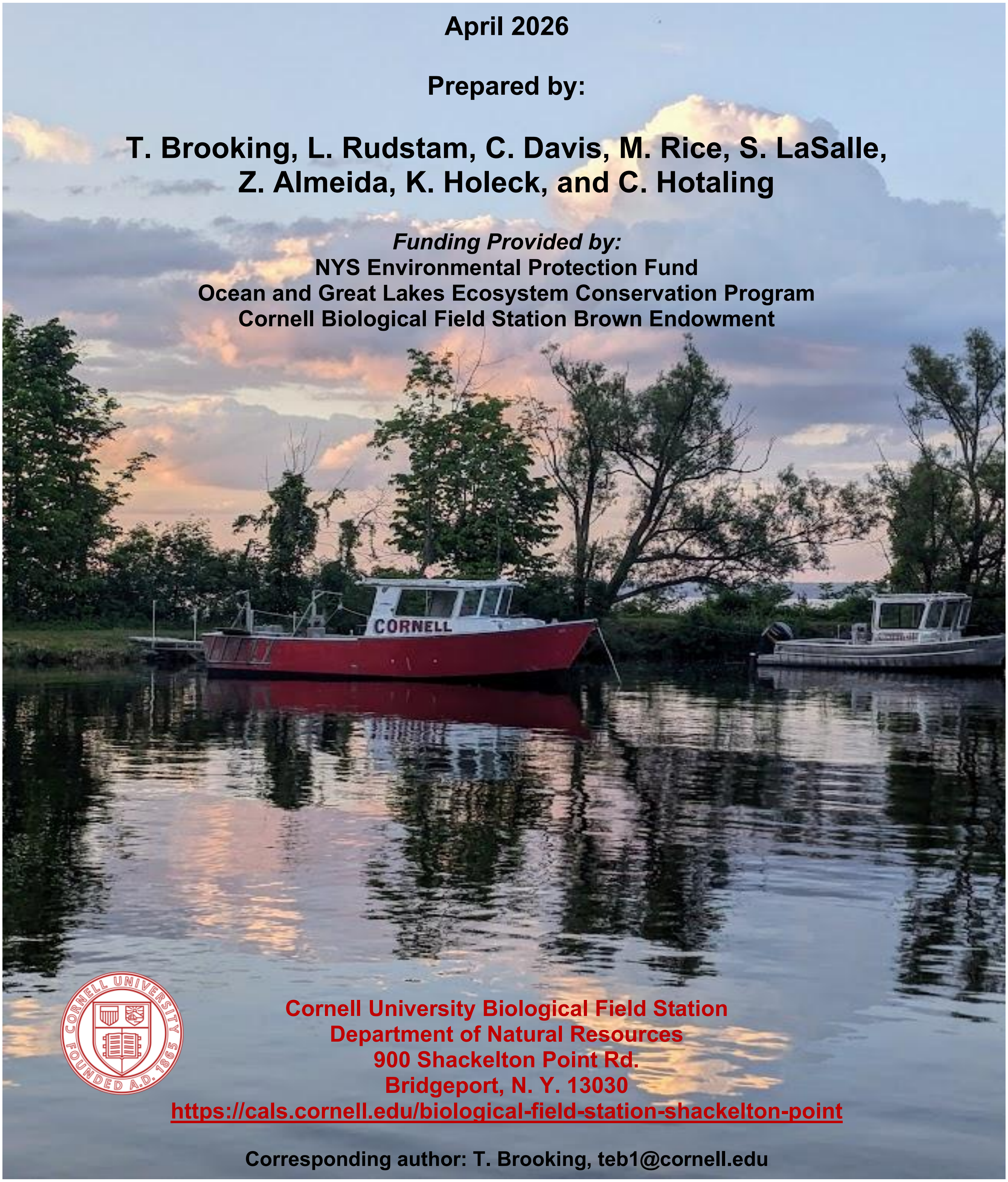
The Fisheries and Limnology of Oneida Lake, 1957-2025



April 2026

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Funding Provided by:
NYS Environmental Protection Fund
Ocean and Great Lakes Ecosystem Conservation Program
Cornell Biological Field Station Brown Endowment

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Dedication

We would like to dedicate this year's work to Tony VanDeValk, who retired on March 31, 2025. One of the longest-term employees at Shackelton Point, Tony's work was absolutely the building block for most all the research surveys contained herein. Building upon the foundation laid by the late John Forney and continuing in his footsteps, Tony's dedication to the fishery, hard work, and tremendous work ethic were unequalled. Oneida Lake and the amazing fishery enjoyed by thousands of anglers owes much of its continued success to the many years of research by Tony VanDeValk. We are all grateful for the many contributions you made to the Oneida Lake fishery, and to Tony we say a huge Thank You!

EXECUTIVE SUMMARY

This report provides the results of studies conducted by the Cornell Biological Field Station on Oneida Lake in 2025 and compares these results to previous data collected as part of the long-term monitoring program. Oneida Lake is New York State's 3rd most heavily fished lake. Walleye *Sander vitreus* has historically received the majority of angler effort followed by bass *Micropterus spp*. and yellow perch *Perca flavescens*. Long-term monitoring of the fisheries and limnology of Oneida Lake has captured a series of changes in the lake's physical and biological characteristics including: reductions in nutrient inputs resulting from the Great Lakes water quality agreements; establishment of invasive dreissenid mussels resulting in increases in water clarity; increases in summer water temperatures and decreases in duration of ice cover; and establishment of populations of the double-crested cormorant *Phalacrocorax auritus*, the round goby *Neogobius melanostomus*, and the spiny water flea *Bythotrephes longimanus*. Quagga mussels *Dreissena bugensis* increased water clarity and decreased *Daphnia spp*. abundance, an important food item for age-0 fish. In addition, the burrowing mayfly *Hexagenia sp.* has returned to the lake and the phantom midge *Chaoborus spp*., a predator on zooplankton, is increasing. Establishment of double-crested cormorants contributed to declines in yellow perch and walleye populations in the 1990s, but an aggressive management program combined with a period of more restrictive walleye harvest regulations aided the recovery of these two important fish species. Assessments of the impacts of these species changes are ongoing.

Walleye adult abundance has decreased from recent high populations and was 603,000 in 2025, which is near the long-term average of 600,000 age-4 and older fish. The yellow perch adult abundance of 3,017,000 remained well above the long-term average. Adult walleye growth and condition were subpar for the fourth time in the past 5 years, likely due to low age-0 yellow perch and gizzard shad *Dorosoma cepedianum* abundances, while adult yellow perch length-at-age has increased with increases in round goby, burrowing mayfly, and *Chaoborus*. The smallmouth bass *Micropterus dolomieu* population has generated concern in recent years, due to very low catches of age-0 fish in several gears and age-1 and older fish in gill-net and trapnet surveys. Recent smaller year-classes coincide with the arrival of round goby, which is a known egg and larvae predator in other systems, and with higher walleye populations. Angler catch rates continue to be characteristic of a very good walleye and yellow perch fishery, with some declines seen in smallmouth bass catch rates.

Oneida Lake continues to support quality sustainable fisheries for walleye and yellow perch. Continued monitoring of the lake's limnology and fish populations will track the impacts of ongoing ecological changes and guide management directed at sustaining or improving quality recreational fisheries.

INTRODUCTION

Oneida Lake is the largest lake entirely within New York State and supports one of the state's most intensively used inland fisheries. Annual angling effort exceeds 600,000 angler-days and generates more than $21 million in economic activity (data from 2017, Duda et al. 2019). The fishery is dominated by walleye *Sander vitreus*, with yellow perch *Perca flavescens* and bass (*Micropterus* spp.) also popular fisheries.

Since 1956, Oneida Lake has been the focus of long-term research by the Cornell Biological Field Station (CBFS) in collaboration with the New York State Department of Environmental Conservation (NYSDEC). The walleye population is actively managed through harvest regulations designed to sustain walleye yield while maintaining adequate forage populations (Forney 1980), along with annual fry stocking and management of double-crested cormorants *Phalacrocorax auritus*. The lake has experienced major ecological changes associated with nutrient reductions, piscivore predation, and multiple species introductions, including zebra and quagga mussels (*Dreissena* spp.), round goby *Neogobius melanostomus*, and spiny water flea *Bythotrephes longimanus*. The ecological effects of more recent changes, such as the return of burrowing mayflies (*Hexagenia* spp.), are also evaluated. This report examines all levels of the food chain using long-term trends, in some cases back 70 years to 1956, to examine responses to recent ecosystem changes in addition to earlier perturbations. Long-term monitoring and targeted studies were continued in 2025 with support from NYSDEC and the CBFS Brown Endowment.

METHODS

Most data presented here derive from long-term sampling protocols initiated at the beginning of CBFS research on Oneida Lake in 1956. Detailed methods for both limnological and fisheries surveys can be found in the metadata on the Knowledge Network for Biocomplexity website (https://knb.ecoinformatics.org).

RESULTS

Limnology

In Oneida Lake, several limnological variables including temperature, ice cover, water clarity, water chemistry (phosphorus and nitrogen), phytoplankton (chlorophyll-*a*), zooplankton, benthic invertebrates, and mussels are monitored each year. Here we present information from 2025 and comparisons with long-term trends.

Climate change indicators:
Oneida Lake continues to warm, and the duration of ice cover is decreasing. Since 1975, the average summer (June-August) water temperature at a depth of 6 ft has increased by 4 ^{o}F and ice duration has decreased by more than a month (Figure 1). Summer integrated whole water column temperature showed the same increase (4.0 ^{o}F). In 2025, the mean Oneida Lake summer water temperature was 73.8 ^{o}F. Daily temperatures (Figure 2) indicated below average temperatures in spring and early summer, and above average temperatures in July-August. Daily water temperatures were below average in December of 2025 (Figure 3) resulting in early ice cover. Oneida Lake was ice-covered for 79 days in the winter of 2024-25, which is the median value for this century, an increase from the very short ice periods in 2022-23 and 2023-24. Both the increase in temperature and decrease in ice cover from 1975-2025 are highly significant statistically (Table 1). Oneida Lake is one of only 60 lakes worldwide with over 100 years of ice

cover data, and the decrease in ice cover is occurring worldwide (O'Reilly et al. 2015; Sharma et al. 2021).

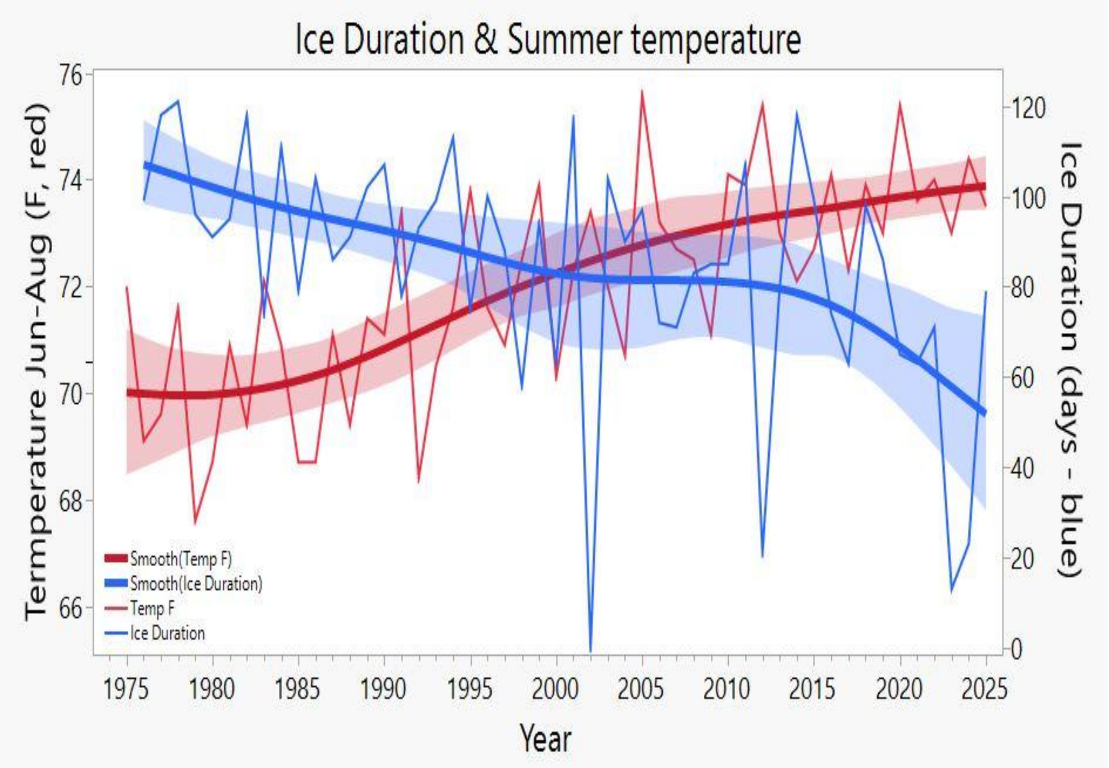

Figure 1. Summer water temperatures (red) and ice duration (blue) from 1975 to 2025 in Oneida Lake. For ice duration, the year refers to the fall year of each winter. The lines are smoothed to fit the data using the spline function in Jmp. Shaded areas are the 95% confidence interval of the smoothed regression line. Data available in Table A1.

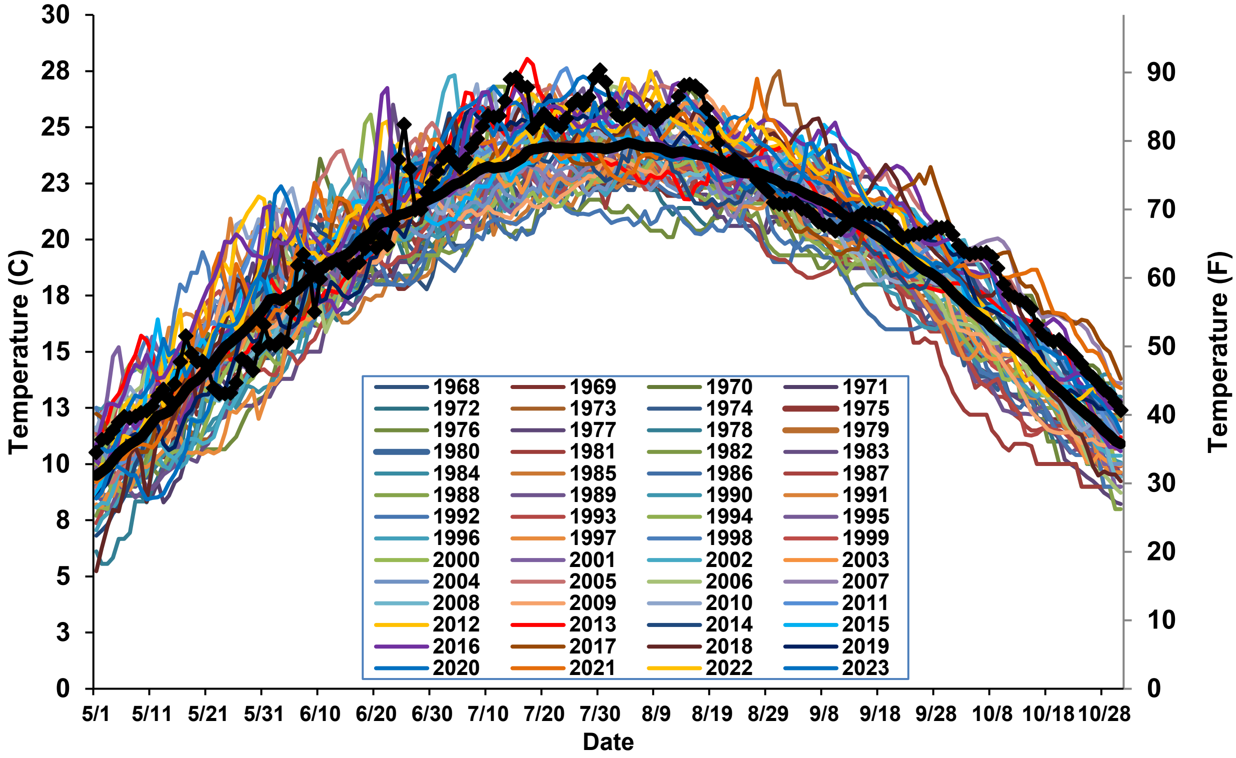

Figure 2. May-October daily average water temperatures at 6.6 ft (2 m) depth measured with hourly temperature loggers at the Shackelton Point temperature buoy in Oneida Lake, 1968-2025.

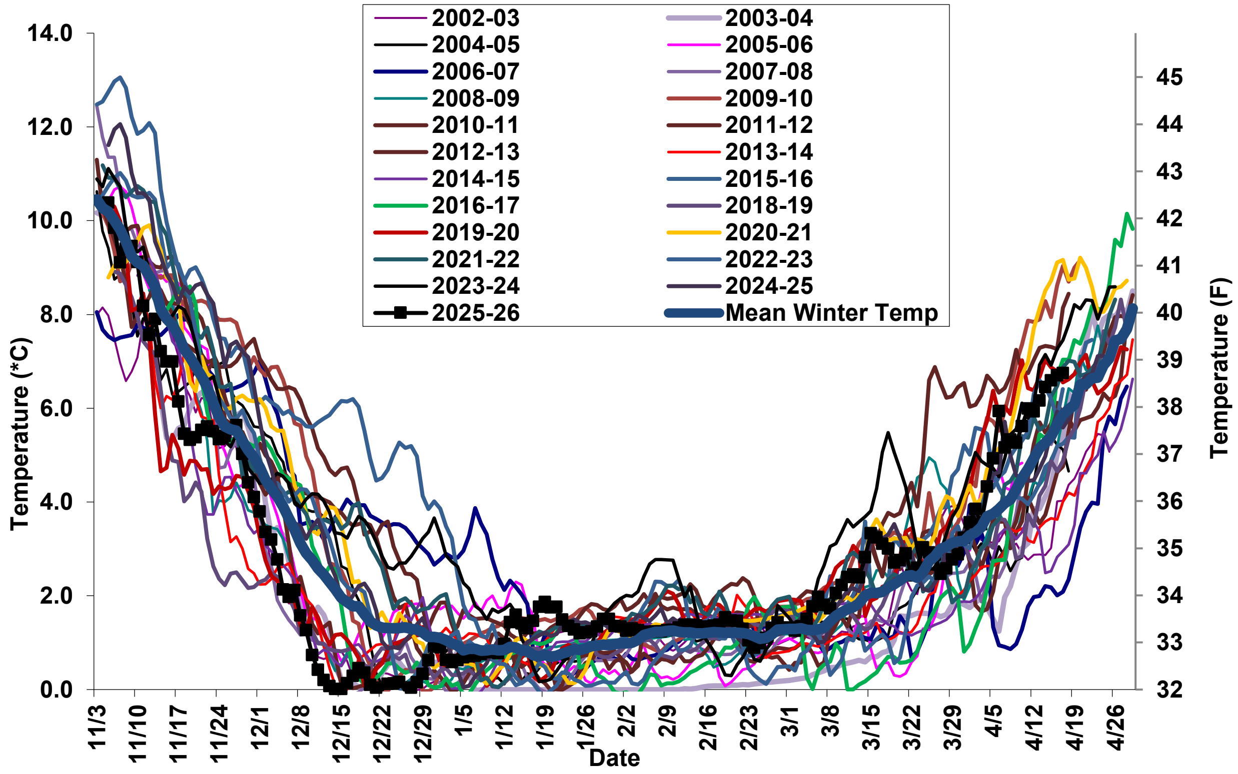

Figure 3. November-April daily average water temperatures at 33 ft (10 m) depth measured with hourly temperature loggers at the Shackelton Point temperature buoy in Oneida Lake, 2002-2025.

Table 1. Analyses of a half century of data (1975-2025) for several limnological indicators. The top section shows the linear regression over the 51 years. Trend is the rate of change per year in the units given, SE is the standard error. All values are calculated as average of weekly values at up to 4 sites from May-October, except: Summer temp is the average temperature for June through August measured daily at 6.6 ft depth (2 m) temperature recorder at Shackelton Point; water temp May-October is the average water column temperature measured weekly from May to October at all sites; ice duration is the number of days with complete ice cover; and summer BDO<3ppm is the percent of sites sampled in June-August with bottom dissolved oxygen (BDO) values below 3 ppm. Significant trends are in bold. The bottom panel shows the average values of the indicators during four time periods: eutrophic period (1975-1984), pre-mussel period (1985-1991), zebra mussel period (ZM, 1992-2008) and quagga mussel period (QM, 2009-2025). Periods that are significantly different at $p<0.05$ are indicated by the different letters (ANOVA followed by Tukey's HSD test).

Trend analysis 1975 to 2025

Indicator	Trend	SE	adj R^2	*N*	*p*
Summer temp at 6 ft (°F)	**0.095**	**0.013**	**0.51**	**51**	**<0.0001**
Water temp May-October (°F)	**0.084**	**0.010**	**0.58**	**51**	**<0.0001**
Ice duration (# days)	**-0.87**	**0.23**	**0.21**	**50**	**<0.001**
Summer BDO<3ppm (%)	**0.51**	**0.13**	**0.24**	**51**	**<0.001**
Total Phosphorus (µg/L)	**-0.38**	**0.09**	**0.29**	**51**	**<0.0001**
Soluble Reactive Phos (µg/L)	-0.13	0.055	0.08	50	0.025
NO$_x$ (Nitrate+Nitrite, ug/L)	**-1.99**	**0.52**	**0.22**	**51**	**<0.0001**
Chlorophyll-*a* (µg/L)	**-0.14**	**0.016**	**0.61**	**51**	**<0.0001**
Water transparency (Secchi, ft)	**0.078**	**0.017**	**0.30**	**51**	**<0.0001**
***Daphnia* (dry mass, µg/L)**	**-1.66**	**0.30**	**0.37**	**51**	**<0.0001**
Other zooplankton (dry mass, µg/L)	-0.20	0.31	0.0	51	0.52

Comparison of four time periods

Indicator	1975-84 Eutrophic	1985-91 Pre-mussel	1992-08 ZM	2009-25 QM	2025
Summer temp at 6 ft (°F)	70.2 a	70.5 ab	72.1 b	73.5 c	73.8
Water temp May-October (°F)	63.8 a	64.2 ab	65.1 b	66.9 c	67.2
Ice duration (days)	102.6 a	92.4 ab	83.4 ab	72.3 b	79
Summer BDO<3ppm (%)	11.4 a	13.8 ab	21.3 ab	27.5 b	33.3
Total Phosphorus (µg/L)	40.4 a	34.2 ab	23.3 c	24.7 bc	24.6
Soluble Reactive Phosphorus (µg/L)	14.6 a	11.7 ab	7.8 b	8.6 b	7.7
NO$_x$ (Nitrate+Nitrite, ug/L)	136 b	223 a	175 ab	91 c	94
Chlorophyll-*a* (µg/L)	9.6 a	9.0 a	5.6 b	4.1 c	3.7
Water transparency (Secchi, ft)	8.7 a	8.5 a	11.8 b	11.7 b	11.2
Daphnia (dry mass, µg/L)	97.2 a	95.6 a	97.8 a	41.5 b	53
Total zooplankton (dry mass, µg/L)	128 a	131 a	112 a	117 a	158
Mussel biomass (g/m^2)	0 a	0 a	290 b	350 b	263

Temperature affects all chemical and biological rates and therefore lake productivity. An increase in temperature can also affect the species composition in lakes, as species adapted to colder temperatures disappear and species adapted to warmer temperatures increase. In addition, increased temperature is predicted to increase the duration of thermal stratification in Oneida Lake (Hetherington et al. 2015) and elsewhere (Richardson et al. 2017). Thermal stratification leads to oxygen depletion in bottom waters in shallow productive lakes like Oneida Lake. Trend analysis indicates that the proportion of time with low oxygen levels in the bottom waters has increased since 1975 (Table 1) but there is a lot of variability between years. In 2025, bottom oxygen levels below 3 ppm occurred on 33% of the sampling events in June to August at the deeper stations (Buoy 109, Buoy 125 and Shackelton Point), close to the median value of the last

25 years (30%, range 2 – 45%). Our continuously recording DO probe moored at 10 m depth at the Shackelton Point site recorded DO levels below 2 ppm from 7/24 to 7/31 and from 8/16-8/18 in 2025. Dissolved oxygen probes were moored at more locations in 2025 but those data sets will not be retrieved until June 2026. Low oxygen in bottom waters is important not only by restricting fish distribution and causing mortality in benthic invertebrates including mussels, but also because low oxygen will lead to the release of legacy phosphorus (P) from the sediment, P that accumulated in Oneida Lake during years of higher productivity. This internal P loading can contribute a large proportion of the summer P to lakes (Nürnberg 2009). For Oneida Lake, we estimated internal P loading during the summer of 2020 to be similar to the external loading from tributaries and nearshore groundwater seepage (Lisboa et al. 2025). Bottom DO that year was similar to 2025.

The availability of nutrients, in particular phosphorus, limits phytoplankton biomass in Oneida Lake. Average May-October total phosphorus (TP) levels were close to 25 µg/L in 2025, about average of our measurements since 2009 (Figure 4). Total phosphorus levels around 20 µg/L are expected in a moderately productive lake like Oneida Lake (mesotrophic). Phosphorus concentrations typically increase in late summer-fall due to both external and internal loading (Lisboa et al. 2025). At the same time, nitrate+nitrite (NO_x) levels decrease, often to below the detection limit (10 µg/L), indicating that the phytoplankton production in the lake at that time is nitrogen limited. This decrease in NO_x has been more pronounced since quagga mussels became dominant in the lake, and 2025 was no exception. The NO_x concentrations in 2025 were again below the detection limit for 12 weeks (from 8/5 to 10/28) as has been the case since 2020 (12-15 weeks, 2020-2025). Previously, low NO_x occurred on average for 5 weeks (range 0-12.3 weeks, 1975-2019). More attention to nitrogen limitation, effects of denitrification and role of mussels is warranted in northeastern US lakes including Oneida Lake (Volponi et al. 2023; Rock and Collins 2024; Paerl et al. 2016).

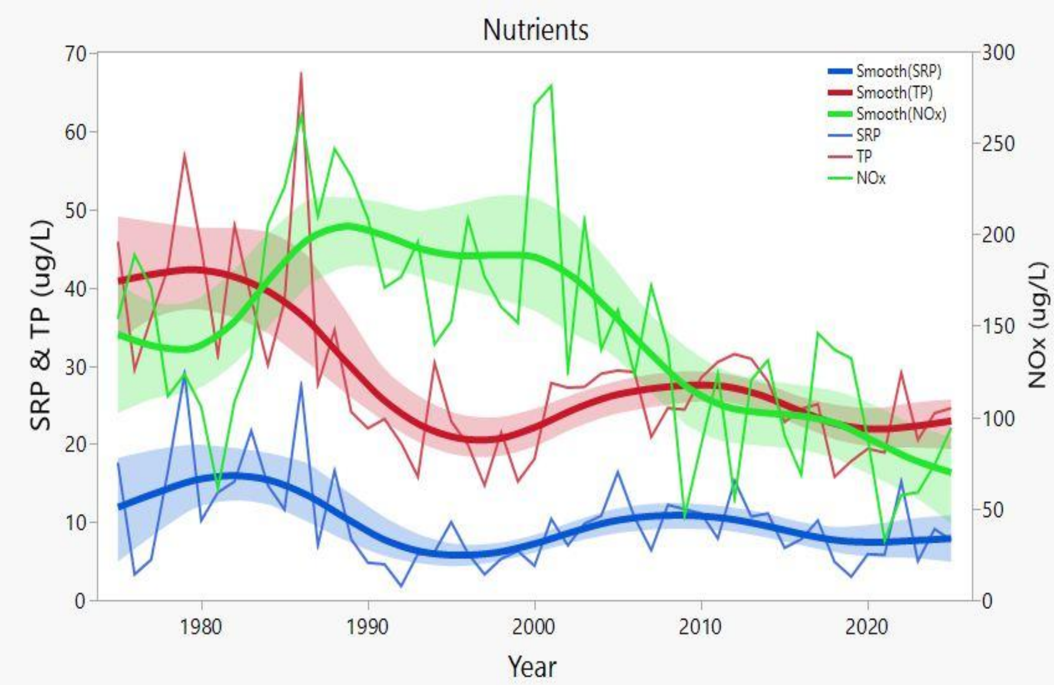

Figure 4. Time trends of nutrients in Oneida Lake from 1975-2025, with TP (in red) and SRP (in blue) on left axis, and NO_x (in green) on right axis. Annual values are calculated for the time period May-October as the average of weekly averages from up to 4 stations. The lines are smoothed to fit the data using spline in Jmp with shaded areas representing the 95% confidence interval of the smoothed regression line. Data available in Table A1.

Phytoplankton can also be limited by filter feeders. Since phytoplankton contributes most of the turbidity in the lake, a decrease in phytoplankton causes an increase in water clarity. Historically, the clear water in early summer was associated with an increase in zooplankton, in particular *Daphnia* (Cáceres et al. 2016). However, the main filter feeders in Oneida Lake are now dreissenid mussels and the arrival of zebra mussels in 1992 correlates with lower phytoplankton, higher water clarity, and deeper macrophytes (Figure 5; Zhu et al. 2006; Mayer et al. 2014).

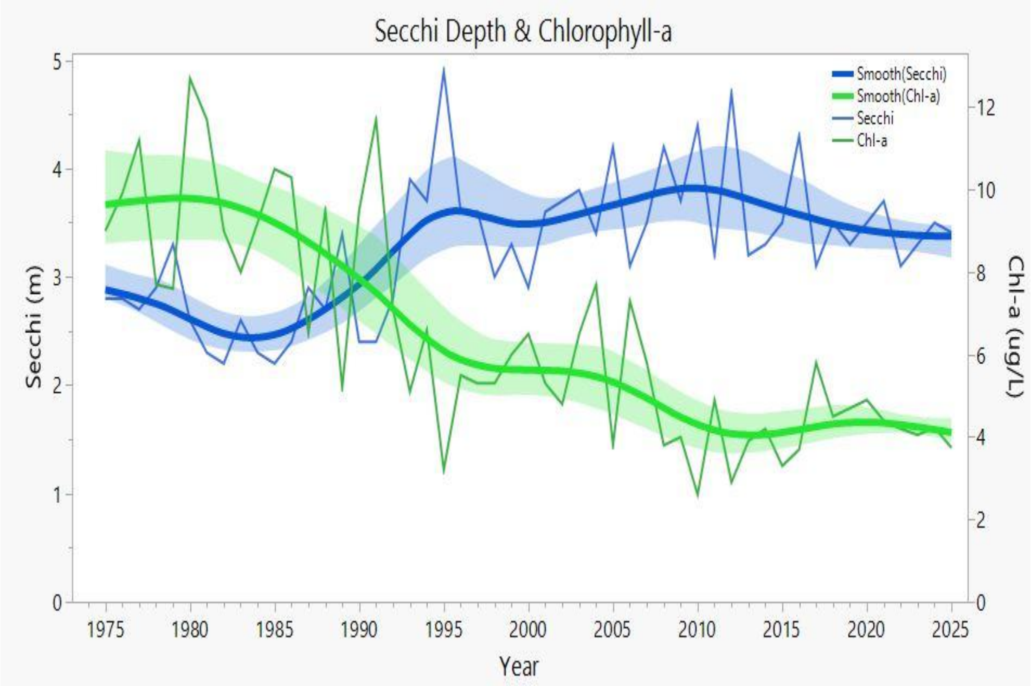

Figure 5. Time trends in Secchi depth (in blue, higher Secchi indicates clearer water) and chlorophyll-*a* (green, right axis) in Oneida Lake from 1975-2025. Annual values are calculated for the time period May through October as the average of weekly averages from up to 4 stations. The lines are smoothed to fit the data using spline in Jmp with shaded areas representing the 95% confidence interval of the smoothed regression line. Data available in Table A1.

The dominance of quagga mussels since 2009 (Figure 6) further decreased phytoplankton and increased water clarity in Oneida Lake compared to zebra mussels alone (Table 1). Interestingly, quagga mussels have declined since the arrival of round goby and the 2025 biomass remains below the high biomass observed in 2012-2017. As a result, there has been some system recovery, similar to what was observed about 10 years after the zebra mussel invasion in many polymictic lakes across the world (Karatayev et al. 2023). The increase in round gobies since 2015 is correlated with the decline in quagga mussels since 2017 (Brooking et al. 2022). Round goby are a mussel specialist co-evolved with dreissenid mussels in their native Ponto-Caspian region and feed heavily on mussels in Oneida Lake (Poslednik et al. 2023). On the other hand, zebra mussels increased somewhat with gobies present and are now 30% of the mussels in the lake (by number), up from 5% in 2011. The increase in zebra mussels is likely due to better predator avoidance traits compared to quagga mussels (Rudstam and Gandino 2020).

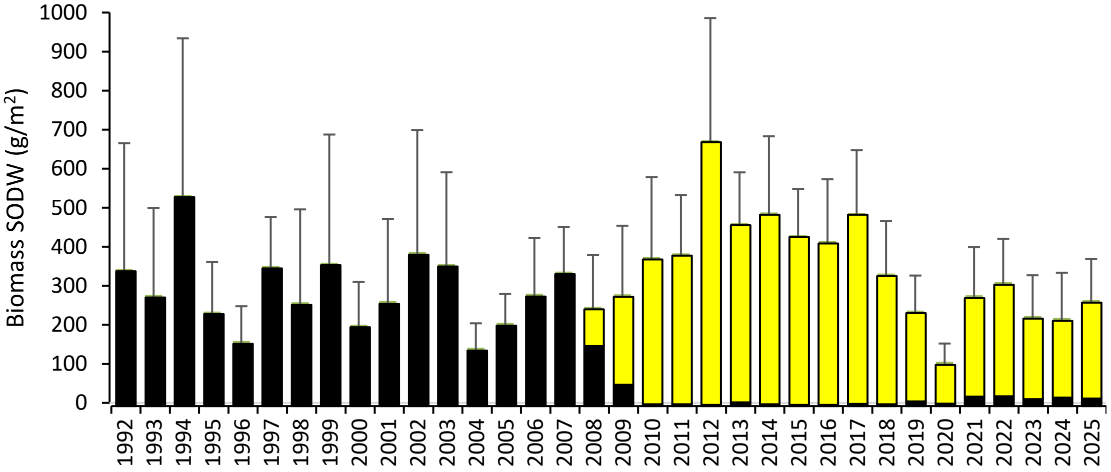

Figure 6. Average lake-wide fall dreissenid biomass (SODW - shell on dry weight) in Oneida Lake since 1992. Zebra mussels were first recorded in the lake in 1991. Zebra mussel biomass indicated in black, quagga mussel biomass in yellow. Error bars represent 1 SE for total dreissenid biomass.

In Oneida Lake, zooplankton, especially *Daphnia*, are a major food source for many fish species. Therefore, a decline in *Daphnia* may decrease growth and survival of young fish. *Daphnia* and other zooplankton were not affected by the arrival of zebra mussels in Oneida Lake, but there was a decline in *Daphnia* associated with quagga mussels (Table 1; Figure 7). Further, the arrival of the spiny water flea in 2019 and the continuing increase in phantom midge larvae *Chaoborus punctipennis* since 2015, both predators on *Daphnia*, coincide with further declines in *Daphnia* in the lake. In 2025, the *Daphnia* biomass was still low but higher than in 2023-2024. However, the *Daphnia* decline did not affect the length of age-0 yellow perch at the end of the growing season (see below), as young yellow perch consumption of the spiny water flea may have offset a decline in consumption of *Daphnia* (Jordan et al. 2023). This is contrary to expectations from Wisconsin and Minnesota lakes where both yellow perch and walleye age-0 growth rates declined after the arrival of *Bythotrephes* (Hansen et al. 2020; Staples et al. 2017).

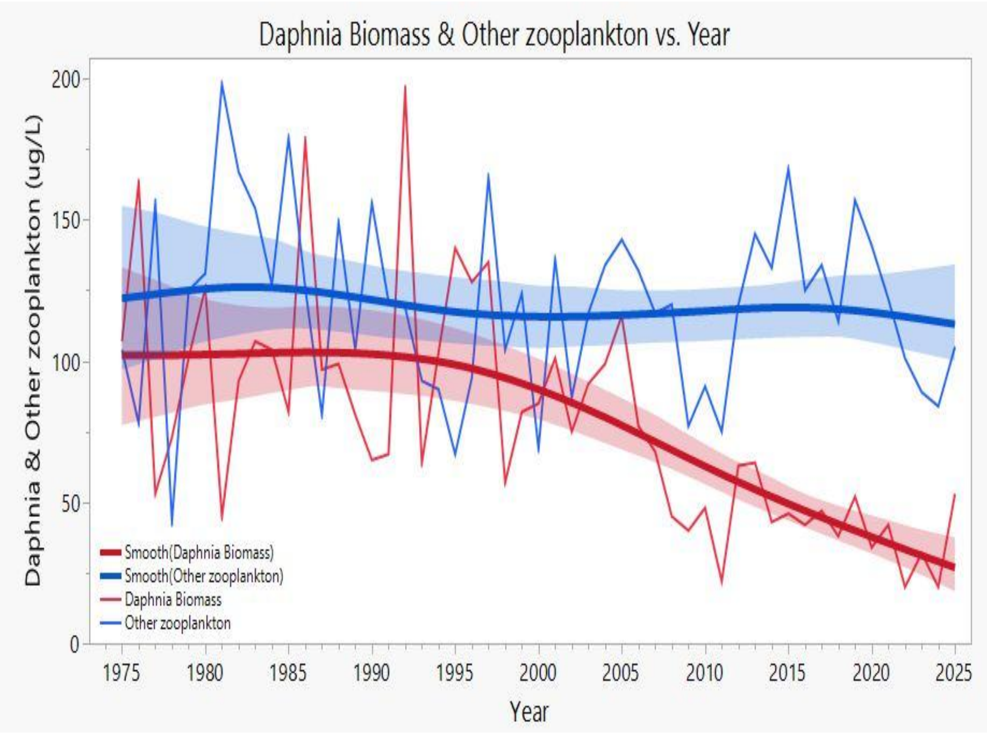

Figure 7. Time trends in zooplankton (*Daphnia* in red, and other zooplankton in blue; in µg dry mass per liter) in Oneida Lake from 1975-2025. Annual values are calculated for the time period May-October as the average of weekly averages from up to 4 stations. The lines are smoothed to fit the data using spline in Jmp with shaded areas representing the 95% confidence interval of the smoothed regression line. Data available in Table A1.

There have been large changes in several benthic invertebrate groups in Oneida Lake over the last three decades. Zebra mussels initially improved conditions for many benthic invertebrates and mollusks (but not unionid clams) in the lake (Idrisi et al. 2001; Mayer et al. 2016; Karatayev et al. 2023), likely due to increased benthic primary production and more bottom structure (benthification; Mayer et al. 2014). However, with the arrival of round goby in 2014, amphipods *Gammarus spp*., snails, caddisflies *Trichoptera spp.*, leeches, and worms have declined (Brooking et al. 2022; Table 2). Karatayev et al. (2025) surveyed mollusks across Oneida Lake in the summer of 2023 and compared those results with similar surveys in 1918, 1960 and 2012. They found large declines in most mollusks in 2023, especially soft-shelled species. Low densities of these groups continued in 2025. Two groups of invertebrates did not decline (chironomids and isopods) and two groups increased (burrowing mayflies and phantom midges). The increasing groups are discussed in more detail below.

Table 2. Student's t-test comparing annual densities of benthic invertebrate groups in Oneida Lake during 1993-2014 (pre-goby years but with established mussels, *N*=22) and 2016-2025 (goby years, *N*=10). 2015 is considered a transition year. Values specifically for 2025 are also given. Values represent the average of the average density for spring, summer and fall deep and shallow sites. Variables with a *p*-value ≤0.05 are in bold.

Group	Mean (pre-goby)	Mean (goby)	2025	*p*-value
Amphipods	**458**	**58.0**	38.8	**<0.0001**
Snails	**279**	**148**	71	**0.024**
Worms	**2,758**	**1,291**	1,371	**0.004**
Leeches	**55.6**	**22.9**	24.7	**0.001**
Caddisfies	66.5	33.9	14.5	0.07

Chironomids	3,139	2,828	3,060	0.46
Isopods	162	174	314	0.86
Hexagenia	**1.2**	**37.0**	78.8	**<0.0001**
Chaoborus	**5.9**	**188**	513	**<0.0001**

Burrowing mayflies (in Oneida Lake mainly *Hexagenia rigida*) are a major food source for many fish species (Brooking et al. 2022), particularly during their emergence in June and July. *Hexagenia* also affect predator-prey interactions between yellow perch and walleye by buffering predation of age-0 fish by adult fish. In 2025, we studied adult yellow perch diets and found five times more food in their stomachs when *Hexagenia* emerged than other times of the year, and *Hexagenia* was the only prey item consumed at that time. Therefore, the presence of abundant mayfly in early summer may lead to better survival of young yellow perch and walleye as their predators instead feed on *Hexagenia*.

Hexagenia abundance in Oneida Lake is assessed by the benthos survey and since 2018 also by the lake-wide mussel survey (Figure 8). The benthos survey is limited to three stations, but still useful for time trends. *Hexagenia* was abundant in the early 1950s but declined precipitously from 1959 to 1964 and were not found after 1969 when one individual was recorded in a yellow perch stomach (Clady and Hutchinson 1976). The cause of the decline was assumed to be oxygen depletion associated with high algal biomass in the 1960s. *Hexagenia* was not detected again in our benthic surveys until 2011 and has increased since then. The mussel surveys use data from 50+ stations throughout the lake collected between August and October. This larger coverage survey shows that *Hexagenia* are primarily found in silty or sandy substrate at depths between 4 and 11 m. The average lake-wide densities in those areas increased from 21/m^2 in 2018 to between 41 and 66/m^2 in 2020-2024, and then decreased slightly to 24/m^2 in 2025. Average density in 4-11 m soft/sandy substrate from 2018 to 2025 was 38/m^2 (1SE=6, *N*=8, range 21-66/m^2). Mayfly distributions are patchy and densities can be much higher at some locations (over 400/m^2). Length distributions indicate that *Hexagenia* have a 2-year life cycle in Oneida Lake, similar to Lake Erie (Stapanian et al. 2017). The return of *Hexagenia* to the lake is an indicator of improved conditions, and many fish species feed on *Hexagenia*, especially during emergence in June when buildings surrounding Oneida Lake can be covered by adult mayflies.

