WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Sandstone Flowage
2023 Fish Management Report

WBIC 531300

Photo Credit: WDNR

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Introduction

Sandstone Flowage is a 153-acre impoundment on the Peshtigo River, located approximately 3 miles west of Crivitz, Wisconsin. The flowage has a maximum depth of 39 feet with only 12 percent of the flowage more than 20 feet (Table 1). Sandstone flowage is primarily riverine in nature with a maximum width of about 900 feet.

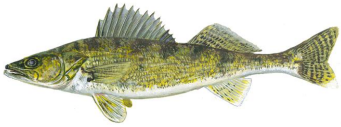
Table 1: Physical / chemical attributes (Wisconsin DNR, 1977).

Surface acres: 153 **Maximum depth (ft):** 39 **Shoreline length (mi):** 6.3 **Lake type:** Drainage **Lake class:** Complex Riverine **Basic water chemistry:** Medium hard water; stained water of moderate transparency. Secchi = 7 ft. (summer). **Littoral substrate:** Sand (80%), gravel (15%), muck (5%) **Aquatic vegetation:** Sparse **Other features:** This lake is highly developed with homes along the shoreline and is located within the Ceded Territory.

Sandstone Flowage has been operating as a dam and hydroelectric facility since December 1925. It is currently owned and operated by Wisconsin Public Service Corporation (WPSC). The flowage was drawn down 3 feet from August 15th to October 1st, 2015 for dam repair and maintenance. Before the drawdown, electrofishing surveys were conducted on May 4th, 12th and June 9th to examine gamefish and panfish populations. The flowage was also sampled on October 6th, after the drawdown, to assess walleye *Sander vitreus* and muskellunge *Esox masquinongy* recruitment. The primary goal of these surveys was to examine the overall condition of the fishery in the flowage. Even though fishing remained open during the drawdown, no negative impacts were observed.

Large fingerling Walleye have been stocked in alternate years at 5 fish/acre since 2013 as part of the Wisconsin Walleye Initiative (WWI; Table 2). Sandstone Flowage was randomly chosen as a study lake for the WWI. As a result, annual fall sampling was completed to assess the contribution of stocked fish and natural reproduction. Sampling was not conducted in 2022 because water levels were still low because of the drawdown (Figure 1).

Table 2. Walleye stocking history in Sandstone Flowage, Marinette County, WI.



Year	Number Stocked	Average Length
2006	5340	1.4
2008	1887	1.4
2009	7390	1.7
2010	5340	7.7
2011	2962	1.8
2012	2749	1.5
2013	764	7.0
2015	634	8.3
2017	634	6.1
2019	634	6.9
2021	683	8.2

Figure 1. Photos of 2022 drawdown of Sandstone Flowage, Marinette County, WI. (left) standing on dam looking west/upstream; (right) boat landing.

The primary goal of the 2023 survey was to assess the status of gamefish and panfish populations after the 2022 drawdown. Coincidently, Sandstone Flowage was on our rotation for 2023, so the survey was timely. Sandstone Flowage is primarily riverine which adds to the overall diversity of the fishery, but it also makes for difficult sampling conditions. For example, spring fyke netting was not completed due to riverine conditions and adult walleye are generally upstream spawning and not vulnerable to capture where nets could be set. Only late spring (SE2) and fall electrofishing surveys were completed. Results were compared to the 2015 survey where applicable.

Methods

DATA COLLECTION

A standard WDNR electrofishing boat was used on June 5, 2023 (SE2) to count and measure adult gamefish (e.g. bass) and panfish. Two, 2-mile shoreline segments were surveyed. Each 2-mile segment had 2 stations: a 1.5-mile gamefish station and a 0.5-mile gamefish/panfish station. All fish collected were measured to the nearest 0.1-inch (in) total length (TL).

Sandstone Flowage was randomly chosen as a "Sentinel" lake (study lake) for the WWI. Therefore, annual fall sampling (4.0 miles) was completed to evaluate walleye natural reproduction and the contribution of stocked walleye. Sampling was completed before stocking (in stocked years) and later in the fall (or when water temperatures were around 60 degrees in non-stocked years) in years when the flowage was not stocked (Table 4). These surveys targeted age-0, age-1 and age-2 walleye. However, all walleye were collected during the 2023 fall survey to document the presence of adult walleye following the 2022 drawdown.

