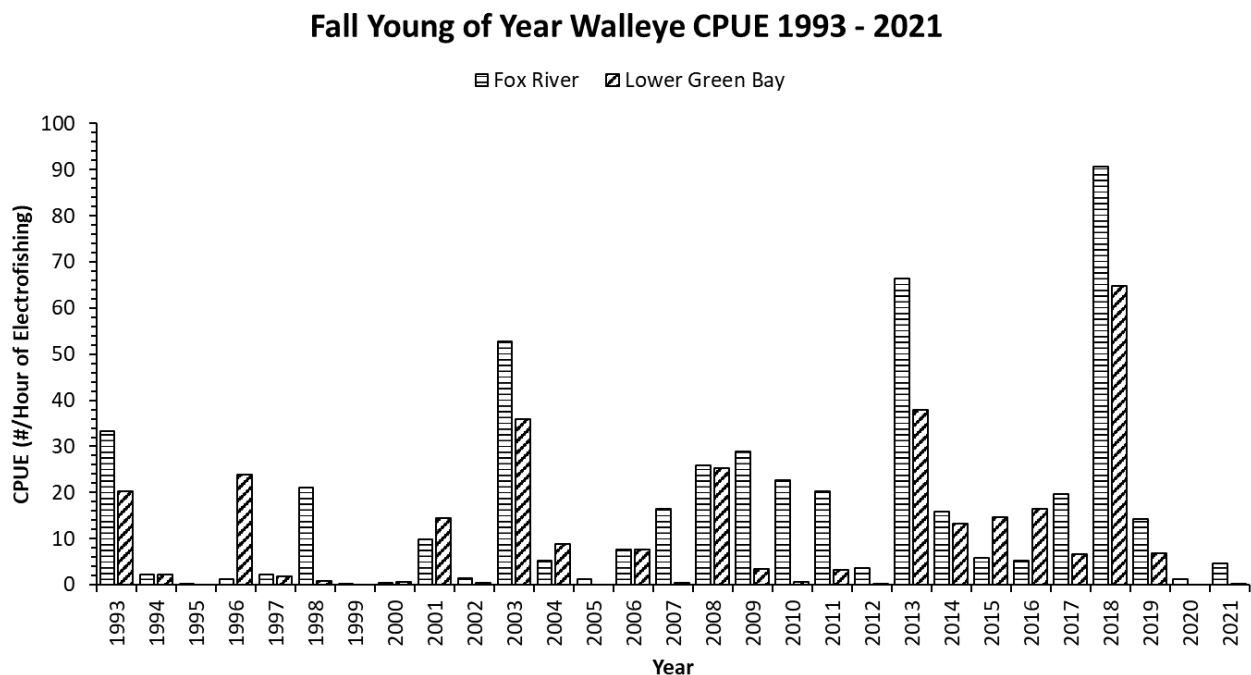


FIGURE 4. Age-frequency distribution (i.e., percent of Walleyes captured) of Walleyes captured in the fall 2021 electrofishing surveys of Lower Green Bay and the Fox River.

## Recruitment of YOY Walleye

Results from our 2021 fall electrofishing index surveys indicated that the CPUE of YOY Walleyes captured on the Fox River and lower Green Bay were below average compared to 1993 through 2021 (Figure 5). In 2021, the CPUE of YOY Walleyes in the Fox River was 4.6 per hour shocked, which was well below the 1993-2020 average CPUE of 17.0 YOY per hour. Catch rates of YOY Walleyes in lower Green Bay in 2021 was even lower at 0.2 YOY per hour shocked, which was much lower than the 1993-2020 average of 11.1 YOY per hour of electrofishing (Figure 5). Walleye recruitment tends to be variable, with strong year classes followed by weak year classes in some years, as shown by the variability in catch rates since 1993. It's interesting to note that apparent predictable strong year classes from the fall Fox River surveys occur every five years (i.e., 1993, 1998, 2003, 2008, 2013 and 2018). Trends in catch rates of YOY Walleyes from lower Green Bay fall surveys follow a relatively similar pattern, but catch rates tend to be lower than in the Fox River in most years with really strong year classes.



**FIGURE 5.** Catch per unit effort (CPUE) of young of year (YOY) Walleye in the lower Fox River and lower Green Bay (south of a line drawn from Longtail Point to Point Sable), as measured by CPUE (number per hour) from data collected in electrofishing index surveys during 1993-2021.