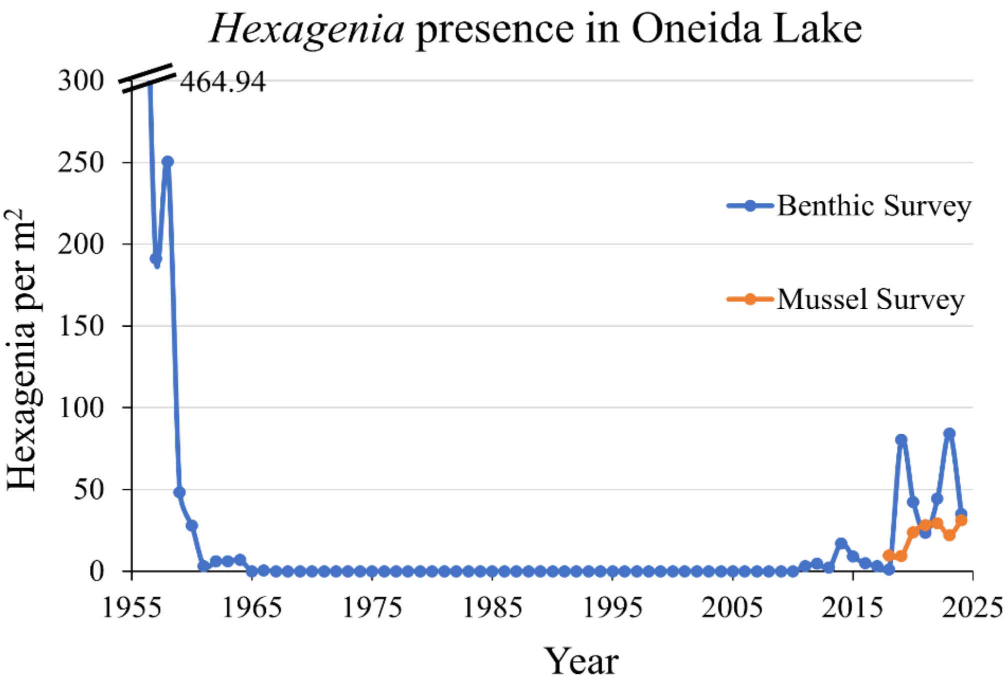

Figure 8. Hexagenia mayfly abundance in oenida Lake, 1956-2025.

In 2025, we collected adults around the lake, and only found the species *Hexagenia rigida*, the same species identified in our benthic samples. Although *Hexagenia limbata* is the species noted in publications from the 1960s (Clady and Hutchinson 1976), it is unclear if this is because the analysts at the time did not differentiate between the two species or because a new species has colonized the lake. Both species occur in Lake Erie (Green et al. 2013).

The phantom midge was identified in 2025 as *Chaoborus punctipennis,* the species typically found in larger lakes with fish (Wissel et al. 2003). This species continues to increase and average May-October densities at the deep sites are now over 800/m^2 (Figure 9, left panel). These midge larvae migrate into the water column at night to feed on zooplankton and return to the bottom during the day to avoid fish predation. Like the spiny water flea, this species is a predator on zooplankton. The increase in Oneida Lake may be related to areas of low oxygen in deep waters in recent years, although *Chaoborus* are found throughout the lake including in shallower areas where there is no oxygen depletion. In June through October, we sampled *Chaoborus* at night with zooplankton nets and found comparable densities as in the benthic grabs (Figure 9, right panel). *Chaoborus* in the water column have to be sampled at night, as they are seldom caught in zooplankton nets during the day. We believe this species has one generation per year in Oneida Lake with adults emerging in July, followed by a couple of weeks of small larvae that feed primarily on rotifers (Moore 1988). By the third and fourth instar, the phantom midge feeds on zooplankton and when abundant, can structure zooplankton communities (e.g. Riessen et al. 1988). Densities around 1000/m^2 are not as high as in fishless lakes or lakes with anoxic hypolimnions where densities of 6,000 to 30,000/m^2 have been reported, but similar to several studies documenting effects of *Chaoborus* predation on zooplankton (reviewed in Rudstam 2009). Thus, predation on *Daphnia* by *Chaoborus* likely contributed to the decline in *Daphnia* observed in recent years. Interestingly, *Bythotrephes* were about four times more abundant at night compared to the day. We are currently using stable isotopes to compare the diets of these two new zooplankton predators (intern project by Abbie Mathews, in prep).

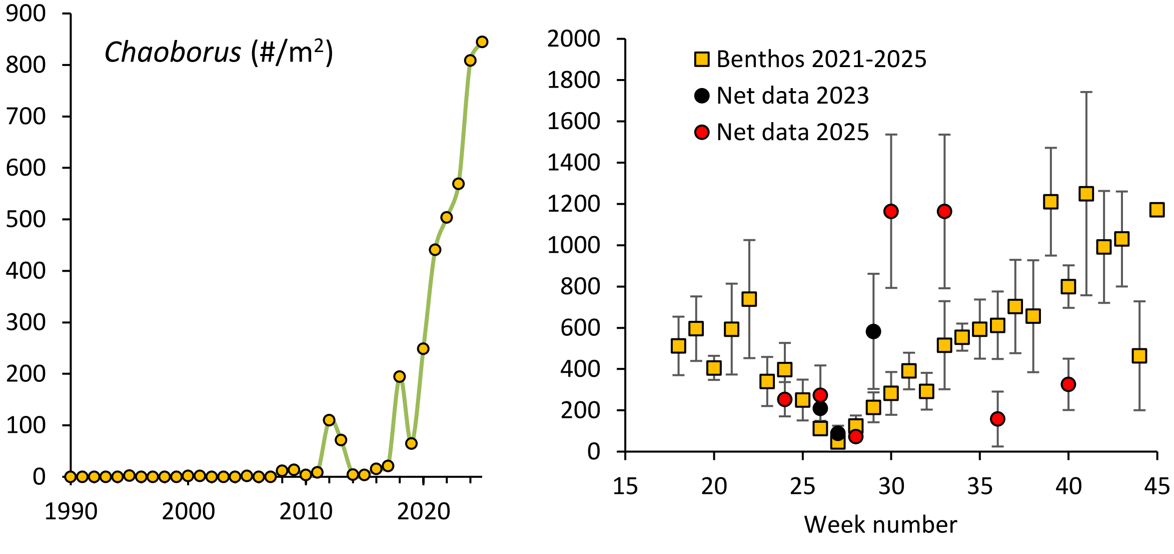

Figure 9. Left panel: Average density of *Chaoborus* in Oneida Lake from 1990-2025 from benthic grabs collected May- October at the two deep benthos stations (Shackelton Point, Buoy 125). Right panel: Seasonal abundance (May-November, week number 18 to 46) of *Chaoborus.* The seasonal development is based on the averages of the five years for a given week. Net data was obtained at night at three deep stations in 2023 and 2025 (Buoy 125, Buoy 109, Shackelton Point).

How can these two species increase after goby invasion when many other invertebrate taxa decline? Round gobies do feed on *Hexagenia* (French and Jude 2001). Perhaps the burrowing activity of this mayfly larva limits goby predation in Oneida Lake. Preliminary experiments in 2025 showed goby feeding on *Hexagenia* in aquaria with no substrate, but not when *Hexagenia* was able to burrow into the sediment. *Chaoborus* larvae are also known to burrow into soft sediment and can survive the day in low oxygen water near the bottom, environments that fish, including round goby, avoid.

Oneida Lake continues to change. Water temperature continues to increase and ice duration continues to decrease, *Daphnia* biomass is low, and the invertebrate community is changing due to increased benthic fish predation, the arrival of the spiny water flea and the increase of two native species (*Hexagenia* and *Chaoborus*). These physical and biological changes affect the lake's fish community and its fishery and understanding such changes in Oneida Lake continue to be an active research area at CBFS.

Fish Community

The Oneida Lake fish community is sampled using multiple netting techniques to follow walleye and yellow perch throughout their life cycle, from hatching through the end of their first summer, as age-1 and juveniles, and as adults. Other fish species are sampled at various stages as well. We use gillnet surveys (since 1957), trawl surveys (since 1961), larval fish surveys (most years since 1965), seine surveys (intermittently since 1959), open-water fish surveys (since 1993), spring and fall trapnet surveys (most years since 1957), and inshore electrofishing surveys (since 2011) to assess various components of the fish community. A summary of several survey results by gear are provided below, followed by more in-depth analysis in the major species of interest sections and preliminary creel survey results for 2025.

Gillnet survey – Fifteen standard sites were sampled using 4 multifilament nets at each site, the equivalent of 60 150-ft gillnets. Gillnet catches in Oneida Lake are typically dominated by yellow perch, white perch *Morone americana* and walleye. These three species accounted for 94% of the gillnet catch in 2025 and have generally represented over 70% of the total gillnet each year. The 2025 gillnet catch of 422 walleye was higher than both the long-term average of 374 fish and the 10-year average of 389 fish (Table A2; Figure 10). The gillnet catch of 1,783 yellow perch was higher than the long-term catch of 1,161, but down somewhat from record catches the past 4 years. The smallmouth bass *Micropterus dolomieu* catch of only 7 fish was the lowest catch in 41 years. The white perch catch of 127 fish was the 2nd lowest in 28 years, continuing recent declines in white perch. The freshwater drum *Aplodinotus grunniens* catch (17 fish) continues to be dominated by the now 38-year-old 1987 year-class which still accounts for the majority of drum in the lake. The pumpkinseed *Lepomis gibbosus* catch (24 fish) was lower than the past 3 years, but higher than the long-term average (14 fish). The remainder of the gillnet catch consisted of 146 fish of 14 additional species. Catches of some species such as common carp *Cyprinus carpio* (linear regression; ln(x+0.1 transformation; R^2=0.09; P<0.01) and rock bass *Ambloplites rupestris* (R^2=0.10; P<0.01) have decreased significantly in the past decade, while others have increased such as redhorse *Moxostoma spp.* (R^2=0.64; P<0.01), bluegill *Lepomis macrochirus* (R^2=0.20; P<0.01), and longnose gar *Lepisosteus osseus* (R^2=0.24; P<0.01). We suggest exploring reasons for the increasing and decreasing species in the coming year.

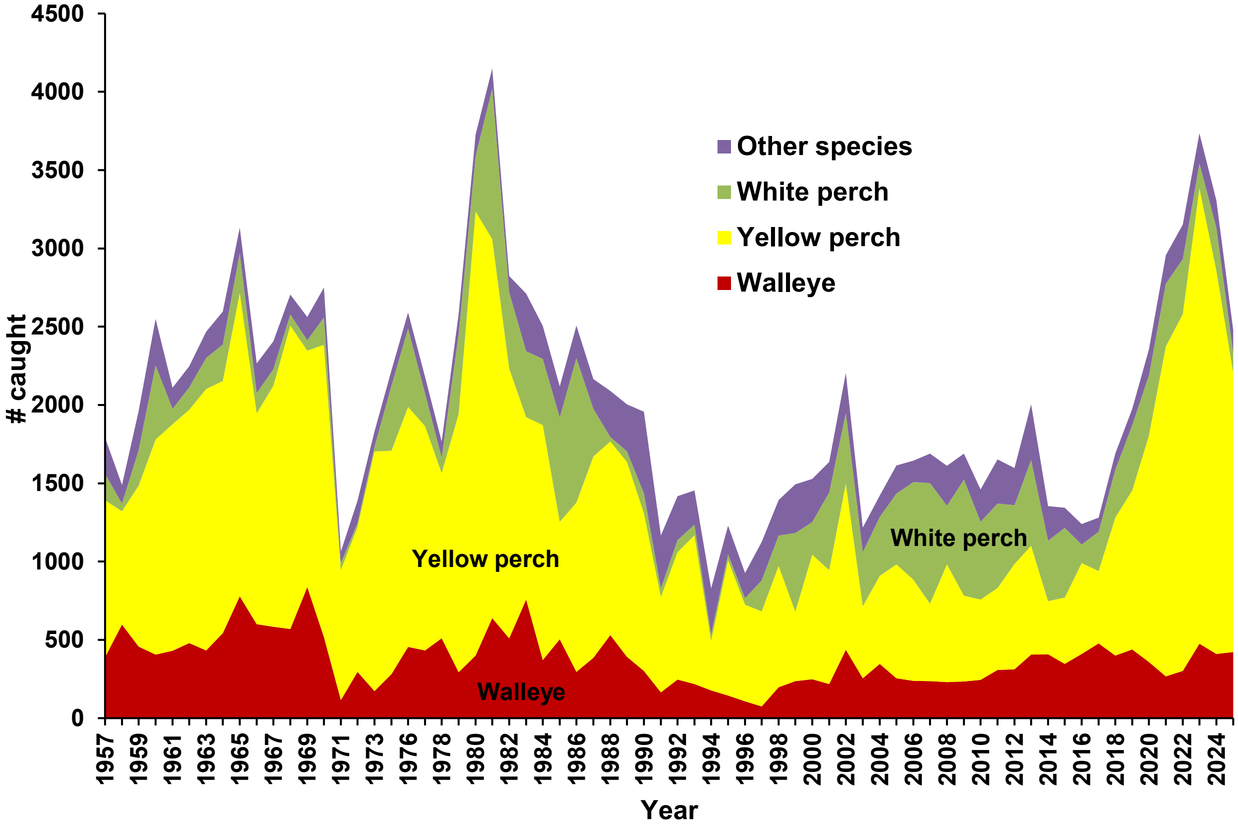

Figure 10. Total annual catch of major fish species in standard gillnet surveys in Oneida Lake since 1957.

Trawl survey – Ten standard sites were sampled once a week from mid-July to October with a standardized 18-ft bottom trawl for a total of 110 trawl hauls in 2025. Thirteen species of fish were caught in 2025 (Table A3; Figure 11). The age-0 catch of yellow perch (221/haul) was higher than the past 2 years but lower than the 10-year average. The round goby catch (21.0/haul) was the highest in 7 years, and the catch of age-0 *Lepomis spp.* (5.5/haul) was the 2nd highest in the past 33 years, but not as high as some catches in the 1960s-1980s. The catch of age-0 white perch (0.9/haul) has been below the long-term average for the last 7 years. The catch of age-0 walleye (0.3/haul) was below the long-term average and 10-year average; however the mean length in October (7.2 in) was the 3rd highest in 27 years. The catch of 3 trout-perch *Percopsis omiscomaycus* was the lowest catch on record in 66 years of trawling, continuing the decline seen in the last 5 years (Table A3). No age-0 smallmouth bass were caught in the last 3 years of trawling, continuing an 11-year trend of low catches. Catches of age-1 and older pumpkinseed (1.1/haul) have remained above average for the last 6 years. Small benthic species, like darters *Etheostoma sp.*, trout-perch, and logperch *Percina caprodes*, have declined from previous decades.

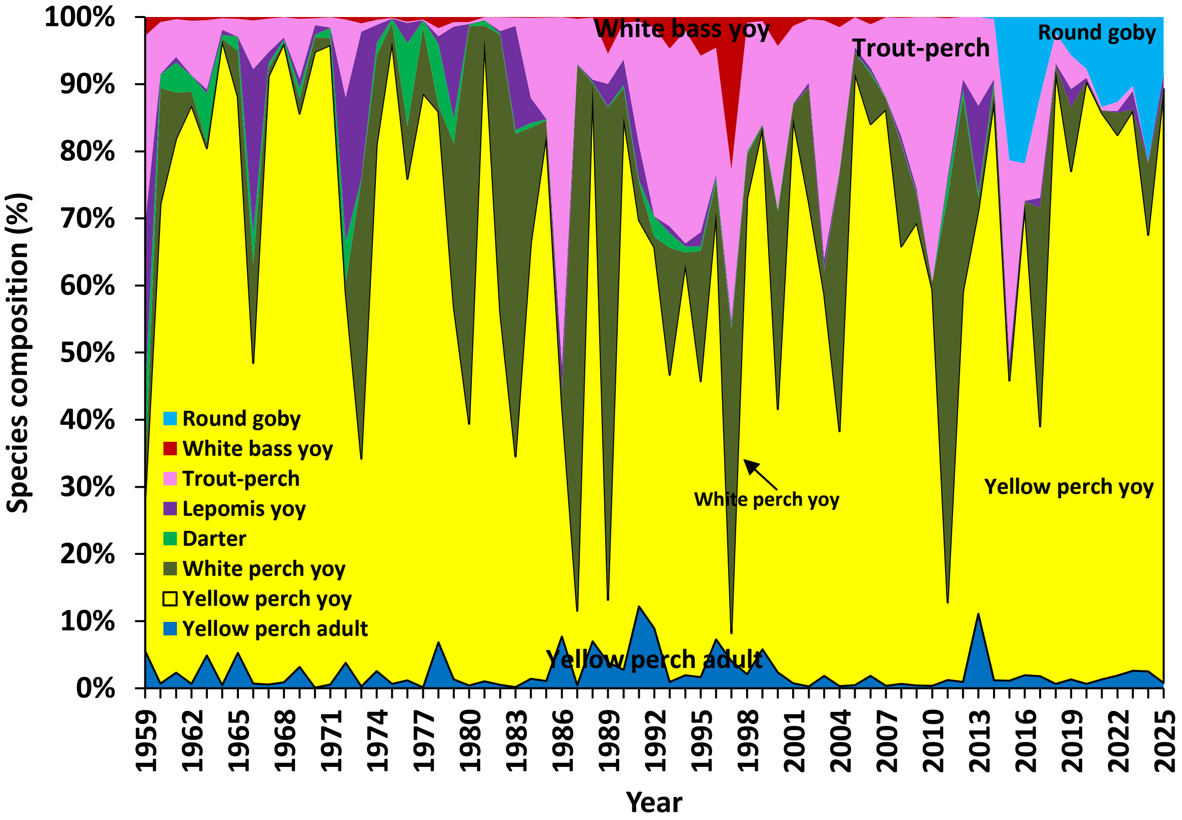

Figure 11. Species composition (%) of the most abundant species in Oneida Lake summer 18-ft bottom trawling from 1959-2025.

Shoreline seine survey – Standard seining with a 75 ft (22.9 m) beach seine with ¼ in mesh was conducted at nine standard sites around Shackelton Point once per month from July through September, for a total of 27 seine hauls per year. A total of 9,186 fish of 19 species were caught (Table A4; Figure 12). Catches in 2025 were dominated by round goby (137/haul), down slightly from last year but still the 3rd highest since round goby became established. Age-0 yellow perch catch (90.2/haul) was below the long-term average of 403/haul and below the 10-yr average of 214/haul. Age-0 *Lepomis* spp. (41.7/haul), banded killifish *Fundulus diaphanous* (16.6/haul), age-0 white sucker *Catostomus commersonii* (15.4/haul) and age-0 rock bass (8.9/haul) were the other most common species caught. Catch of age-0 largemouth bass *Micropterus nigricans* was 2.9/haul, about equal to the long-term average of 2.6/haul and the 10-yr average of 2.7/haul. Catch of age-0 smallmouth bass was 0.1/haul, well below the long-term average of 4.7/haul and the 10-yr average of 1.8/haul.

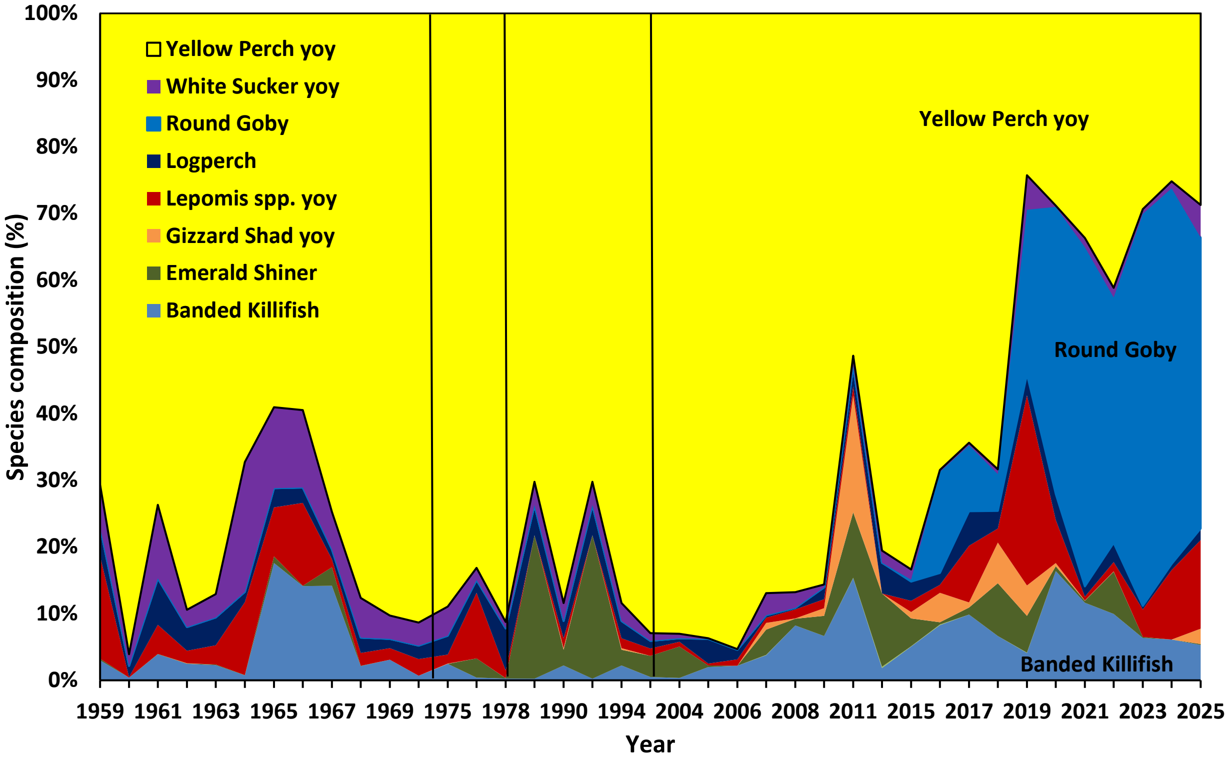

Figure 12. Shoreline seine species composition of the most abundant species in Oneida Lake from 1959-2025. Vertical lines separate groups of years when sampling did not occur.

<u>Fall electrofishing survey</u> – In 2025 the standard shoreline electrofishing survey was changed from spring to fall, for reasons discussed in last year's report (VanDeValk et al. 2025). This fall we sampled each of 8 standard sites with a 1-hr predator run and two 15-minute all-fish samples (16 total), for a total on-time of 12 hours. We collected a total of 3,251 fish of 29 species (Table A5; Figure 13). The predator runs were dominated by adult walleye (31.8/h) and adult largemouth bass (5.3/h), along with age-0 walleye (12.5/h) and age-0 largemouth bass (22.6/h). The age-0 largemouth bass catch rate (22.6/h) was higher than any previous fall or spring age-0 largemouth bass catch rate. The adult smallmouth bass catch rate (0.3/h) was the lowest fall or spring catch rate since this survey began in 2011.

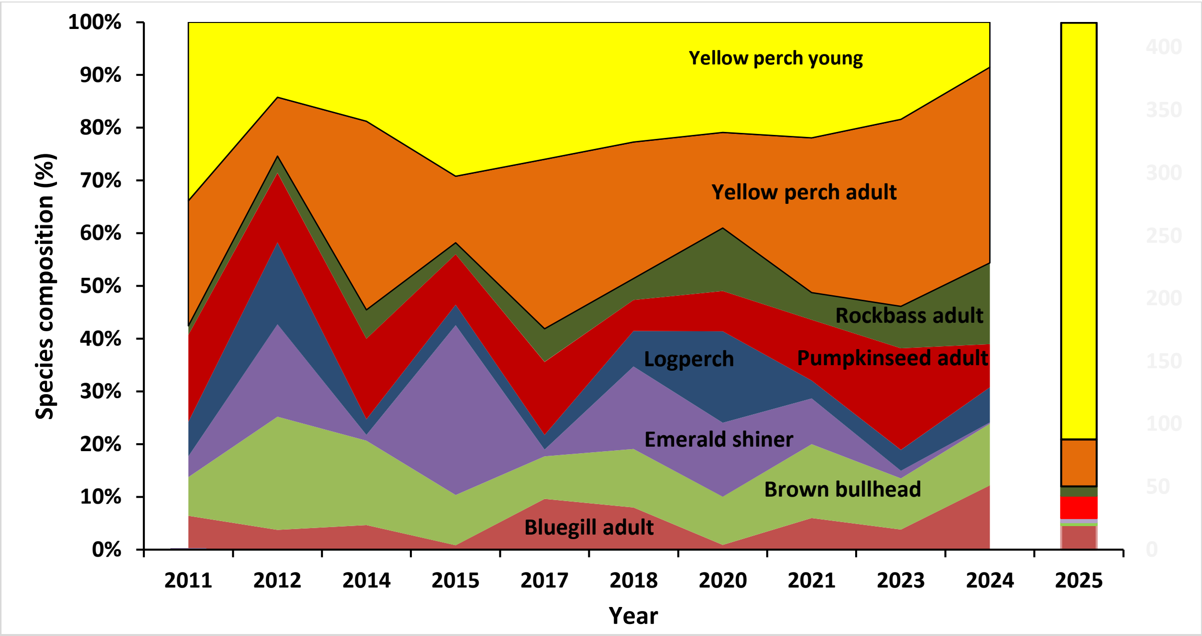

Figure 13. Species composition of all-fish runs from standard electrofishing in Oneida Lake from 2011-2025. All years were spring sampling until the change to fall sampling in 2025.

Species of Interest

More detailed population assessments of species of particular interest are provided below. These species are walleye, yellow perch, largemouth bass, smallmouth bass, white perch, lake sturgeon *Acipenser fulvescens*, round goby, pelagic fish, and double-crested cormorants.

Walleye – We survey the walleye population in Oneida Lake as larvae (¼ in) with fry sampling nets; as young fish in the summer and fall with bottom trawls and seines; and as juveniles and adults with trawling, gillnets, trapnets, and electrofishing. Adult populations (age-4 and older) are estimated with mark-recapture about every 3 years.

Age-0 walleye

The Oneida Fish Cultural Station stocked 169 million walleye fry (3,313/ac) in Oneida Lake around May 2, 2025 (Evans et al. 2026). We estimated larval abundance approximately 2 weeks after stocking based on 188 larval fish samples from 47 sites on 5/14-5/16/25. We caught 275 larval walleye for an estimated population of 37.7 million or 737/ac (Table A6; Figure 14), slightly above the long-term average of 684/ac and the 4th highest in 13 years. While there is not a significant relationship between larval walleye density and density at later life stages (Rudstam et al. 2016b), this survey indicates substantial numbers of larvae remained several weeks after the time of stocking by the Oneida Fish Cultural Station. By October 1st the density estimate from trawling for this year's cohort was 1.5/ac (Table A6; Figure 15), well below the long-term average of 10.7/ac and the 10-yr average of 3.3/ac. However, length of yoy walleye was 7.2 in (184 mm) by October 1, which is the 3rd highest in the last 27 years (Figure 16) and suggests the possibility for high overwinter survival (Forney 1976; Rudstam et al. 2016b). The fall electrofishing catch rate of age-0 walleye was 5.1/h and will be used as an index of age-0 walleye in future years.

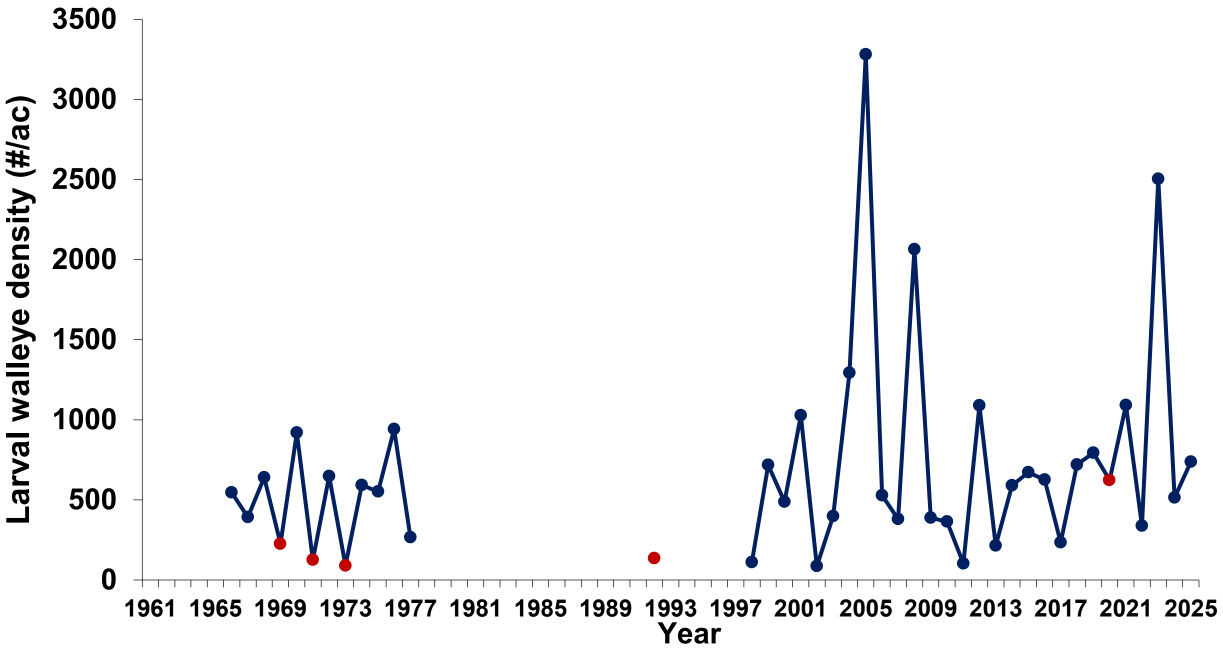

Figure 14. Estimated larval walleye density (#/acre) from fry surveys for Oneida Lake from 1966-2025. Red markers indicate years with no walleye fry stocking.

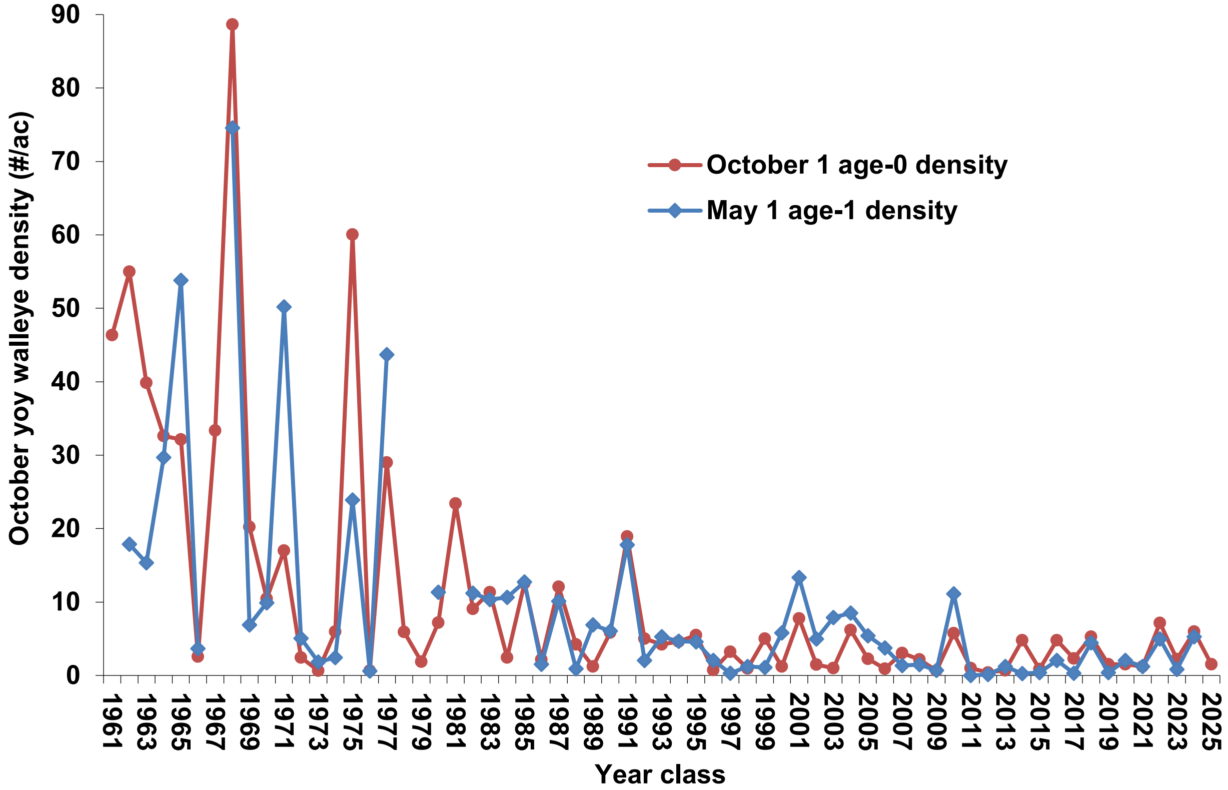

Figure 15. Density (#/acre) of age-0 walleye on October 1 and age-1 density on May 1 the following year, based on bottom trawl surveys in Oneida Lake from 1961-2025.

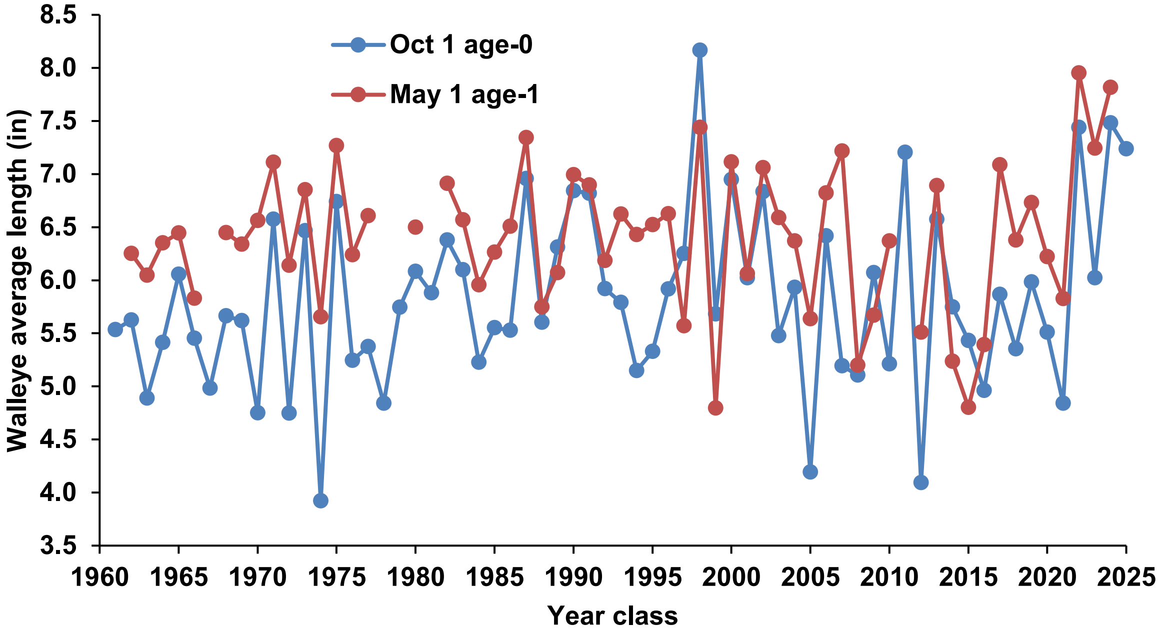

Figure 16. Mean length (in) of age-0 walleye on October 1 and age-1 on May 1 the next spring, based on bottom trawls for Oneida Lake from 1961-2025.

Age-1 to age-3 walleye

Future recruitment of walleye year classes to the adult population is predicted using age-1 to age-3 catches in trawls and gillnets. Age-1 catches of the 2024 walleye year class in May 2025 suggest this year class may contribute substantially to the adult stock in 2028. Density from May bottom trawling was 5.3/ac, the highest in the last 13 years (Table A7), and mean length was the 2nd highest for age-1. The fall electrofishing catch rate of age-1 walleye was 12.3/h and will be used as an index of age-1 walleye in the future.

Based on age-1 to age-3 trawl and gill net catches and gear catchabilities derived by Irwin et al. (2008), we expect the following contributions to the adult (age-4) populations in future years: Age-1 (2024 year-class) 96,165 in 2028; Age-2 (2023 year-class) 76,897 in 2027; Age-3 (2022 year-class) 330,318 in 2026, which is the largest age class in over a decade. These predictions of the contribution of each year-class to the adult stock are refined each year based on successive year's trawl and gillnet catches as they get closer to age-4.

Age-4 and older walleye

The adult walleye population was estimated in April 2025 using a mark/recapture population estimate. Adult fish were marked using a right ventral fin clip during the spring spawning run at the Oneida Fish Cultural Facility in Constantia, then the ratio of marked and unmarked fish from summer and fall was used to estimate the population. We marked as many females as possible and a roughly equivalent number of males, and continued running the hatchery nets for an extra 3 days until the catch declined. We marked an initial total of 13,311 fish, including 5,964 females and 7,347 males. After aging a sample of 973 scales, we removed 325 age-3 fish (2.4%) for a final total of 12,986 age-4 and older walleye marked.

The recapture sample consisted of initial samples of 1,747 walleye from 48 h of fall electrofishing throughout the shoreline of the lake; 274 walleye from the equivalent of 60 sixty 150-ft summer gillnet sets at 15 sites; 539 walleye from 68 15-minute hauls of 30-ft fall trawling; and 763 walleye from 157 net-nights of fall trapnetting at 21 sites. This required a total crew of 6 people during the month of October. Approximately 1/3 of the catch was aged (1,079 fish total) and the age ratios in each gear applied to the catch from that gear. After removal of age-3 fish, the final recapture sample totaled 2,693 age-4 and older walleye. Of those, we determined 57 fish were finclipped recaptures. All recaptures were aged and none were less than age-4. We used the Bailey modification of the Peterson mark/recapture estimate to account for sampling with replacement (released fish). The final estimate of the adult walleye population in Spring 2025 was 603,177 walleye age-4 and older (95% confidence intervals: 467,162 – 850,928). The walleye population has now returned to more normal levels found over the last decade, somewhat reduced from the high populations estimated in 2018-2021 (Figure 17; Table A7). Based on our predicted contributions of age-2 and age-3 (above), we project the walleye adult population to increase to 758,655 in 2026, and decrease to 615,411 in 2027.

The gillnet catch of walleye was also used to estimate the adult walleye population, providing an independent estimate of abundance (Irwin et al. 2008). In 2025 we caught 422 walleye in the standard summer gillnet, resulting in a gillnet estimate of 623,093 age-4 and older walleye, which is very close to the mark/recapture estimate this year (Figure 17). The two estimates do not always agree closely and reasons for this are discussed below.

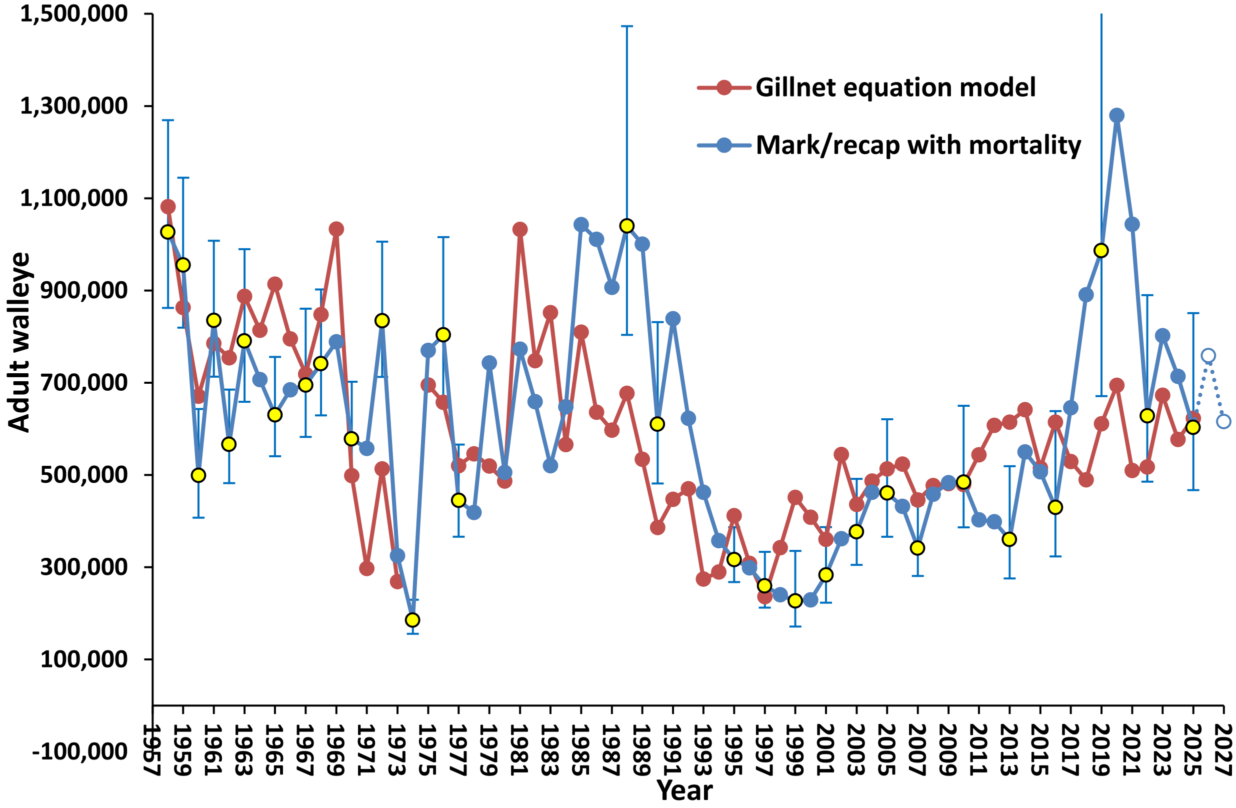

Figure 17. Population estimate of adult (age-4 and older) walleye in Oneida Lake since 1958. Blue line indicates population estimated by mark/recapture with between-years estimated using recruitment and mortality rate. Yellow markers indicate mark-recapture years with associated 95% confidence limits. Red line indicates population estimated using the gillnet catch of adult walleye. Open markers provide the predicted population in future years based on recruitment and survival rate.

