

**WISCONSIN DEPARTMENT OF NATURAL
RESOURCES**
Fishery Survey Report for Europe Lake
Door County, Wisconsin 2023
WATERBODY IDENTIFICATION CODE: 93100



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INTRODUCTION

Europe Lake (WBIC 93100) is a 297-acre lake located in the northeast portion of the Door County peninsula (T32N, R29E, Section 9) in the township of Liberty Grove. Europe Lake is a shallow seepage lake with 3.5 miles of shoreline and a maximum depth of ~13 feet. The predominant bottom compositions are sand, gravel, rock and muck. The eastern shore of Europe Lake borders Newport State Park, which provides an undeveloped wooded wetland making up roughly one-third of the entire shoreline. The rest of the shoreline is developed with homes and cottages. Public boat access is available from Europe Lake Road on the southwest end of the lake.

The history of fisheries management for Europe Lake has included fisheries surveys, fish stocking, fish removal and water chemistry investigations (Hacker 1958, Hacker 1960, Wiegert 1962, Wiegert 1963, Wiegert 1964, Wiegert 1965, Kernen 1969, Kernen 1974, Lychwich 1988, Mc Kee et al. 2001, Hogler and Surendonk 2008). Prior to our fisheries survey 2023 efforts, the most recent fisheries surveys on Europe Lake were a comprehensive survey in 1999 and an electrofishing survey in May 2008, which yielded few fish (Mc Kee et al. 2001, Hogler and Surendonk 2008). Europe Lake has a history of fish stocking including but not limited to walleye, smallmouth bass and northern pike with the most recent walleye stockings taking place in 2000 and 2015 (Table 1). During 2023, a comprehensive survey was conducted to assess the fish populations in Europe Lake.

METHODS

A comprehensive survey of Europe Lake was conducted between April and Sept. of 2023. The assessment began shortly after ice-out with 8 standard fyke nets (3'x6' frames) set at locations selected to cover a variety of habitat types. The nets were set on April 7 and fished until April 13 for a total effort of 48 net-nights. Total length (mm) was recorded on all game fish and on a subsample of all panfish that were netted. The second or third dorsal spine was collected from walleyes and smallmouth bass and the leading anal spine was collected from northern pike for age estimation. A subsample of yellow perch and bluegills were sacrificed for otolith extraction for age estimation. Sex and condition were noted for sampled fish if apparent. All other fish captured were enumerated by species.

Electrofishing surveys were conducted on April 13, May 24 and Sept. 27. The entire shoreline (3.3 miles of effort on each date; 9.9 miles total) was shocked after dark using pulsed DC electricity for each survey and all fish encountered in each survey were netted. Total length was recorded on all game fish and on a subsample of all panfish that were netted. During spring sampling, the second or third dorsal spine was collected from walleyes and smallmouth bass and the leading anal spine was collected from northern pike for age estimation. A subsample of yellow perch and bluegills were sacrificed for otolith extraction for age estimation. Sex and condition were recorded for sampled fish expressing gametes. All other fish captured were enumerated by species.

In the laboratory, otoliths were removed from sacrificed fish. Both spines and otoliths were cleaned, sectioned, mounted on glass slides and aged by counting annuli using a microscope. A Chapman-modified continuous Schnabel population estimate was

conducted for game fish populations when an adequate number of fish were marked (top caudal clip) and recaptured. Mean length at age was used to compare growth to previous surveys on Europe Lake as well as the statewide averages.

RESULTS

WALLEYE

A total of 12 individual walleyes and 5 recaptured walleyes were caught by fyke nets during spring sampling resulting in a catch per unit effort (CPUE) of 0.4/net-night. Two walleyes were sampled by electrofishing resulting in a CPUE <0.01/mile. The fyke net CPUE from the 2023 survey was much lower than all previous surveys from 1973 to 1999 (Table 2). The walleyes sampled were likely from the 2015 stocking as there has historically been a lack of natural reproduction in Europe Lake and the fish were aged and estimated to be 8-years old. Like CPUE, size structure of walleyes has been affected by the decreased frequency of walleye stocking. The walleyes that were caught were large females ranging in length from 23.0 to 26.1 inches and averaging 24.2 inches (Figure 1). Previous surveys from 1973-1999, with a higher frequency of walleye stocking, resulted in a much less truncated size structure (Table 3). While growth comparisons are difficult based on the low sample size of walleyes in the 2023 survey, it appears that growth rates of walleyes sampled from Europe Lake are exceptional and well above the statewide average for 8-year-old fish that were sampled (Table 4). The 1999 survey showed a similar result. Due to the small sample size of walleyes sampled, a population estimate was not calculated.