DATA ANALYSIS

Catch per unit effort (CPUE) was calculated as catch by gear divided by sampling effort for each species collected. Length frequency distributions were tabulated from fish measured during the electrofishing and fyke net samples; not all panfish were measured. Proportional stock density (PSD) and relative stock density for preferred length fish (RSD^{P}) were calculated for dominant gamefish (Anderson and Neumann 1996). Preferred lengths of various gamefish have a minimum length between 45 and 55% of the world record length for that species (Anderson and Neumann 1996). Stock, quality, and preferred lengths were used as proposed by Gabelhouse (1984).

Results

Overall, 128 fish representing 18 species were collected during the 2023 sampling season (Table 3). The five most abundant species collected by number were yellow perch *Perca flavescens*, smallmouth bass *Micropterus dolomieu*, walleye, northern pike *Esox Lucius*, and rock bass *Ambloplites rupestris*.

Table 3. Species composition of fishes collected during the 2023 and 2015 surveys of Sandstone Flowage, Marinette County, WI.

SPECIES COMPOSITION OF FISHES COLLECTED							
	2023			2015			
*COMMON NAME	NUMBER COLLECTED (SE2 - EF)	AVERAGE LENGTH (inches)	LENGTH RANGE (inches)	NUMBER COLLECTED (SE1 - EF)	NUMBER COLLECTED (SE2 - EF)	AVERAGE LENGTH (inches)	LENGTH RANGE (inches)
Yellow Perch	26	5.1	2.5-9.4		31	6.0	3.2-10.3
Smallmouth Bass	26	11.3	4.0-18.4	50	19	14.5	5.3-20.5
Walleye	20	10.3	6.5-23.4	41	18	10.1	5.2-23.2
Northern Pike	10	16.1		7	10	18.4	12.2-28.8
Rock Bass	10	4.2	2.5-6.9		31	6.2	3.5-9.3
White Sucker	9				14		
Shorthead Redhorse	8						
Bluegill	6	3.5	2.0-5.9		25	5.3	3.0-7.1
Black Bullhead	3	6.1	6.0-6.2				
Pumpkinseed	2	4.0	2.5-5.5		12	5.0	3.1-7.4
Largemouth Bass	1	14.2		2	2	15.5	14.3-17.6
Muskellunge	1	19.6		3	1	26.3	10.0-43.3
Common Shiner	1				11		
Brown Bullhead	1	6.6					
Golden Redhorse	1						
Hornyhead Chub	1						
Northern Hog Sucker	1	2.2					
Yellow Bullhead	1	12.8					
Black Crappie					5	7.8	5.5-11.2
Golden Shiner					3		
TOTALS	**128**			**103**	**174**		

* Common names of fishes recognized by the American Fisheries Society.

WALLEYE

In 2023, 20 walleye were collected during the SE2 electrofishing survey (Table 3). Walleye averaged 10.2 inches and the largest collected was 23.4 inches long (Table 3 and Figure 2). Walleye SE2 CPUE was nearly identical between 2015 and 2023 at 4.5 and 5.0 walleye per mile, respectively (Table 4).

In 2023, 17 young-of-the-year (YOY) walleye were collected during fall electrofishing in addition to several adult walleye (Table 5 and Figure 2). Walleye were not stocked in 2023 so all the YOY collected during fall electrofishing were the result of natural reproduction. Typically, adult walleye are not collected during fall electrofishing surveys. But in 2023 we collected adults to demonstrate that walleye were still present despite the 2022 drawdown (Figure 2). Immigration

from the upstream flowages and natural reproduction will sustain a modest walleye fishing opportunity in Sandstone Flowage.

Table 4. Electrofishing CPUE from SE2 (gamefish/panfish) surveys on Sandstone Flowage, Marinette County, WI.

Survey Date	Species	Number of Miles	Number of Fish	CPUE (fish/mile)
6/9/2015	LARGEMOUTH BASS	4.0	2	0.5
6/5/2023		4.0	1	0.3
6/9/2015	MUSKELLUNGE	4.0	1	0.3
6/5/2023		4.0	1	0.3
6/9/2015	NORTHERN PIKE	4.0	10	2.5
6/5/2023		4.0	10	2.5
6/9/2015	SMALLMOUTH BASS	4.0	19	4.8
6/5/2023		4.0	26	6.5
6/9/2015	WALLEYE	4.0	18	4.5
6/5/2023		4.0	20	5.0

Table 5. Fall Walleye electrofishing results from Sandstone Flowage, Marinette County, WI.