Long-term data series of walleye population estimates by age allow us to calculate survival and mortality rates. The mortality rate calculated between the 2022 and 2025 mark/recapture estimates for age-4 and older fish was 33% per year. Mortality rates calculated from mark/recapture estimates from 1957-2025 averaged 26% per year (*N*=28), and from 2010-2025 averaged 29% per year (*N*=5).

Walleye growth and condition

Adult walleye length-at-age is determined from fish otoliths collected in fall (typically October) using 40-ft bottom trawls and electrofishing. Despite significant increases in growth from 2007 through 2019 (Jackson et al. 2019), growth of all ages has decreased since 2020 though increases were seen in age-1 and age-2 walleye in 2025 (Table A8; Figure 18).

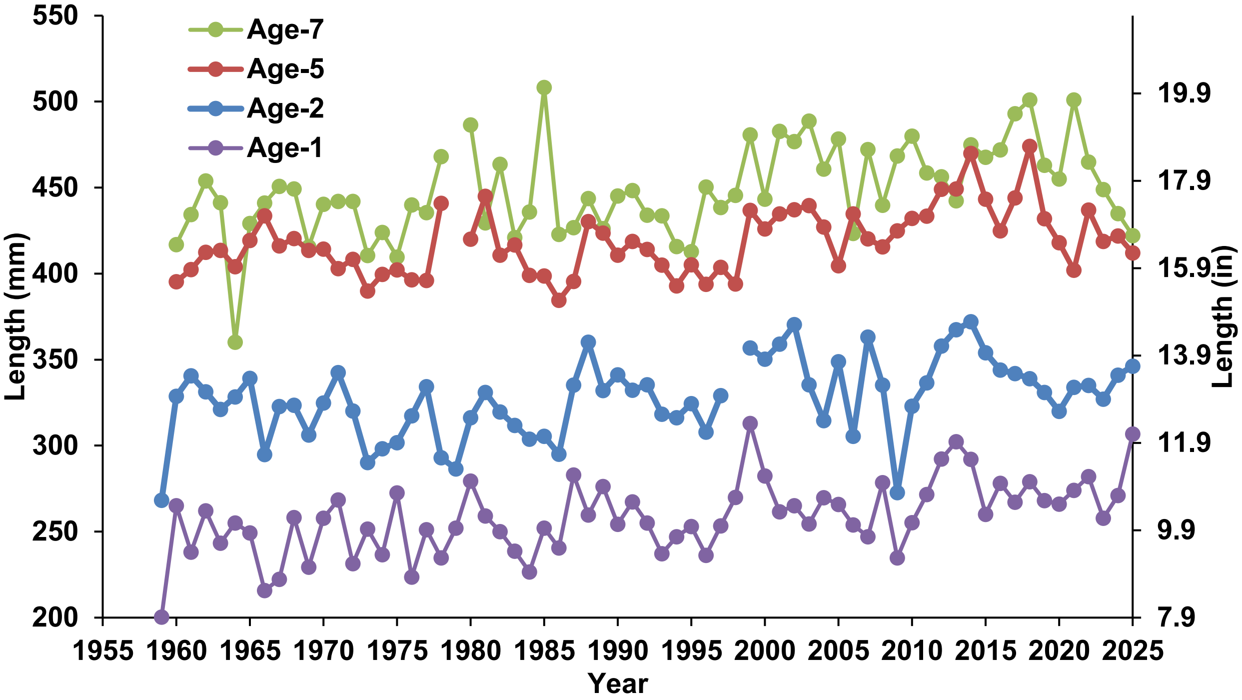

Figure 18. Observed length-at-age for ages 1-7 walleye from fall trawls and electrofishing for Oneida Lake since 1959.

Fall relative weight (W_r) is used to monitor condition of age-1 and older walleye caught in 40-ft trawl and electrofishing surveys each year, and also from standard summer gillnetting (Figure 19). W_r in the fall has declined since about 2017 and remains near the lowest values ever found, despite reduced walleye populations. W_r from the summer gillnet remains low as well.

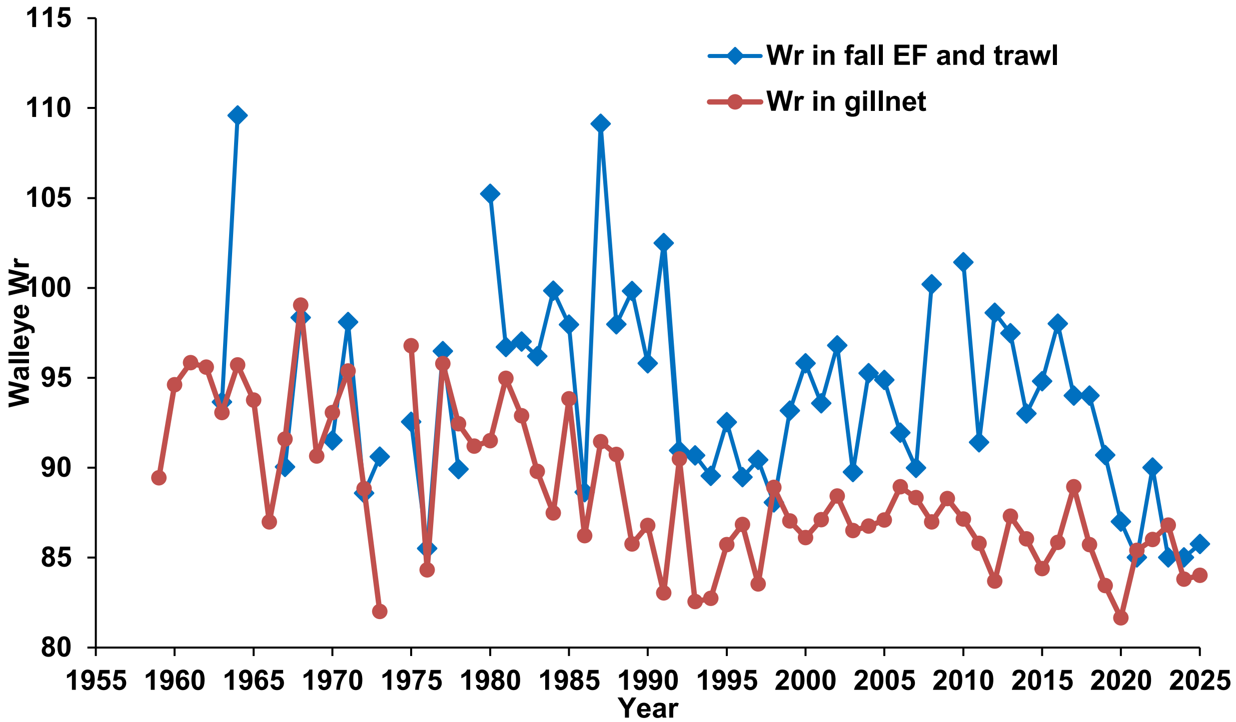

Figure 19. Relative weight (W_r) of age-1 and older walleye caught in fall trawl and electrofishing surveys for Oneida Lake since 1959.

Reasons for lower growth and condition are unclear. Walleye growth depends on the availability of young yellow perch, gizzard shad and white perch (VanDeValk et al. 2008). Round goby was added to the forage base in 2014 and became abundant by 2015. Decreases in growth and condition observed in recent years may be due to lower abundance of prey fish seen in the past several years (gizzard shad, white perch, yellow perch). We measure the amount of prey fish in walleye stomachs in the fall and the number of fish per pound of walleye examined were below the long-term mean every year since 2018 (Table A9; Figure 20). Gizzard shad, which have been low in recent years, were significantly related to W_r in the fall (linear regression; R^2=0.18; P<0.01). The recent addition of round goby to the Oneida Lake prey fish community has not resulted in improved growth of walleye to date.

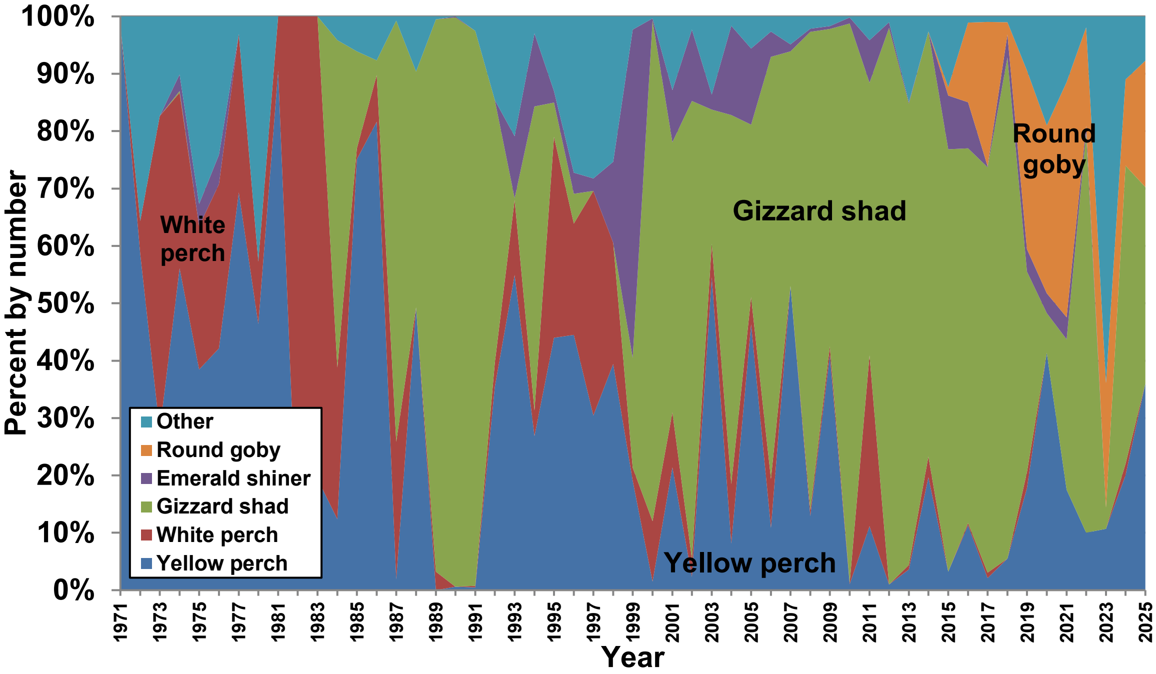

Figure 20, Walleye fall diet composition (% by number) from fall trawling and electrofishing from 1971-2025.

Summary

The adult walleye population in Oneida Lake has returned to around the long-term average of 600,000 fish and has shown an increasing trend over the last decade. Observed adult mortality combined with expected recruitment suggests the adult population will remain near the current levels through 2026 with a slight decrease in 2027.

Our previous 2019 mark/recapture estimate indicated a high walleye population of over 1 million adult walleye in the lake. However, that estimate had one of the largest confidence limits of any of our past mark/recapture estimates due to the low number of recaptures, and the high values were not mirrored in the gillnet index of adult walleye. We calculate the population numbers in Figure 17 for years in between the mark/recapture estimates by using mortality estimates between mark/recapture years to estimate the population in the two years in between. The in-between years are therefore dependent on the mark/recapture estimates every 3rd year. In contrast, the gillnet index does not depend on those and consists of independent estimates obtained each year. After obtaining two more mark/recapture estimates since 2019, we have reasons to believe that the walleye population in 2019 was lower than the mark/recapture estimate suggested for that year. This is because mortality rates calculated from mark/recapture estimates in 2016 to 2019 were very low, and from 2019 to 2022 very high, which would be the case if the 2019 estimate was too high. Note that the gillnet and mark/recapture estimates are correlated using all data (linear regression; ln(x) transformation; N=67 years; R^2=0.41, P<0.01) and using data from 1995 onwards (N=31 years; R^2=0.49, P<0.01)).

Whether or not to trust the 2019 mark/recapture estimate and therefore the walleye boom from 2018-2021 is important because our interpretation and potential management actions differ. The mark-recapture index predicted a large buildup in 2018-2021 with numbers not previously observed in the lake, followed by a large 40% population decline to current levels, if accurate. On the other hand, the gillnet index suggested a slow and continuous increase in the walleye population with relatively stable populations from 2013-2025 and into the future, which suggested the population is doing well and not overharvested. We plan on addressing these discrepancies by applying a stock assessment model framework using the available information in both mark/recapture data, gill net data, age structure and incorporation of information from the telemetry project on the walleye movement patterns in the lake in the near future. Last time we did this was for data up to 2005 (Irwin et al. 2008).

Another issue, discussed also for yellow perch, is changing efficiencies of our gear, in particular the trawl, over time. Our estimates of age-1 walleye in trawls are likely biased low. We know that catchability in trawls and gillnets or both have changed over time as they have diverged over time (Rudstam et al. 2016a), and it is most likely that this is due to decreased efficiency of our trawl rather than increased efficiency of the gillnets. Lower efficiency of trawls may be related to the presence of mussels, increased water clarity, and changes in young percid habitat use associated with these ecosystem changes.

Both the gillnet index and the mark/recapture estimates in 2022 and 2025 indicate a stable population of around the long-term average of 600,000 age-4 and older walleye. Thus, the current annual harvest has been sustainable given annual recruitment. Observed adult mortality combined with expected recruitment suggests the adult population will remain near the current levels in the next several years.

Walleye telemetry study

This year concluded the 2nd year of a 3-year telemetry study plan outlined in the 2023 annual report (VanDeValk et al. 2024). The second data download and receiver re-deployment was completed in July 2025 with 100% of receivers successfully recovered. An additional 4 receivers were added to the array in 2025 (1 in Oneida Creek, 3 in the lake proper). To date, 239 adult walleyes have been tagged, although only 224 had been tagged at the time of the most recent data download. The download brought the total number of valid fish detections to 12.3 million across the study period.

To limit tag burden on individual fish, walleyes greater than 400mm were selected for tagging. Of the 239 tagged walleye, 123 were tagged during the fall with a mean total length of 470 mm (1 SD 50 mm). The sex of these fish is unknown, but sampling with the same methods and time of year in 2023-2025 yielded 67% females for fish larger than 400 mm. Six fish were caught during hatchery egg take operations and therefore the sex is known for those fish (2 males, 4 females). A total of 116 walleyes (60 females, 56 males) have been tagged at the Oneida Fish Cultural Station during the spring spawning period with a mean length of 473 ± 57 mm, slightly larger than the mean length of all spawning walleye in 2024 and 2025 (443 ± 59 mm). Overall, tagged fish represent the larger individuals within the Oneida Lake adult walleye population, and fall tagged individuals are more likely to be females than males. Scale aging of tagged fish will be completed in the coming year to understand their age distribution.

Of the 224 walleyes tagged prior to July 2025, 7 fish (3.1%) likely experienced tagging mortality (2 from fall tagging in 2023, 5 from spring tagging in 2024), as their movements halted within 14 days of their release date. These fish were removed from all analyses. One fish from the fall 2023 tagging group was harvested 17 days post release and had no detection history. This fish was included in survival analyses only. An additional 7 fish (3 in 2024, 4 in 2025), all males tagged at the hatchery, have left the system through the Oneida River. Of the 3 males that left in the spring of 2024, 1 returned to Oneida Lake in the spring of 2025, and left the system again after presumably spawning in Chittenango Creek.

One-year survival probability of the 201 eligible walleyes tagged in the fall of 2023 and spring of 2024 was 59% (95% CI 52%-66%) and Cox Regression models revealed no significant difference in survival between tagging groups ($p = 0.6$) or sexes ($p = 0.3$). Although there was no significant difference in survival probability across the study period, spring tagged fish showed lower survival probabilities shortly after their release date when compared to fall tagged fish (Figure 21). This may be due to the additional stress of surgically implanting tags during the spawning period.

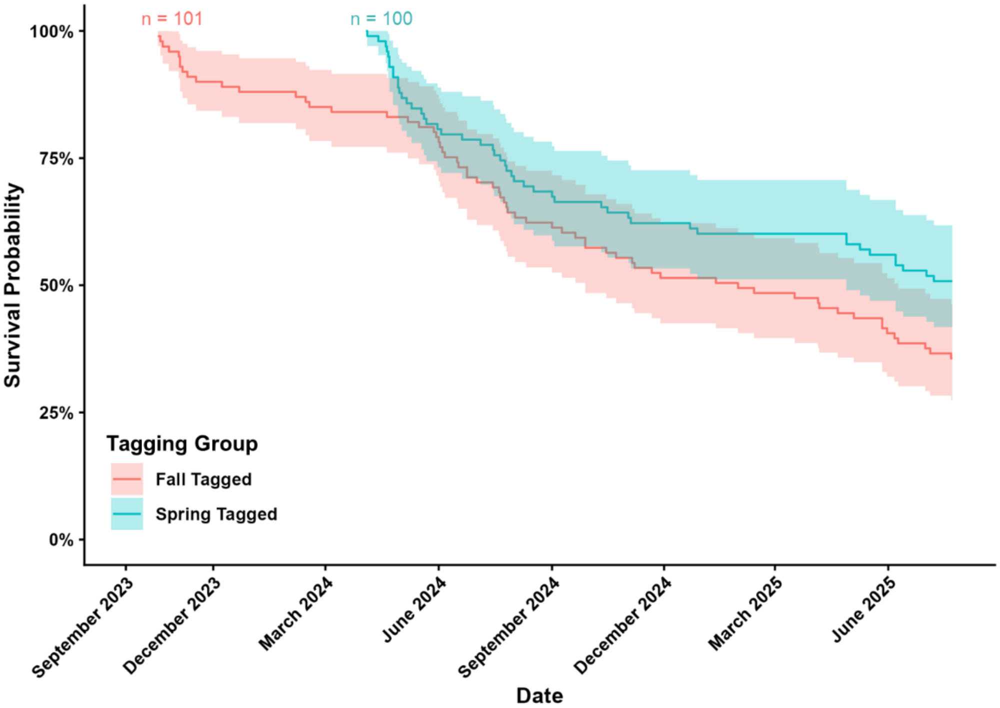

Figure 21. Kaplan-Meier survivorship estimates (shaded areas are 95% confidence intervals) of adult walleye tagged in the fall of 2023 (red) and spring of 2024 (blue) from October 2023 – July 2025.

As of July 2025, 43 tags have been returned by anglers, confirming those fish were harvested, and providing a minimum exploitation rate of 20% across the study period. Catch information provided by anglers reveals the seasonality and diurnal variation of exploitation rates, with 35% of harvested walleye captured during the fall months (October-November), 9% harvested during the winter months (December – March), and 56% harvested between May 1st and September 30th (Figure 22). Although total catches of walleyes from day (n = 21) and night (n = 21) are equal, the proportion of night-to-day–caught fish is much higher in the fall, indicating that the fall night fishery should warrant consideration when generating annual walleye harvest estimates.

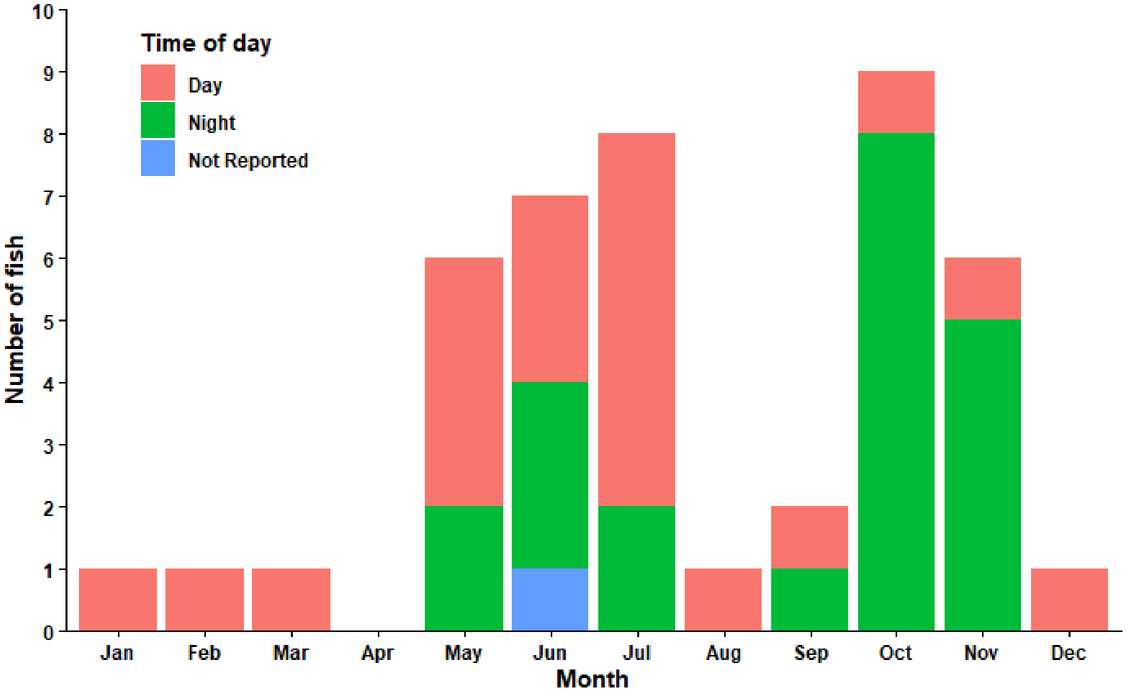

Figure 22. Monthly and diurnal distribution of tagged walleye harvested by anglers from October 2023 – July 2025.

An additional 28 walleyes may have been harvested by anglers but were unreported, as the movement patterns of these fish show horizontal movement indicating the fish was alive, followed by an abrupt cessation in detections that did not resume within 1 month of the data being offloaded from receivers. Given the comprehensive coverage of the telemetry array, comparison of movement patterns with known harvested fish, and conversations with anglers who have returned tags, it is likely that these fish were removed from the system by anglers. Discussions with anglers revealed that tags were not obvious and could be easily discarded with scraps from the filleting process. Additionally, the size range of these fish (>400mm) makes it unlikely that predation by cormorants could be the cause of these fish being removed from the system. It is possible that some of these fish may inhabit parts of the lake with limited receiver coverage, and this may explain the cessation in detections; an additional year of data collection should help determine whether this is the case. If we assume these 28 fish were also harvested, it raises the total harvest rate to 33% across the study period.

Analysis of fall-tagged fish movements during the spring spawning period (3/15 – 4/15) in 2024 and 2025 has identified a mix of tributary and lake spawning site selection. We required fish to spend a minimum of three hours in a tributary to assume that spawning occurred there. If a fish did not meet these criteria, or did not enter a tributary at all, it is believed to have spawned in the lake. In 2024, of the 85 fish that were alive as of March 15th, 27 fish (32%) were assigned to a tributary spawning site (16 in Scriba Creek, 8 in Fish Creek, and 3 in Chittenango Creek), and 58 fish (68%) remained in the lake. In 2025, of the 50 fish that were alive during the spawning season, 26 fish (52%) were assigned to a tributary (17 in Scriba Creek, 6 in Fish Creek, and 3 in Chittenango Creek), and 24 fish (48%) remained in the lake. In both 2024 and 2025, the west end of the lake appears to be an area of high use for lake spawning walleye during the spawning period. Forty-eight fall-tagged fish were detected in both 2024 and 2025 spawning periods, and initial estimates reveal a 68% spawning site fidelity rate.

Preliminary analysis of the seasonal distributions of all tagged walleye was conducted using a lattice-based density estimator (LDE) and suggest high usage of the shallower waters found in the west end of the lake during the winter (December 2024 – February 2025) and spring months (March 2025 – May 2025), with a general shift to deeper, cooler waters during the summer (June 2024 – August 2024) and fall months (September 2024 – November 2024) (Figure 23). Individual core use areas (50% LDE home ranges) ranged from 0.1 to 4.3 km^2 and overall use areas (95% LDE home ranges) ranged from 0.5 to 18.1 km^2 for tagged walleyes. Overall space usage was highest in the spring season (mean = 7.1 km^2) and lowest during the winter months (mean = 4.0 km^2). Larger space usage during the spring was expected, as walleyes migrate to and from preferred spawning locations. Future analyses will investigate spatial occupancy and overlap of habitat use between tagging groups and sexes across seasons, with particular focus on the fall season, as this has implications for the mark-recapture survey efforts.

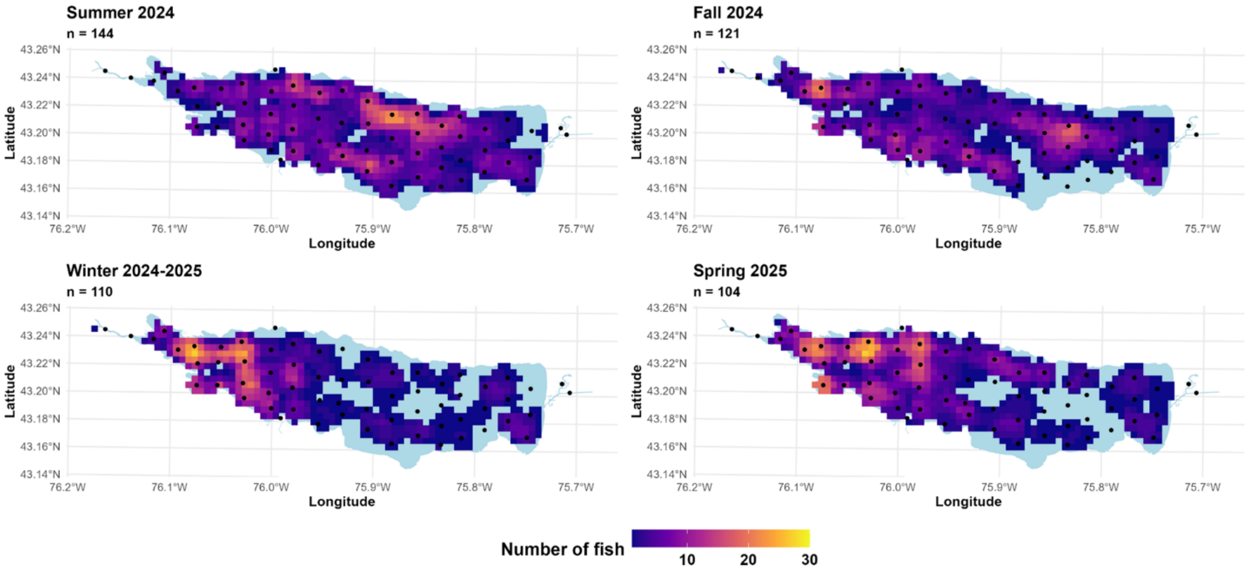

Figure 23. Core use areas (50% LDE home ranges) of tagged walleye from both the fall and spring tagging groups across seasons. The shading of each cell is based on the number of tagged walleye that had that given cell as part of their core range. Black dots denote receiver locations.

Yellow perch - The yellow perch population in Oneida Lake is assessed as larvae with fry samplers in the spring; as juveniles in the summer and fall with bottom trawls and seines; and as subadults and adults with gill nets in the summer. The annual catch in gill nets is used as an index of abundance.

Age-0 yellow perch

Abundance of age-0 yellow perch is measured at the larval stage (two surveys: 8 mm and 18 mm), and in 18-ft bottom trawls through the summer, and again as yearlings in trawls centered on May 1 (Table A10). The larval yellow perch catch at the 18 mm stage in 2025 was 1,924 fish resulting in a density estimate of 15,010/ac (37,090/ha; Figure 24) which was the lowest abundance in 6 years and about half the long-term average of 27,700/ac. The trawl catch was 26,550 which is the 2nd highest catch in 16 years. However, by fall, the density from trawling was only 137/ac (338/ha), below the long-term average of 372/acre but similar to the 10-yr average of 189/ac. The mean length of yellow perch by fall (3.1 in; 78 mm) was similar to the long-term average (3.0 in) and the 10-yr average (3.1 in; Figure 25) however lengths on August 1 have been well below average the past several years, likely due to low *Daphnia* densities in recent years. Note that a high catch of 18 mm yellow perch in 2024 resulted in a lower density by fall than the

2025 cohort, which was near average for the last 10 years by October despite lower larval density. Larval yellow perch catches are significantly related to fall densities (linear regression; ln(x) transformation; R^2=0.29; P<0.01) and provide important evidence about spawning/hatching success and timing of mortality for age-0 yellow perch.

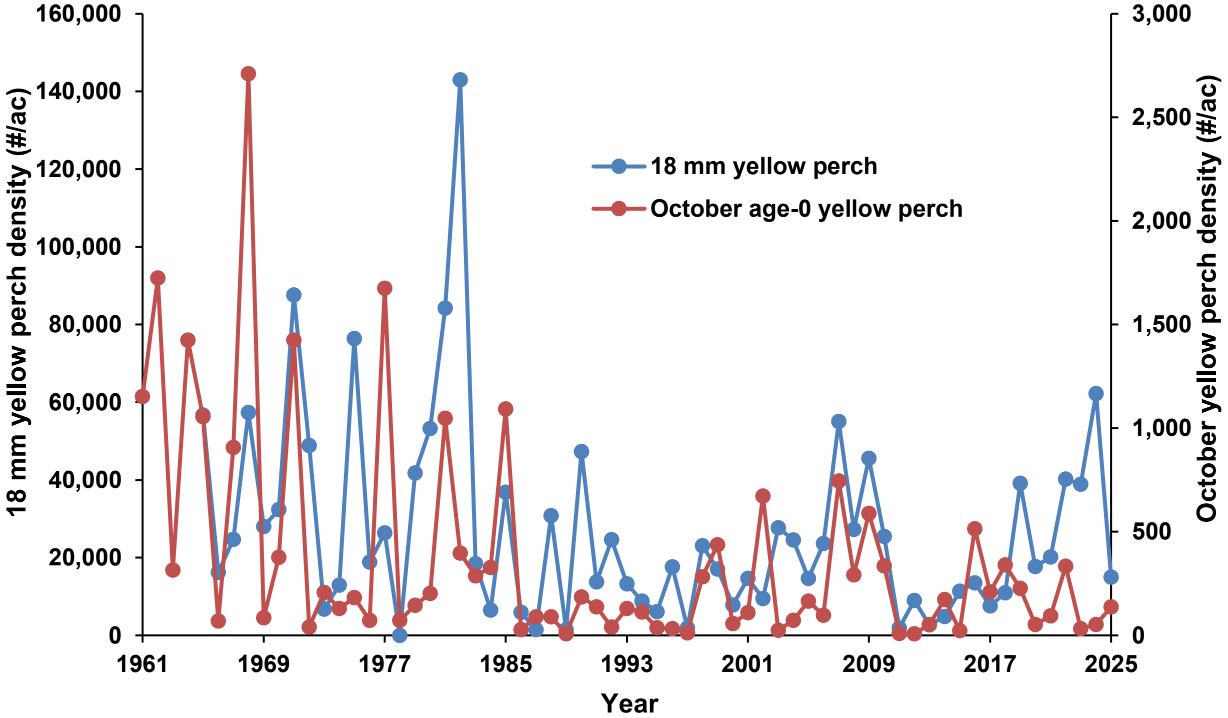

Figure 24. Time trends in larval and fall age-0 yellow perch densities (#/ac) for Oneida Lake since 1961.

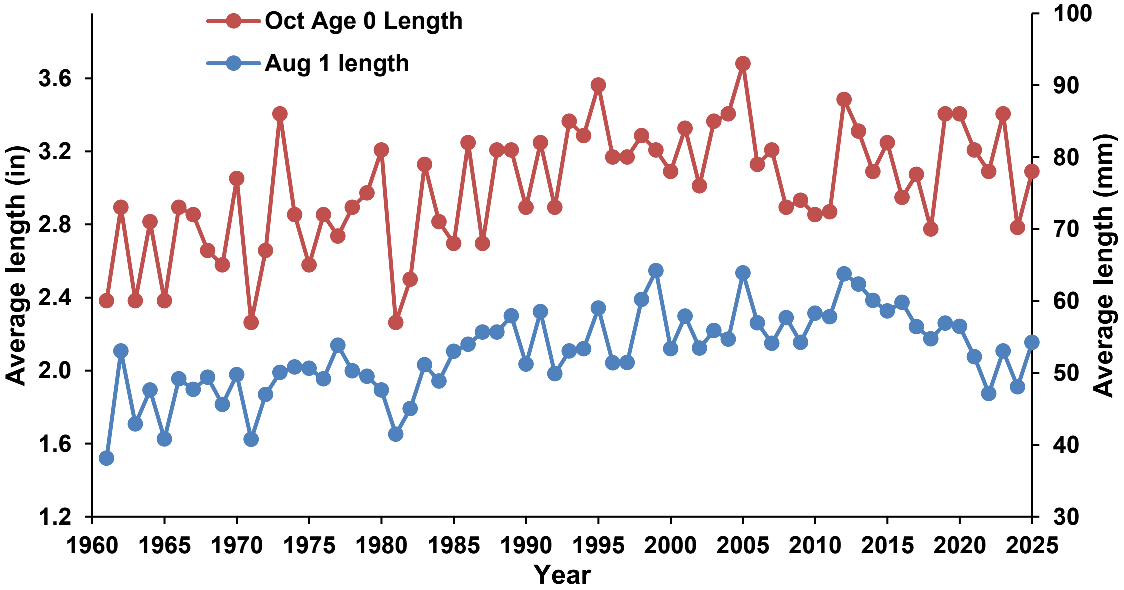

Figure 25. Time trends in fall mean length of age-0 yellow perch for Oneida Lake since 1961.

Age-1 yellow perch

The catch of age-1 yellow perch in the spring trawling was 24 fish in 30 hauls, a density of 3.2/ac (8.0/ha; Table A10; Figure 26). This is much lower than the long-term average (77/ac) and the 10-yr average (28.4/ac) and represents only 6.3% overwinter survival of the 2024 age class. Overwinter survival is significantly related to fall length of age-0 yellow perch going into the winter (linear regression; ln(x) transformation; R^2=0.27; P<0.01) and the 2024 average length in October was 2.76 in (70 mm), tied for the smallest average length in 36 years. Summer age-1 density from trawling was 1.2/ac (2.9/ha) which is the 3rd lowest in 37 years, suggesting recruitment of yellow perch from the 2024 year class to the adult stock at age-3 will be low. Summer trawl catches of age-1 yellow perch were significantly related to age-3 abundance (linear regression; ln(x) transformation; R^2=0.40, P<0.001).

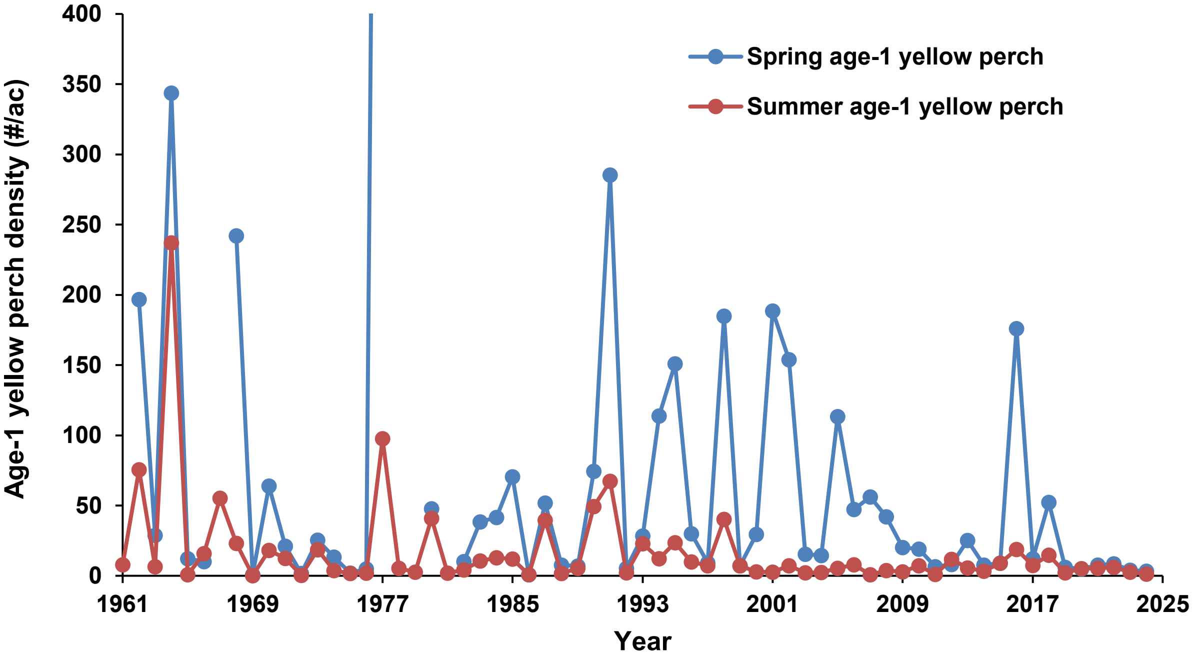

Figure 26. Time trends in spring and summer age-1 yellow perch densities (#/ac) for Oneida Lake since 1961. The 1977 year-class spring yearling density was 1,370/ac.

Age-2 yellow perch

The catch in gill nets is used to index age-2 yellow perch abundance. The age-2 gill-net catch in 2025 was 203 fish for an estimated density of 20.4/ac (50.4/ha) which is lower than the record populations of the past several years, but still above the long-term average (12.6/ac; Table A11; Figure 27). We estimate these age-2 fish (from the 2023 year class) will contribute 13.2 fish/ac (676,513 fish) to the age-3 yellow perch population in 2026, based on average survival from age-2 to age-3 over the past 10 years (64%).

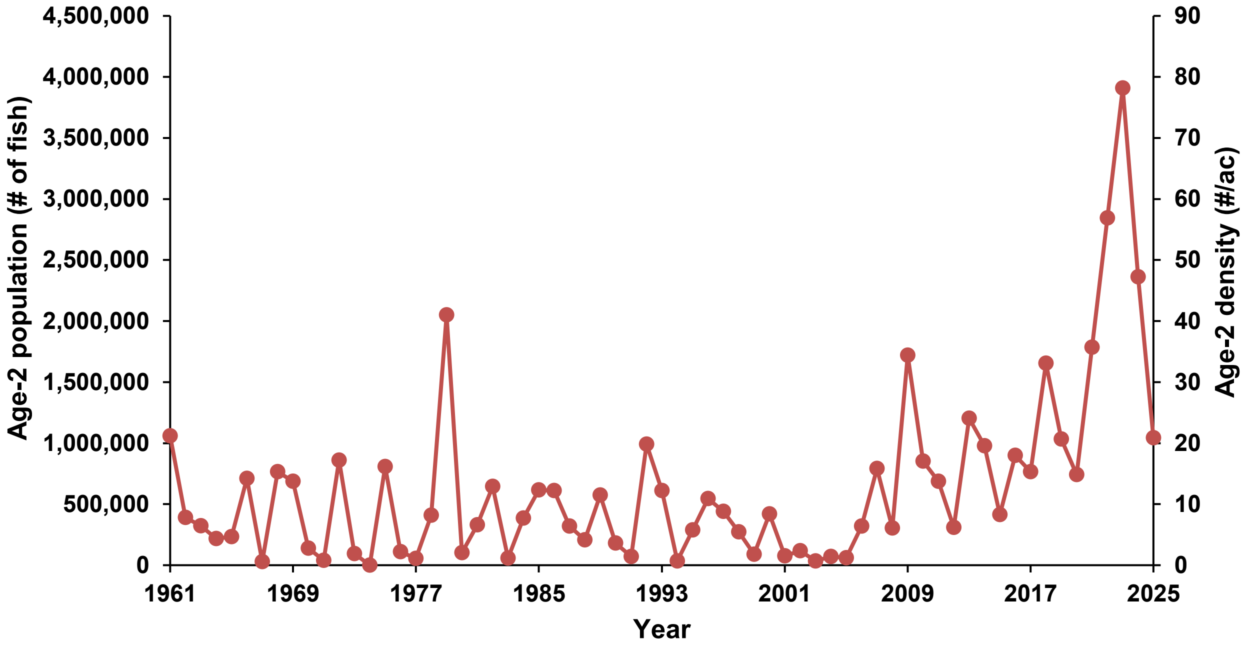

Figure 27. Time trends in age-2 yellow perch population and density based on gillnet catch in Oneida Lake from 1961-2025.

Adult yellow perch (age-3 and older)

The age-3 and older yellow perch gillnet catch is used to estimate the adult population. The gillnet catch of yellow perch in 2025 was 1,783 fish which included 1,539 fish age-3 and older. The total population of age-3 and older yellow perch was estimated to be 3,017,343 fish (59.0/ac; 145.8/ha; Table A11; Figure 28). This was a decrease from the record populations of the past two years, but still the 5th highest catch in the last 43 years. About 61% of the current yellow perch adult population consists of age-3 and age-4 fish (2021 and 2022 year classes). The 2023 year class is projected to add 676,289 yellow perch to the age-3 population in 2026 (based on regression of age-2 catch in 2025 to age-3) and the 2024 year class is predicted to add 346,642 yellow perch to the age-3 and older population in 2027 (based on regression of age-1 catch in 2025 to age-3). The age-3 and older yellow perch populations are projected to be 3,090,170 in 2026 and 2,818,784 in 2027 (based on 80% adult survival rate plus recruitment).