NORTHERN PIKE

A total of 74 individual adult northern pike were sampled from Europe Lake during spring sampling. During the spring survey 21 northern pike were recaptured resulting in an adult population estimate of 144 (95% CI 99-214) and density of 0.5/acre (95% CI 0.33-0.72). A total of 68 individual northern pike and 21 recaptured northern pike were caught in fyke nets resulting in a CPUE of 1.9/net-night and 6 were caught via electrofishing resulting in a CPUE of 0.61/mile. The resulting fyke net CPUE from 2023 was similar to the surveys conducted from 1973 to 1999, except for 1977 (Table 2). Of the 74 northern pike that were sampled, 35 were females, 28 were males and 11 were classified as unknown but many were likely spent females. Northern pike that were sampled ranged in length from 14.2 to 33.9 inches and averaged 26.8 inches (Figure 2). The size structure of northern pike appears to have remained relatively stable over time (Table 3). Age-1, 3, 4, 5, 6, 7, 8 and 9 northern pike were sampled during the spring surveys (Figure 3). Growth of northern pike in Europe Lake are near or above the statewide average for fish that were sampled (Table 5).

SMALLMOUTH BASS

A total of 67 individual smallmouth bass were sampled from Europe Lake during spring sampling. A total of 47 individual smallmouth bass and 13 recaptured smallmouth bass were caught in fyke nets resulting in a CPUE of 1.3/net-night. Twenty individual

smallmouth bass and 10 recaptured smallmouth bass were caught via electrofishing resulting in a CPUE of 3.0/mile. The resulting fyke net CPUE from 2023 was higher than the surveys conducted from 1973 to 1999 (Table 2). Smallmouth bass that were sampled ranged in length from 6.5 to 21.9 inches and averaged 11.7 inches (Figure 4). Age-1, 2, 3, 4, 8, 9, 10 and 13 smallmouth bass were sampled during the spring surveys (Figure 5). Smallmouth bass growth in Europe Lake is exceptional and well above the statewide average for fish that were sampled (Table 6). A smallmouth bass population estimate was not calculated because netting efforts concluded before anticipated peak bass spawning and spring electrofishing efforts did not sample adult smallmouth bass very well. A population estimate based on these efforts may not be entirely representative of the actual population in Europe Lake.

YELLOW PERCH

A total of 1,958 yellow perch were captured. A total of 1,939 yellow perch were caught in fyke nets resulting in a CPUE of 40.4/net-night and 19 were caught via electrofishing resulting in a CPUE of 1.9/mile. The resulting fyke net CPUE from 2023 was higher than the surveys conducted from 1973 to 1999, except for 1982 and 1985 (Table 2). Yellow perch that were sampled ranged in length from 4.6 to 10.2 inches and averaged 6.1 inches (Figure 6). The size structure of yellow perch appears to have remained relatively stable over time (Table 3). High numbers of yellow perch less than 5 inches were observed but not efficiently captured by our gear. Age-3 to 6 yellow perch were sampled during the spring surveys (Figure 7). Growth of sampled yellow perch appears to be relatively slow and near the statewide average (Table 7).

BLUEGILL

A total of 786 bluegill were captured. A total of 754 bluegills were caught in fyke nets resulting in a CPUE of 15.7/net-night and 32 were caught via electrofishing resulting in a CPUE of 3.2/mile. The resulting fyke net CPUE from 2023 was higher than the surveys conducted from 1973 to 1999 (Table 2). Bluegills sampled ranged in length from 4.0 to 9.5 inches and averaged 5.9 inches (Figure 8). High numbers of bluegills less than 4 inches were observed but not efficiently captured by our gear. Age-2, 3, 4, 5, 7 and 8 bluegills were sampled during the spring surveys (Figure 9). Bluegill growth in Europe Lake is relatively high and above the statewide average for all ages of fish that were sampled (Table 8).

PUMPKINSEED

A total of 28 pumpkinseed were captured. A total of 27 pumpkinseed were caught in fyke nets resulting in a CPUE of 0.6/net night and only 1 was caught via electrofishing. The resulting fyke net CPUE from 2023 was similar to the surveys conducted from 1973 to 1999 (Table 2). Pumpkinseeds sampled ranged in length from 4.3 to 7.3 inches and averaged 5.6 inches (Figure 10). The size structure of pumpkinseeds appears to have remained relatively stable over time (Table 3).

ROCK BASS

A total of 749 rock bass were captured. A total of 718 rock bass were caught in fyke nets resulting in a CPUE of 15.0/net-night and 31 were caught via electrofishing resulting in a CPUE of 3.1/mile. The resulting fyke net CPUE from 2023 was higher than the surveys conducted from 1973 to 1999 (Table 2). Rock bass ranged in length from 4.2 to 9.3 inches and averaged 6.7 inches (Figure 11). The size structure of rock bass appears to have remained relatively stable over time (Table 3).