Survey Date	Species	Number of Miles	Number of Fish	CPUE (fish/mile)
9/29/2014	WALLEYE	4.0	5	1.3
10/6/2015		4.3	5	1.2
9/28/2016		3.8	2	0.5
9/7/2017		3.8	3	0.8
9/24/2018		4.1	7	1.7
9/10/2019		3.9	8	2.1
10/13/2020		3.9	1	0.3
9/15/2021		4.0	2	0.5
10/2/2023		4.0	30	7.5

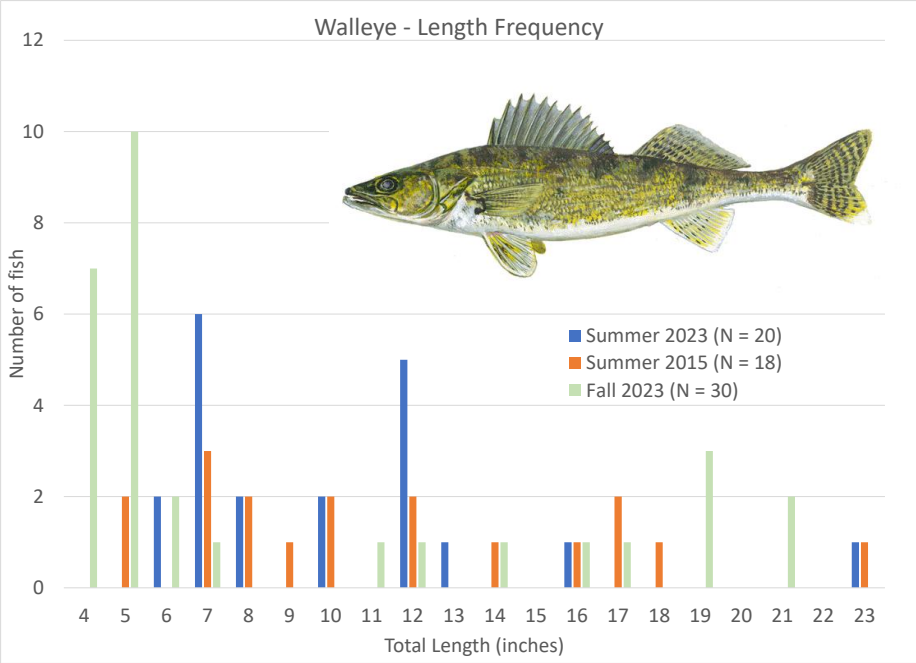


Figure 2. Length frequency of Walleye collected during 2015 and 2023 SE2 electrofishing surveys and the fall 2023 electrofishing survey from Sandstone Flowage, Marinette County, WI.

SMALLMOUTH BASS

Smallmouth Bass are also known for their seasonal migration from overwintering habitat in the deeper portion of the flowage to upriver locations after spawning in the spring. Twenty-six smallmouth were collected during the 2023 SE2 electrofishing survey (Table 4). CPUE increased from 4.8 smallmouth per mile in 2015 to 6.5 per mile in 2023 (Table 4). Smallmouth bass ranged in length from 4.0 inches to 18.4 inches and averaged 11.7 inches (Figure 3). The low catch rate but exceptional size structure suggests the smallmouth bass population is stable (Figure 3).

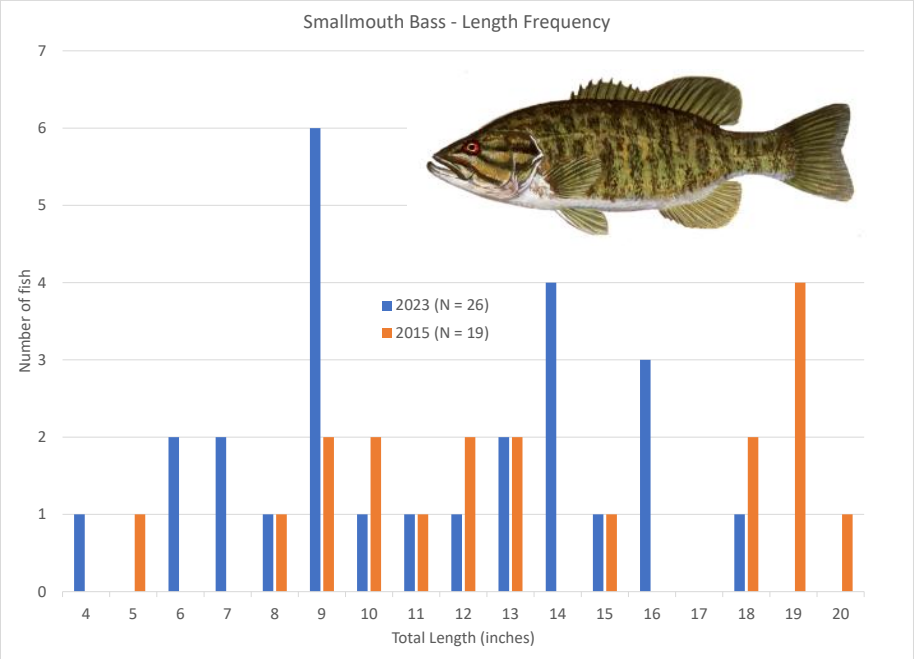


Figure 3. Length frequency of Smallmouth Bass collected during 2015 and 2023 SE2 electrofishing surveys from Sandstone Flowage, Marinette County, WI.