## **CATCH AND HARVEST**

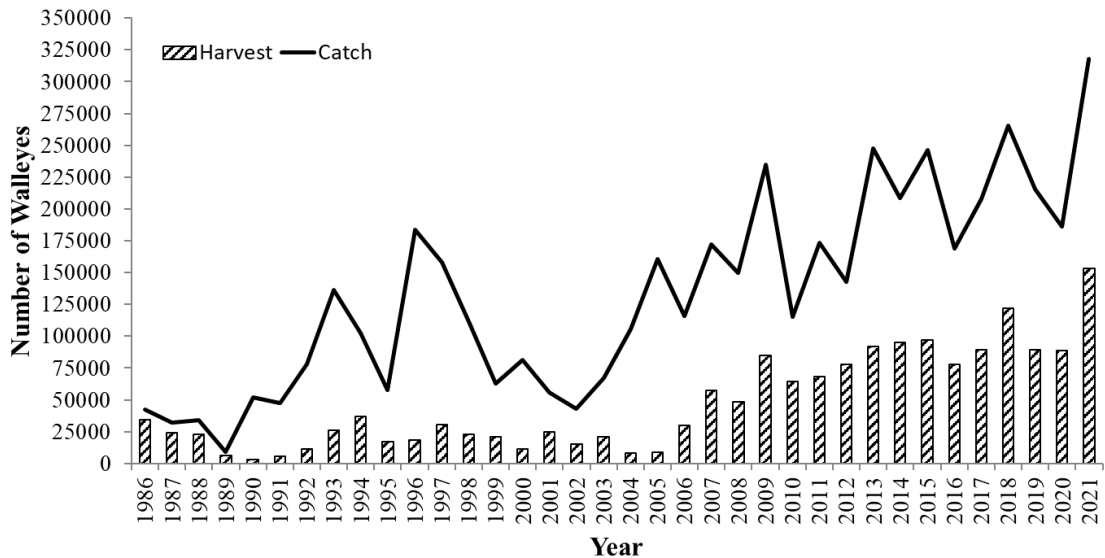
Estimates of catch and harvest of Walleyes from Wisconsin waters of Green Bay and its tributaries have been generated from creel survey data collected during the open water season in every year since 1986. From 1986-2012, open water creel surveys were conducted from March 15-Oct. 31. Starting in 2013, the end date of the open water creel was extended to Nov. 15 along the west shore of Green Bay.

The total catch of Walleyes during the 2021 open water season was estimated at 318,101 fish (Figure 6). The total catch of Walleyes in 2021 was 42.7% higher than the estimated average annual total catch of 222,974 Walleyes from 2013-2019. The years 2013-2019 were used because these were the years in which the creel was extended a couple of weeks later in the fall. Total catch from 2020 was not included in the average of total Walleye catch because creel surveys did not start until July of 2020 due to the COVID-19 pandemic, meaning estimates of catch and harvest in 2020 are likely lower than what was caught and harvested during the open water season in that year.

Total open water harvest of Walleyes also increased in 2021 and was estimated to be 153,054 fish (Figure 6). Harvest of Walleyes during the 2021 open water season was 61% higher than the estimated average annual total harvest of 94,675 Walleyes from 2013-2019.

Catch and harvest of Walleyes during the 2021 open water season continued the upward trend that started in the early 2000s and were the highest on record since open water creel surveys started in 1986 (Figure 6). Increases in catch and harvest of Walleyes over the last 20 years are likely driven by increases in the adult Walleye population fueled by consistent recruitment. In particular, increases in catches in more recent years have likely resulted from the really strong 2013 and 2018 year classes, the two strongest year classes documented in fall electrofishing surveys since 1993.

## Green Bay Open Water Walleye Catch and Harvest, 1986-2021



*FIGURE 6. Estimated total open water season catch and harvest of Walleyes from Wisconsin waters of Green Bay and the lower Fox River from 1986 through 2021. 2020 data reflects only July-November data because of reduced creel effort due to the COVID-19 pandemic. Starting in 2013, the end date for open water creel was extended from Oct. 31 to Nov. 15.*

## THE FUTURE OF THE SPORT FISHERY

The future of the southern Green Bay/lower Fox River Walleye stock and sport fishery appears to be very promising. Substantial Walleye year classes have been measured in 11 of the past 14 years during fall electrofishing surveys, with the 2018 cohort being the strongest year class measured since the onset of fall index shocking in 1993. Reports from anglers in recent years have been that they are catching a lot more smaller fish, likely a result of the dominance of the 2018 year class in the population. As the 2018 year class fully recruits to the fishery and fish from this year class continue to get larger, the size of Walleyes in angler catches will likely increase.

Additionally, as contaminant levels continue to decrease from the Fox River polychlorinated biphenyls (PCB) clean-up, the Walleye harvest will likely continue to show a generally increasing trend. The Green Bay creel survey will continue to play a vital role in managing the Walleye fishery in the future.



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