OTHER SPECIES

In addition to the species mentioned, white suckers, a black crappie, and common shiners were observed in Europe Lake.

MANAGEMENT CONSIDERATIONS

Walleye, northern pike and smallmouth bass are the top predator species in Europe Lake. Like previous surveys on Europe Lake, northern pike were the most common predator species sampled during the 2023 comprehensive survey. The northern pike population in Europe Lake has seemingly remained stable over the last 50 years, with similar catch rates and size structure over that time likely due to the abundant yellow perch and white sucker prey base. While smallmouth bass are generally difficult to sample by fyke net (relative to walleyes and northern pike, which are commonly targeted with fyke nets), more smallmouth bass were sampled in the 2023 survey than any previous survey on Europe Lake. Smallmouth bass in Europe Lake exhibit exceptionally high growth rates and trophy potential, likely aided by the relatively small size structure and high abundance of the yellow perch population. A relatively high number of juvenile smallmouth bass were sampled, which is encouraging for the future of the smallmouth bass fishery in Europe Lake. Where northern pike have remained stable and smallmouth bass have increased in Europe Lake, the walleye population has shown a considerable decline. Over time it has been noted that the presence of a walleye population will only be maintained through the presence of stocking due to a lack of natural reproduction. The overall decline in the walleye population post 2000 can be attributed to the decreased frequency of stocking. Historical surveys show that Europe Lake can only support a walleye population through stocking efforts if there is interest in a walleye fishery in Europe Lake.

Yellow perch, bluegill and rock bass are the most common panfish species in Europe Lake with pumpkinseed present at lower abundances. These panfish species provide a fishery, but few of the fish that were sampled were of preferred harvestable size for anglers. Of all species sampled yellow perch had the highest CPUE. Yellow perch abundance has remained high, and the size structure and growth have remained relatively low since 1973. The oldest yellow perch sampled in 2023 was age-6, suggesting mortality and population turnover is high. The low size structure, slow growth, and high mortality of yellow perch may be attributed to several factors; however, density dependence, from an overabundance of small individuals competing for

resources, likely has the greatest impact. Bluegill CPUE was the highest on record on Europe Lake in 2023. The sampled bluegill population was young with few fish over age-4, but the population exhibited high growth rates and some bluegills ≥ 9 inches which is promising. Rock bass and pumpkinseed were sampled at rates and sizes relatively consistent with previous surveys. Rock bass CPUE remained relatively high while pumpkinseed CPUE remained low. Overall, panfish populations in Europe Lake are seemingly healthy, but have exhibited low size structure from 1973-2023. Panfish populations in Europe Lake may benefit from habitat improvements. Europe Lake is shallow and fairly featureless, so habitat improvement such as cribs or habitat benches offshore and fish sticks affixed to shore could help by diversifying the available habitat and providing refuge for small fish.

FIGURES

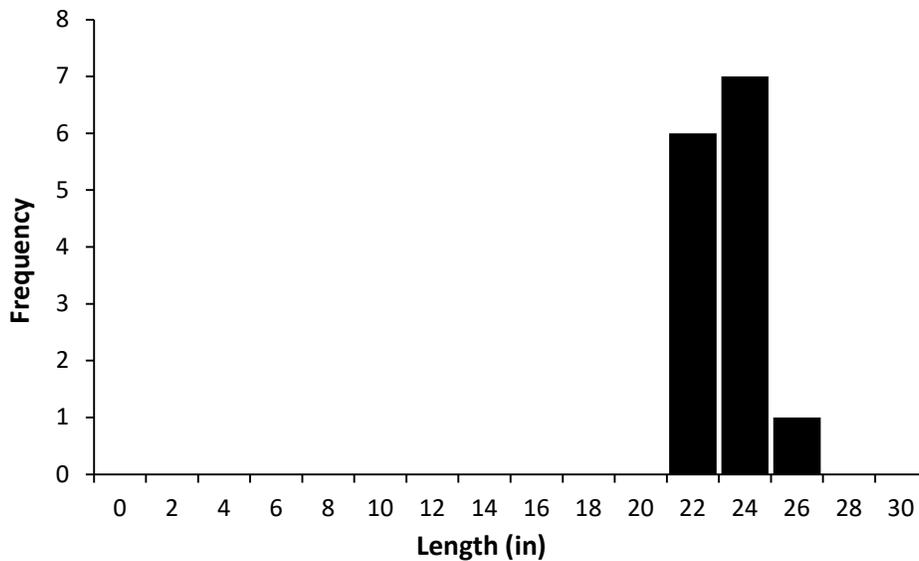


Figure 1. Length frequency of walleye sampled from Europe Lake in 2023.