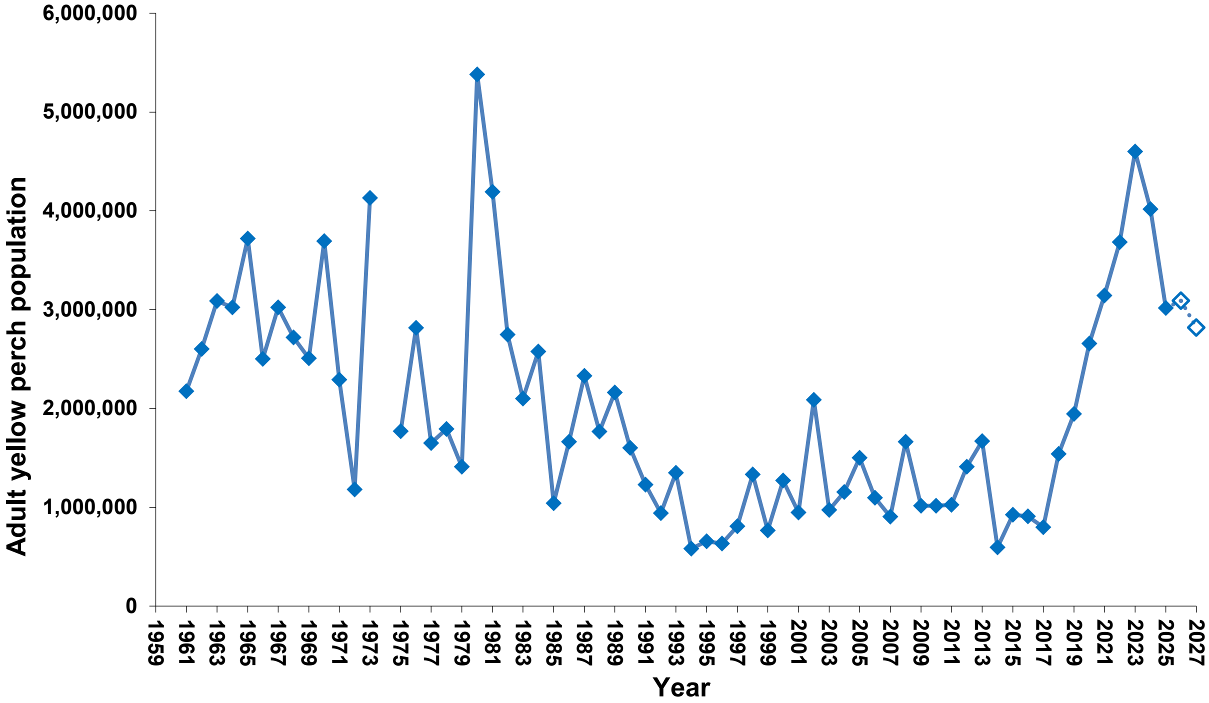

Figure 28. Age-3 and older yellow perch population estimated from gillnet catch for Oneida Lake from 1961-2025. Open circles indicate predicted populations based on catch of age-1 and age-2.

The size structure of the yellow perch population in Oneida Lake indicates a high percentage of large fish. Standard stock size indices (Bonar et al. 2009) indicate the proportional stock density (PSD) of yellow perch was 95 in 2025, above the long-term mean (84) and the 10-yr average (82). Relative stock density of memorable size fish (RSD_m) was 3.4, which is also higher than the long-term mean (2.0) and about equal to the10 yr average (3.1; Figure 29). In most years since 2010, the yellow perch population in Oneida Lake has had a higher percentage of large fish than at any previous time in the 69-yr dataset.

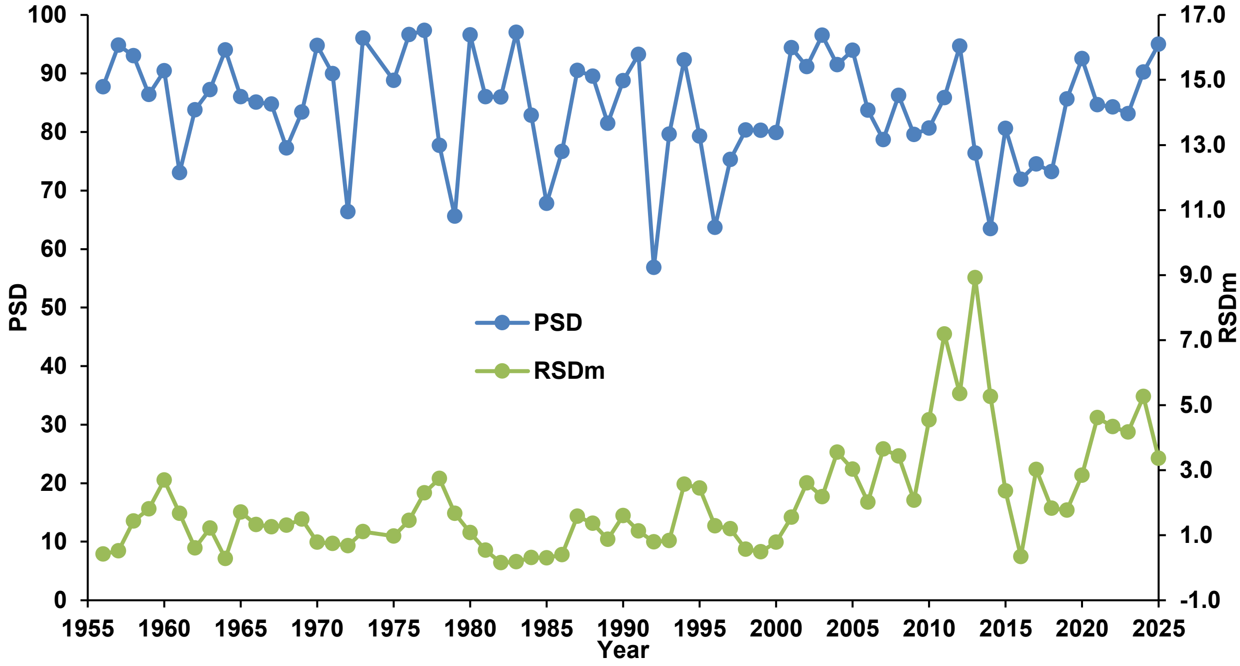

Figure 29. Size indices of the yellow perch population calculated from the gillnet catch for Oneida Lake from 1956-2025.

Growth rate of yellow perch

The average length of yellow perch at age-2 and at age-5 are used to monitor growth. Ages are from otoliths collected from fish in the standard gillnet since 2009 and scales in earlier years. Despite the near-record population size, yellow perch length at age has seen record highs in recent years (Table A12; Figure 30). Growth in 2025 was down slightly from recent years but still remained higher than the long-term average and the 10-yr average, for both age-2 and age-5 yellow perch. This is likely attributed to abundant food such as mayflies, round gobies, and Bythotrephes zooplankton, and despite decreases in daphnia. Of the 101 yellow perch diets (18.1%) from the gillnet which contained fish in 2025, 102 of the 107 identifiable fish items in the diets were round gobies.

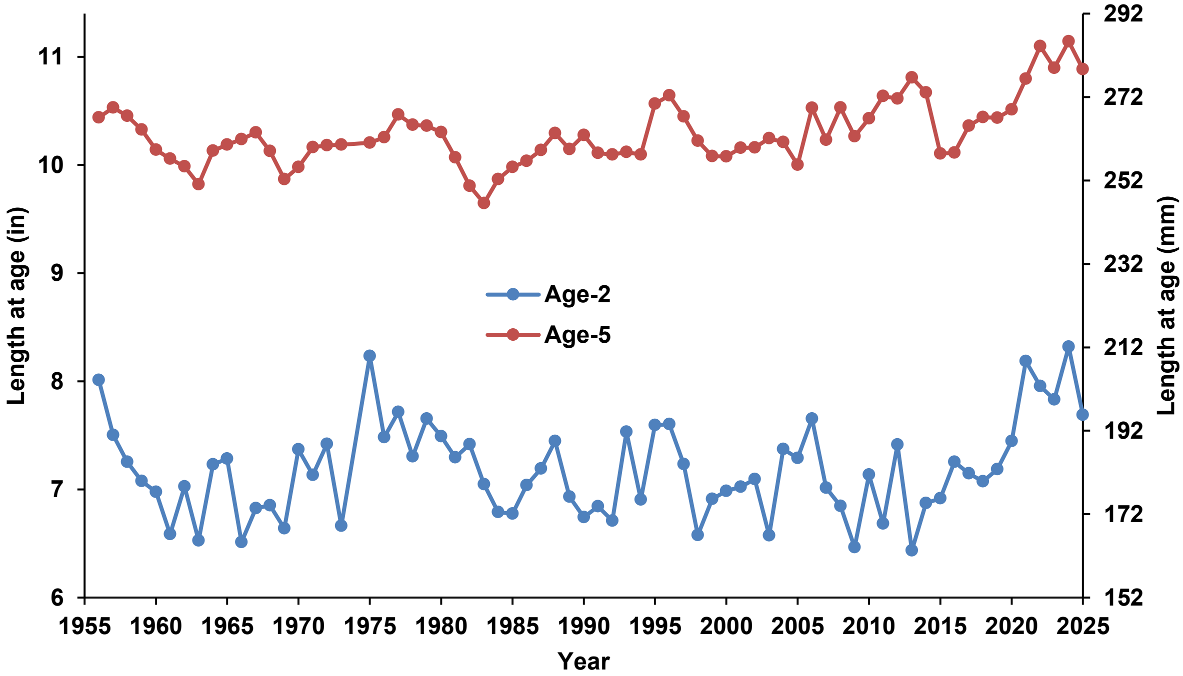

Figure 30. Average length of yellow perch at age-2 and at age-5 caught in gillnets in Oneida Lake since 1956.

Summary of yellow perch

The increase in yellow perch in recent years was a considerable change in the fish community of Oneida Lake, with adult yellow perch increasing since 2017 to reach a 40-year high in 2023. There is no similar series of six continuously increasing yellow perch abundance years in the whole data set. The larval and age-0 abundances are not low but not particularly high. This contrasts with the high abundance of perch in 1980 which was due to a 1977 year class that survived the winter well and produced an exceptionally large number of age-1 perch in the spring of 1978 (Rudstam et al. 2016b). In contrast to recent years, the 1977 year class was followed by two poor year classes and the perch population declined and continued to decline up to 1994. Thus, the recent increase in perch is unprecedented in the almost 70 years we monitored the perch population of Oneida Lake.

The very low indices for age-1 perch both in spring and summer during this increase in adult yellow perch is puzzling. Although large size of age-0 fish in the fall improves overwinter survival which could compensate for lower age-0 numbers (Irwin et al. 2009), this did not result in higher age-1 numbers. As all the low indices are from the trawl survey, we have to consider the possibility that the catchability in the trawls of age-1 yellow perch has declined substantially. Clearer water associated with mussels and mussels themselves could cause decreased catchability, especially after quagga mussels invaded the soft bottoms of the lake. Alternatively, young perch may be more littoral than in the past, as suggested by Fetzer et al. (2016). In both cases, trawl catches may no longer provide reliable indices of age-1 perch

However, our age-2 gillnet catches indicate high numbers of yellow perch in the 2019-2022 year classes, fish that contributed to the continuously increasing adult perch numbers. Clearly a series of years with high survival of young yellow perch built the adult population. High abundance of yellow perch is predicted to result in decreased growth rates (Rudstam et al. 1996), but growth rates are high. It remains to be seen if this high yellow perch abundance will continue. Mortality estimates from catch curves average 31% (1957-2025) however since 2009 mortality has averaged 50% (Figure 31) so the population will decline if recruitment returns to levels seen in the earlier part of this century. Possible reasons for the high survival of young fish includes reduced predation by double-crested cormorants. Further, increases in mayfly and round goby may have reduced predation on young perch as well. Harvest is likely to reduce yellow perch populations in the next several years as the age-2 index for the 2023 year class is not particularly large.

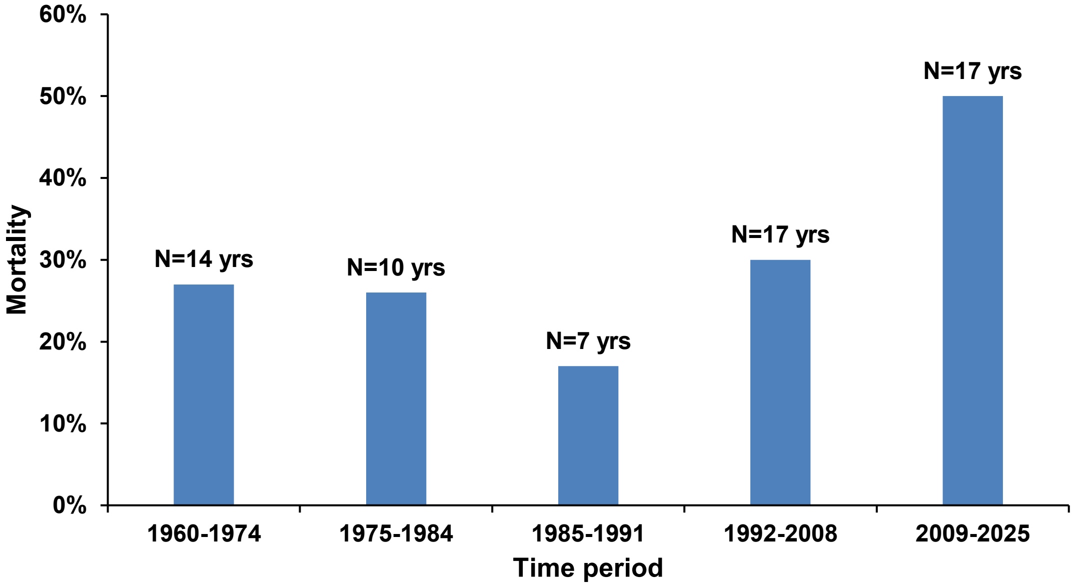

Figure 31. Mortality estimates of yellow perch derived from the slope of the gillnet catch curve for age-3 to age-7 yellow perch in Oneida Lake since 1960.

Largemouth bass – Largemouth bass in Oneida Lake are sampled as young fish by seining during the summer months and electrofishing during spring or fall. Adult largemouth bass are sampled by spring or fall electrofishing, along with spring and fall trap netting.

Age-0 largemouth bass

The seine catch is used to index age-0 largemouth bass recruitment. In 2025 seining we caught 79 age-0 largemouth bass for a catch rate of 2.9/haul (Table A4; Figure 32). This compares favorably to the long-term mean (2.6/haul) and the 10-yr average (2.7/haul). Age-0 largemouth bass are also collected in near-shore electrofishing surveys, which were switched to fall this year instead of spring (see VanDeValk et al. 2025). Electrofishing catch rates of age-0 this fall were 22.6/h (Table A5), which was over 6 times higher than any spring age-1 catch rates from 2011-2024 and was 2.4 times higher than the 2024 fall age-0 catch rate, mirroring the higher catches in the seine compared to 2024. The average length of age-0 bass from fall electrofishing was 137 mm, which is equal to the long-term average of age-1 lengths in the spring from past years. Despite low catches in 2024, consistent catch rates in seines since 2005 suggest continued recruitment to the adult population of largemouth bass in Oneida Lake.

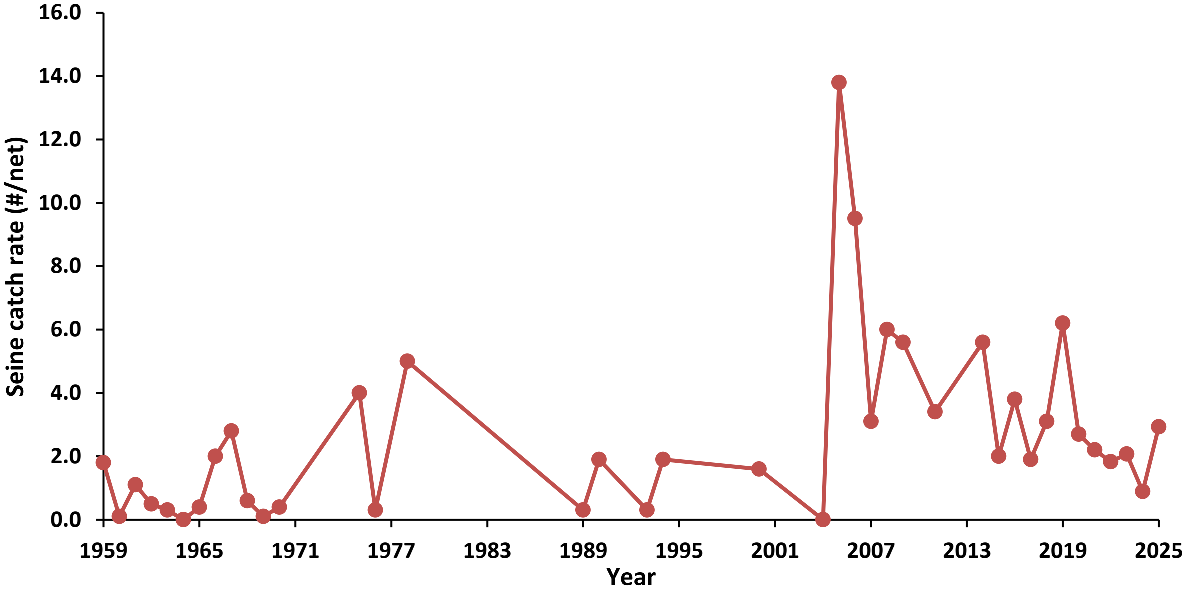

Figure 32. Beach seine catch rates of largemouth bass in Oneida Lake from 1959-2025.

Adult largemouth bass

In the 2025 fall electrofishing survey, the catch rate of age-1 and older adult largemouth bass was 5.3/h (Table A5; Figure 33), which is lower than the average of 12 years of spring catch rates (11.1/h). The fall catch rate for adult largemouth bass in 2024 was 1.8 times higher than the spring catch rate (VanDeValk et al. 2024) though spring sampling generally results in higher catch rates of large bass due to spawning behavior (Brooking et al. 2018). The 2025 fall catch rate ranks in the lower 1/3 of statewide largemouth bass fall electrofishing catch rates.

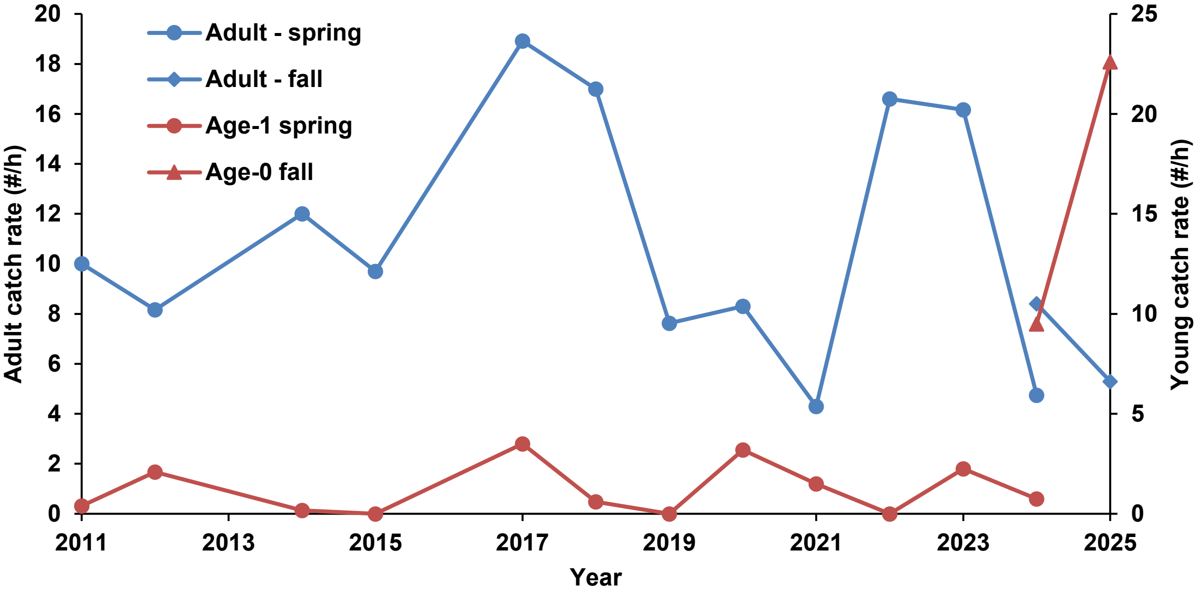

Figure 33. Electrofishing catch rates (#/h) of largemouth bass in Oneida Lake in spring and fall from 2011-2025. Young catch rate refers to age-0 in fall, and age-1 in spring.

The fall and spring standard trap net sets at Shackelton Point provide another index of adult largemouth bass abundance. The 2025 spring catch rate (0.38/net-night) and fall catch rate

(0.50/net-night; Figure 34) are both about equal to the long-term averages (0.44 and 0.42/net-night, respectively). Based on the trap net catches, there has been a weak but significant long-term increase in largemouth bass since the 1980's (linear regression; ln(x+0.01) transformation; fall trapnet; R^2=0.22; P<0.01).

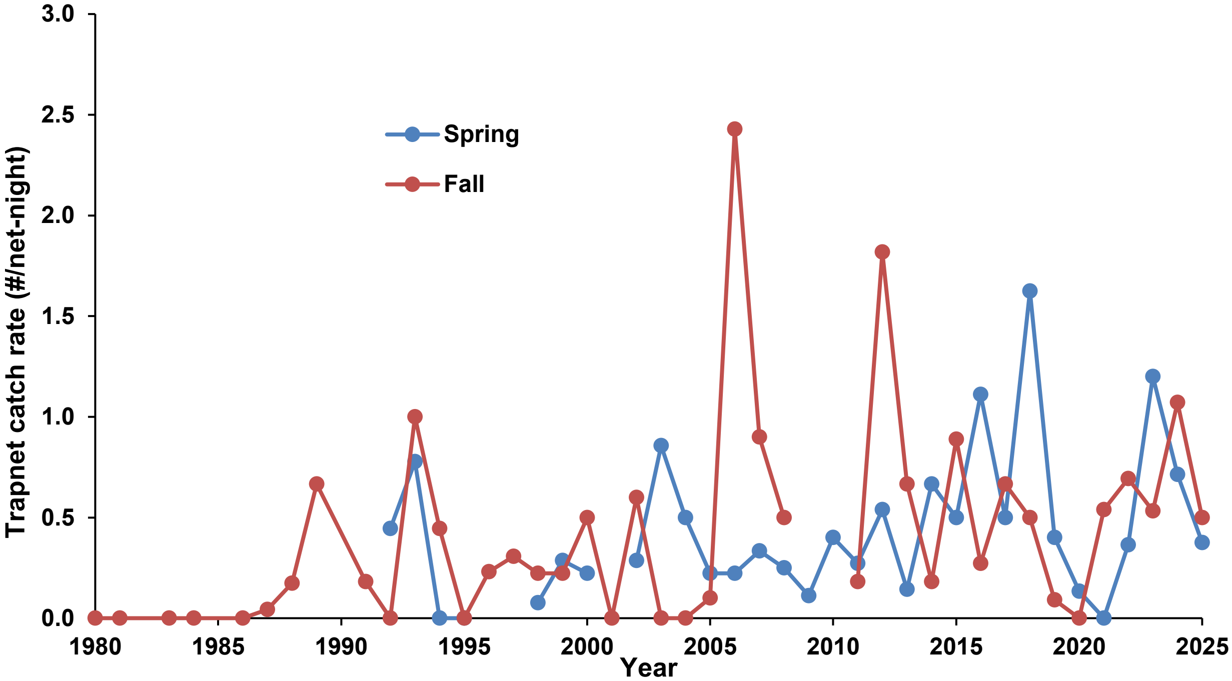

Figure 34. Spring and fall trapnet catch rates (#/net-night) of largemouth bass in Oneida Lake from 1980-2025.

Growth rate of largemouth bass

The length at age of largemouth bass is determined from scales collected by fall or spring electrofishing. The average length at age in fall 2025 of age-2 (10.0 in) and age-5 largemouth bass (15.7 in; Figure 35) is indicative of a fast-growing population compared to other NY waters (Brooking et al. 2018).

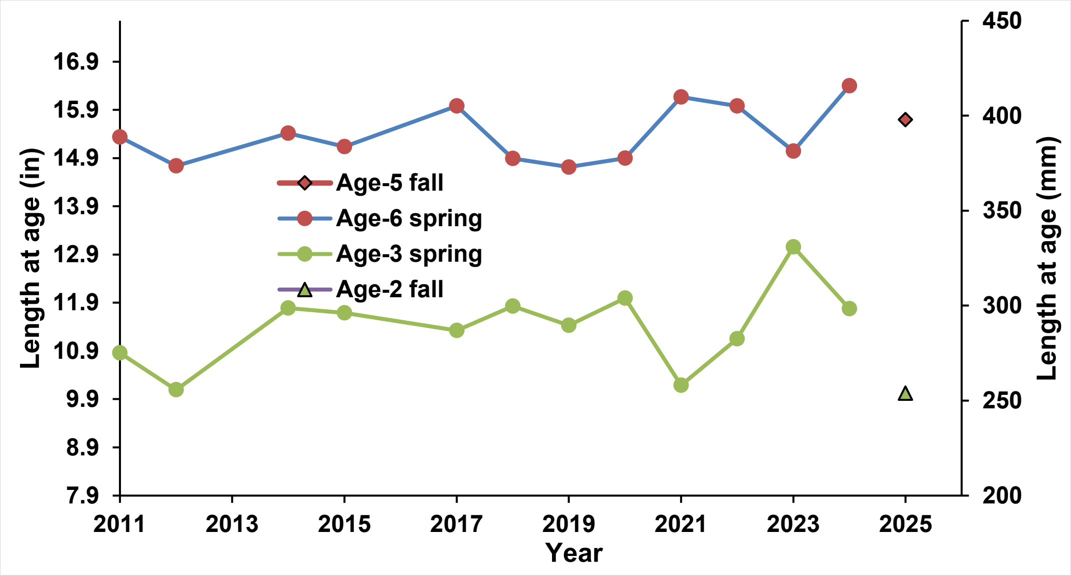

Figure 35. Length at age of largemouth bass in Oneida Lake in spring and fall from 2011-2025. Note that 2025 fall numbers are not directly comparable to previous spring numbers, because fall fish include nearly another complete growing season.

Size structure and relative weight of largemouth bass

In the 2025 fall electrofishing survey, the largemouth bass PSD was 80 and RSD$_p$ was 61 (Figure 36). These values for both fall and spring electrofishing size structure indicate Oneida Lake falls within the upper 1/3 of lakes in NY. The mean relative weight of largemouth bass was 119 in fall of 2025, which is the highest recorded since surveys started (12 yrs; Figure 37).

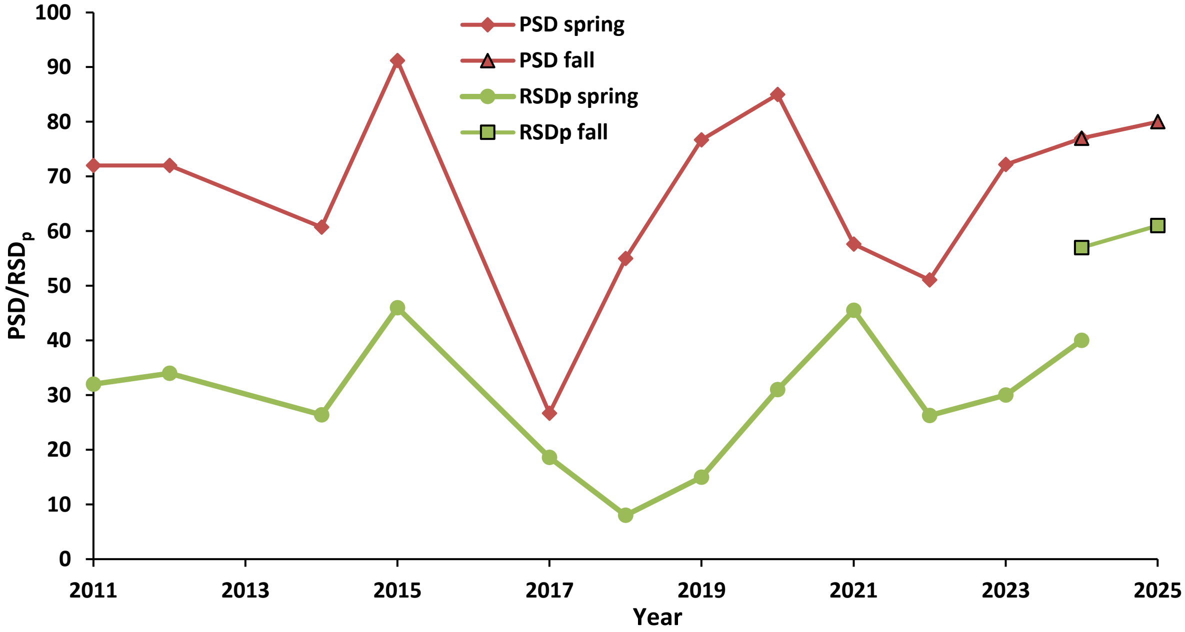

Figure 36. Size structure indices (PSD and RSD$_p$) of largemouth bass in Oneida Lake in spring and fall electrofishing from 2011-2025.

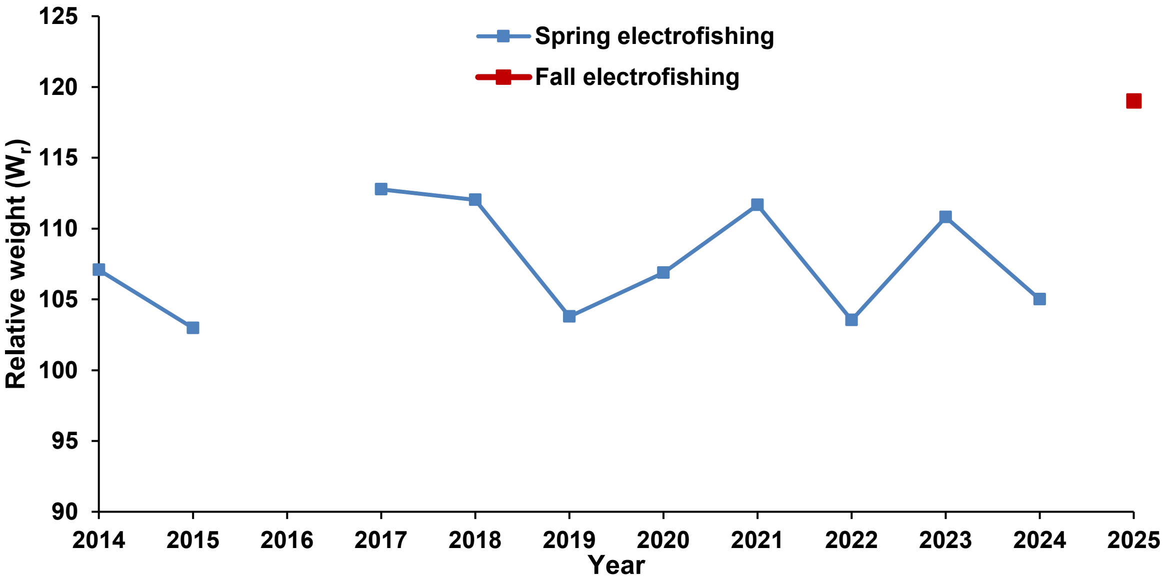

Figure 37. Mean relative weight of largemouth bass in Oneida Lake in spring and fall from 2014-2025.

In summary, largemouth bass in Oneida Lake experienced high growth rates, high condition, and good size structure thru 2025, with no significant decrease detectable in overall catch rates from electrofishing or trapnets. Based on the catch rate of age-0 fish in 2025, recruitment should maintain largemouth bass numbers in the near future.

Smallmouth bass –

Age-0 smallmouth bass

The abundance of age-0 smallmouth bass in Oneida Lake is indexed by the standard summer 18-ft trawl and by the seine catches. In 110 trawl hauls in 2025, we did not catch any smallmouth bass (Table A3; Figure 38). In 430 trawl hauls the past 4 years, we caught 1 age-0 smallmouth bass. A large year class of smallmouth bass has not been seen since 2014 in the trawl catch.

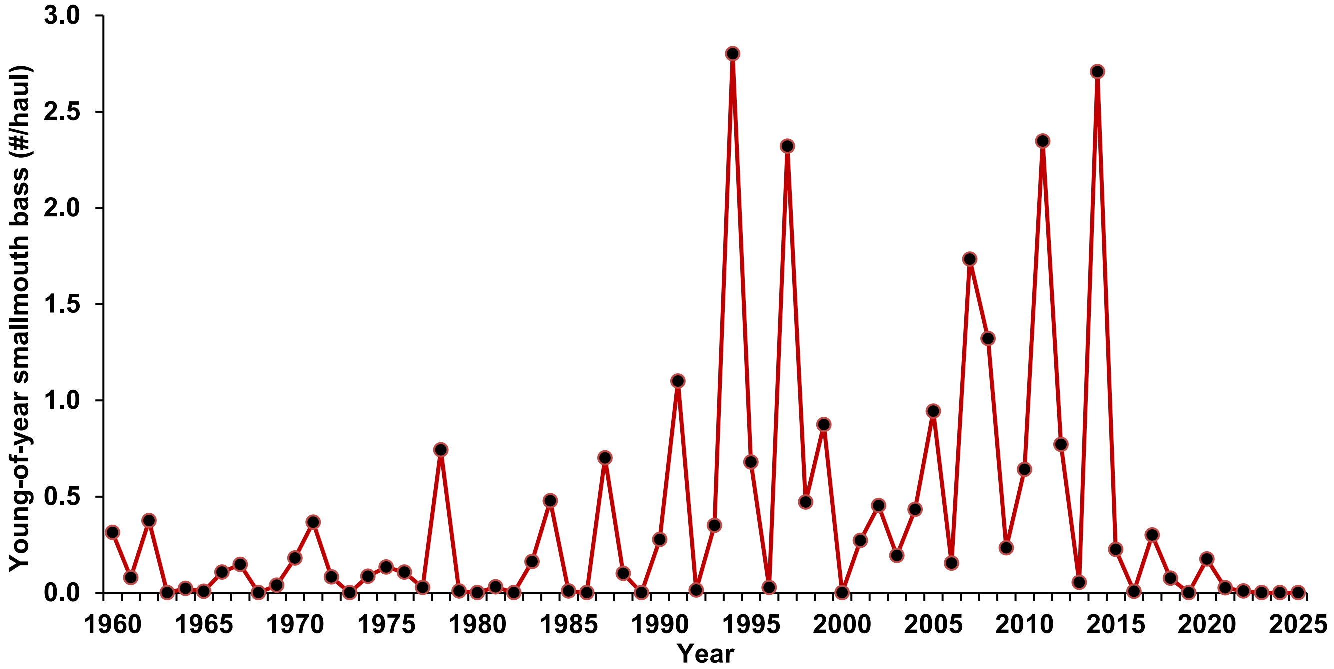

Figure 38. Catch rate of age-0 smallmouth bass in standard 18-ft summer bottom trawls in Oneida Lake from 1960-2025.

In 27 beach seine hauls in 2025, we caught 4 age-0 smallmouth bass (0.1/haul), continuing the low catches seen in recent years (Table A4; Figure 39). A large year class of smallmouth bass has not been seen since 2014 in the seine catch.

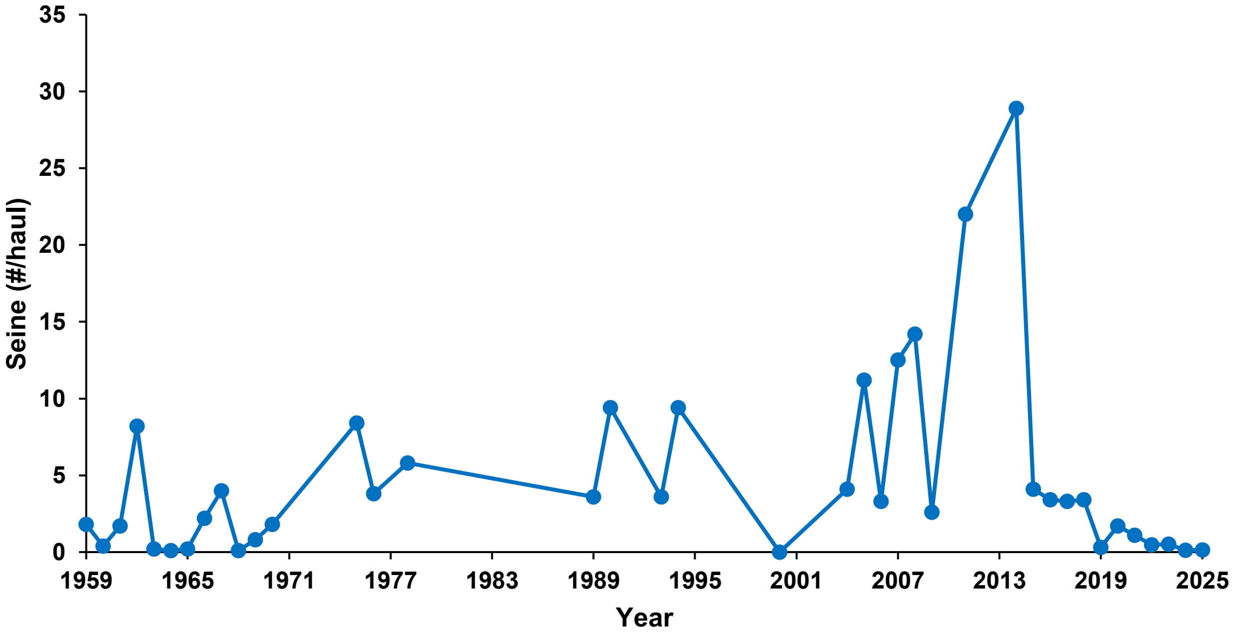

Figure 39. Catch rate of age-0 smallmouth bass in standard seine hauls in Oneida Lake from 1959-2025.

Adult Smallmouth bass

The best indicator of adult (age-3 and older) smallmouth bass abundance in Oneida Lake is the standard summer gillnet catch. In 15 gillnet sets with 4 150-ft nets per site (equivalent of 60 150-

ft nets), we caught 7 adult smallmouth bass in 2025. This was the lowest catch in 42 years, well below the long-term average (28.0/net) and the 10-yr average (26.6/net) and is nearly a 10-fold decrease from catches during the high periods (Table A2; Figure 40). The decline in gillnet catches began around 2017.

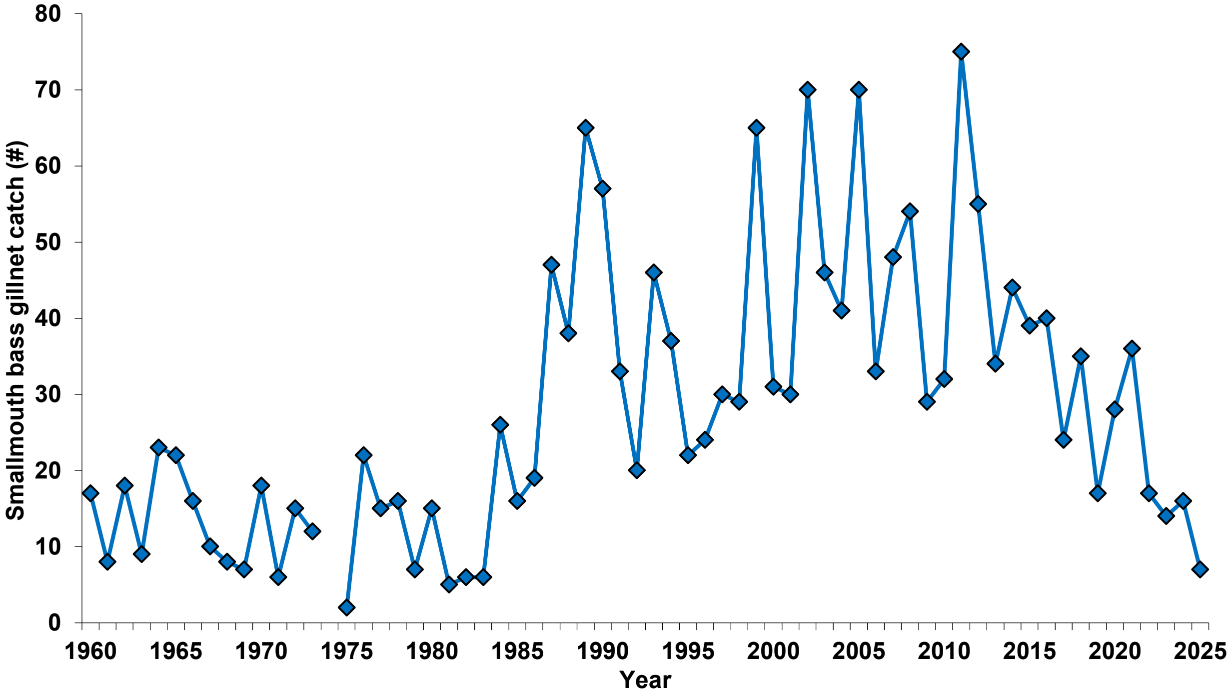

Figure 40. Catch rate of adult smallmouth bass in standard summer gillnets in Oneida Lake from 1960-2025.

Adult smallmouth bass are also indexed in our spring and fall trapnet catches. The spring trapnet catch in 2025 was 2.0/net-night, below the long-term average of 7.9/net-night and the 10-yr average of 4.8/net-night (Figure 41). Catches of adults have remained low since 2018. In the fall trapnet, the catch was 0.4/net-night, less than the long-term average of 1.2/net-night and the 10-yr average of 0.6/net-night. Catches in the fall have likewise been low since 2018.