PANFISH

SE2 electrofishing indicated relatively low panfish abundance in Sandstone Flowage. Bluegill (6/mile), pumpkinseed (2/mile), and black crappie (0/mile) generally prefer more lentic environments that lack significant current/moving water. The median bluegill CPE for complex riverine lakes is 39/mile. Due to habitat, food availability, and morphological features (fish shape) most panfish species are not adapted to life in moving water. On the other hand, species such as rock bass (10/mile) and yellow perch (26/mile) are more adapted to flowing water. As a result, these species were more abundant in Sandstone Flowage (Table 2).

LARGEMOUTH BASS

Largemouth bass, like panfish, prefer water without current. Due to the riverine nature of Sandstone Flowage, it is not surprising largemouth bass relative abundance was low. The median CPUE for largemouth bass in complex riverine systems is 3.7 per mile. Largemouth SE2 CPUE in Sandstone Flowage was 0.3 per mile in 2023 and 0.5 per mile in 2025.

NORTHERN PIKE

Northern pike were captured in low numbers in 2023, however electrofishing is not the most effective gear for sampling northern pike. The largest pike collected was 25 inches long. SE2 electrofishing CPUE in 2023 was the same as and their presence in the electrofishing survey likely indicates a population that should provide anglers with plenty of opportunity2015 (Table 2).

MUSKELLUNGE

There were 5 muskellunge captured during the 2023 fall electrofishing survey with a CPUE of 1.3/mile (Table 4). Muskies ranged in length from 8.6 to 40.1 inches long (Figure 4). YOY musky have been captured on a regular basis in low numbers during fall electrofishing surveys on Sandstone Flowage (Table 4). Muskellunge stocked upstream are fin clipped before stocking. The YOY musky collected in Sandstone Flowage were not clipped and the result of natural reproduction within the system. However, the population was likely initially established from the downstream migration of muskellunge stocked in the larger, upstream flowages (e.g. Caldron Falls, High Falls, Johnson Falls). Musky abundance remains low but continues to provide a limited fishing opportunity based on local reports.

Table 4. Fall Muskellunge electrofishing results from Sandstone Flowage, Marinette County, WI.

Survey Date	Species	Number of Miles	Number of Fish	CPUE (fish/mile)
10/6/2015	MUSKELLUNGE	4.3	2	0.5
9/28/2016		3.8	1	0.3
9/24/2018		4.1	3	0.7
9/10/2019		3.9	4	1.0
10/13/2020		3.9	1	0.3
9/15/2021		4.0	1	0.3
10/2/2023		4.0	5	1.3

Figure 4. Young-of-the-year Muskellunge collected in Sandstone Flowage in 2023.

Conclusions and Recommendations

Sandstone Flowage supports a respectable fishing opportunity for a variety of gamefish and panfish species. Fish populations will continue to expand after the 2022 drawdown as fish from the upstream flowages migrate downstream. This also occurred after the 2015 drawdown.

Walleye stocking (5/acre in alternate years) is likely contributing little to overall abundance in Sandstone Flowage. Because natural reproduction is occurring, and fish are flushed downstream from the flowages above, stocking should be evaluated by clipping walleye prior to stocking. Follow-up surveys over several years would look for clipped versus unclipped walleye and a determination could be made if stocking is necessary. The current walleye fishing regulation (3 fish daily bag; 20 to 24-inch protected slot) is adequate and by design, should promote additional natural reproduction by protecting spawning adults.

The consisted collection of YOY musky, and the occasional adult musky, is encouraging. The habitat and forage base are sufficient to support muskellunge. As a result, a limited musky fishery will continue to be available within the flowage.

The next survey of Sandstone Flowage (SE2 and fall electrofishing) is tentatively scheduled for 2031 and will focus on gamefish abundance, size structure, natural reproduction, and recruitment to the fishery. Access to Sandstone is adequate. Boaters are reminded to remove all vegetation from their boat and trailer before leaving to limit the spread of this and other invasive species. A map of Sandstone Flowage can be found at the following internet address: https://apps.dnr.wi.gov/doclink/lakes_maps/0531300a.pdf

Literature Cited

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