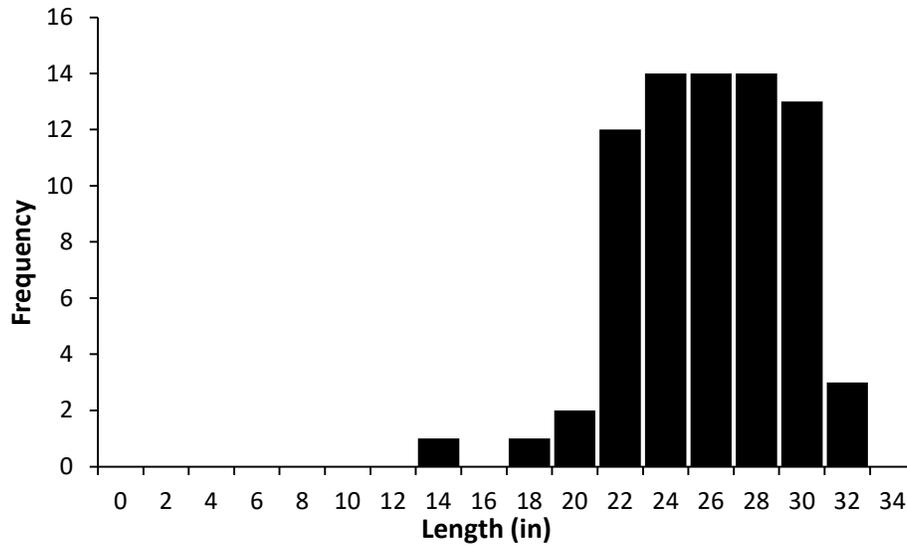


Figure 2. Length frequency of northern pike sampled from Europe Lake in 2023.

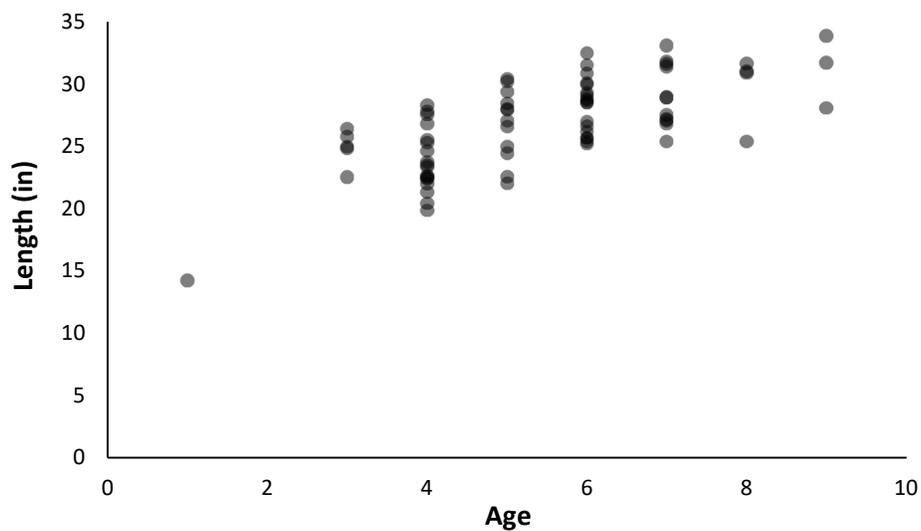


Figure 3. Age-length relationship of northern pike sampled from Europe Lake in 2023. Darker points represent a higher frequency of individuals sampled at that age/length.

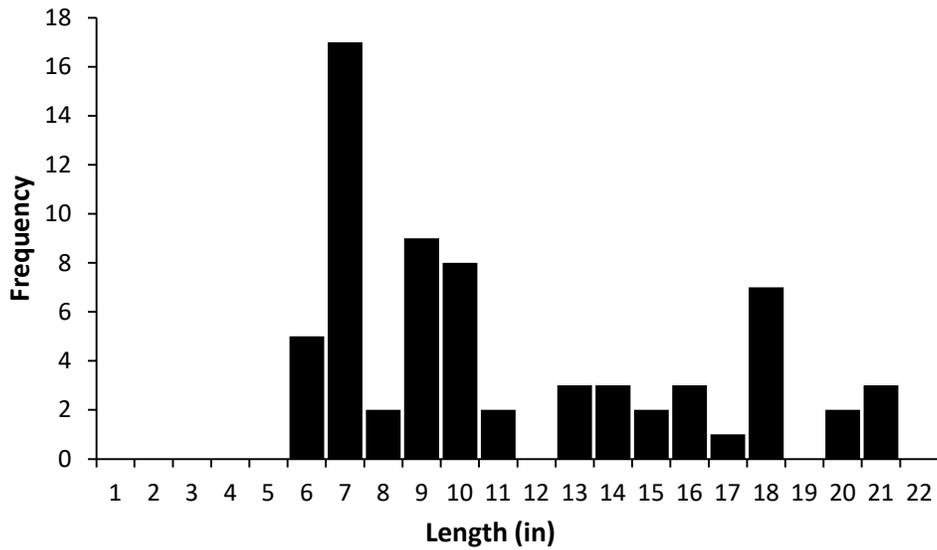


Figure 4. Length frequency of smallmouth bass sampled from Europe Lake in 2023.