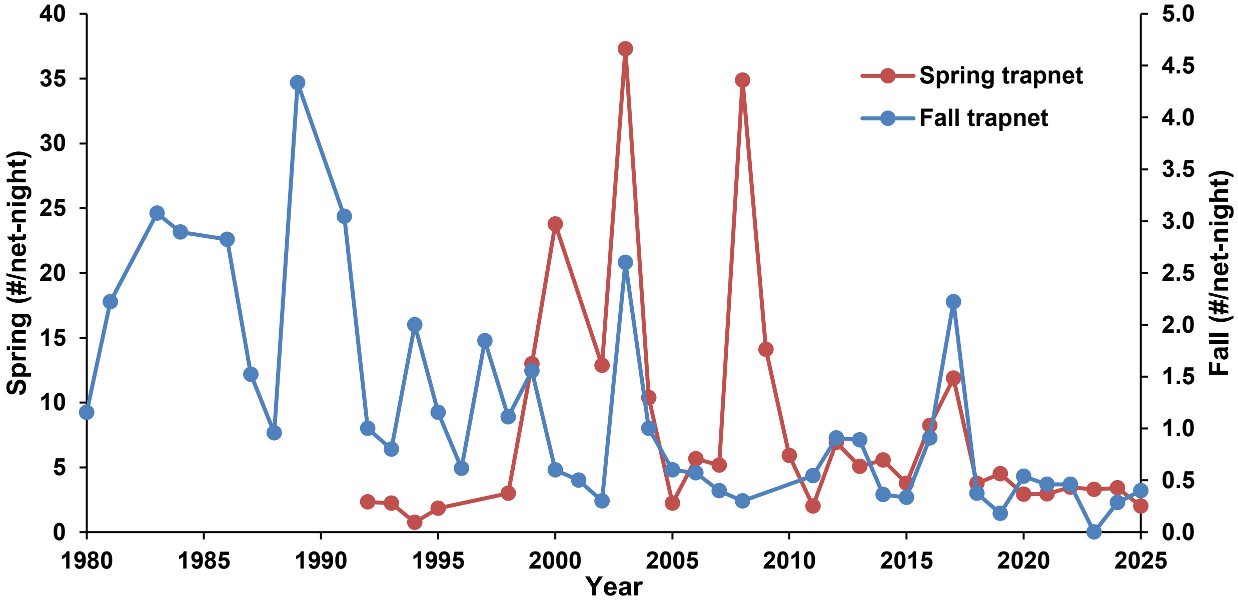

Figure 41. Catch rate of adult smallmouth bass in standard spring and fall trapnets in Oneida Lake from 1980-2025.

Effectiveness of electrofishing surveys for smallmouth bass in Oneida Lake has been uncertain in the past (see VanDeValk et al. 2025). The switch to fall electrofishing in 2025 complicates interpretation of catch rates, however they suggest similar trends as other adult smallmouth bass indices (Figure 42).

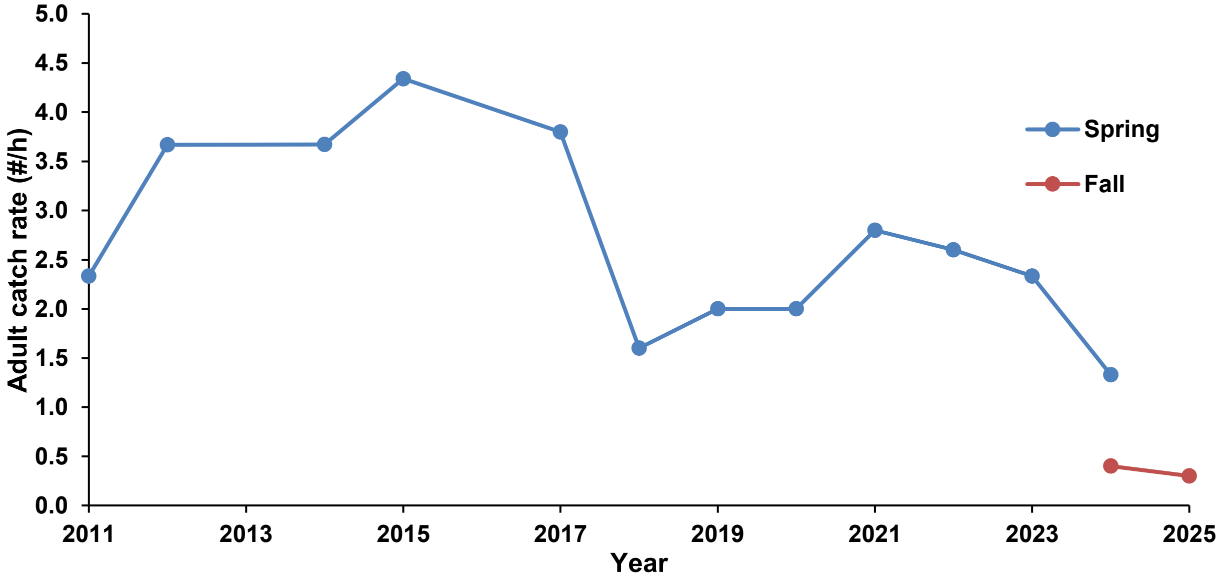

Figure 42. Catch rate of adult smallmouth bass in standard spring and fall electrofishing in Oneida Lake from 2011-2025.

Growth rate of smallmouth bass

Length at age of age-2 and age-5 smallmouth bass is used to index growth rate. Smallmouth bass ages are collected using otoliths from the standard summer gillnet and scale samples from electrofishing. In 2025 sample sizes were very low in both gillnetting (*N*=7) and electrofishing (*N*=4). No age-2 smallmouth bass were caught in the limited samples, in either electrofishing or gillnet. The age-5 mean length at age from electrofishing was 17.2 in (437 mm; Figure 43), the highest we've seen, with no age-5 fish caught in the gillnet. Growth of age-5 smallmouth bass has remained high in recent years, and these growth rates would be in the top 3rd of growth rates found in other NY lakes (Brooking et al. 2018).

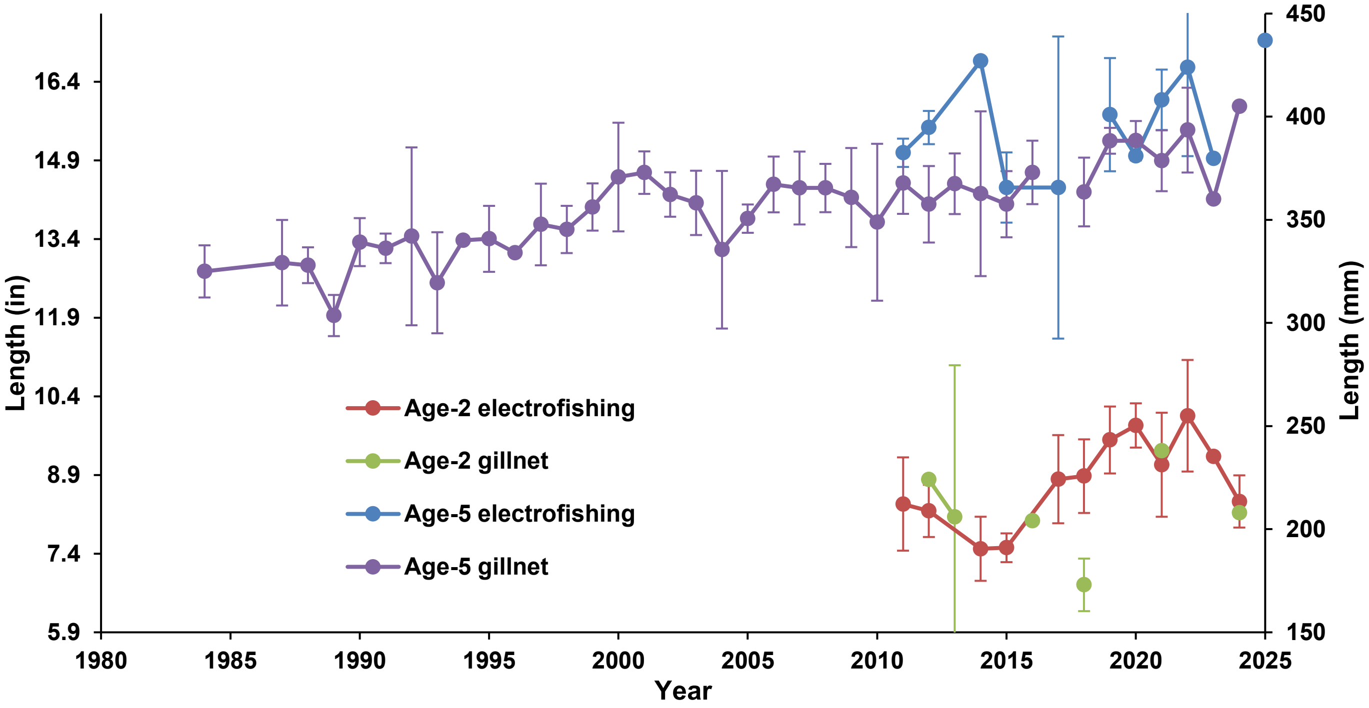

Figure 43. Length at age of age-2 and age-5 smallmouth bass from electrofishing and standard gillnets in Oneida Lake from 1984-2025.

Size structure and relative weight of smallmouth bass

The size structure of smallmouth bass from electrofishing in 2025 indicated a PSD of 100 and RSD_p of 100 (Figure 44) however these are not useful due to the small sample size (*N*=4 fish). While high size structure is usually considered good, it is also an indication of a population experiencing recruitment problems (Bonar et al. 2009).

The relative weight of smallmouth bass was high in both electrofishing and gillnet samples in 2025 (Figure 45). Smallmouth bass W_r has seen record highs in recent years indicating the fish are in excellent condition, likely due to feeding on gobies.

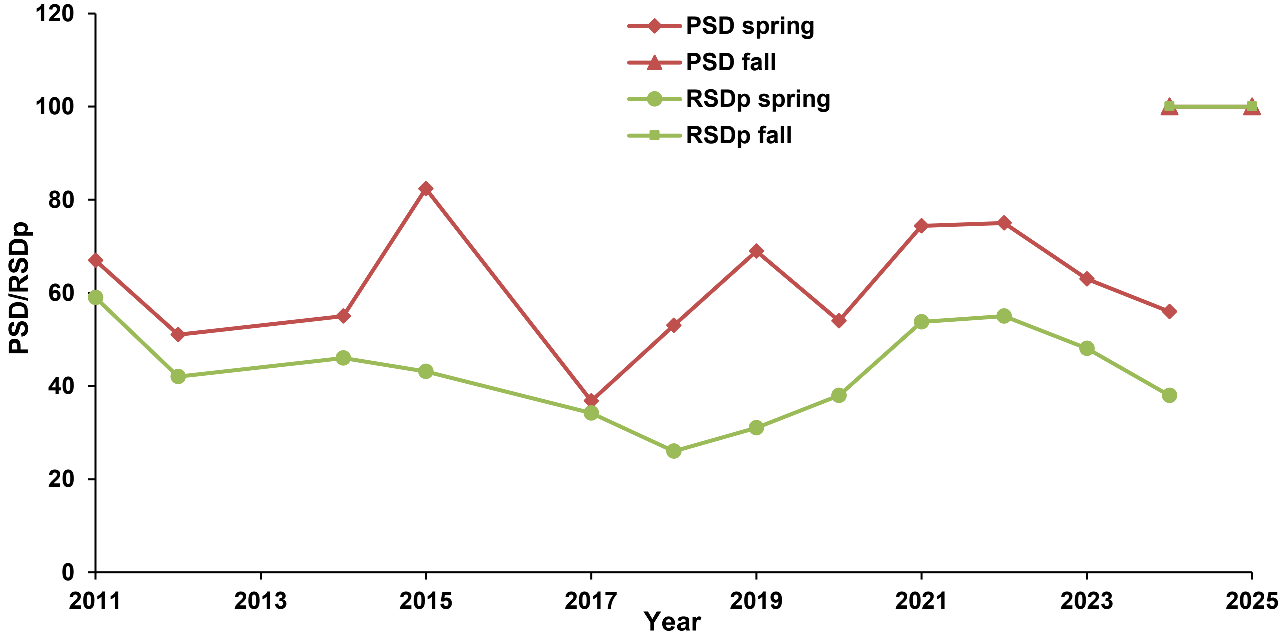

Figure 44. Size structure indices (PSD and RSD$_p$) of smallmouth bass in Oneida Lake in spring and fall electrofishing from 2011-2025.

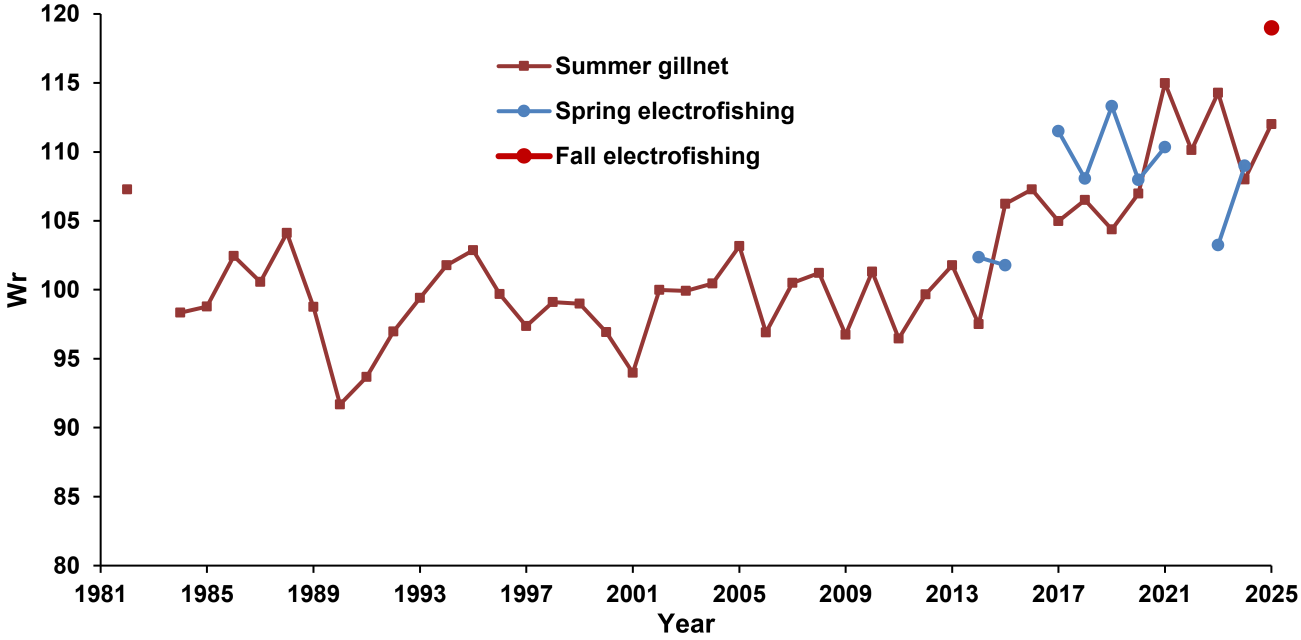

Figure 45. Relative weight of smallmouth bass from standard summer gillnetting, and from spring and fall electrofishing in Oneida Lake from 1982-2025.

Discussion of smallmouth bass populations

The lack of production of age-0 smallmouth bass has been well established through intensive sampling in recent years and is cause for concern. Seine samples beginning in mid-July, as well as bottom trawl samples in late July and early August, establish the lack of age-0 fish even early on in their first year of life with zero catches in recent years. A string of 5-yr consecutive low catches as low as the past 5 has not been observed previously in the long-term datasets for either trawling or seining. Low age-0 catches began in 2015, with continuously very low catches since 2021, representing 11 years of low age-0 catches.

Before further discussions on causes for recruitment decline, we need to establish that there was a relationship between our age-0 index and future recruitment of that year class to the adult population. The relationship between age-0 abundance and future recruitment can be highly variable and age-0 abundance is not always a good predictor of future recruitment (Siepker et al. 2009; see review by Naas 2024), although Philipp et al. (2023) determined reduced fishing effort during spawning season resulted in increased reproductive success which translated to increased annual recruitment in an Ontario lake. We define recruitment here as the number of fish reaching age-3 and index recruitment as the number of fish age-3 and age-4 from a given year class caught in our standard gillnets. For smallmouth bass in Oneida Lake, recruitment was related to the age-0 index as the ln-transformed age-0 index explains 31% of the variability in recruitment (year classes 1985 to 2021, adjusted R^2=0.31, P<0.01, N=37). This relationship can only be explored from 1985 (when we started aging smallmouth bass) to the 2021 year class (as the fish needs to grow for 3 years to reach age-3 when they are reliably caught in our standard gillnets). Although there are years with reasonable recruitment even from low age-0 index values, they are relatively rare. This positive relationship between our age-0 index and future recruitment suggests that age-0 abundance is important for smallmouth bass recruitment in Oneida Lake. Gillnet and trapnet data both indicate adult populations of smallmouth bass began to reflect the decrease as age-2 and age-3 catches beginning in 2017 and 2018, 2-3 years after the age-0 decline began. Given the low age-0 catches in the last 5 years, we should therefore expect continued decline in the smallmouth bass population for the next several years.

Several factors may be responsible for the decline in smallmouth bass and below we examine the support provided by available data for each factor:

<u>Round goby predation on eggs/larva</u> – Round gobies are well-known to be intense nest predators, especially on smallmouth bass. Round goby predation on smallmouth bass nests has been documented in the St. Lawrence River and Lake Ontario (McCarthy 2017; Tufts 2019), Lake Erie (Steinhart et al. 2004b), and Lake Opeongo, Ontario, CA (Steinhart et al. 2005). Further stressors on age-0 smallmouth bass have been shown to result from interference competition and the aggressive nature of round gobies (Winslow 2010). Upon introduction of round gobies to Oneida Lake in 2014, Jackson et al. (2015) hypothesized that one of the most likely negative consequences could be an impact on centrarchid nesting success. However, smallmouth bass populations in other waters (Lake Erie, Lake Ontario, St. Lawrence River) persist despite substantial round goby populations and few, if any, studies have demonstrated population-level effects of increased round goby predation on smallmouth bass nests.

The evidence of a goby effect through nest predation are as follows. Lack of age-0 smallmouth bass as early as our July surveys lends support to mortality in a very early life stage. Round gobies were first found in 2014 and became abundant by 2015 which aligns with the timing that they might be expected to first impact spring spawning of smallmouth bass. Regression analysis of the survey data indicates the round goby index explains 53% of the variance in age-0 smallmouth bass trawl catches (linear regression on log transformed [ln(x+0.01)] abundance data using years 2002-2025 representing an equal number of years pre- and post-round goby; R^2=0.53; P<0.01). Likewise, the round goby index explains 48% of the variance in age-0 smallmouth bass seine catches (same parameters; R^2=0.48; P<0.01). Decreases seen in adult abundance are what would be expected from lack of recruitment.

<u>Increased predation on age-0 smallmouth bass</u> – Recent increases in predator populations could impact age-0 smallmouth bass abundance. There is conflicting information on the strength of negative interactions between walleye and smallmouth bass. Smallmouth bass populations have

declined following proliferation of walleye in some lakes (Kempinger and Carline 1977; Johnson and Hale 1977; Gauthier 2001). Therefore, recent increases in walleye populations could impact age-0 smallmouth bass abundance. However, Wuellner et al. (2011), Galster et al (2012), and Fayram et al. (2005) all found little evidence of negative competitive interactions between smallmouth bass and walleye, and determined the two species often continue to coexist. Frey et al. (2003) determined walleye predation was not responsible for low smallmouth bass recruitment in a Wisconsin lake. Olivencia et al. (2024) determined declines in smallmouth bass or walleye are unlikely due to competitive interactions. Smallmouth bass and walleye populations have coexisted well in Lake Erie for several decades (Ludwig 2025).

Regression analysis indicated adult walleye abundance explained 13% of the variance in age-0 trawl catch of smallmouth bass using the entire dataset (1960-2025; same parameters as above; R^2=0.13; P<0.01) and explained 21% of the variance using the above subset of years pre- and post-goby (R^2=0.21; P=0.02). Walleye abundance was only above average in 2018-2021, which does not align well with age-0 smallmouth bass decreases beginning in 2015 and persisting every year through 2025. Based on walleye abundance, we would expect to see smallmouth bass age-0 abundance near normal levels in 2015-2017 and 2022-2025, which did not happen. A query of walleye diets in our database indicates of the 44,000 walleye diets examined over time, only 44 age-0 smallmouth bass were found in diets (0.01%), though Fetzer et al. (2016) found some predation by walleye on age-0 smallmouth bass in inshore littoral zones, which are not often sampled for walleye diets in the summer though our diet data include shoreline electrofishing in the fall. If predation on juveniles were responsible for the age-0 smallmouth bass decline, we would expect to see a gradual but continuing decline across the summer, which is not what was observed in trawling and seining.

There is not much information on negative effects of adult yellow perch on age-0 smallmouth bass in the literature whether through predation or competition. However, adult yellow perch can be a predator on small fish and a nest predator, and this species has been well-above average in Oneida Lake since 2020.

Regression analysis indicated that adult yellow perch abundance explained 29% of the variance in age-0 smallmouth bass trawl catches for the entire dataset (years; same parameters above; R^2=0.29; P<0.01) and explained 46% of the variance using the above subset of years pre- and post-goby (R^2=0.46; P<0.01). However, our database does not include a single age-0 smallmouth bass identified in over 180,000 adult yellow perch diets. Competitive interactions for zooplankton between young perch and larval smallmouth bass are possible. The yellow perch abundance is likely a confounding variable as there is a positive significant correlation between walleye and yellow perch abundance (1961-2025; same parameters as above; R^2=0.27; P<0.01).

Increased mortality of adult smallmouth bass –
Adult smallmouth bass populations could be declining due to other causes than low age-0 abundance, and in turn result in fewer age-0 fish simply because of decline in the spawning stock. Decrease in the adult stock can occur through harvest, hooking mortality in catch-and-release fisheries, predation by cormorants, and diseases. However, spawning stock is a poor predictor of year class strength in bass in several well studied lakes (Gillooly et al. 2000; Chu et al. 2006).

We analyzed catch curves from smallmouth bass gillnet catch at age to determine if changes in adult mortality might contribute to declining smallmouth bass populations. The average mortality rate of age-3 to age-7 smallmouth bass from 1988-2014 was 0.23, compared to 0.53 from 2015-2025 after round gobies became abundant. Reasons for this were speculative but may include increased mortality due to angling pressure, or increased mortality due to disease. Growth and condition were not likely contributors as they remained high. In fall of 2018, we received multiple complaints from anglers about large numbers of dead smallmouth bass adults. Samples analyzed by the Cornell University Aquatic Animal Health Program in 2018 and throughout the summers of 2019-2020 identified LMBv virus in smallmouth bass. Anglers reported large numbers of dead smallmouth bass but the total impact could not be quantified. This could have contributed to increased adult mortality in recent years. Note that even with higher mortality rates of adults, the adult population decreased gradually based on our sampling unlike the more abrupt decline in age-0 production after 2015. Given this, and the lack of studies implementing spawning stock size as regulating year class strength in smallmouth bass, we do not believe increased mortality of adults is the cause for the lack of recruitment in recent years.

Summary of smallmouth bass

Sampling data provides strong evidence for a large decline in production of age-0 smallmouth bass beginning around 2015. Correlation with round goby populations explains 48%-53% of the variance in age-0 production. Other factors such as walleye predation may contribute to the decline but only explain 13-21% of the variance. The smallmouth bass population experienced disease outbreaks in 2018-2020 but the magnitude of the population-level effects could not be quantified. The gradual decrease in the adult population is what might be expected given lack of recruitment. Almeida et al. (in preparation) is investigating further influences on smallmouth bass populations in Oneida Lake.

White perch – The 2025 gillnet catch of 127 adult white perch was the 2nd lowest in 29 years (Table A2; Figure 46). Gillnet catches of white perch in Oneida Lake were high through the 1980s, and again through the 2000's. However, reduced age-0 catches in 11 of the last 13 years have resulted in adult catches that are less than ¼ of catches during the 2010's. Trawl catches of age-0 in 2025 were 0.74/haul, well below the long-term average of 63/haul (Table A3). Thus, the multiple years of low recruitment should result in a continued decrease of adult white perch in the lake in the next several years.

Declining numbers of white perch in both the trawl and gillnet catch suggest the impacts of white perch on the Oneida Lake ecosystem are greatly reduced from previous years. Diet data indicates white perch consumed large numbers of age-0 fish early in the summer (Brooking et al. 2022). Declining numbers of adult white perch likely contributed to recent increases in survival of larval percids (Jackson et al. 2020; VanDeValk et al. 2016).

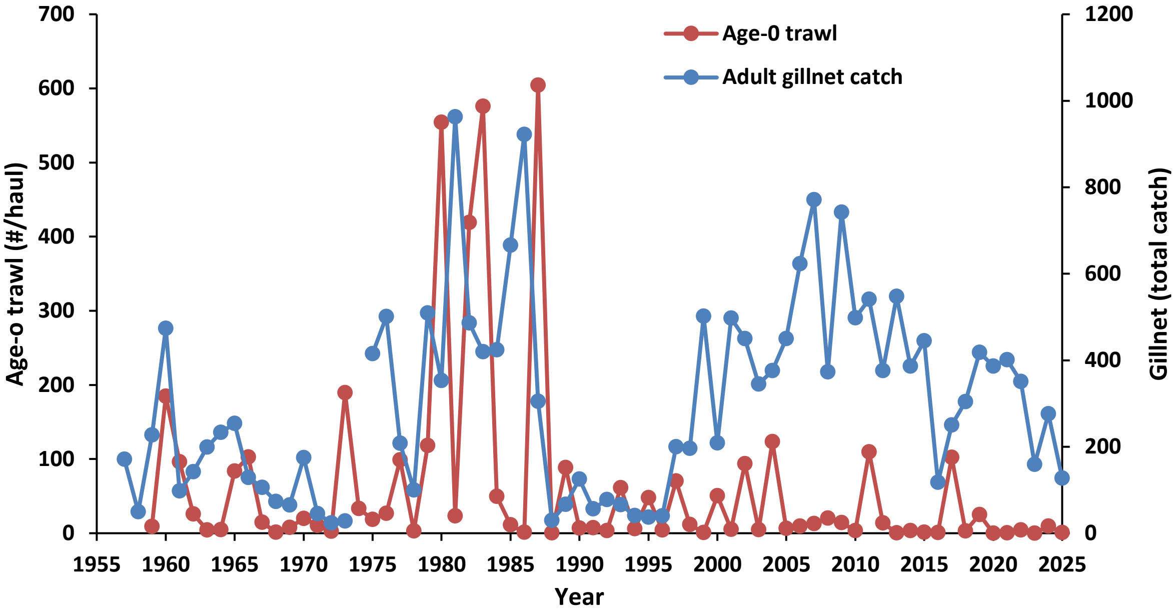

Figure 46. Time trends in annual summer trawl catch of age-0 white perch, and gillnet catch of adult white perch for Oneida Lake since 1961.

Lake sturgeon – Age-0 lake sturgeons were first stocked in Oneida Lake 30 years ago (1995) and are now stocked annually from the Oneida Fish Cultural Station in Constantia. In 2025, 1,000 fish were stocked which is an increase from 500 in recent years due to increased production this year. In spring of 2025, large-mesh gillnetting at 12 sites caught 11 lake sturgeon in May, and 12 lake sturgeon in June. Catch rates have remained fairly stable since netting surveys began in 2002 (23 yrs; Table A13; Figure 47).

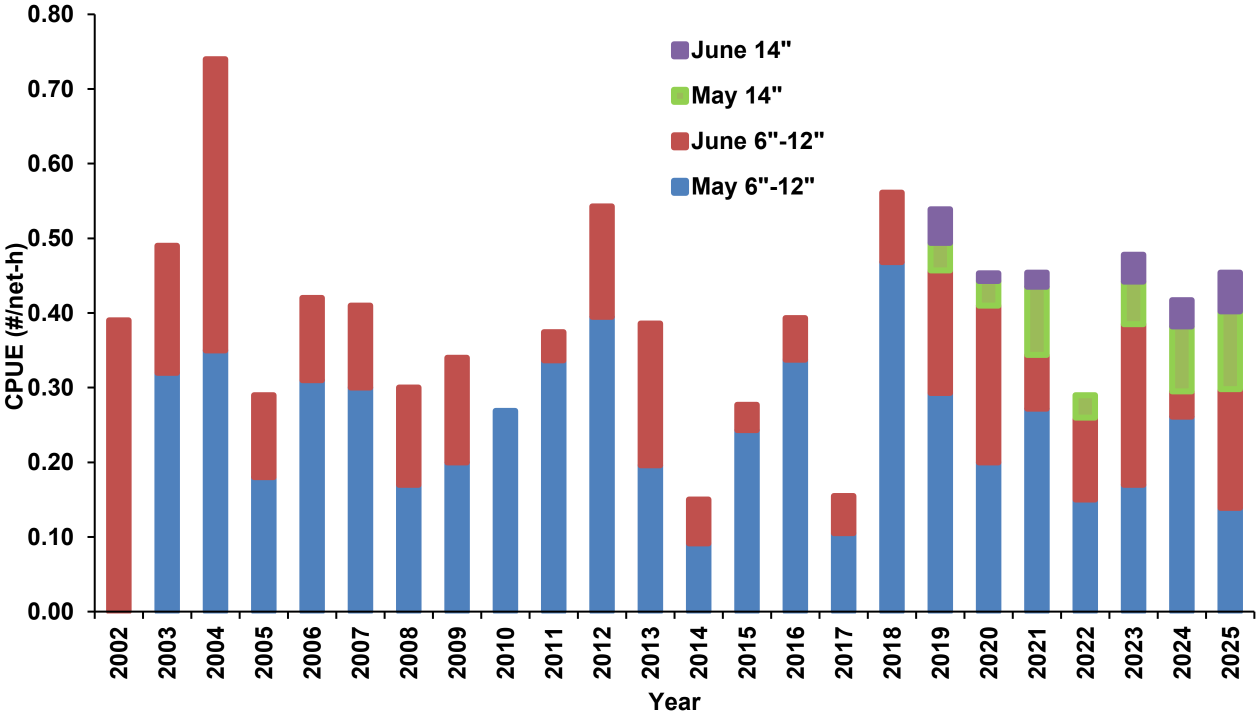

Figure 47. Time trends in spring large mesh gill-net catches of lake sturgeon for Oneida Lake since 2002. No May survey conducted in 2002. Note 14 in mesh panels were added to the gillnets in 2019.

Young sturgeon are caught in our smaller-mesh, standard summer gillnets targeting walleye and yellow perch. In 2025 we caught 10 lake sturgeon in the standard Oneida gillnets. Between both net surveys in 2025, we caught a total of 19 lake sturgeon between age-2 and age-11, and 8 of the 19 (42%) had no tags and are judged to be wild fish from natural reproduction. A total of 55 wild fish have been caught to date. Catch records now include evidence of successful natural reproduction and survival of young from every year from 2011-2023. The ratio of stocked vs. wild fish caught from the years when fish were stocked (2014-2023) was 2.1:1 (overall mean; or 3.0:1 mean of the annual ratios). With 5,507 fish stocked during that period, we estimate natural reproduction has contributed approximately 1,800-2,600 age-2 and older fish to date. The Jewell gillnet site at the northeastern shore has produced 31 of the 55 wild lake sturgeon, with no other site contributing more than 5 fish, which is deserving of further investigation.

In 2024 and again in 2025, we sampled environmental DNA (eDNA) levels in 3 tributaries of Oneida Lake to detect presence of lake sturgeon, as part of a collaborative project with USFWS Northeast Fishery Center. Samples were taken in Fish Creek, Chittenango Creek, and Oneida Creek in May to detect presence of potential spawning activity, and again in July to detect summer presence or absence. Fish Creek samples were positive for lake sturgeon eDNA in May of both years. Oneida Creek was negative in 2024 but tested positive in 10 of 10 samples in May 2025. No positive samples were found in Chittenango Creek, and none of the tributaries tested positive in July of either year. The results in Fish Creek are not surprising given that angler tag returns, angling reports, and netting surveys have previously identified lake sturgeon use of Fish Creek during the spawning season. The positive result from Oneida Creek in 2025 is the first indication of sturgeon activity in Oneida Creek during the spawning season. It is surprising that no sturgeon activity has been identified in Chittenango Creek by eDNA, tagging, or anglers given that substantial habitat and flow is present. In 2026, we plan to put telemetry tags in 10-15 lake sturgeon in cooperation with NYSDEC Region 7, which should provide more insight into sturgeon movement and tributary use.

Round goby - Round goby were first found in our surveys in 2014 and became abundant by 2015. We use several gears to measure the relative abundance of round goby. Video surveys have been used to assess round goby abundance across a wide range of substrates (Johnson et al. 2005; Schaner et al. 2009; Andres et al. 2020), and large catches of round gobies are also found in trawling, seining, and diets of fish and cormorants.

The 2025 video survey at 47 sites encountered 105 round gobies for an estimated abundance of 10,957/ac (27,075/ha; Table A14; Figure 48). This is about half the maximum density found in 2023. Round gobies were 3.1 times more abundant in sites with hard substrates than soft substrates, however soft substrates cover 5.9 times more of the lake area than hard substrates. Density estimates from video surveys in other lakes include 7,365/ac in Cayuga Lake (Andres et al. 2020), 17,000/ac in Lake Ontario (Karatayev et al. 2021), and 15,700/ac in Bay of Quinte (Taraborelli et al. 2009). Potential attraction/avoidance to the video apparatus is unknown in most of these studies including ours.

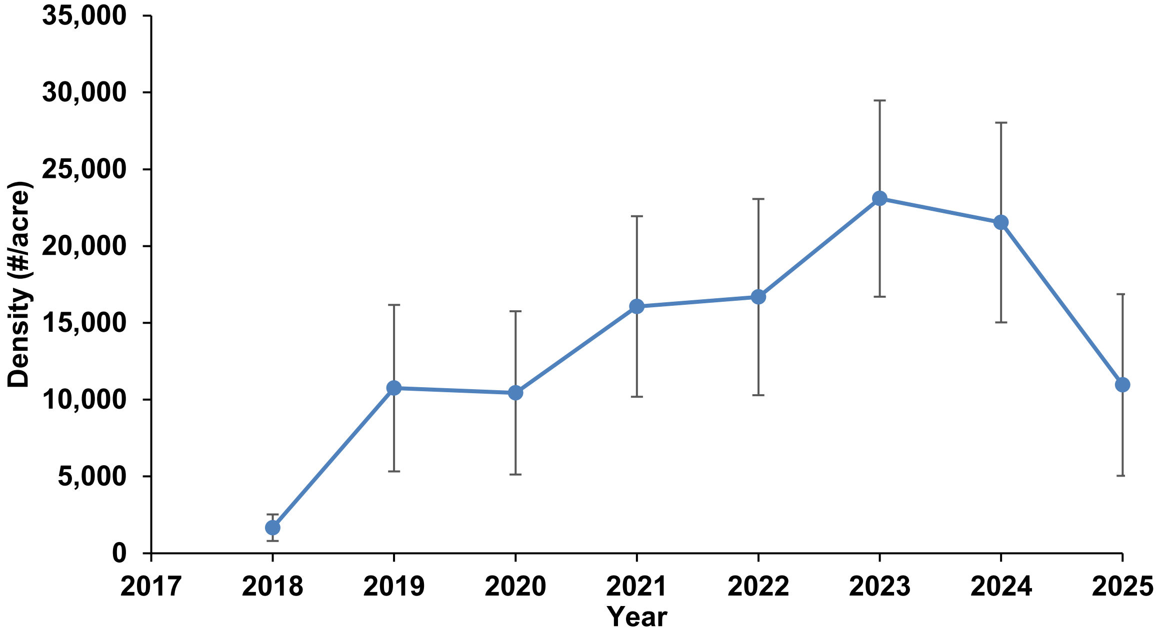

Figure 48. Density of round goby estimated from video surveys since 2018. Error bars represent 90% confidence limits.

The standard seine surveys caught 3,696 round gobies in 27 hauls or 137/haul in 2025 (Table A4) which is about 67% of the highest catch in 2023. Standard 18 ft trawling caught 2,524 round gobies in 120 hauls or 21/haul which is the 4th highest in the 11-year dataset. We can combine indices from all gears which index goby by calculating the percent of the maximum catch each year in each gear to estimate an annual relative abundance. This Goby Index estimates round gobies were about 74% of their maximum observed abundance in 2025 (Figure 49).

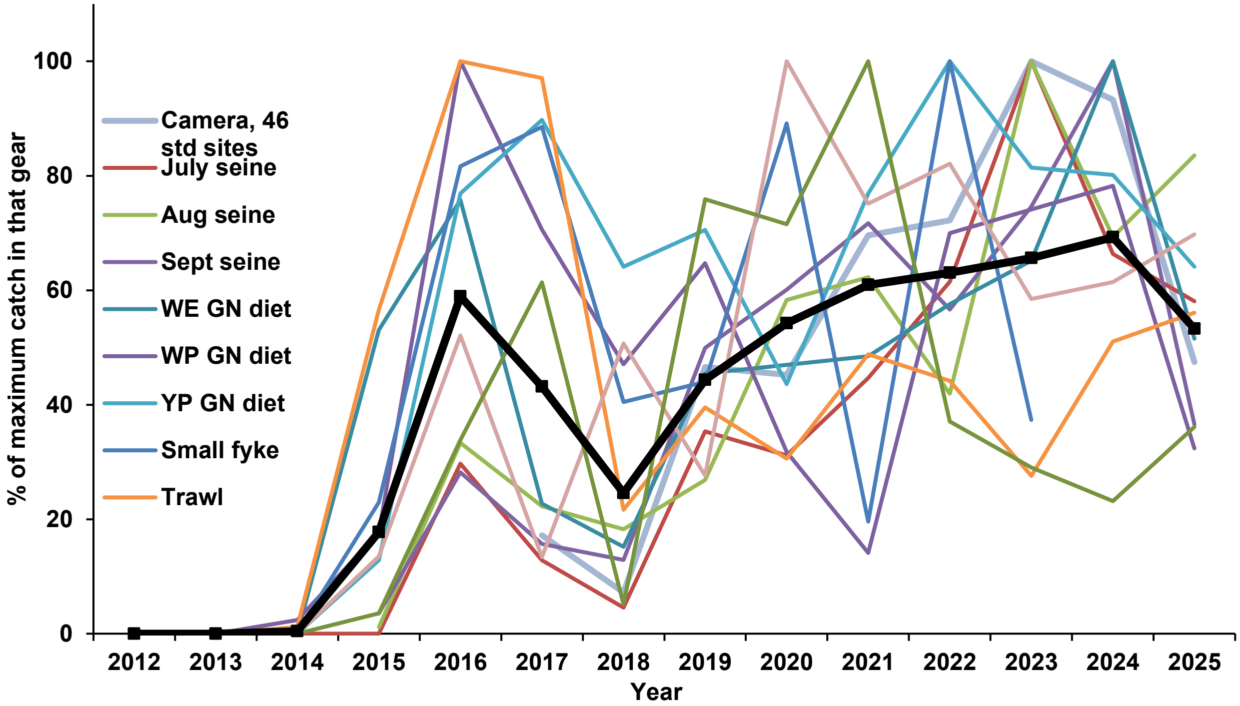

Figure 49. Index of round goby expressed as the mean percent of the maximum catch in each gear since 2012.

Establishment of a round goby population appears to be having mixed effects on the other biota in Oneida Lake. Round gobies are utilized as prey for piscivores such as walleye, smallmouth bass, yellow perch, and white perch in Oneida Lake. In Lake Erie, round gobies were detected in the diets of all piscivorous species examined including smallmouth bass, yellow perch and burbot (Steinhart et al. 2004a; Crane and Einhouse 2016). Conversely, analyses indicate round goby likely have a negative impact on benthic invertebrate densities in Oneida Lake (Brooking et al. 2022) and elsewhere (Lederer et al. 2008), along with increased predation on nests of centrarchid species in Lake Erie (Steinhart et al. 2004a; Steinhart et al. 2005), Lake Ontario, and the St. Lawrence River, New York (Killourhy 2013; McCarthy 2017; Leblanc et al. 2020).). We will continue to monitor impacts of round gobies on fish diets and growth as well as recruitment in Oneida Lake.

Pelagic fish survey – Abundance of emerald shiner and age-0 gizzard shad are estimated on September 1 each year using hydroacoustics with supporting small-mesh gill nets and midwater trawling. We caught 308 age-0 gizzard shad in 8 small-mesh gillnet sites in 2025 (38.5/net) continuing a trend of low abundance seen in the last 7 years (Table A15; Figure 50). No emerald shiners were caught in the small-mesh nets, which has happened only one other time in the last 32 years.

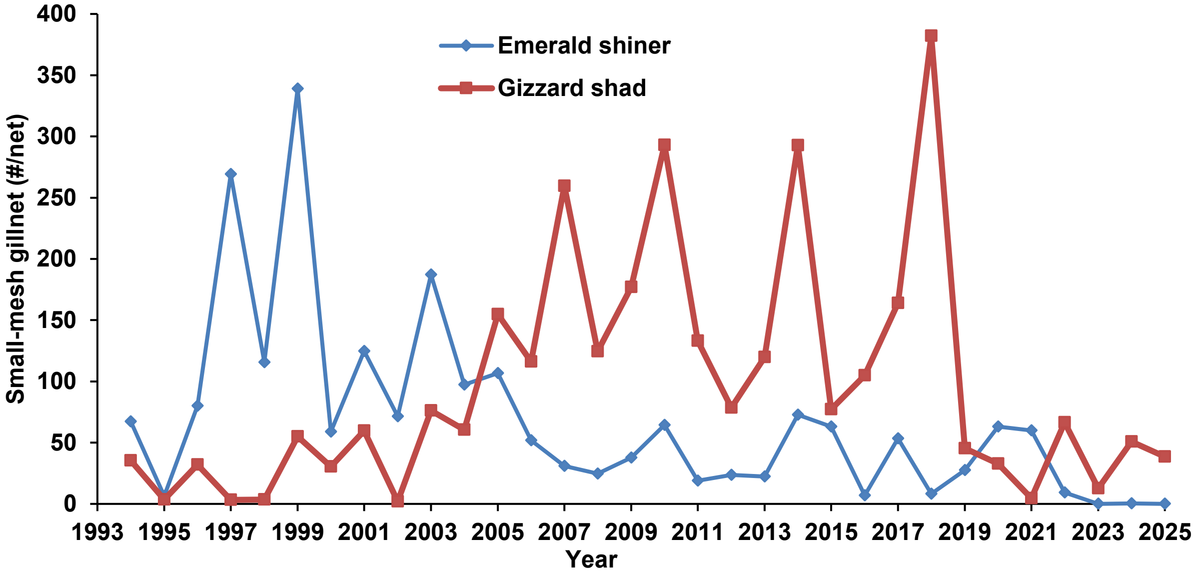

Figure 50. Small-mesh gillnet catch (#/net) of gizzard shad and emerald shiner in Oneida Lake 1993-2025.

The catch of emerald shiner in 16 midwater fry trawls was 1.3/haul, the 3rd lowest in the 28 year dataset, continuing a trend of low catches in recent years (Figure 51). Conversely, we saw the highest catch rate of age-0 *Lepomis* sp. (bluegill and pumpkinseed) in the dataset (33.2/haul). Larval round goby (3.8/haul) were not as abundant as some past years.

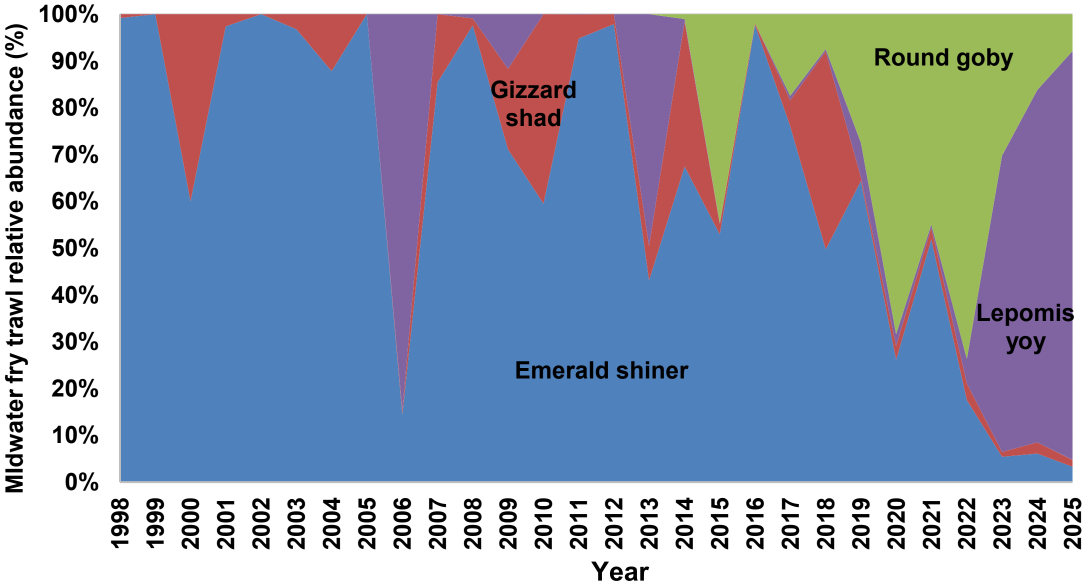

Figure 51. Relative abundance of midwater fry trawl catch in Oneida lake from 1998-2025.

Based on the hydroacoustic survey and the net catches, we estimated the abundance of age-0 gizzard shad was 159/ac (393/ha) in 2025. This is the 3rd lowest since 1999 (Table A15; Figure 52). Abundance of emerald shiner was estimated at 21/ac (53/ha), the 2nd lowest in the 33-yr dataset. The most abundant pelagic fish were age-0 *Lepomis* sp. (465/ac) which were too small (10-30 mm) to have much value as prey for adult walleye. No alewife *Alosa pseudoharengus* or blueback herring *A. aestivalis* were caught in 2025, despite known occurrences in connecting waters (Oneida River and Mohawk River).

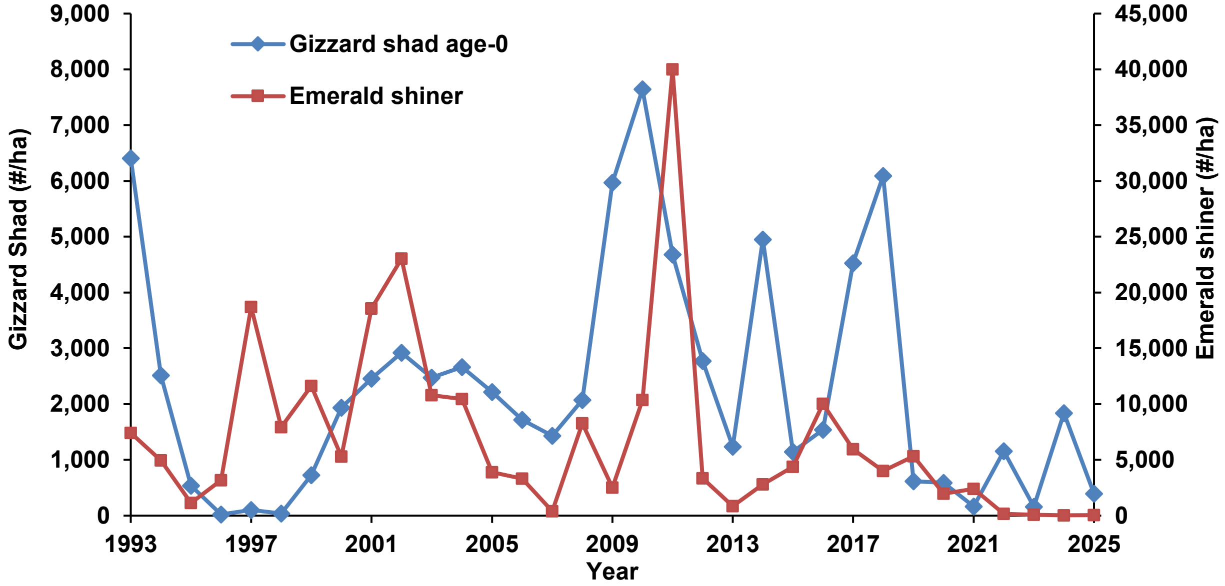

Figure 52. Acoustic abundance (#/ac) of gizzard shad and emerald shiner in Oneida Lake 1994-2025.

The catches in small-mesh gillnets were strongly correlated with the acoustic abundance for gizzard shad *Dorosoma cepedianum* (Figure 53; linear regression: R^2=0.58; P<0.01). There was a weak but significant correlation between emerald shiner *Notropis atherinoides* midwater trawl catch and acoustic abundance (linear regression: R^2=0.11; p=0.04).

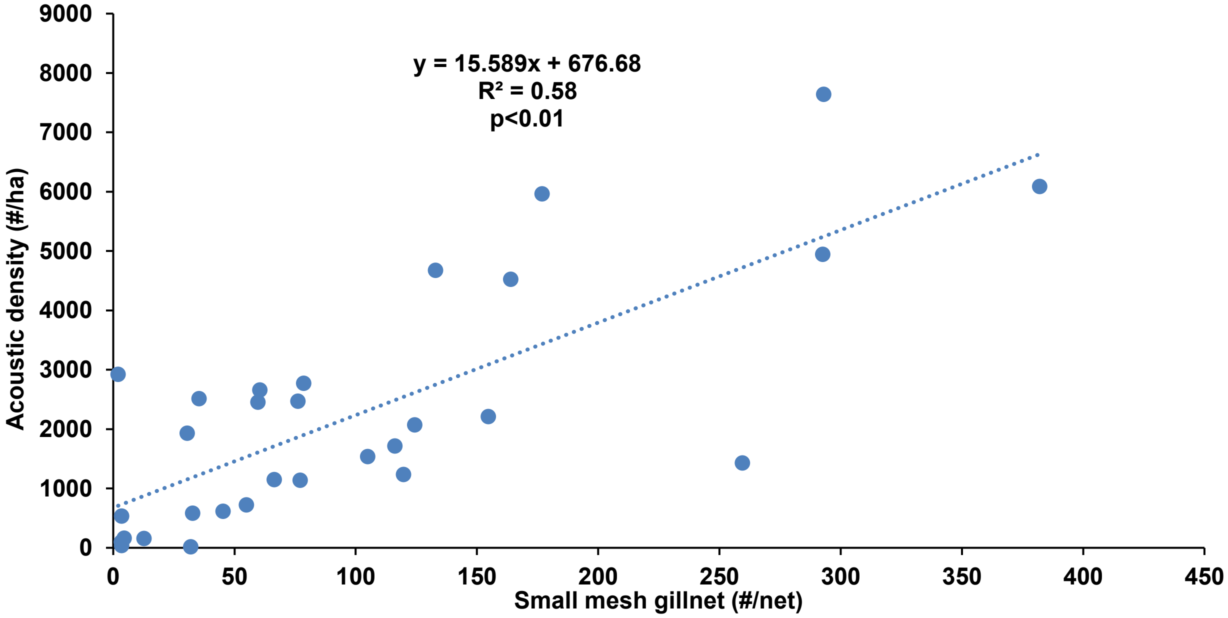

Figure 53. Small-mesh gillnet catch of gizzard shad vs. density estimated from acoustics, 1993-2025.

<u>Double-crested cormorants</u> - Since the early 2000s the double-crested cormorant population on Oneida Lake has been managed through active hazing and nest limitation by NYSDEC (Coleman et al. 2016). In recent years, the target goal was no more than 100 double-crested cormorants on the lake and no successful nesting. In 2025, hazing to about 200 birds through the first part of the summer, increasing to over 500 beginning around 8/1/25 and peaking at 1,091 birds on 9/9/25 (Table A16; Figure 54). The number of feeding days by double-crested cormorants on Oneida Lake in 2025 was 85,274 which is about equal to the 10-yr average (82,167) with full season hazing efforts (Figure 55). Much of the consumption (mean=78% from 2014-2025) occurs after the beginning of August, when large flocks of cormorants begin migrating from the Eastern Basin of Lake Ontario and elsewhere.

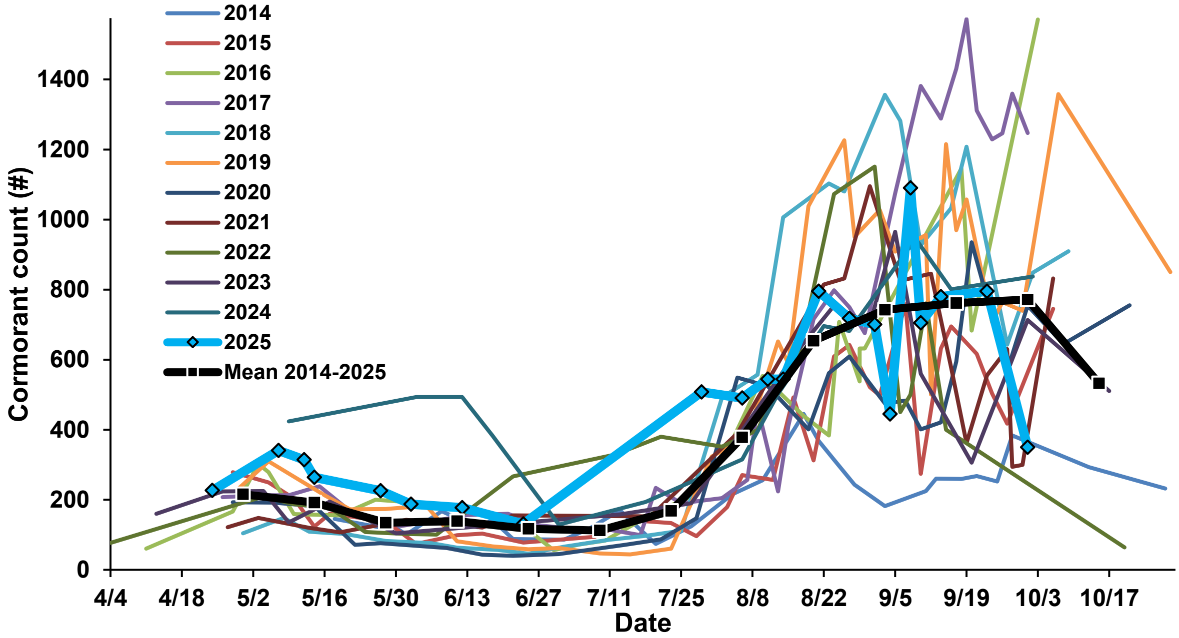

Figure 54. Cormorant counts by week over the course of the summer in Oneida Lake in years since hazing was initiated, 2014-2025.

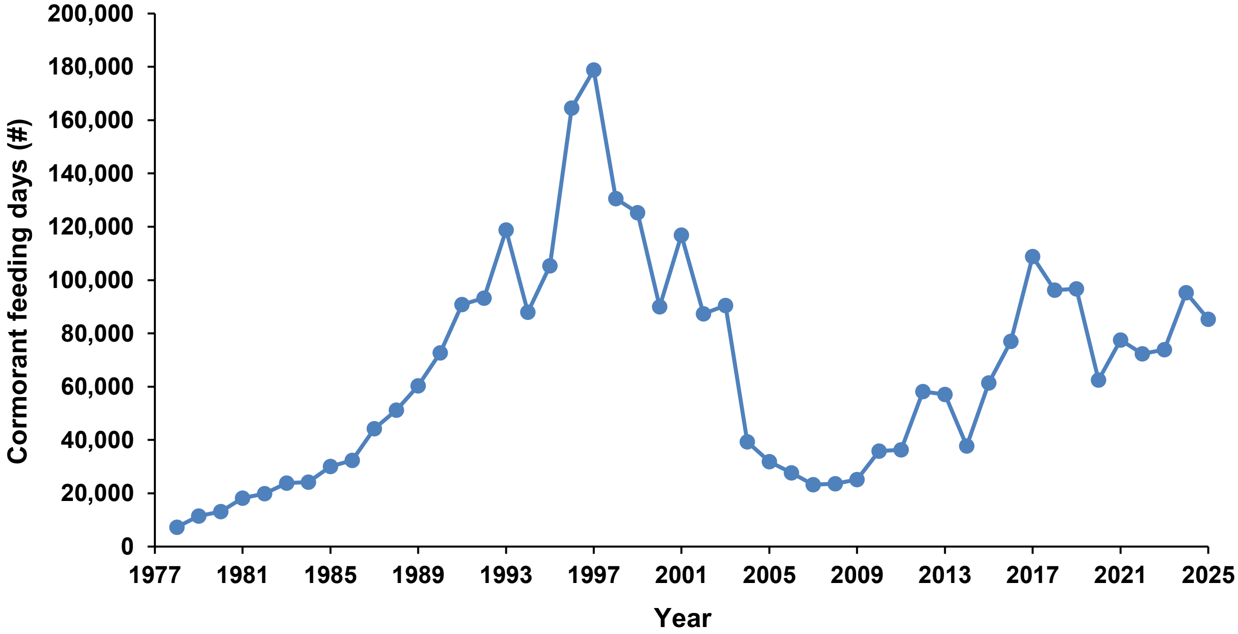

Figure 55. Total annual feeding days of double-crested cormorants on Oneida Lake since 1978. Feeding days calculated from weekly bird counts conducted by USDA Wildlife Services (2004-2009) and NYSDEC personnel.

Diets were examined from 270 birds in 2025. A total of 1,221 prey items were identified (Table A16; Figure 56). The most common prey items numerically were round goby (64%) followed by gizzard shad (20%) and yellow perch (14%). By weight, yellow perch made up 51% of double-crested cormorant diets, followed by walleye (28%), gizzard shad (9%) and round goby (8%). Seven other species accounted for 3% of the diet. Based on the number of feeding days and diet composition, assuming cormorants ate 1 lb of fish per day, we estimate cormorants consumed 10,453 age-3 and older walleye and 58,565 age-3 and older yellow perch in 2025 (see Table A16 for other ages). These values are within the range of percids consumed over the last decade, but are much higher than the years 2004-2015 due mainly to two factors: 1) fall cormorants numbers have been higher than during the intensive harassment years, and 2) abundance of alternate prey such as gizzard shad and emerald shiner have been much lower than during the previous period.

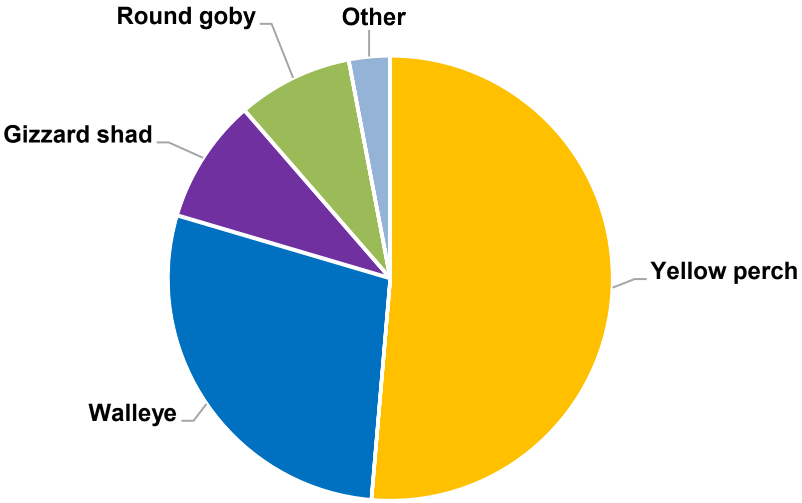

Figure 56. Percent composition of 270 double-crested cormorant diets by weight in 2025 from Oneida Lake.

Analyses of double-crested cormorant diets over a 20-year span found positive selection for schooling, soft-bodied prey such as gizzard shad when they were available. Predation on percids in the latter half of the summer was likely buffered in years when gizzard shad were abundant in the fall (Rudstam et al. 2004; DeBruyne et al. 2013). Since 2019 when gizzard shad decreased, 72% of double-crested cormorant diet by weight has consisted of walleye (27%) and yellow perch (45%). To date, round goby have been a minor contributor to double-crested cormorant diets, accounting for an average of 14% of the total biomass of fish consumed since they became abundant in 2015 (Figure 57).

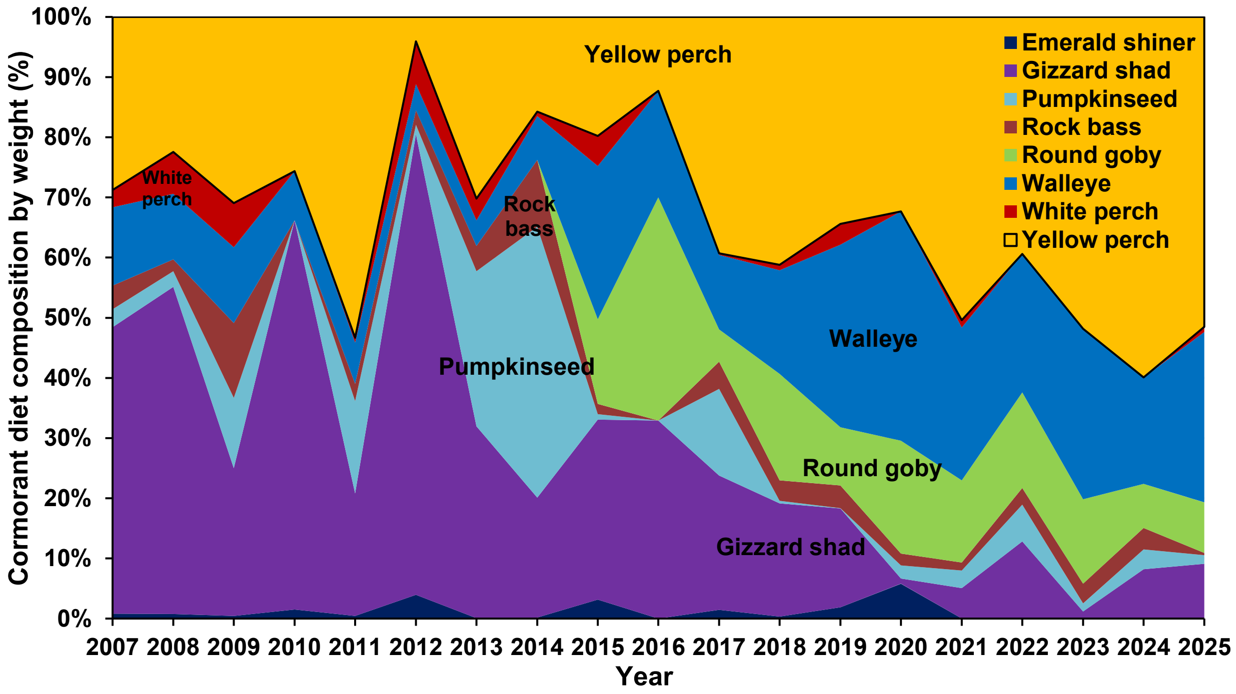

Figure 57. Percent composition by weight of major species in double-crested cormorant diets from 2007-2025 in Oneida Lake.

Angler survey- In recent years, we have used an abbreviated angler survey each year to measure catch and harvest rates, interviewing anglers at access points during June and July. At about 5-year intervals, we do a year-round roving survey of anglers out on the lake from May 1st right through the full ice fishing season. In 2025 we completed both of these angler surveys concurrently. Note that we had to use slightly different methods from prior surveys (no tower counts of boats) due to circumstances beyond our control, however we strived to make them as comparable as possible to previous surveys. In addition, we completed a fall shoreline night angler survey, and a full season ice fishing survey. The following sections summarize major findings, while a full Angler Survey Report for the 2025-2026 survey will be forthcoming.

Access point survey

We conducted 290 interviews of anglers at the 3 major boat launches (South Shore Boat Launch [*N*=172], Oneida Shores County Park [*N*=87], and Godfrey Point Boat Launch [*N*=31]) from 6/1/25-7/31/25, encompassing 516 total anglers. The catch rate for walleye (all trips) averaged 0.69/h and the mean targeted catch rate was 0.90/h (Table A17). The targeted catch rate for walleye was 2.2 times higher than the long-term average (0.43/h). In other NY waters, catch rates for all anglers exceeding 0.25/h are considered excellent in NY, while targeted catch rates approaching 0.50/h are considered excellent (Festa et al. 1987). The smallmouth bass catch rate from the access point surveys (all trips) averaged 0.14/h for all anglers and 0.40/h for anglers targeting bass. The targeted catch rate was 27% below the long-term average (0.55/h).

Summer roving angler survey

Effort – In 2025 we were unable to do instantaneous tower counts of boats, as has been done in all past surveys. Instead, we instituted roving progressive counts of boats in 8 areas of the lake. Effort calculations were stratified by month, day type (weekend-holiday or weekday), and by area. By doing this we treated the count in each area as an instantaneous count for that area, with counts averaged by month and day type. Boats that were moving and recreational/non-fishing boats were excluded. Roving boat counts were done on 91 dates from 5/1/25-10/31/25. The estimated monthly effort ranged from 42,680 angler-h in June to 13,441 angler-h in October (Table A17; Figure 58). Total effort for the summer open water season (May-October) was estimated to be 173,456 angler-h. Note that this effort data uses a different method than was used in the past, when tower counts were made from Shackelton point twice a day and averaged, then corrected using airplane flyovers. The correction was non-linear but the average correction factor was approximately 2.3. The comparability of these two methods for estimating effort is unknown and will be explored further in a final report on the creel survey.

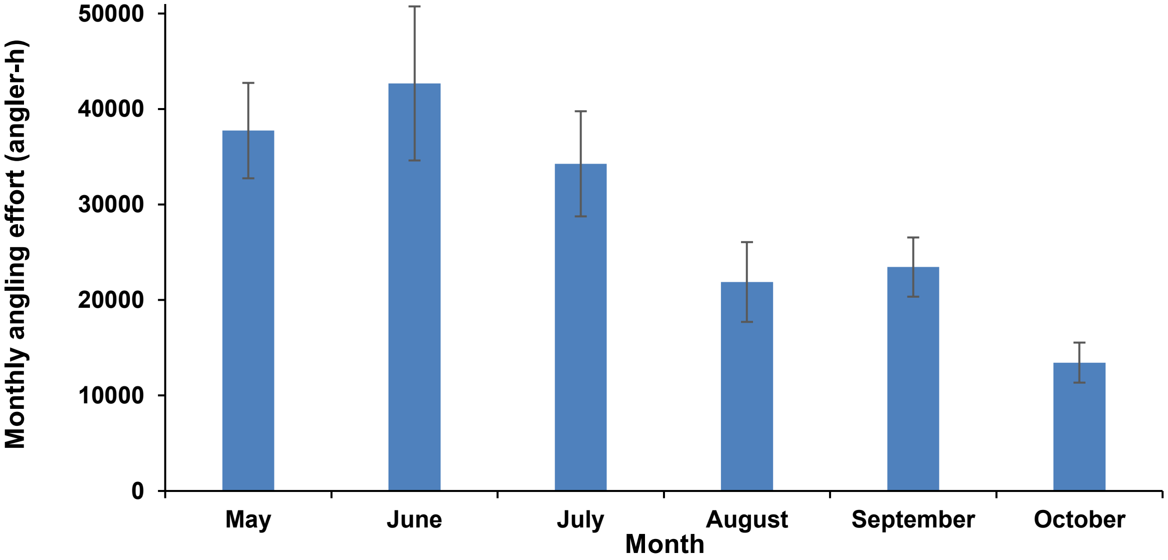

Figure 58. Monthly total angling effort (angler-h) on Oneida Lake from May-October 2025.

Catch rates – On the 91 summer roving survey dates, we interviewed 1,523 boats consisting of 2,898 anglers. Overall, 72% of anglers reported targeting walleye, and 16% reported targeting bass. The average catch rate for walleye was 0.71 fish/h for all anglers and 0.83 fish/h for anglers targeting walleye (Table A18; Figure 59). These catch rates are similar to those obtained from completed trips at the access point interviews. These are the highest walleye catch rates seen in 24 angler surveys on Oneida Lake between 1958-2025 and are 2.6 times the average catch rate for all anglers (0.27/h) and 1.9 times the average catch rate for anglers targeting walleye (0.43/h). These catch rates compare favorably to other lakes in NY (Festa et al. 1987). The catch rate for smallmouth bass was 0.07/h for all anglers (Figure 60) and 0.37/h for anglers targeting bass (Figure 61). This is the lowest targeted catch rate of smallmouth bass in 8 years and the 2nd lowest in 20 years, about 41% of the long-term catch rate for all anglers (0.17/h), and about 67% of the long-term targeted catch rate (0.55/h). The smallmouth bass angler catch rates show a similar pattern to the smallmouth bass population indexed by the gillnet catch (Figure 62). The catch rate for largemouth bass was 0.03/h for all anglers and 0.16/h for anglers targeting bass, which are both about half the catch rate of smallmouth bass. These catch rates are preliminary and will be refined once analysis is complete for the final creel survey report.

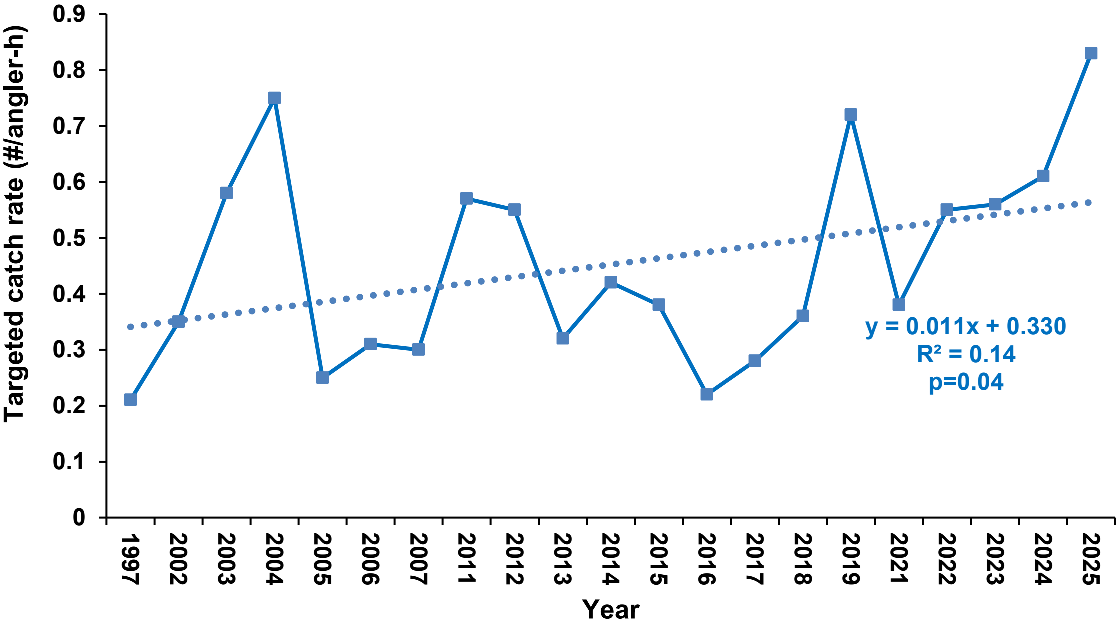

Figure 59. Targeted angler catch rates for walleye in Oneida Lake in most years since 1997.

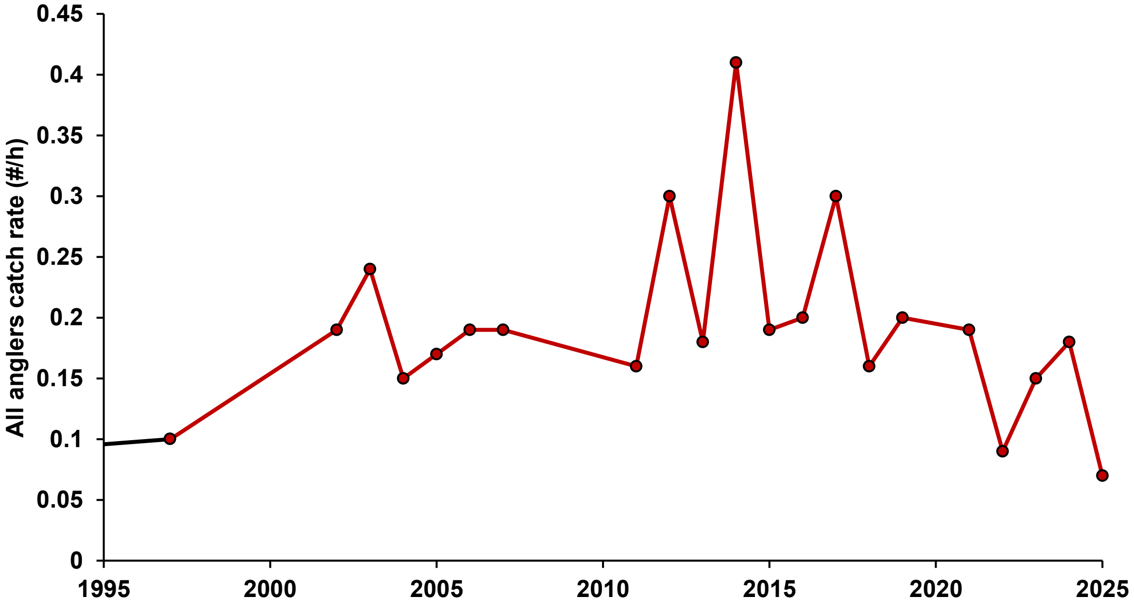

Figure 60. Angler catch rates of smallmouth bass for all anglers (top panel) and anglers targeting bass (bottom panel) in Oneida Lake in most years since 1997.

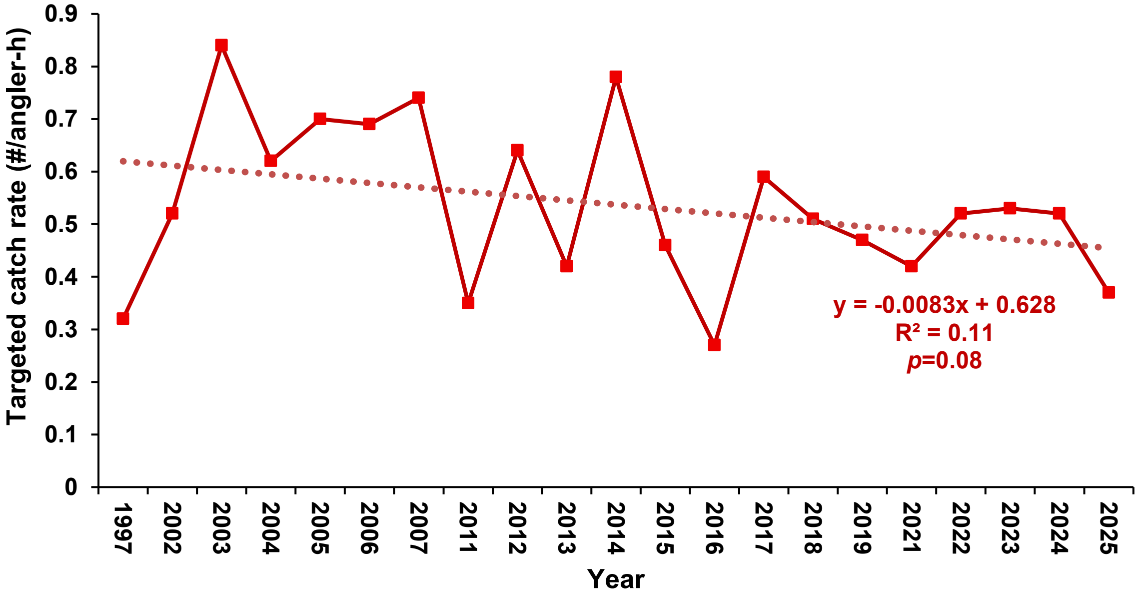

Figure 61. Angler catch rates of smallmouth bass for all anglers (top panel) and anglers targeting bass (bottom panel) in Oneida Lake in most years since 1997.

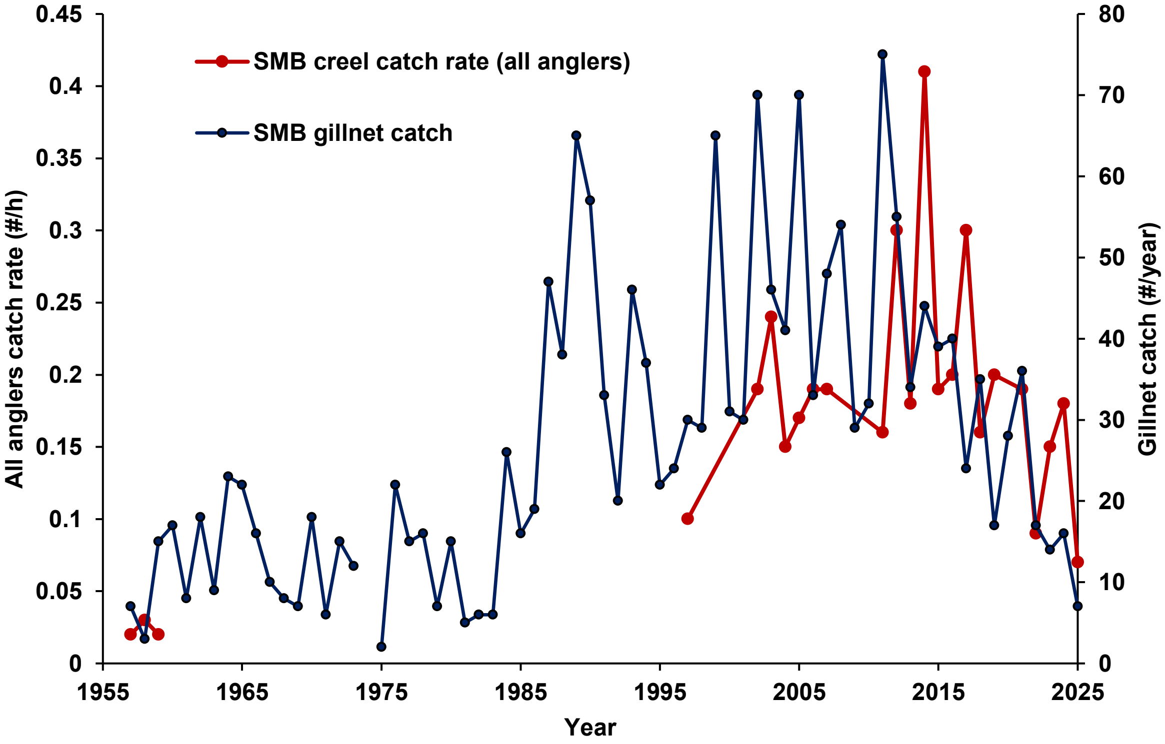

Figure 62. Angler catch rates of smallmouth bass for all anglers compared to gillnet catch of smallmouth bass.

Based on the catch rate and effort calculations, our preliminary estimates indicate during the open water fishing season, anglers harvested approximately 40,000 walleye and 30,000 yellow perch, however these numbers will be refined once analysis is complete for the final creel survey report.

Fall night shoreline survey

In 2025 we began a trial survey of fall night shoreline anglers. This fall fishery is well-known for having high walleye catch rates during a short 1-2 h period around dusk. Observations combined with survey experience indicated the shoreline fall night fishery extended from about 9/20/25 to 11/30/25, a period of approximately 72 days.

In the first part of this preliminary trial, we counted shore anglers at dusk from a boat driven around the shoreline using a spotlight. One of the 8 areas of the lake was completed each night, however only 7 total runs were made due to weather and other factors. The average count was 9.0 anglers per area, which when expanded to the 8 lake areas would be 72 anglers per night or 5,184 angler-nights over the 72-day period. This estimate should be viewed with caution as sample sizes are not large enough for a reliable estimate.

In the 2nd part of the trial, we counted and interviewed anglers at every access point possible (13 sites) by driving a vehicle in a complete circumference of the lake each survey night. We made 152 counts over 12 days from 11/13/25 – 11/30/25 and counted 82 anglers. The average nightly count for the entire lake was 6.8 anglers per night, or 490 angler-nights for the season. We interviewed 57 angling parties (80 anglers) that had an average walleye catch rate of 0.24/h. This catch rate seems low based on discussions with other anglers, who often report catching 10 walleye or more in a 2-hour period. Mean time fished was 1.62 h/trip or 794 total angler-h, resulting in an estimated catch of 191 walleye over the 72-day period, which is very low. Even if we apply the catch rate of 0.24/h to the 5,184 angler-nights estimated above, the walleye catch would only be 1,244 walleye. If we used the highest catch rate of 0.95/h from the targeted roving creel survey with the highest estimate of fall angler-nights, the walleye catch would be 4,925 walleye. Telemetry tag returns indicate that 35% of the walleye harvest occurs during this fall time period. However, despite the tag returns and the popularity and publicity attributed to the fall night shoreline fishery, our data has not indicated a substantial harvest during this period.

Winter angler survey

Winter effort – Ice conditions were very good this winter, and the winter angler survey ran from 12/15/25 - 3/8/25, a period of 84 days. Most counts and roving interviews were done from access points or by foot on the ice. Anglers and shanties were counted using the same 8 lake areas as the summer roving survey. To estimate the number of anglers in shanties, we multiplied the number of shanties by the average party size (1.83) from the ice angler interviews. Total daily counts ranged as high as 935 anglers with several daily counts that exceeded 700 anglers (Figure 63). Total angling effort was estimated to be 253,901 total angler hours (Figure 64), however these numbers will be refined once analysis is complete for the final creel survey report.

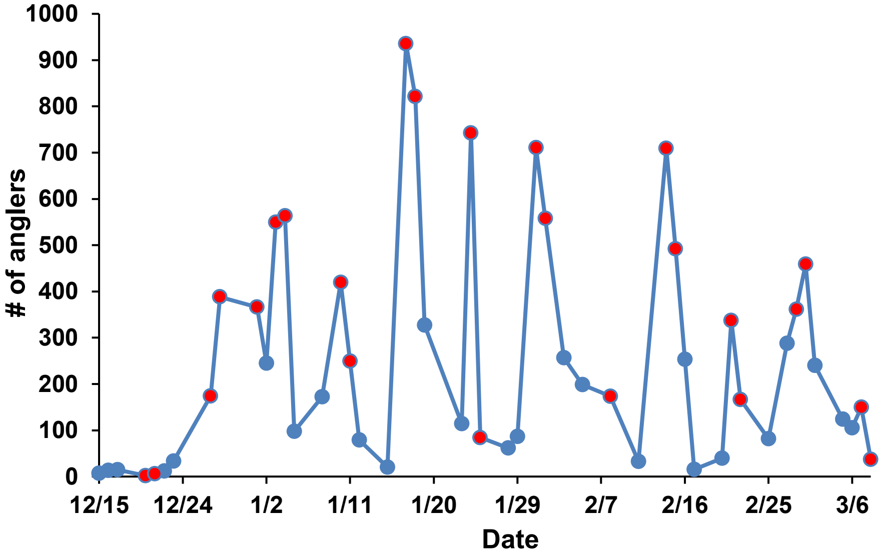

Figure 63. Daily total counts of ice anglers on Oneida Lake from December 2025 to March 2026. Red points indicate weekend days (and holidays), blue points indicate weekdays.

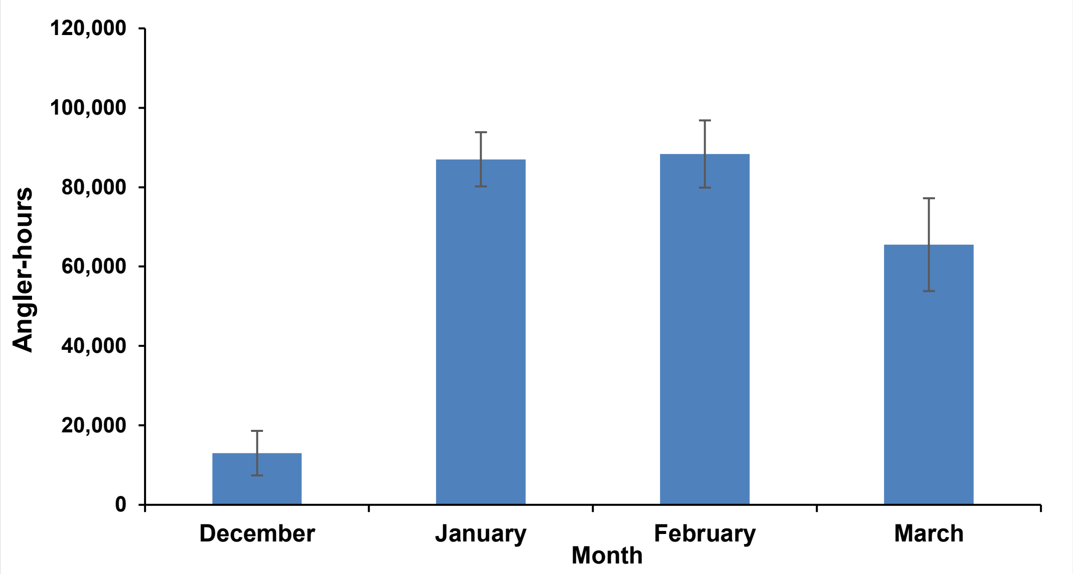

Figure 64. Monthly estimates of total angler-hours for the winter ice fishery on Oneida Lake from December 2025 to March 2026.