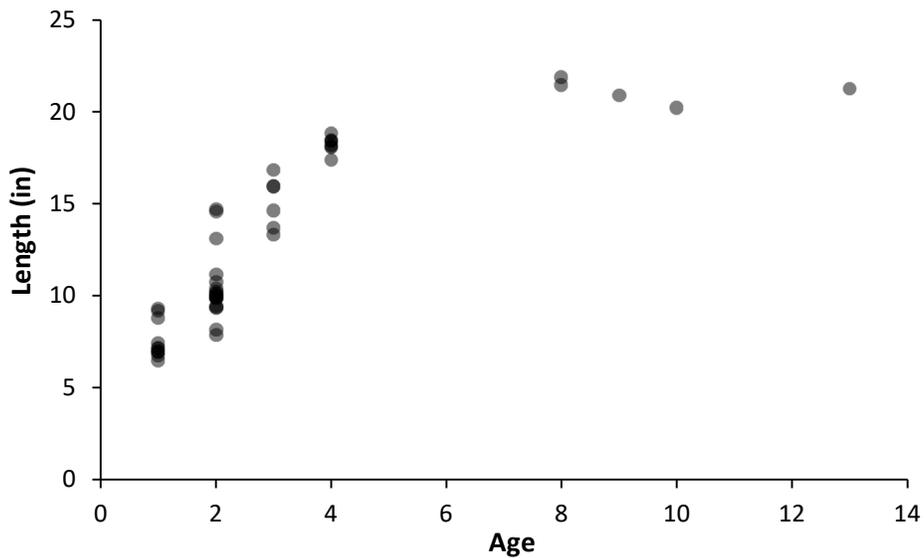


Figure 5. Age-length relationship of smallmouth bass sampled from Europe Lake in 2023. Darker points represent a higher frequency of individuals sampled at that age/length.

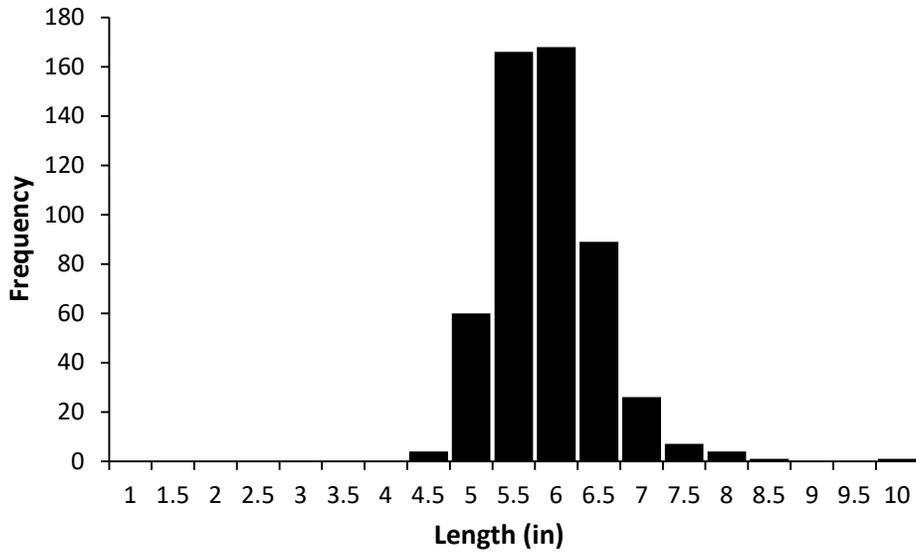


Figure 6. Length frequency of yellow perch sampled from Europe Lake in 2023.