Winter catch rates - A total of 465 parties were interviewed encompassing 853 people. Most anglers targeted walleye (72%) and yellow perch (68%), with 16% targeting anything, and <1% targeting panfish. Walleye catch rates were 0.18/h for all anglers, and targeted catch rate of 0.22/h. Yellow perch were the most abundant species caught with a catch rate of 0.85/h for all anglers, and 0.95/h for anglers targeting yellow perch. Based on the catch rate and effort calculations, preliminary estimates indicate anglers harvested approximately 13,000 walleye and 120,000 yellow perch during the winter season, however these numbers will be refined once analysis is complete for the final creel survey report.

Zip code analysis

Anglers we interviewed in all surveys were asked to provide their zip code of origin. We recorded zip codes on 8,590 anglers in 2025. Overall, 82% of anglers were from within NY state. Most anglers originated from the immediate Central NY area, along with concentrations that generally follow the NYS Thruway from Albany to Buffalo, and along the Route 81 corridor from Watertown south through PA and into the Chesapeake Bay area (Figure 65). The highest percentage of out-of-state anglers was found in the summer roving survey (23%) while the ice fishing survey and fall night shoreline survey found >95% of anglers from NY. States with the highest contributions of anglers were NY (82%), PA (13%), NJ (0.9%), FL (0.6%), CT (0.5%) and MA (0.5%). A few anglers originated from as far away as FL, TX, and WA.

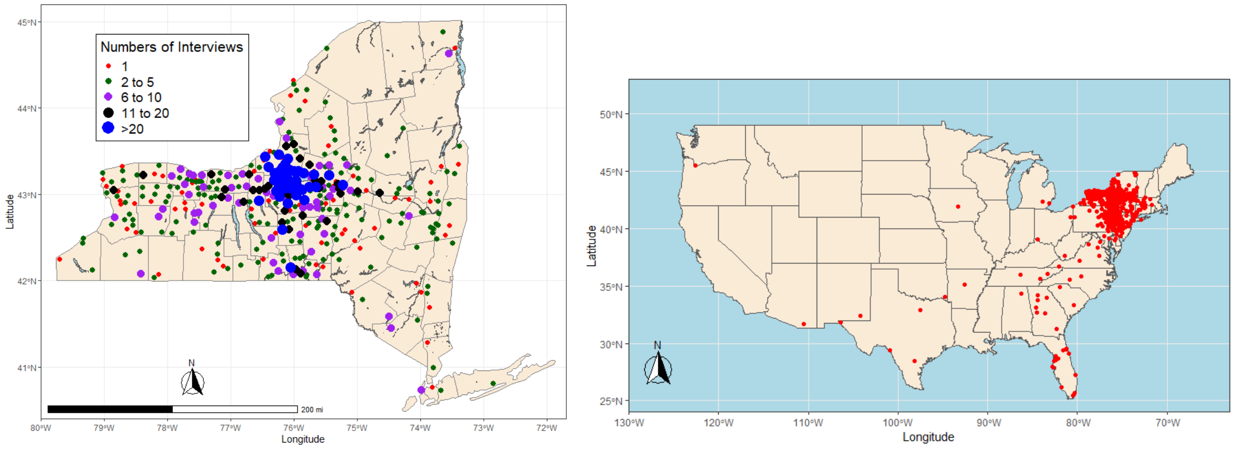

Figure 65. Angler origins determined from zip codes in Oneida Lake angler surveys in 2025-2026.

Angler opinion questions

Additional survey questions addressed angler opinions about the fishery. In 2025, three questions were included in the survey. The preliminary data reported below is for the launch interviews and summer roving interviews combined and does not yet include the ice fishing surveys.

Question 1. Are you aware of the walleye telemetry study that is currently being conducted?

In the 2025 launch interviews, 53% of 290 respondents said they were aware of the study. In the roving interviews, 42% of 1,508 respondents said they were aware of the study. The same question in 2024 indicated only 30% of respondents were aware of the study (launch interviews only).

Question 2. On a scale of 1 to 5, with 5 being very satisfied, how satisfied are you with the overall quality of fishing on Oneida Lake?

Angler satisfaction with the quality of fishing on Oneida Lake was again high in 2025 with a mean score of 4.0 in the launch interviews, and 4.0 in the roving interviews. This question has been asked since 2013 and scores have remained high (Figure 66).

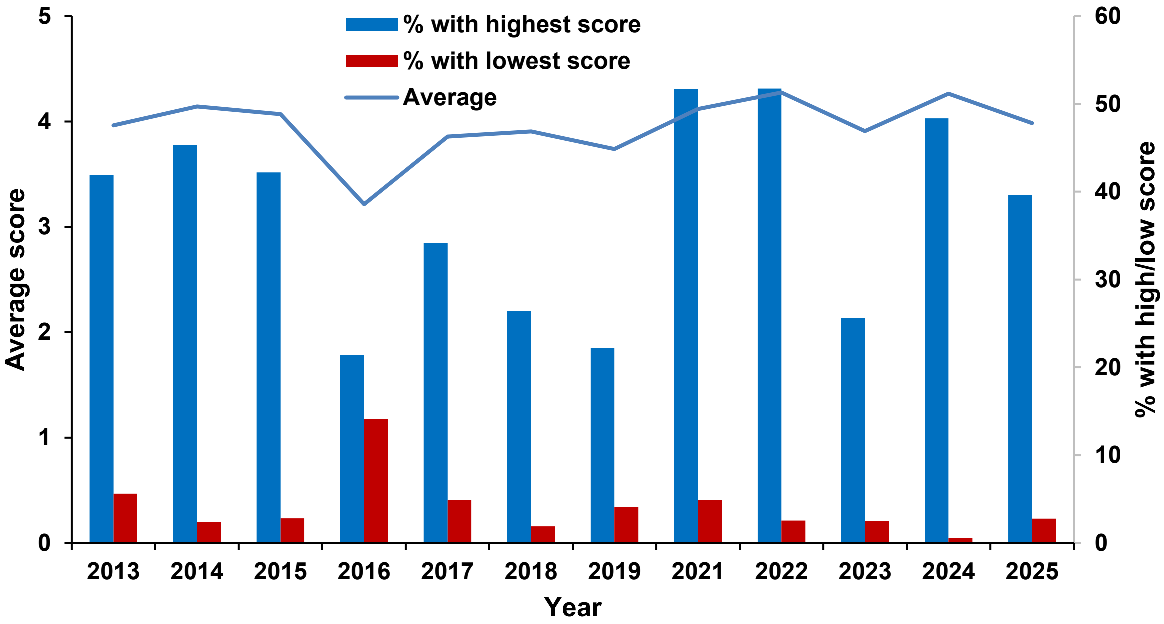

Figure 66. Angler satisfaction score from 1 to 5, with 5 being very satisfied, and the percentage of respondents that scored the highest and lowest score in Oneida Lake angler surveys from 2013-2025.

Question 3. Are you fishing in a tournament today? What tournament (or species)?

In the launch interviews, only 5 of the 290 respondents (1.7%) indicated they were fishing in a tournament that day. In the roving interviews, 108 of 1524 respondents (7.1%) indicated they were in a tournament. Of those in a tournament, 77% reported being in a bass tournament, and 23% reported being in a walleye tournament.

DEC online opinion survey, winter 2025

To help determine if current surveys adequately measure the information needed for managing the fishery, an online opinion survey was developed and administered by NYSDEC. The complete survey results were presented by Loukmas (2025) and a short summary of that is presented here. The web-based survey was delivered to all subscribers to the DEC Fishing Line newsletter (approximately 180,000 recipients) and to all anglers that held a New York State annual or lifetime fishing license and had a valid email address in the DEC Automated Licensing System (approximately 350,000 recipients). The survey was active from January 24 – February 7, 2025 and received 2,719 responses to the following questions:

Question 1. Have you fished for walleye in Oneida Lake in the last five years?

Seventy-three percent of respondents answered “yes”. Those who answered “no” were not asked any additional questions.

Question 2. Please enter the approximate percentage of your walleye fishing time spent (annually) on a boat, from shore, or on the ice.

Approximately 78% fish for walleye in Oneida Lake from a boat, 46% fish for walleye from shore, and 53% ice fish for walleye, at least some of the time. About 55% of anglers use a combination of those methods.

Question 3. During what times of year do you typically fish for walleye in Oneida Lake?

Responses indicated 75% of anglers fish from May-June (spring), 56% fish from July-September (summer), 36% fish from October-December (fall), and 44% fish from January-March (winter). There was much overlap as most anglers (62%) fish in more than one season.

Question 4. On average how many days, and at what times of day, do you typically fish for walleye in Oneida Lake during this time of year?

The majority of anglers (63-68%) fished 10 days or less within each season. The percent of anglers who fished at least 20 days was slightly lower during winter (12%) than during spring through fall (16%-17%). In spring, summer and winter, the majority of anglers (62%-65%) fish in the morning before sunrise or during daylight hours. In the fall only 35% of respondents fish during those time periods, and almost half (47%) fish in the evening starting before sunset or after sunset.

Summary

Daylight-based, direct-contact surveys effectively sample Oneida Lake's walleye fishery during spring, summer, and winter, when angling is primarily diurnal and boat- or ice-based. However, these designs fail to capture a significant segment of the fall fishery, during which effort shifts to nocturnal shore-based angling. Consequently, current survey protocols likely underestimate total fall walleye harvest and effort.

Bass tournament registry analysis

Beginning in 2025, NYSDEC instituted a statewide tournament registration requirement for bass tournaments. On Oneida Lake, 45 bass tournaments were scheduled in 2025 and 35 of these tournaments were actually held. Thirty-four of the 35 tournaments reported results, with a total of 1,375 angler-days (not including practice days). Note that the actual participants were only about 63% of anticipated number of registrants. Tournaments were either 1-day (74%) or two-days (26%). Nearly all tournaments (97%) were held on weekend days. Only 1 tournament was scheduled in May (Figure 67), and many summer months had 2 to 3 tournaments per weekend. From the opening day of bass season on June 15 to the end of September, only 5 of 16 weekends did not have any tournaments. There were 19 tournaments (56%) held at Oneida Shores County Park, and 13 tournaments (38%) held at South Shore DEC Boat Launch, with 2 at other sites.

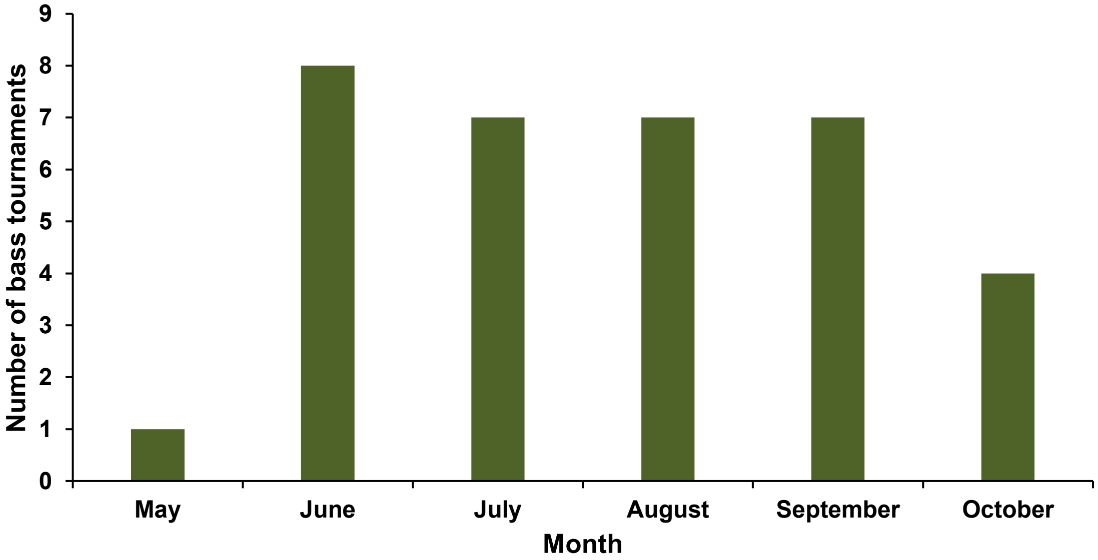

Figure 67. Number of bass tournaments by month registered on Oneida Lake in 2025 through the NYS DEC Bass Tournament Registry.

All but one tournament brought bass into a central weigh-in station. The total reported number of largemouth bass brought in was 1,218 and total smallmouth bass was 2,577. An average of 0.79 largemouth bass/angler/day were brought to the weigh-in, along with an average of 1.56 smallmouth bass/angler/day. On average, 53% of anglers were able to bring in a 5 fish limit. Of the 34 tournaments, 41% had at least one smallmouth bass of 5 lb or more and 12% had at least one largemouth bass of 5 lb or more. The largest fish reported was a 6.1 lb smallmouth bass.

DISCUSSION

Oneida Lake has undergone many changes that affect the fish community since research began in 1957. The major changes include reduced nutrient inputs, increased water clarity associated with the arrival of zebra and quagga mussels, decreased phytoplankton production and increased submerged aquatic vegetation, increased water temperature and decreased ice cover associated with ongoing climate change, the return of abundant burrowing mayflies and increases in other invertebrates such as the phantom midge and the spiny water flea, and the changes in the cormorant population. The fish community has also changed with the arrival of several new species to the lake over time, such as white perch, gizzard shad, and round goby, and the decline in some others such as burbot and cisco and more recently several benthic species like common carp, white suckers, trout-perch and darters. Oneida Lake presently fits the overall characteristics of a mesotrophic system with reduced primary production from the early decades of studies when the lake was classified as eutrophic. Some of the productivity has shifted from the pelagic to the littoral zones including increases in littoral macrophytes and benthic algae production. There is evidence of reduced *Daphnia* abundance associated with quagga mussels, a typical response to dreissenid colonization not observed with only zebra mussels present, but the decrease has been exacerbated by the arrival of spiny water flea and *Chaoboru*s*.* Declines in *Daphnia* densities may have implications for planktivorous life stages of important sport fishes. Some invertebrates such as mayflies and *Chaoborus* have increased in recent years and likely provide substantial food resources for many fish species, while other invertebrates have decreased due to predation by round gobies.

The adult walleye population was estimated at 603,177 fish in 2025. The population has decreased from recent highs and is now within the normal range seen in the last decade. The mortality rate over the last 3 years was moderately high (0.33/year) likely due to high catch rates and harvest by anglers. However, netting surveys indicate high numbers of sub-adult fish. A strong 2022 year-class is projected to increase the adult walleye population to 758,655 age-4 and older fish in 2026, followed by a decrease to 615,411 adult walleye in 2027. Thus, in the next several years the walleye population is projected to remain within the levels seen over the past decade.

Indices for walleye condition and growth were again low in 2025 despite lower populations of adult walleye, with the exception of higher growth rates in age-1 and age-2 walleye. Fall relative weight has remained at near-all-time lows and the reasons for this are uncertain but likely related to decreases in gizzard shad and changing forage base. Age-0 yellow perch and round goby represent less calorie-rich prey.

The walleye telemetry study concluded the 2nd year of a 3-year study. Initial analysis indicated that 48-68% of spawning walleye in Oneida Lake spawn on lake shoals rather than tributaries. For tributary spawning fish, Scriba Creek remains the most used spawning stream, followed by Fish Creek along with a lower number in Chittenango Creek. Tag returns from anglers indicate substantial harvest rates, with a 41% annual mortality rate. The pattern of tag returns indicates about 55% were harvested during the spring and summer fishery, and 35% harvested in fall. The angler survey in May-October of 2025 indicated some of the highest catch rates ever seen for walleye. Walleye mortality rates are high in Oneida Lake due mainly to angler harvest, underscoring the importance of continued monitoring to inform adaptive management.

The yellow perch adult population remains high compared to the past decade although it has decreased by about 1/3 in the last 2 years. The winter creel survey in 2025 indicated high catch rates and harvest of yellow perch during the ice fishing season. The lower catch of age-2 yellow perch in 2025, combined with lower age-0 catches the past several years, suggests the high adult population will likely continue to approach more average levels through harvest over the next several years.

The past decade has seen smallmouth bass adult numbers decline from the highs observed from the late 1980s through the early 2010s, and net catches are now in the low ranges seen in the 1960s and 1970s. Catch rates of smallmouth bass in the creel survey were the lowest targeted catch rate in 8 years, and the 2nd lowest in 20 years. Production of age-0 smallmouth bass has been substantially lower the last 11 years. The increased abundance of round goby since 2014 may have intensified predation on eggs and fry and could be responsible for the decreased age-0 abundance observed in our sampling gears. Predation on age-0 smallmouth bass by high walleye populations could have contributed to the decline though it seems less likely. Increased mortality rate of adult smallmouth bass has also been identified, which could be due to disease issues seen in 2018-2020 along with increased angler pressure. Lack of recruitment combined with increased adult mortality suggests the smallmouth bass population should continue to decline in the next several years. Largemouth bass populations do not show the same impacts, and large numbers of age-0 largemouth bass were found in 2025 samples.

Round goby were established in the lake about 10 years ago, and numbers in 2025 remained high. The presence of round goby and burrowing mayfly may be aiding percid early life survival by providing alternate prey for common predators. Mayflies dominated food intake of many predators during emergence in June, a period when piscivores would otherwise feed on young-of-year fish. However, mayflies are consumed throughout the year. Round gobies spawn multiple times in a growing season and their young are available for consumption by young piscivores throughout the summer and winter. Since 2015 round goby have become important in the diet of age-0 walleye, age-0 bass, and adult yellow perch and white perch. Adult yellow perch and white perch growth have increased in the presence of round goby and burrowing mayfly (Brooking et al. 2022). Continuing analysis and monitoring of the Oneida Lake data set should provide information on the response to these ongoing ecological changes that are relevant not only to Oneida Lake but also other systems experiencing these changes.

Several species have had declining catches in the past decade and their impacts on the ecosystem have likely decreased. Catches of adult white perch, which were more abundant than yellow perch in gillnet catches in a few years, are only about ¼ of the catches from the past decade. Age-0 catches of white perch do not suggest any increase in the adult population in the next several years. White bass are now seldom found in Oneida Lake. Chain pickerel and burbot catches have likewise declined, and logperch, emerald shiners, and gizzard shad have seen low populations over the past several years as well. We have seen drastic decreases in the catches of trout-perch and darters which have declined to near-zero catches. Common carp catches in standard gillnets have declined significantly over the past decade. Future research should consider the causes and impacts of these species changes in Oneida Lake.

Lake sturgeon continue to be stocked annually as part of a larger statewide effort to restore lake sturgeon across NY State. The stocking has been very successful, and gillnet catch rates have remained steady. We continue to detect natural reproduction in most years, albeit at low levels.

Growth of sturgeon remains high and fish up to nearly 160 pounds have been tagged and released. Telemetry tags will be implanted in sturgeon beginning in 2026.

Double-crested cormorant diets continue to be monitored, and predation on subadult percids has been substantial in Oneida Lake. Hazing efforts by NYSDEC personnel continue to keep predation at reduced levels, although high fall migrant numbers are still substantial resulting in predation on young percids, especially in years when gizzard shad densities are low. In the absence of gizzard shad, percids accounted for over 60% of the fish by weight in double-crested cormorant diets. Though round goby have been the most commonly consumed species by number, they accounted for less than 20% of fish in diets by weight. Evidence from other systems also suggests that round goby sometimes dominate double-crested cormorant diets by number (75-79%; Johnson et al. 2010) and since gobies in those systems are larger they may account for a larger proportion of the diet by weight than in Oneida Lake.

Oneida Lake offers diverse, high-quality sportfishing opportunities and should continue to do so into the foreseeable future, but recent poor year classes of smallmouth bass could lead to lower angler catch rates for that species. Angler catch rates of smallmouth bass and walleye in Oneida Lake have been as dependent on prey abundance as sport fish abundance (Forney 1961; VanDeValk et al. 2005). Catch rates of walleye and yellow perch remained high in 2025 and should continue for the next several years based on adult population projections.

RECOMMENDATIONS FOR MANAGEMENT AND FUTURE RESEARCH

Fisheries management on Oneida Lake includes stocking of walleye larvae, size and creel limits for walleyes, bass and other species, and control of double-crested cormorants.

Stocking of walleye larvae. Continue stocking at current levels. Best estimates suggest that the number of naturally produced walleye larvae in the lake are about 20% of the numbers stocked (Rudstam et al. 2016b). However, in 2020, a year with no fry stocking, the larval walleye abundance estimate was similar to the long-term average and the number of age-4 from the 2020 year class was similar to surrounding years with stocking. It is possible substantial spawning now occurs in other tributaries and on shoals – see preliminary results from the telemetry study. However, fry stocking likely stabilizes annual recruitment by providing larvae to the lake in years with poor survival of wild spawned fish (Rose et al. 1999).

Size and creel limits. We recommend maintaining the current size and creel limits for walleye and other species. The adult walleye population is currently near the long-term average and projected to be maintained at about current levels in the next few years. Walleye mortality rate has increased and should be monitored closely.

SMB population. Steps to reduce impacts on the declining smallmouth bass population should be considered. This could include investigation of factors affecting age-0 production, adult mortality rates, impacts of spring season and tournament fishing, etc.

Double-crested cormorant control. We recommend maintaining current hazing efforts, especially on fall migrants. We have observed an increase in walleye and yellow perch populations concomitant with more intensive double-crested cormorant control supporting the expectation that removing double-crested cormorants does increase percid recruitment to the fishery. The data show that a rebuilding of summer double-crested cormorant numbers may reduce subadult walleye and yellow perch survival (DeBruyne et al. 2013, Coleman et al. 2016). Hazing efforts should be maintained to prevent the rebuilding of a large summer population and minimize fall migrant numbers.

Walleye abundance. We recommend an analysis of the combined data from mark/recapture and gillnet indices using standard stock assessment models. This has not been done since Irwin et al. (2008) and needs to be updated. Such an update will inform the future frequency of mark/recapture studies of the adult walleye population, which are currently scheduled every 3 years.

Creel survey. We recommend conducting an access point creel survey in June and July on Oneida Lake each year, with an additional full creel survey every 3-5 years.

Given the results and discussion in this report, we recommend the following research and monitoring activities in 2026:

1) Continue standard sampling program. This program includes weekly limnological surveys from May-October, a dreissenid mussel survey in August/September, two larval fish sampling surveys (walleye and yellow perch surveys), 15 standard gillnets, spring and weekly trawl surveys from mid-July through October, monthly seine surveys from July-September, video assessment of round goby in July, a pelagic prey fish survey with acoustics accompanied by midwater trawl and pelagic gillnets about September 1st, fall trawling and electrofishing to monitor walleye diet and condition, and large mesh gill nets for lake sturgeon monitoring in May and June.

2) Continue assessments of current standard surveys to identify any surveys that should be modified/discontinued to increase program efficiency.

3) Continue diet analyses of double-crested cormorants in coordination with NYSDEC. Diet information is critical to assessing double-crested cormorant impacts and can change annually.

4) Conduct a walleye mark/recapture study to estimate adult abundance in 2028.

5) Complete analysis and write final report for the full creel survey, completed in 2025-26.

6) Continue the acoustic telemetry study on adult walleye. The 1st 3-year phase of the study will be completed in 2026, with goals of providing a more comprehensive understanding of walleye spawning locations and seasonal walleye movements and habitat use, as well as post-spawn distributions of the Scriba Creek spawning population. A 2nd phase is planned to start in 2026, with the intent of determining impacts of low oxygen levels and temperature preferences of adult walleyes. We also plan to assist NYSDEC in deploying approximately 15 or more lake sturgeon telemetry tags in 2026, along with exploring options to tag other species.

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Appendix 1: Standard Data Tables

Table A1. Physical, chemical and biological characteristics of Oneida Lake since 1975. Secchi depth (ft), chlorophyll-*a* (µg/L), total phosphorous (TP, µg/L) soluble reactive phosphorous (SRP, µg/L), total zooplankton biomass (µg/L), and *Daphnia* spp. biomass (µg/L) are averages of weekly data from 1 to 5 stations from May to October. Mussel biomass is lake-wide average shell-on dry weight weighted by substrate in g/m^2. Ice in day (day since Dec 1), ice duration and ice out day (day of year) are noted at CBFS and refer to the year of ice break-up. The lake was not completely frozen over in the winter of 2001-02. Summer temperature (^{o}F) is the average temperature from June to Aug measured every hour at 6 ft depth at a site near Shackelton Point.

Year	Secchi	Chl-*a*	SRP	TP	Zoopl. Biomass	*Daphnia* Biomass	Mussel biomass	First Freeze Day	Ice Duration	Ice Out Day	Sum Temp
1975	9.2	9.0	17.6	45.9	211	107	0	no data	no data	87	72.0
1976	9.2	9.9	3.3	29.5	241	163	0	19	99	87	69.1
1977	8.9	11.2	5.2	36.2	209	53	0	3	118	90	69.6
1978	9.5	7.7	16.5	42.5	116	73	0	15	121	105	71.6
1979	10.8	7.6	29.0	56.9	226	101	0	29	96	94	67.6
1980	8.5	12.7	10.2	45.2	257	126	0	35	91	95	68.7
1981	7.5	11.7	13.8	31.3	243	45	0	15	95	76	70.9
1982	7.2	9.0	15.2	48.0	260	93	0	20	118	107	69.4
1983	8.5	8.0	21.7	38.6	261	107	0	13	74	87	72.1
1984	7.5	9.2	14.7	30.1	231	104	0	21	111	101	70.9
1985	7.2	10.5	11.6	38.3	261	82	0	40	79	88	68.7
1986	7.9	10.3	27.5	67.1	304	178	0	19	104	92	68.7
1987	9.5	6.5	7.3	27.6	178	97	0	35	86	90	71.1
1988	8.9	9.4	17.1	34.6	248	99	0	34	91	94	69.4
1989	11.2	5.2	9.4	24.1	185	81	0	16	102	84	71.4
1990	7.9	9.5	4.8	22.0	221	65	0	5	107	81	71.1
1991	7.9	11.7	4.6	23.2	188	67	0	31	78	78	73.4
1992	9.2	7.1	1.8	20.1	315	196	343	25	93	102	68.4
1993	12.8	5.1	5.9	15.8	157	64	276	24	99	105	70.5
1994	12.1	6.6	6.2	30.4	193	103	533	27	113	109	71.6
1995	16.1	3.2	10.0	22.9	207	140	234	39	75	97	73.8
1996	11.8	5.5	6.0	19.9	222	128	158	32	100	101	71.6
1997	11.8	5.3	3.3	14.7	300	135	351	39	88	96	70.9
1998	9.8	5.2	5.2	21.5	161	57	258	48	58	86	72.5
1999	10.8	6.0	6.3	15.2	206	82	359	33	94	96	73.9
2000	9.5	6.5	4.4	18.1	154	85	201	45	63	77	70.3
2001	11.8	5.3	10.4	27.8	237	101	261	12	117	103	72.3
2002	12.1	4.8	7.0	27.2	162	75	386	no freeze	0	-	73.4
2003	12.5	6.5	9.8	27.3	209	92	356	10	104	105	72.0
2004	11.2	7.7	10.8	29.0	233	99	142	21	90	95	70.7
2005	13.8	3.8	16.4	29.4	259	116	205	26	97	98	75.6
2006	10.2	7.3	10.6	29.2	209	77	279	18	72	91	73.2
2007	11.5	5.8	6.4	20.9	185	68	336	54	71	94	72.7
2008	13.8	3.8	12.2	24.6	165	45	246	19	83	92	72.5
2009	12.1	4.0		24.4	117	40	278	24	85	81	71.1
2010	14.4	2.6	11.1	28.5	139	48	373	23	85	81	74.1
2011	10.5	4.9	7.9	30.5	97	22	383	17	107	94	73.9
2012	15.4	2.9	15.3	31.5	183	63	673	46	21	53	75.4
2013	10.5	3.9	10.7	30.8	209	64	460	30	80	91	73.0
2014	10.8	4.2	11.1	28.0	176	43	488	30	118	103	72.1
2015	11.5	3.2	6.5	22.5	214	46	430	37	99	105	72.7
2016	14.1	3.7	7.8	24.5	167	42	414	45	74	57	74.1
2017	10.2	5.8	10.2	25.1	181	47	487	20	63	90	72.3
2018	11.5	4.5	4.9	15.8	152	38	331	27	98	94	73.9
2019	10.8	4.7	3.0	17.8	209	52	237	42	86	99	73.0
2020	11.5	4.9	5.9	19.4	175	34	105	20	65	84	75.4

Year	Secchi	Chl-*a*	SRP	TP	Zoopl. Biomass	*Daphnia* Biomass	Mussel biomass	First Freeze Day	Ice Duration	Ice Out Day	Sum Temp
2021	12.1	4.4	5.8	18.9	164	42	275	41	63	75	73.6
2022	10.2	4.2	15.2	29.1	121	20	363	39	71	80	74.0
2023	10.8	4.0	5.0	20.5	121	32	254	26	13	42	73.0
2024	11.5	4.2	9.1	24.0	104	20	217	50	23	42	74.4
2025	11.2	3.7	7.7	24.6	158	53	263	25	79	80	73.8

Table A2. Total annual catch of select species in gill-net surveys for Oneida Lake since 1957.

Year	chain pickerel	freshwater drum	gizzard shad	lake sturgeon	largemouth bass	longnose gar	pumpkinseed	redhorse sp.	rock bass	smallmouth bass	walleye	white bass	white perch	white sucker	yellow perch
1957	0	0	0	0	0	0	3	0	5	7	389	101	171	25	1001
1958	0	0	0	0	0	0	1	0	1	3	598	55	50	24	723
1959	0	0	0	0	0	0	5	0	7	15	458	149	227	26	1027
1960	0	0	0	0	0	0	21	0	5	17	405	45	474	92	1375
1961	0	0	0	0	0	0	5	0	2	8	430	13	98	47	1447
1962	0	0	0	0	0	0	18	0	8	18	479	9	142	31	1491
1963	0	0	0	0	0	0	11	0	5	9	432	24	199	38	1670
1964	0	0	0	0	0	0	36	0	12	23	543	15	233	35	1611
1965	0	0	0	0	0	0	12	0	4	22	778	9	254	21	1938
1966	0	0	0	0	0	0	7	0	10	16	601	3	129	70	1346
1967	0	0	0	0	0	0	12	0	5	10	583	4	106	104	1540
1968	0	0	0	0	0	0	13	0	5	8	569	0	73	54	1937
1969	0	0	0	0	0	0	7	0	12	7	837	0	65	48	1510
1970	0	0	0	0	0	0	25	0	9	18	519	2	175	68	1866
1971	0	0	0	0	0	0	9	0	9	6	116	0	45	12	830
1972	0	0	0	0	0	0	16	0	5	15	295	0	24	63	926
1973	0	0	1	0	0	0	13	0	23	12	173	2	28	22	1531
1975	0	11	0	0	0	0	5	0	5	2	281	12	415	10	1427
1976	0	5	0	0	0	0	18	1	13	22	454	3	501	9	1534
1977	0	8	1	0	0	0	5	2	4	15	432	8	208	20	1433
1978	0	7	1	0	0	0	6	0	9	16	510	6	100	22	1055
1979	0	1	0	0	0	0	6	0	10	7	293	1	509	67	1649
1980	0	2	7	0	0	0	4	0	6	15	399	8	353	68	2838
1981	0	8	1	0	0	0	4	1	1	5	638	6	963	21	2420
1982	0	13	0	0	0	0	14	2	7	6	511	5	486	27	1722
1983	0	2	8	0	0	0	12	0	12	6	757	0	420	28	1166
1984	0	22	12	0	1	0	22	0	10	26	372	0	424	44	1499
1985	0	12	60	0	0	0	5	1	5	16	504	6	666	42	750
1986	0	13	25	0	0	0	23	2	16	19	296	6	922	53	1081
1987	0	13	3	0	0	0	17	3	14	47	386	3	305	58	1285
1988	0	94	42	0	0	0	8	1	14	38	530	1	30	38	1236
1989	0	55	15	0	0	0	15	0	22	65	391	14	67	34	1245
1990	0	291	33	0	0	0	10	1	18	57	302	18	125	33	1008
1991	0	178	17	0	0	0	1	1	9	33	165	10	56	27	608
1992	0	107	49	0	0	0	1	0	5	20	246	23	78	40	814
1993	0	100	1	0	0	0	9	0	1	46	217	2	66	44	952
1994	0	154	2	0	0	0	11	3	1	37	177	10	41	47	316
1995	0	93	0	0	0	0	9	1	4	22	144	0	37	37	864
1996	0	49	0	5	0	0	5	1	0	24	108	11	40	41	617
1997	0	33	0	33	0	0	20	1	7	30	75	11	200	59	606
1998	0	83	0	12	0	0	15	4	3	29	198	4	196	54	773
1999	0	74	17	23	0	0	19	5	1	65	236	17	502	66	444
2000	0	35	9	26	0	0	33	2	1	31	248	3	209	64	796
2001	0	32	3	25	0	0	31	5	1	30	218	3	497	34	728
2002	0	69	9	13	0	0	20	5	2	70	437	10	450	34	1061
2003	0	34	2	14	0	0	9	2	0	46	255	5	345	17	460
2004	0	25	5	15	0	0	4	3	0	41	346	1	376	23	563
2005	0	32	2	20	0	0	2	1	0	70	255	7	450	32	728
2006	1	30	5	15	0	0	8	3	0	33	238	1	623	7	647
2007	0	22	30	20	0	5	8	1	3	48	237	4	771	23	493
2008	1	39	18	8	1	1	28	7	2	54	230	2	373	33	753
2009	1	33	15	2	0	0	22	4	0	29	234	8	742	29	547
2010	1	42	62	3	0	0	11	1	2	32	244	8	498	27	513
2011	3	34	24	3	0	0	38	4	3	75	308	21	541	32	522
2012	3	38	37	4	0	2	30	4	1	55	312	0	376	28	672

Year	chain pickerel	freshwater drum	gizzard shad	lake sturgeon	largemouth bass	longnose gar	pumpkinseed	redhorse sp.	rock bass	smallmouth bass	walleye	white bass	white perch	white sucker	yellow perch
2013	4	80	91	1	2	1	45	2	7	34	405	0	548	20	695
2014	2	14	61	0	0	0	10	2	1	44	408	0	386	58	340
2015	3	19	2	0	0	0	22	5	2	39	347	0	445	23	423
2016	0	33	5	17	0	0	5	0	0	40	411	0	118	15	580
2017	1	7	14	3	0	0	2	3	2	24	477	0	250	27	463
2018	0	10	14	13	0	2	6	1	0	35	400	0	304	19	881
2019	1	17	12	9	0	0	8	9	1	17	438	0	418	22	1016
2020	1	19	33	14	0	4	9	13	20	28	359	0	386	14	1444
2021	2	31	28	6	0	0	13	10	21	36	267	0	401	23	2106
2022	1	33	44	11	0	1	32	8	15	17	301	0	351	45	2279
2023	3	29	48	23	0	0	37	2	7	14	476	0	159	22	2907
2024	1	29	28	6	0	3	30	10	13	16	410	0	276	30	2447
2025	1	17	19	10	0	12	24	7	15	7	422	0	127	22	1783

Table A3. Catch of select species in standard 18-ft trawl surveys for Oneida Lake since 1960. Catches are for age-0 except for trout-perch and round goby, which are not separated by age.

Year	# hauls	Lepomis spp.	round goby	smallmouth bass	trout-perch	walleye	white perch	yellow perch
1960	96	156	0	30	8,576	210	21,834	79,416
1961	114	1,546	0	9	9,700	1,873	10,991	125,998
1962	96	211	0	36	13,350	1,617	3,128	128,905
1963	120	465	0	0	7,541	1,203	552	55,101
1964	140	1,560	0	3	3,737	1,370	655	180,475
1965	140	29	0	1	4,300	1,351	11,738	142,301
1966	140	24,019	0	15	7,125	228	14,379	46,679
1967	130	2,533	0	19	7,624	1,163	1,910	138,011
1968	140	672	0	0	8,081	3,083	159	266,826
1969	130	692	0	5	4,287	965	1,041	39,489
1970	100	1,779	0	18	1,296	321	1,930	44,970
1971	120	62	0	44	1,965	561	1,202	113,034
1972	110	4,477	0	9	2,426	335	288	11,515
1973	150	15,061	0	0	848	33	28,650	23,268
1974	140	951	0	12	269	744	4,651	27,400
1975	120	43	0	16	85	1,891	2,219	75,354
1976	130	1,329	0	14	87	106	3,464	32,861
1977	150	6	0	4	142	1,226	14,820	133,333
1978	140	585	0	104	593	550	442	40,337
1979	110	8,630	0	1	377	99	14,952	33,351
1980	130	98	0	0	358	238	77,273	47,038
1981	130	19	0	4	713	851	3,059	157,850
1982	120	458	0	0	2,500	307	50,294	67,715
1983	130	25,689	0	21	2,089	196	75,488	56,010
1984	130	1,405	0	62	4,381	147	6,448	24,325
1985	120	53	0	1	9,423	470	1,366	50,884
1986	130	498	0	0	6,543	80	190	4,366
1987	130	103	0	91	6,150	334	73,024	10,273
1988	130	111	0	13	3,014	141	56	27,198
1989	130	533	0	0	706	32	11,520	1,455
1990	130	897	0	36	1,294	108	999	19,494
1991	160	1,114	0	176	3,899	563	1,149	12,277
1992	140	17	0	2	8,855	226	488	17,897
1993	140	467	0	49	11,829	237	8,573	20,703
1994	140	237	0	392	15,472	257	851	29,936
1995	140	741	0	95	9,050	277	6,685	15,174
1996	150	60	0	5	2,858	36	681	9,618
1997	150	213	0	348	5,221	69	10,534	975
1998	140	27	0	66	4,927	42	1,663	18,160
1999	150	12	0	131	4,419	157	105	22,310
2000	140	36	0	0	5,529	49	6,587	9,452
2001	140	55	0	38	4,163	428	721	30,280
2002	150	556	0	68	7,759	57	14,043	59,123
2003	140	316	0	27	6,845	36	665	10,973
2004	150	12	0	65	10,297	315	18,536	18,248
2005	150	233	0	141	1,691	244	978	28,783
2006	130	88	0	20	1,054	23	1,216	13,287
2007	150	117	0	260	3,014	218	1,955	103,495
2008	140	197	0	198	3,542	77	3,052	13,062
2009	140	353	0	35	12,144	17	1,975	32,862
2010	150	18	0	92	16,532	161	463	25,332
2011	150	179	0	362	6,642	52	16,771	3,231
2012	150	113	0	116	674	326	2,097	4,224
2013	130	478	0	7	483	10	70	2,197
2014	140	87	64	379	2,208	137	487	21,205
2015	120	219	2,586	27	3,606	51	141	5,410
2016	130	40	4,954	1	1,267	130	118	15,918
2017	130	591	4,810	39	6,155	110	13,283	15,157
2018	120	142	990	9	1,834	299	373	37,419
2019	120	860	1,807	0	1,594	60	3,033	24,010

Year	# hauls	Lepomis spp.	round goby	smallmouth bass	trout-perch	walleye	white perch	yellow perch
2020	120	80	1,398	21	243	78	16	16,301
2021	120	1	2,246	3	85	82	61	14,139
2022	120	43	1,997	1	215	190	502	12,781
2023	110	310	1,117	1	83	67	11	9,114
2024	90	17	1,751	0	3	133	873	5,291
2025	120	606	2524	0	3	33	89	26,550

Table A4. Mean catch per haul in 75 ft (22.9 m) standard beach seine for Oneida Lake in various years since 1959. Data for the 9 standard sites only. Surveys conducted once per month in July, August and September (some years surveys conducted in 1 or 2 of the months only; months sampled identified by subscript in # of surveys column). Data provided for the main species of interest (does not include less abundant species).