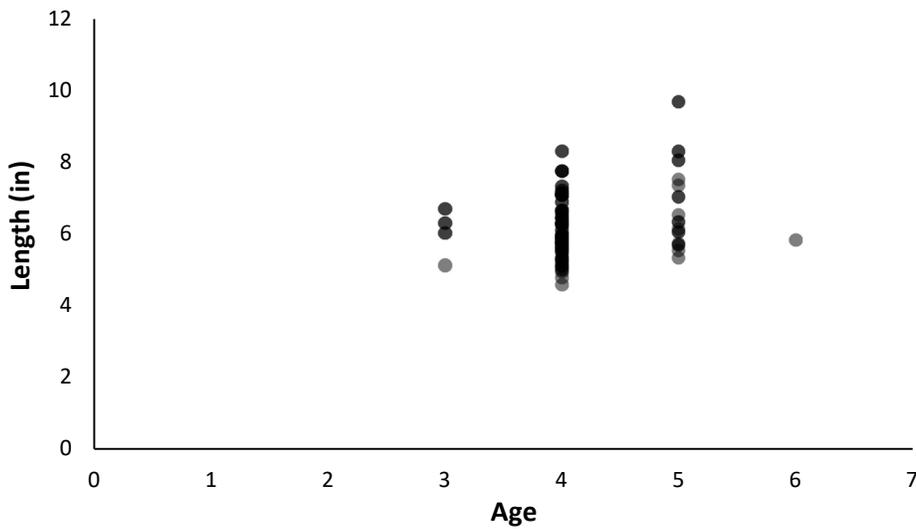


Figure 7. Age-length relationship of yellow perch sampled from Europe Lake in 2023. Darker points represent a higher frequency of individuals sampled at that age/length.

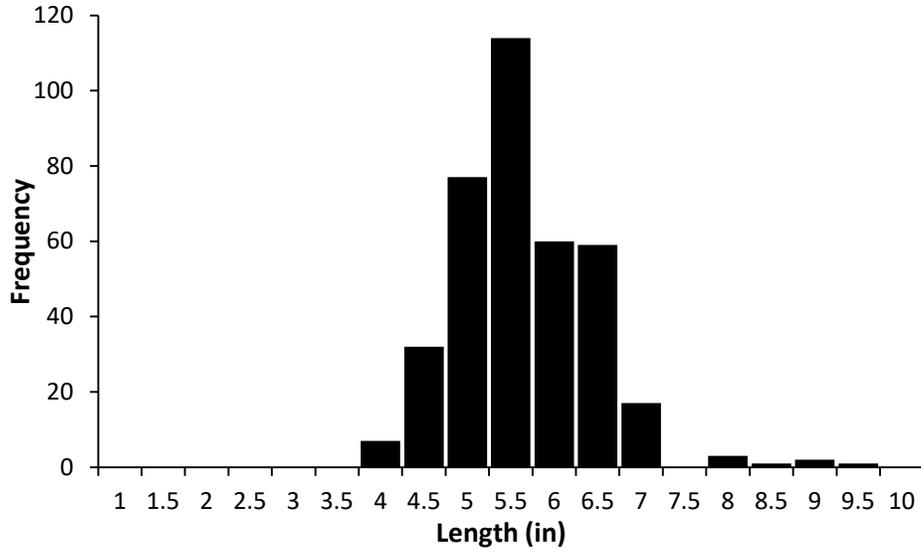


Figure 8. Length frequency of bluegill sampled from Europe Lake in 2023.

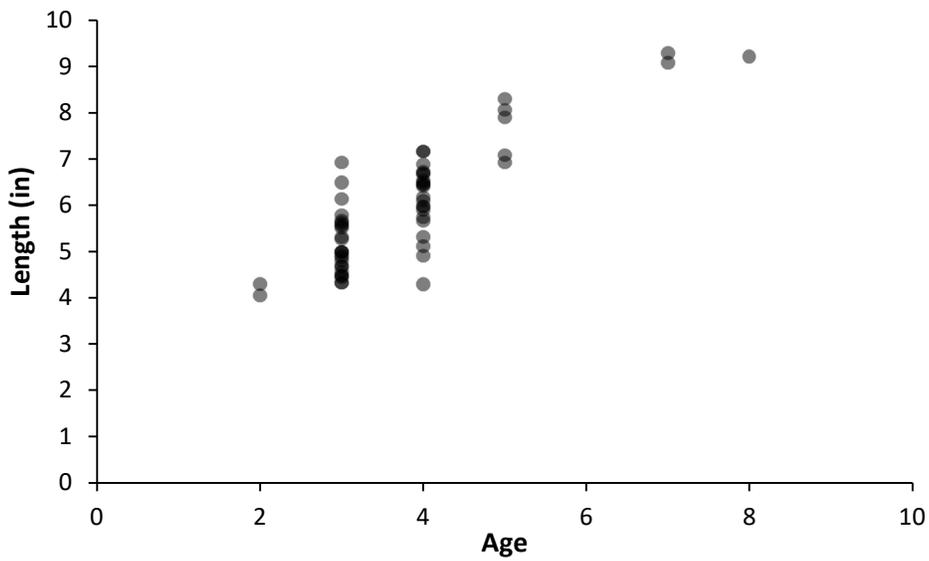


Figure 9. Age-length relationship of bluegills sampled from Europe Lake in 2023. Darker points represent a higher frequency of individuals sampled at that age/length.

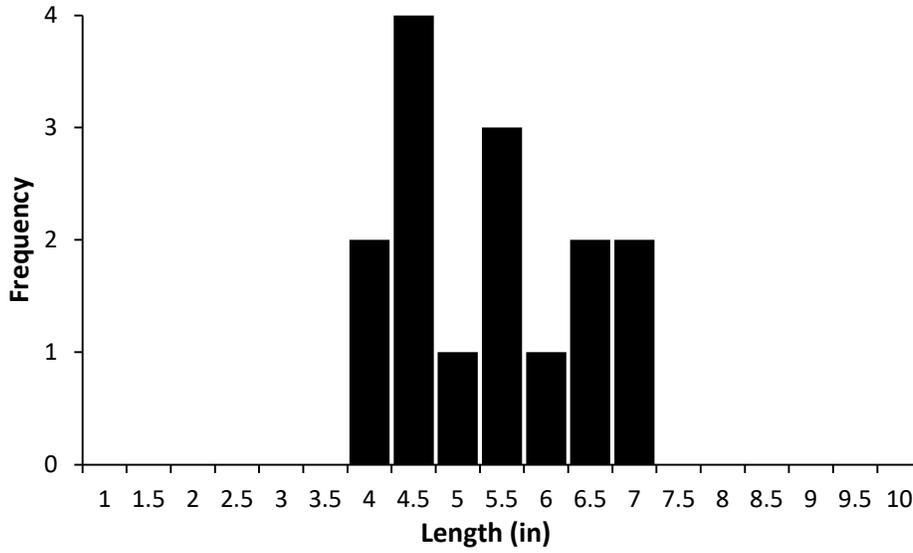


Figure 10. Length frequency of pumpkinseed sampled from Europe Lake in 2023.

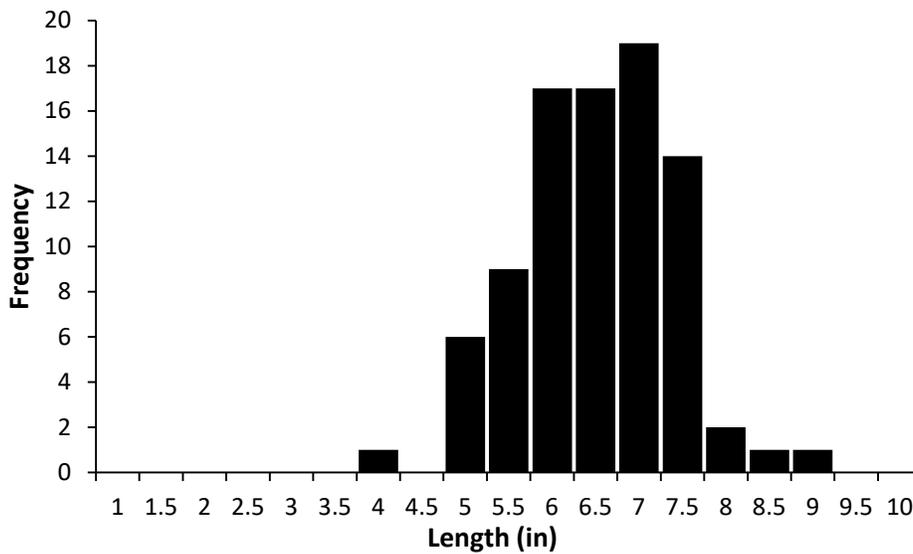


Figure 11. Length frequency of rock bass sampled from Europe Lake in 2023.

TABLES

Table 1. Stocking summary for Europe Lake, Door County from 1939 to 2023.

Stocking Year	Species	Number Stocked	Size Stocked
1939-1946	Smallmouth Bass	15,220	FRY
1939-1946	Smallmouth Bass	25,250	FINGERLING
1939-1946	Smallmouth Bass	16	ADULT
1945	Bullheads	3,000	UNKNOWN
1947	Smallmouth Bass	1,900	FINGERLING
1948	Smallmouth Bass	1,900	FINGERLING
1949	Smallmouth Bass	300	FINGERLING
1952	Smallmouth Bass	2,200	FINGERLING
1959	Walleye	3,600	FINGERLING
1963	Northern Pike	1,262	ADULT
1964	Northern Pike	72,000	FRY
1968	Walleye	6,140	FINGERLING
1972	Walleye	500	FINGERLING
1973	Walleye	500	FINGERLING
1975	Walleye	113	FINGERLING
1976	Walleye	190	FINGERLING
1978	Walleye	162	FINGERLING
1986	Walleye	77	ADULT
1994	Walleye	5,000	FINGERLING
1996	Walleye	5,000	FINGERLING
1998	Walleye	5,000	FINGERLING
2000	Walleye	5,000	FINGERLING
2015	Walleye	12,483	FINGERLING

Table 2. Total fyke net catch and catch per unit effort (CPUE; net night) of species caught during spring surveys from 1977 to 2023 in Europe Lake.

	1973		1977		1982		1985		1999		2023	
	Total Catch	CPUE										
Bluegill	0		6	2.0	0		0		1	0.1	754	15.7
Bullheads	420	11.7	12	4.0			7	0.1	4	0.1	0	
Northern Pike	46	1.3	42	14.0	25	2.1	87	1.2	87	1.5	89	1.9
Pumpkinseed	0		2	0.7	1	0.1	11	0.2	6	0.1	27	0.6
Rock Bass	39	1.1	26	8.7	98	8.2	468	6.5	943	14.4	718	15.0
Smallmouth Bass	0		1	0.3	0		2	0.0	17	0.1	60	1.3
Walleye	132	3.7	148	49.3	42	3.5	99	1.4	67	1.1	17	0.4
White Sucker	20	0.6	5	1.7	25	2.1	117	1.6	7	0.1	0	
Yellow Perch	175	4.9	5	1.7	772	64.3	6631	92.1	540	4.6	1939	40.4

Table 3. Minimum length (in), maximum length (in), and average length (in) of species caught during spring surveys from 1977 to 2023 in Europe Lake.

	1973			1977			1982			1985			1999			2023		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg									
Bluegill				4.2	7.3	5.6										4	9.5	5.9
Bullheads	8.3	10.1	9.1	9.2	12.2	10.5				7.9	13.7	9.9						
Northern Pike	13	32.1	23.9	11.1	32	19.2	14.2	33	24.6	11	39.1	24.4	14.0	32.1		14.2	33.9	26.8
Pumpkinseed				3.8	6.2	5.2	4.8	4.8		5.4	8	6.5	3.5	4.3		4.3	7.3	5.6
Rock Bass	5	9	7.2	4.9	9.8	7.1	4.4	10	6.5	4.3	10.4	6.8	3.6	10.5		4.2	9.3	6.7
Smallmouth Bass				8	8					13.5	13.6	13.6	4.8	18.3		6.5	21.9	11.7
Walleye	7.8	27.6	15.7	11.5	26	18.1	15.9	22.8	20	17.7	24.4	20.8	4.1	23.8		23	26.1	24.2
White Sucker	17.5	22.3	19.5	9.1	11	10	8.4	21.7	15	15.4	22.3	18.4						
Yellow Perch	6	9.1	6.9	6.5	7.2	6.9	5.1	9	6.8	4.4	9.4	6.3	3.9	8.3		4.6	10.2	6.1

Table 4. Mean length (in) at age of walleye captured on Europe Lake from surveys conducted in 1999 and 2023 compared to the statewide mean length at age for walleye.

Year	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10
State Avg.	7.6	11.8	13.6	15.0	16.4	17.9	19.1	20.2	21.1	21.9
1999	8.8	9.2	-	-	-	-	22.3	23.1	21.6	21.3
2023	-	-	-	-	-	-	-	24.2	-	-

Table 5. Mean length (in) at age of northern pike captured on Europe Lake from surveys conducted in 1999 and 2023 compared to the statewide mean length at age for northern pike.

Year	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10
State Avg.	11.7	14.7	17.8	20.5	23.2	25.5	28.3	30.6	32.5	32.9
1999	-	-	18.3	22.0	24.6	26.6	27.2	28.6	30.3	30.4
2023	14.2	-	24.9	23.9	26.8	28.3	29.1	29.8	31.2	-

Table 6. Mean length (in) at age of smallmouth bass captured on Europe Lake from the survey conducted in 2023 compared to the statewide mean length at age for smallmouth bass.

Year	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10
State Avg.	4.8	7.3	9.5	11.5	13.6	15.3	16.4	17.9	18.3	19.9
2023	7.6	10.5	15.1	18.2	-	-	-	21.7	20.9	20.2

Table 7. Mean length (in) at age of yellow perch captured on Europe Lake from surveys conducted in 1999 and 2023 compared to the statewide mean length at age for yellow perch.

Year	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8
State Avg.	4.1	5.0	6.1	6.9	7.8	8.6	9.6	10.2
1999	-	-	5.0	6.1	6.5	7.2	7.3	-
2023	-	-	6.2	6.2	7.0	-	-	-

Table 8. Mean length (in) at age of bluegills captured on Europe Lake from the survey conducted in 2023 compared to the statewide mean length at age for bluegills.

Year	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8
State Avg.	3.3	4.0	4.8	5.8	6.4	7.0	7.6	8.0
2023	-	4.2	5.2	6.1	7.7	-	9.2	9.2

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