Year	# of surveys	Banded Killifish	Bluntnose Minnow	Chain Pickerel yoy	Darter spp.	Emerald Shiner	Gizzard Shad yoy	Largemouth Bass yoy	Lepomis spp. yoy	Logperch	Rock Bass yoy	Round Goby	Smallmouth Bass yoy	Walleye yoy	White Perch yoy	White Sucker yoy	Yellow Perch yoy
1959	3	8.2	0.9	0.0	4.4	0.6	0.0	1.8	42.1	11.8	1.4	0.0	1.8	9.8	0.1	17.3	192.9
1960	1_J	1.7	1.6	0.0	3.9	0.1	0.0	0.1	0.3	7.2	0.0	0.0	0.4	4.7	0.9	7.5	413.1
1961	3	12.3	0.8	0.0	9.1	0.1	0.0	1.1	13.8	21.9	3.3	0.0	1.7	14.8	1.2	34.8	232.3
1962	3	9.8	0.3	0.0	3.6	0.1	0.2	0.5	7.4	14.1	3.7	0.0	8.2	7.9	4.6	10.3	354.1
1963	3	10.2	0.4	0.0	7.4	0.4	0.0	0.3	12.9	18.8	2.1	0.0	0.2	19.7	0.5	15.8	391.4
1964	3	4.8	0.7	0.0	5.9	0.2	0.0	0.0	69.6	9.7	0.4	0.0	0.1	7.4	2.5	124.0	428.2
1965	3	46.1	0.7	0.0	3.6	2.7	0.0	0.4	19.2	7.5	0.8	0.0	0.2	0.3	1.3	31.9	154.9
1966	2_{JA}	44.4	0.3	0.0	5.0	0.2	0.0	2.0	39.1	7.3	1.9	0.0	2.2	3.9	1.0	36.5	187.3
1967	2_{JA}	51.9	0.8	0.0	3.8	10.2	0.0	2.8	4.3	5.5	7.2	0.0	4.0	7.7	1.1	20.6	273.7
1968	2_{JA}	8.8	0.2	0.0	3.7	0.2	0.0	0.6	8.1	9.5	0.3	0.0	0.1	37.6	0.1	24.7	364.6
1969	2_{JA}	16.1	0.0	0.0	5.5	0.0	0.0	0.1	8.7	7.4	2.6	0.0	0.8	37.2	4.7	18.0	467.0
1970	2_{JA}	4.0	0.2	0.0	5.8	0.0	0.0	0.4	14.6	11.7	6.6	0.0	1.8	13.2	4.8	19.9	530.7
1975	3	22.0	6.6	0.0	6.9	0.1	0.2	4.0	12.3	25.1	17.2	0.0	8.4	5.0	14.3	39.3	796.2
1976	2_{JA}	5.3	0.6	0.0	15.6	38.8	0.1	0.3	132.5	25.8	0.7	0.0	3.8	14.7	16.3	24.4	1118.3
1978	2_{JA}	2.6	0.2	0.0	4.5	0.7	0.0	5.0	11.8	65.0	7.8	0.0	5.8	13.0	1.6	10.0	937.4
1989	2_{JA}	3.0	9.6	0.0	5.6	260.0	0.0	0.3	0.2	54.6	1.8	0.0	3.6	6.3	0.6	42.5	849.5
1990	3	7.5	5.3	0.0	1.8	7.9	0.8	1.9	4.9	8.8	1.6	0.0	9.4	1.7	0.2	9.0	296.8
1993	2_{JA}	3.0	9.6	0.0	5.6	260.0	0.0	0.3	0.2	54.6	1.8	0.0	3.6	6.3	0.6	42.5	849.5
1994	3	7.5	5.3	0.0	1.8	7.9	0.8	1.9	4.9	8.8	1.6	0.0	9.4	1.7	0.2	9.0	296.8
2000	2_{JA}	2.9	0.7	0.0	0.1	17.5	0.0	1.6	6.3	6.3	0.3	0.0	0.0	1.8	64.9	6.5	519.8
2004	1_J	2.3	2.4	0.1	0.6	32.0	0.0	0.0	4.8	3.7	0.0	0.0	4.1	30.1	0.0	4.3	631.4
2005	2_{JA}	20.3	4.1	0.0	1.7	2.3	0.0	13.8	3.1	37.8	11.8	0.0	11.2	1.1	0.5	1.2	958.8
2006	1_A	8.8	1.0	0.0	2.0	0.0	0.0	9.5	3.8	5.8	3.8	0.0	3.3	0.0	13.3	0.3	382.5
2007	3	16.3	1.7	0.1	0.2	16.5	4.4	3.1	3.3	1.6	0.9	0.0	12.5	1.5	0.7	14.3	376.1
2008	3	47.5	3.5	0.0	2.7	5.8	0.3	6.0	8.0	1.3	4.1	0.0	14.2	1.2	0.6	13.6	502.4
2009	3	30.6	6.5	0.0	4.1	14.1	5.3	5.6	6.2	8.3	1.8	0.0	2.6	0.3	8.4	1.9	395.9
2011	2_{JA}	35.0	4.8	0.1	2.0	22.4	40.0	3.4	3.1	7.0	0.2	0.0	22.0	0.2	31.4	3.5	117.2
2014	1_J	10.6	6.8	1.2	0.7	63.9	0.0	5.6	0.0	26.7	0.3	0.0	28.9	3.0	0.6	10.7	468.3
2015	3	45.8	1.5	0.3	0.7	37.7	8.8	2.0	15.4	26.0	3.0	2.5	4.1	3.6	21.3	13.7	754.7
2016	3	37.5	5.8	0.3	0.5	1.6	19.9	3.8	5.5	8.0	3.4	68.6	3.4	0.3	0.1	1.2	309.7
2017	3	36.4	2.7	0.0	0.0	4.0	2.7	1.9	31.4	19.3	4.9	36.4	3.3	0.3	9.4	1.5	238.0
2018	3	27.8	1.4	0.0	0.0	33.3	25.6	3.1	8.8	11.1	7.8	23.2	3.4	0.5	0.3	3.0	287.0
2019	3	13.5	0.1	0.1	0.0	18.3	14.9	6.2	94.0	10.3	10.2	81.4	0.3	1.6	0.7	17.0	80.0
2020	3	38.9	1.3	0.0	0.0	1.7	1.1	2.7	15.4	9.2	5.5	102.0	1.7	0.2	0.0	0.5	68.4
2021	3	28.7	0.8	0.0	0.0	0.7	0.1	2.2	1.4	3.8	11.5	125.4	1.1	0.3	0.1	3.4	83.1
2022	3	33.4	1.7	0.0	0.0	21.2	0.2	1.8	4.7	9.6	3.5	123.7	0.5	0.0	0.3	4.9	138.3
2023	3	23.0	0.7	0.0	0.0	0.4	0.0	2.1	15.0	1.8	10.9	213.0	0.5	0.3	0.2	2.6	106.4
2024	3	18.2	2.6	0.0	0.0	0.1	0.0	0.9	31.0	2.7	9.4	168.1	0.1	0.2	1.1	3.1	75.1
2025	3	16.6	2.5	0.0	0.0	0.5	7.1	2.9	41.7	5.4	8.9	136.9	0.1	0.1	0.0	15.4	90.2

Table A5. Electrofishing catch per hour by species in predator runs from Oneida Lake since 2011. Data are separated by age-0 (or age-1 in the spring) and older fish.

Year	Season	Bowfin	Chain pickerel adult	Chain pickerel young	Freshwater drum	Largemouth bass adult	Largemouth bass young	Longnose Gar	Smallmouth bass adult	Smallmouth bass young	Walleye adult	Walleye young
2011	Spring	2.6	4.0	0.5	1.8	10.0	0.4	1.8	2.3	0.9	4.7	4.0
2012	Spring	1.6	3.7	0.0	5.4	8.2	2.1	2.0	3.7	1.0	8.0	1.5
2014	Spring	2.6	6.6	0.6	1.8	12.0	0.2	2.2	3.7	0.2	4.8	3.3
2015	Spring	1.8	9.3	0.3	2.8	9.7	0.0	3.1	4.3	0.2	11.7	3.9
2017	Spring	2.9	3.7	0.1	2.7	18.9	3.5	3.4	3.8	3.3	9.2	5.6
2018	Spring	3.1	4.8	0.0	3.8	17.0	0.6	3.8	1.6	0.1	13.0	0.9
2019	Spring					7.6	0.0		2.0	0.3	16.1	
2020	Spring	2.5	3.8	0.1	2.9	8.3	3.2	2.6	2.0	0.3	10.2	4.7
2021	Spring	3.6	2.0	0.0	2.8	4.3	1.5	3.6	2.8	0.3	11.4	1.3
2022	Spring	2.5	1.4	0.0	3.6	16.6	0.0	3.3	2.6	0.1	7.9	2.3
2023	Spring	2.4	0.7	0.1	2.8	16.2	2.3	2.4	2.3	0.1	5.9	9.4
2024	Spring	3.2	1.6	0.0	3.2	4.8	0.8	2.7	1.3	0.6	10.7	2.2
2024	**Fall**	**0.8**	**4.8**	**1.0**	**4.9**	**8.4**	**9.5**	**0.0**	**0.4**	**0.4**		
2025	**Fall**	**4.7**	**1.6**	**3.9**	**1.8**	**5.3**	**22.6**	**0.1**	**0.3**	**2.1**	**39.2**	**5.1**

Table A6. Young of year and age-1 walleye density estimates and mean lengths for Oneida Lake since 1961. Larval walleye density (#/acre, at the time of the 8 mm perch survey) are from Miller sampler surveys at that time or calculated from the 9 mm larval walleye survey. Age-0 walleye densities (#/acre) and mean lengths (TL, inches) on October 1 are from trawl surveys surrounding the October 1 date (5 dates, 50 trawls), and age-1 walleye densities (#/acre) and mean lengths on May 1 are from trawl surveys around May 1 (3 dates, 30 trawls). Densities calculated based on area swept assuming no avoidance.

Year-class	Larval Density	Age-0 Density	Age-0 Length	Age-1 Density	Age-1 Length
1961	-	46.3	5.5	-	-
1962	-	55.0	5.6	17.9	6.2
1963	-	39.9	4.8	15.3	6.0
1964	-	32.6	5.4	29.7	6.3
1965	-	32.1	6.0	53.8	6.4
1966	546	2.5	5.4	3.6	5.8
1967	391	33.3	5.0	-	-
1968	639	88.6	5.6	74.5	6.4
1969	226	20.2	5.6	6.9	6.3
1970	919	10.4	4.7	9.9	6.5
1971	125	17.0	6.5	50.2	7.1
1972	647	2.4	4.7	5.1	6.1
1973	90	0.6	6.4	1.8	6.8
1974	592	6.0	3.9	2.4	5.6
1975	551	60.1	6.7	23.9	7.2
1976	942	0.6	5.2	0.6	6.2
1977	267	29.0	5.3	43.7	6.6
1978	-	5.9	4.8	-	-
1979	-	1.9	5.7	-	-
1980	-	7.2	6.0	11.3	6.4
1981	-	23.4	5.8	-	-
1982	-	9.1	6.3	11.2	6.9
1983	-	11.3	6.0	10.3	6.5
1984	-	2.4	5.2	10.6	5.9
1985	-	12.5	5.5	12.7	6.2
1986	-	2.2	5.5	1.5	6.4
1987	-	12.1	6.9	10.1	7.3
1988	-	4.2	5.5	0.9	5.7
1989	-	1.2	6.2	6.9	6.0
1990	-	5.8	6.8	6.1	6.9
1991	-	18.9	6.7	17.8	6.8
1992	135	5.0	5.9	2.0	6.1
1993	-	4.2	5.7	5.3	6.6
1994	-	4.6	5.1	4.7	6.4
1995	-	5.5	5.3	4.6	6.5
1996	-	0.7	5.9	2.0	6.6
1997	-	3.2	6.2	0.3	5.5
1998	111	1.0	8.1	1.2	7.4
1999	718	5.0	5.6	1.1	4.8
2000	489	1.2	6.9	5.8	7.1
2001	1,028	7.8	6.0	13.4	6.0
2002	86	1.5	6.8	5.0	7.0
2003	399	1.0	5.4	7.9	6.5
2004	1,293	6.2	5.9	8.5	6.3
2005	3,280	2.3	4.2	5.4	5.6
2006	528	0.9	6.4	3.8	6.7
2007	381	3.0	5.1	1.3	7.1
2008	2,065	2.2	5.1	1.5	5.1
2009	387	0.6	6.0	0.7	5.6
2010	363	5.8	5.1	11.1	6.3
2011	102	1.0	7.1	0.0	-
2012	1,090	0.4	4.1	0.1	5.5
2013	214	0.7	6.5	1.2	6.8
2014	590	4.8	5.7	0.3	5.2
2015	672	0.9	5.4	0.4	4.8

Year-class	Larval Density	Age-0 Density	Age-0 Length	Age-1 Density	Age-1 Length
2016	626	3.6	4.8	2.0	5.3
2017	235	2.3	5.8	0.3	7.0
2018	720	5.3	5.3	4.5	6.3
2019	794	1.5	5.9	0.4	6.7
2020	623	1.5	5.5	2.0	6.2
2021	1,091	1.2	4.8	1.2	5.8
2022	339	7.2	7.4	5.0	7.9
2023	2,503	2.2	6.0	0.8	7.2
2024	514	6.0	7.4	5.3	7.8
2025	737	1.5	7.2	-	-

Table A7. Walleye age-specific density estimates (#/acre) for Oneida Lake since 1957. Ages 1, 2 and 3 walleyes are estimated from the average of trawl and gill-net estimates using catchabilities in Irwin et al. (2008). Bold values are from mark-recapture estimates. Densities of walleyes for intervening years were approximated from the distribution of mortality between successive population estimates. Estimates from 1978-1987 and 1992-1994 from Irwin et al. (2008).

Year	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age≥7	Total (Age≥4)
1957	no data	no data	no data	**0.2**	**2.6**	**--------2.4-------**		**5.1**
1958	3.7	0.6	1.9	**15.3**	**0.2**	**2.4**	**2.2**	**20.1**
1959	0.2	4.9	1.5	**1.0**	**14.0**	**0.1**	**3.6**	**18.7**
1960	2.0	1.5	9.2	**0.6**	**0.8**	**6.5**	**1.9**	**9.8**
1961	11.3	7.6	1.9	**8.6**	**0.9**	**0.7**	**6.1**	**16.3**
1962	6.4	5.9	5.1	**1.1**	**5.5**	**--------4.4-------**		**11.1**
1963	9.9	6.6	7.3	**5.4**	**1.0**	**6.3**	**2.8**	**15.5**
1964	14.0	7.8	4.2	3.3	3.9	0.6	6.0	13.8
1965	17.7	7.7	5.2	**3.5**	**2.2**	**2.8**	**3.9**	**12.3**
1966	8.9	12.8	6.1	4.8	2.3	1.6	4.7	13.4
1967	1.6	7.8	11.8	**4.2**	**3.4**	**1.5**	**4.5**	**13.6**
1968	9.0	1.2	8.4	**7.1**	**2.3**	**1.6**	**3.5**	**14.5**
1969	37.9	12.6	2.0	4.7	5.2	1.7	3.7	15.4
1970	1.3	15.3	4.4	**0.4**	**3.4**	**3.9**	**3.6**	**11.3**
1971	1.6	0.2	3.2	3.5	0.3	2.0	5.0	10.9
1972	32.5	3.7	0.6	**8.9**	**2.4**	**0.3**	**4.8**	**16.3**
1973	0.3	17.7	1.9	0.3	3.0	1.0	2.0	6.4
1974	2.5	0.9	19.3	**1.1**	**0.1**	**1.0**	**1.4**	**3.6**
1975	0.6	1.5	0.4	10.6	1.8	0.1	2.6	15.1
1976	37.5	1.5	1.3	**0.6**	**11.2**	**2.6**	**1.4**	**15.7**
1977	0.3	22.3	1.0	**0.7**	**0.1**	**6.4**	**1.5**	**8.7**
1978	14.9	0.4	12.7	0.6	0.7	0.1	6.7	8.2
1979	1.4	12.2	0.4	9.0	0.5	0.5	4.6	14.5
1980	1.0	1.8	9.0	0.4	5.8	0.3	3.3	9.9
1981	16.1	1.8	2.3	8.7	0.3	3.8	2.4	15.1
1982	10.9	9.2	1.6	1.4	7.1	0.2	4.2	12.9
1983	5.8	13.4	12.4	1.0	1.2	5.1	2.9	10.2
1984	4.0	3.8	8.4	5.6	0.9	0.8	5.4	12.7
1985	4.1	2.8	5.8	10.9	4.7	0.6	4.2	20.4
1986	6.1	3.7	2.8	4.0	9.1	3.5	3.1	19.8
1987	1.3	5.4	2.6	3.2	3.3	6.8	4.5	17.7
1988	42.8	0.9	5.1	**4.4**	**2.2**	**4.1**	**9.6**	**20.3**
1989	1.6	20.6	1.1	4.0	3.3	3.2	9.0	19.6
1990	3.2	3.4	20.2	**0.5**	**2.6**	**2.4**	**6.4**	**11.9**
1991	4.9	3.0	1.6	8.0	1.1	2.0	5.3	16.4
1992	18.5	3.7	2.7	0.7	6.8	0.5	4.2	12.2
1993	1.4	10.8	1.2	0.7	0.6	4.7	3.1	9.0
1994	3.5	1.0	9.4	0.9	0.5	0.4	5.2	7.0
1995	2.4	2.1	0.5	**2.5**	**0.7**	**0.3**	**2.7**	**6.2**
1996	3.9	1.1	1.1	0.6	2.4	0.4	2.4	5.8
1997	1.5	2.0	1.2	**0.7**	**0.5**	**2.2**	**1.7**	**5.1**
1998	9.0	0.6	1.7	0.3	0.6	0.5	3.3	4.7
1999	5.5	3.1	0.8	**0.7**	**0.2**	**0.6**	**2.9**	**4.4**
2000	3.9	4.8	2.6	0.2	0.8	0.3	3.3	4.5
2001	2.9	5.0	2.4	**1.6**	**0.2**	**0.9**	**2.9**	**5.5**
2002	13.0	3.7	3.4	1.8	1.4	0.5	3.4	7.1
2003	4.4	5.8	1.5	**1.2**	**1.6**	**1.1**	**3.5**	**7.4**
2004	2.6	5.2	4.9	2.5	1.8	1.1	3.6	9.0
2005	3.4	0.6	1.9	**2.4**	**2.0**	**2.2**	**2.4**	**9.0**
2006	2.2	3.9	0.5	0.7	2.6	1.4	3.7	8.4
2007	3.7	2.7	1.8	**0.3**	**0.6**	**2.6**	**3.2**	**6.7**
2008	0.8	0.9	0.4	1.8	1.4	0.6	5.3	9.0
2009	0.0	2.2	1.1	1.3	1.6	1.2	5.3	9.4
2010	0.7	2.1	1.5	**1.8**	**1.2**	**1.5**	**5.1**	**9.5**
2011	3.4	1.1	2.8	1.1	1.0	0.9	4.9	7.9
2012	1.6	3.1	1.0	1.8	0.8	0.8	4.4	7.8

Year	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age≥7	Total (Age≥4)
2013	2.2	2.6	3.9	0.9	1.4	0.6	4.1	7.0
2014	3.8	4.4	1.8	5.3	0.8	1.1	3.6	10.8
2015	4.6	4.2	2.3	1.8	4.0	0.6	3.5	9.9
2016	4.9	4.1	2.7	0.9	1.3	3.0	3.1	8.4
2017	13.3	5.5	4.2	5.5	1.9	0.9	4.2	12.6
2018	2.8	8.3	3.1	8.7	3.8	1.3	3.5	17.4
2019	4.6	1.4	6.8	5.8	6.0	2.6	4.8	19.3
2020	3.7	2.6	1.7	12.4	3.4	4.1	5.2	25.0
2021	4.5	2.2	1.9	3.1	8.5	2.3	6.4	20.4
2022	4.9	3.9	1.8	1.2	2.2	5.9	3.0	12.3
2023	14.1	3.9	4.2	5.8	2.5	1.5	6.0	15.7
2024	3.3	11.4	3.0	3.4	3.9	1.7	5.0	13.9
2025	5.3	1.7	6.7	3.2	2.3	2.6	3.7	11.8

Table A8. Length at age (in) of walleye in October from Oneida Lake, NY since 1959.

Year	Age-0	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8
1959	6.9	7.9	10.6	11.5	0.0	0.0	18.5	0.0	0.0
1960	6.6	10.4	12.9	14.0	14.9	15.6	16.5	16.4	18.1
1961	6.7	9.4	13.4	14.1	15.4	15.8	16.8	17.1	17.3
1962	7.1	10.3	13.0	15.0	15.3	16.2	16.7	17.9	18.0
1963	6.9	9.6	12.6	14.4	15.7	16.3	17.0	17.4	17.7
1964	5.6	10.0	12.9	14.9	15.6	15.9	15.8	14.2	0.0
1965	7.9	9.8	13.4	14.7	15.7	16.5	17.2	16.9	17.9
1966	0.0	8.5	11.6	14.0	15.2	17.1	16.5	17.4	18.5
1967	0.0	8.8	12.7	14.0	15.4	16.4	17.0	17.7	18.6
1968	7.5	10.2	12.7	14.5	15.5	16.6	17.4	17.7	18.8
1969	5.8	9.0	12.1	13.3	15.1	16.3	18.8	16.4	18.2
1970	7.4	10.2	12.8	14.2	14.9	16.3	16.9	17.3	18.3
1971	7.0	10.6	13.5	14.7	15.7	15.9	17.2	17.4	18.3
1972	0.0	9.1	12.6	13.9	15.4	16.1	17.3	17.4	18.5
1973	6.0	9.9	11.4	12.9	13.5	15.3	15.8	16.2	18.2
1974	0.0	9.3	11.7	13.3	14.3	15.7	16.0	16.7	19.4
1975	0.0	10.7	11.9	13.8	15.2	15.8	0.0	16.1	0.0
1976	5.4	8.8	12.5	13.7	14.2	15.6	16.3	17.3	16.9
1977	8.4	9.9	13.2	14.7	15.3	15.6	17.0	17.1	18.3
1978	7.1	9.2	11.5	14.2	15.7	17.4	0.0	18.4	0.0
1979	0.0	9.9	11.3	0.0	15.1	0.0	0.0	0.0	19.0
1980	0.0	11.0	12.4	13.7	14.2	16.5	16.8	19.2	0.0
1981	0.0	10.2	13.0	14.3	15.4	17.5	16.8	16.9	18.8
1982	7.7	9.8	12.6	14.3	15.7	16.2	16.4	18.3	0.0
1983	7.6	9.4	12.3	13.8	15.3	16.4	17.0	16.6	17.5
1984	0.0	8.9	12.0	13.3	14.9	15.7	15.7	17.2	23.7
1985	8.2	9.9	12.0	13.8	14.7	15.7	0.0	20.0	18.6
1986	7.5	9.5	11.6	13.2	14.6	15.1	15.9	16.6	17.7
1987	8.9	11.1	13.2	14.9	15.1	15.6	15.9	16.8	0.0
1988	7.4	10.2	14.2	15.4	16.3	16.9	17.2	17.5	18.0
1989	0.0	10.9	13.1	15.2	15.9	16.7	16.7	16.8	16.8
1990	8.1	10.0	13.4	14.3	15.7	16.2	16.8	17.5	17.1
1991	9.0	10.5	13.1	14.7	15.6	16.5	16.6	17.7	18.0
1992	7.5	10.0	13.2	14.8	16.0	16.3	16.7	17.1	18.2
1993	0.0	9.3	12.5	14.1	15.2	15.9	16.4	17.1	18.1
1994	8.4	9.7	12.4	13.7	14.8	15.5	15.8	16.4	16.9
1995	0.0	10.0	12.8	13.8	14.8	16.0	16.0	16.3	16.9
1996	6.3	9.3	12.1	13.8	14.6	15.5	15.1	17.7	16.0
1997	0.0	10.0	13.0	14.2	15.5	15.9	17.0	17.3	18.1
1998	7.1	10.6	0.0	14.3	16.2	15.5	14.2	17.5	0.0
1999	5.8	12.3	14.0	15.3	16.8	17.2	17.7	18.9	19.2
2000	6.9	11.1	13.8	15.3	16.1	16.8	17.8	17.5	17.6
2001	6.2	10.3	14.1	15.8	16.3	17.1	17.5	19.0	0.0
2002	6.9	10.4	14.6	15.8	16.9	17.2	17.4	18.8	0.0
2003	6.1	10.0	13.2	15.3	16.8	17.3	18.1	19.2	0.0
2004	5.9	10.6	12.4	14.3	16.1	16.8	17.5	18.1	0.0
2005	4.8	10.5	13.7	14.6	15.7	15.9	17.2	18.8	0.0
2006	6.4	10.0	12.0	0.0	0.0	17.1	17.9	16.7	0.0
2007	5.3	9.7	14.3	15.1	16.5	16.5	17.3	18.6	0.0
2008	5.6	11.0	13.2	14.3	15.5	16.4	17.1	17.3	18.2

Year	Age-0	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8
2009	6.8	9.2	10.7	13.9	15.0	16.7	17.2	18.4	18.9
2010	5.5	10.0	12.7	14.4	15.8	17.0	18.0	18.9	19.2
2011	8.0	10.7	13.2	15.2	16.7	17.1	18.3	18.1	18.5
2012	6.6	11.5	14.1	16.2	17.0	17.7	18.1	18.0	18.5
2013	6.7	11.9	14.5	16.4	18.0	17.7	17.7	17.4	19.0
2014	6.2	11.5	14.6	15.8	16.7	18.5	18.3	18.7	17.5
2015	6.5	10.2	13.9	15.5	17.0	17.5	17.9	18.4	18.5
2016	7.2	10.9	13.5	16.0	16.7	16.7	18.3	18.6	0.0
2017	6.8	10.5	13.5	16.2	17.9	17.5	18.4	19.4	20.7
2018	7.5	11.0	13.3	15.8	17.3	18.7	18.8	19.7	18.7
2019	6.8	10.6	13.0	14.8	16.6	17.0	17.8	18.2	18.7
2020	6.9	10.5	12.6	14.9	15.6	16.5	18.2	17.9	18.6
2021	6.7	10.8	13.1	14.4	15.1	15.8	16.8	19.7	17.8
2022	7.9	11.1	13.2	15.2	15.8	17.2	17.1	18.3	17.4
2023	6.9	10.1	12.9	14.5	15.7	16.5	17.1	17.7	18.3
2024	7.9	10.7	13.4	14.8	15.4	16.6	16.9	17.1	17.7
2025	9.1	12.1	13.6	14.7	14.6	16.2	17.1	16.6	17.5

Table A9. Fish observed in stomachs of yearling and older walleye taken by trawls and electrofishing during October and November for Oneida Lake since 1971, expressed as numbers per pound of walleye.

Year	N	% empty	Yellow perch	Morone	Gizzard shad	Emerald shiner	Round goby	Other fish	Total
1971	240	37	1.78	0.00	0.00	0.00	0.00	0.03	2.53
1972	163	58	0.46	0.05	0.00	0.00	0.00	0.28	1.19
1973	295	32	0.31	0.62	0.00	0.00	0.00	0.20	1.74
1974	228	27	0.96	0.52	0.00	0.05	0.00	0.17	2.51
1975	204	68	0.09	0.06	0.00	0.01	0.00	0.08	0.35
1976	156	36	0.59	0.40	0.00	0.07	0.00	0.34	1.94
1977	70	19	1.43	0.57	0.00	0.00	0.00	0.06	2.46
1978	85	56	0.23	0.05	0.00	0.00	0.00	0.21	0.84
1981	88	66	0.69	0.07	0.00	0.00	0.00	0.00	1.02
1982	122	11	0.17	2.39	0.00	0.00	0.00	0.00	2.81
1983	117	62	0.09	0.36	0.00	0.00	0.00	0.00	0.58
1984	148	59	0.10	0.20	0.44	0.00	0.00	0.03	0.98
1985	151	50	0.73	0.02	0.16	0.00	0.00	0.06	1.17
1986	193	45	0.73	0.07	0.02	0.00	0.00	0.07	1.11
1987	194	23	0.02	0.29	0.89	0.00	0.00	0.01	1.46
1988	180	55	0.16	0.00	0.14	0.00	0.00	0.03	0.48
1989	193	26	0.00	0.08	2.46	0.00	0.00	0.01	2.93
1990	179	28	0.01	0.00	2.23	0.00	0.00	0.00	2.55
1991	137	20	0.01	0.00	1.73	0.00	0.00	0.05	2.14
1992	65	58	0.08	0.01	0.10	0.00	0.00	0.03	0.36
1993	134	25	0.97	0.23	0.00	0.19	0.00	0.37	2.34
1994	120	55	0.16	0.03	0.32	0.08	0.00	0.02	0.95
1995	86	45	0.20	0.16	0.03	0.01	0.00	0.06	0.76
1996	184	32	0.39	0.17	0.05	0.03	0.00	0.24	1.50
1997	75	45	0.13	0.16	0.00	0.01	0.00	0.12	0.94
1998	78	40	0.13	0.07	0.00	0.05	0.00	0.08	0.62
1999	64	42	0.11	0.01	0.11	0.34	0.00	0.01	0.87
2000	134	21	0.02	0.13	1.05	0.00	0.00	0.00	1.63
2001	123	28	0.18	0.08	0.40	0.08	0.00	0.11	1.01
2002	83	41	0.01	0.02	0.47	0.07	0.00	0.01	0.73
2003	183	39	0.38	0.04	0.16	0.02	0.00	0.10	0.94
2004	135	13	0.14	0.17	1.07	0.26	0.00	0.03	2.08
2005	134	30	0.49	0.05	0.32	0.14	0.00	0.06	1.29
2006	110	25	0.17	0.13	1.14	0.07	0.00	0.04	1.78
2007	264	50	0.39	0.00	0.30	0.01	0.00	0.04	0.95
2008	199	26	0.25	0.02	1.61	0.01	0.00	0.04	2.54
2009	188	23	0.91	0.03	1.23	0.01	0.00	0.04	2.39
2010	162	11	0.02	0.00	1.53	0.02	0.00	0.00	1.99
2011	207	37	0.10	0.26	0.42	0.07	0.00	0.04	1.18
2012	206	21	0.01	0.00	1.02	0.01	0.00	0.01	1.48
2013	234	63	0.06	0.01	1.42	0.00	0.00	0.26	1.97
2014	196	30	0.22	0.04	0.83	0.00	0.00	0.03	1.62
2015	152	14	0.06	0.00	1.32	0.17	0.03	0.22	2.63
2016	150	21	0.14	0.00	0.81	0.10	0.17	0.01	1.24
2017	202	12	0.08	0.04	2.62	0.00	0.93	0.04	3.70
2018	220	15	0.17	0.00	2.66	0.12	0.06	0.03	3.05
2019	219	38	0.15	0.02	0.29	0.03	0.25	0.08	0.82
2020	205	37	0.11	0.00	0.02	0.01	0.08	0.05	0.26
2021	252	37	0.15	0.00	0.22	0.03	0.34	0.10	0.83
2022	166	25	0.14	0.00	0.98	0.02	0.24	0.03	1.41
2023	177	45	0.16	0.00	0.05	0.00	0.32	0.95	1.48
2024	146	38	0.21	0.02	0.57	0.00	0.17	0.12	1.09
2025	196	37	0.44	0.00	0.41	0.00	0.27	0.06	1.18

Table A10. Young of year and age-1 yellow perch density (#/acre) estimates and mean lengths for Oneida Lake since 1961. Larval yellow perch densities (at 18 mm) are estimated from Miller sampler surveys. Age-0 yellow perch densities, age-0 mean lengths (TL, in) are estimates for October 15 obtained from regression analysis of weekly catches throughout the season. Age-1 yellow perch densities are from trawl surveys around May 1 and from mid-July through October. Age-1 yellow perch mean lengths (TL, in) are from spring trawl surveys centered on May 1 since 1961.

Year-class	18 mm Density	Age-0 Density	Age-0 Length	May Age-1 Density	Age-1 Length	Summer Age-1 Density
1961	-	1,153	2.3	-	-	7.9
1962	-	1,724	2.8	196.7	3.0	75.6
1963	-	316	2.3	28.7	-	6.4
1964	-	1,425	2.8	343.6	2.8	237.1
1965	56,698	1,056	2.3	12.1		0.8
1966	16,269	69	2.8	10.1	2.9	15.9
1967	24,767	907	2.8	-	-	55.2
1968	57,386	2,711	2.6	242.0	2.9	23.1
1969	28,005	85	2.5	0.8	-	0.2
1970	32,376	376	3.0	63.9	3.3	18.0
1971	87,576	1,425	2.2	21.0	2.4	12.3
1972	48,847	40	2.6	1.6	3.0	0.3
1973	6,718	206	3.4	25.5	3.5	18.6
1974	12,950	130	2.8	13.4	2.9	3.8
1975	76,366	182	2.5	2.0	2.9	1.7
1976	18,859	73	2.8	4.9	3.0	1.9
1977	26,386	1,675	2.7	1,369.9	2.7	97.7
1978	-	73	2.8	-	-	5.5
1979	41,764	146	2.9	-	-	2.6
1980	53,258	202	3.2	47.8	3.2	40.8
1981	84,257	1,048	2.2	-	-	1.9
1982	143,019	397	2.5	10.1	2.7	4.3
1983	18,454	287	3.1	38.4	3.1	10.6
1984	6,475	328	2.8	41.7	2.8	13.0
1985	36,868	1,093	2.7	70.4	2.9	12.1
1986	5,909	28	3.2	0.8	3.3	0.7
1987	1,497	89	2.7	51.8	2.7	39.6
1988	30,838	89	3.2	7.7	3.2	1.8
1989	1,497	8	3.2	6.9	3.2	5.3
1990	47,349	186	2.8	74.5	2.7	49.3
1991	13,760	138	3.2	285.3	3.3	67.4
1992	24,605	40	2.8	5.3	3.1	2.2
1993	13,274	130	3.3	28.3	3.3	22.8
1994	8,822	113	3.2	113.7	3.2	12.2
1995	6,111	36	3.5	151.0	3.5	23.7
1996	17,645	32	3.1	29.9	3.2	9.8
1997	1,862	12	3.1	9.3	3.1	7.1
1998	23,108	283	3.2	184.9	3.3	40.2
1999	17,038	437	3.2	7.3	3.3	7.2
2000	7,811	57	3.0	29.5	3.1	2.9
2001	14,650	109	3.3	188.6	3.4	2.5
2002	9,470	672	3.0	153.8	3.1	7.1
2003	27,722	24	3.3	15.4	3.3	2.1
2004	24,565	73	3.4	14.6	3.3	2.3
2005	14,690	166	3.6	113.3	3.6	5.5
2006	23,675	997	33.1	447.3	33.1	77.9
2007	55,034	7745	33.2	556.3	33.3	00.8
2008	27,285	291	2.8	42.1	3.0	3.7
2009	45,614	588	2.9	20.2	3.0	2.8

Year-class	18 mm Density	Age-0 Density	Age-0 Length	May Age-1 Density	Age-1 Length	Summer Age-1 Density
2010	25,429	335	2.8	19.0	3.0	7.2
2011	1,907	8	2.8	6.5	2.8	1.1
2012	9,023	7	3.4	8.1	3.3	11.7
2013	2,693	53	3.3	25.1	3.3	5.5
2014	4,870	173	3.0	7.7	3.0	3.4
2015	11,397	23	3.2	8.9	3.1	9.1
2016	13,548	514	2.9	176.0	3.0	18.9
2017	7,554	210	3.0	12.1	3.0	7.3
2018	10,951	341	2.7	52.2	3.0	14.6
2019	39,158	227	3.4	6.1	3.2	2.3
2020	17,717	53	3.4	4.9	3.7	5.2
2021	20,215	94	3.2	7.7	2.9	5.4
2022	40,244	334	3.0	8.6	3.2	5.9
2023	38,886	33	3.4	3.9	3.3	2.6
2024	62,209	74	2.7	3.2	3.0	1.2
2025	15,010	137	3.1	-	-	-

Table A11. Age density of yellow perch from Oneida Lake, NY.

Year	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7+>	Total (age3+>)	Total pop
1961	20.72	4.57	22.95	3.80	4.13	7.08	42.53	2,175,570
1962	7.65	15.54	11.25	16.27	5.18	2.63	50.87	2,601,990
1963	6.31	10.81	16.23	13.23	13.56	6.52	60.34	3,086,370
1964	4.25	4.57	18.21	17.97	13.27	5.02	59.04	3,022,200
1965	4.57	17.89	5.14	27.20	16.75	5.71	72.68	3,719,790
1966	13.88	7.93	11.57	8.46	15.86	5.14	48.97	2,502,630
1967	0.57	20.28	11.37	11.01	8.26	8.22	59.13	3,022,200
1968	14.97	1.42	28.41	6.48	6.92	9.96	53.18	2,719,980
1969	13.44	8.78	2.95	21.97	7.65	7.65	49.01	2,508,840
1970	2.71	19.43	9.35	3.04	25.05	15.34	72.20	3,692,880
1971	0.77	3.12	21.29	6.92	1.21	12.22	44.76	2,291,490
1972	16.79	0.73	3.08	10.89	3.64	4.82	23.15	1,181,970
1973	1.86	58.44	1.58	2.91	7.16	10.60	80.70	4,129,650
1974								
1975	15.78	0.36	2.31	24.81	1.01	6.07	34.56	1,769,850
1976	2.14	22.87	1.13	4.53	20.72	5.83	55.08	2,817,270
1977	1.09	5.22	16.19	0.20	0.89	9.79	32.29	1,649,790
1978	7.97	1.58	3.48	16.88	1.46	11.66	35.05	1,792,620
1979	40.11	5.06	2.19	2.47	13.72	4.17	27.60	1,409,670
1980	1.98	72.52	6.60	3.48	5.87	16.71	105.18	5,382,000
1981	6.48	6.60	54.39	9.39	1.50	10.08	81.95	4,191,750
1982	12.63	4.17	4.29	40.31	1.74	3.24	53.74	2,748,960
1983	1.13	11.21	3.32	2.10	22.02	2.35	41.00	2,098,980
1984	7.53	5.10	19.55	6.96	4.17	14.57	50.34	2,577,150
1985	12.06	3.08	2.02	8.98	1.34	4.94	20.36	1,041,210
1986	11.94	9.71	4.17	3.28	11.70	3.64	32.50	1,662,210
1987	6.23	12.83	11.74	4.49	2.02	14.45	45.53	2,328,750
1988	4.05	6.27	10.00	7.65	1.74	8.86	34.52	1,767,780
1989	11.25	2.87	7.53	12.55	9.51	9.79	42.25	2,161,080
1990	3.52	13.56	1.17	2.35	6.96	7.28	31.32	1,602,180
1991	1.38	1.50	7.49	2.39	3.64	9.02	24.04	1,229,580
1992	19.38	2.23	2.10	7.45	2.63	4.05	18.45	941,850
1993	11.94	11.41	3.04	1.94	5.54	4.37	26.31	1,347,570
1994	0.69	4.21	3.60	0.61	0.32	2.63	11.37	581,670
1995	5.63	1.74	6.52	2.39	0.57	1.62	12.83	656,190
1996	10.68	4.33	1.62	3.44	1.46	1.54	12.38	633,420
1997	8.62	10.64	2.83	0.57	1.09	0.69	15.82	807,300
1998	5.34	9.67	8.90	4.21	1.70	1.58	26.06	1,331,010
1999	1.74	4.25	5.30	3.60	1.09	0.69	14.93	765,900
2000	8.22	3.60	6.15	7.85	4.25	2.95	24.81	1,270,980
2001	1.50	8.70	2.87	1.94	2.35	2.63	18.49	945,990
2002	2.31	3.20	18.62	4.65	4.33	9.96	40.75	2,086,560
2003	0.69	0.93	2.87	8.78	2.47	3.97	19.02	972,900
2004	1.38	2.19	2.23	3.36	6.88	7.89	22.54	1,152,990
2005	1.17	5.42	5.02	1.98	3.72	13.19	29.34	1,500,750
2006	6.27	4.45	5.10	3.28	1.17	7.49	21.49	1,097,100
2007	15.46	6.07	2.87	2.63	1.42	4.73	17.73	906,660
2008	5.95	16.88	6.48	2.27	1.50	5.42	32.54	1,664,280
2009	33.63	3.52	6.35	4.78	1.42	3.80	19.87	1,014,300
2010	16.67	6.68	1.86	5.22	2.91	3.18	19.86	1,016,370
2011	13.43	3.42	5.21	2.64	5.58	3.18	20.04	1,024,985
2012	6.07	3.12	8.05	7.12	1.70	7.61	27.60	1,411,740
2013	23.51	9.47	3.28	4.61	7.28	7.97	32.62	1,668,420
2014	19.14	3.64	2.10	0.89	2.19	2.79	11.61	594,090
2015	8.09	10.08	3.56	1.70	0.40	2.31	18.05	923,220
2016	17.56	3.64	10.48	1.74	0.65	1.25	17.77	908,730
2017	14.97	6.88	2.63	3.80	1.13	1.13	15.58	796,950
2018	32.34	16.71	6.39	1.86	2.91	2.23	30.11	1,540,080

Year	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7+>	Total (age3+>)	Total pop
2019	20.19	17.56	12.38	5.02	0.93	2.10	38.00	1,943,730
2020	14.49	14.81	16.59	13.31	4.29	2.91	51.92	2,655,810
2021	34.88	10.56	16.47	17.69	12.38	4.33	61.43	3,142,260
2022	55.61	25.50	9.47	14.04	14.77	8.26	72.04	3,684,600
2023	76.43	48.51	17.47	6.11	4.90	12.95	89.94	4,600,290
2024	46.18	33.51	25.94	9.43	3.32	6.31	78.51	4,015,800
2025	20.39	20.41	19.50	11.57	2.97	4.53	58.99	3,017,343

Table A12. Length at age of yellow perch from standard summer gillnet surveys in Oneida Lake.

Age	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7
1956	0.0	8.0	9.6	10.0	10.5	10.7	10.8
1957	0.0	7.5	9.2	10.1	10.6	11.0	11.2
1958	0.0	7.3	8.6	9.8	10.5	10.9	11.1
1959	0.0	7.1	8.6	9.8	10.4	10.9	11.2
1960	0.0	7.0	8.5	9.8	10.2	10.8	11.3
1961	5.6	6.6	8.1	9.3	10.1	10.7	11.3
1962	5.4	7.0	8.7	9.5	10.1	10.7	10.9
1963	5.4	6.5	8.3	9.4	9.9	10.5	10.7
1964	5.3	7.2	8.7	9.5	10.2	10.5	11.0
1965	5.5	7.3	8.7	9.8	10.3	10.8	11.1
1966	0.0	6.5	8.6	9.5	10.3	10.7	11.2
1967	5.7	6.8	8.3	9.5	10.4	10.8	11.1
1968	5.6	6.9	8.3	9.3	10.2	10.6	10.9
1969	0.0	6.6	8.6	9.3	9.9	10.5	10.8
1970	0.0	7.4	8.8	9.7	10.0	10.3	10.8
1971	6.1	7.1	9.0	9.8	10.2	10.4	10.6
1972	5.6	7.4	8.7	10.0	10.3	10.5	10.9
1973	0.0	6.7	9.0	9.8	10.3	10.6	10.8
1975	5.9	8.2	9.1	9.6	10.3	10.8	10.9
1976	5.4	7.5	9.2	9.7	10.3	10.6	10.9
1977	5.7	7.7	9.3	10.1	10.5	10.7	10.9
1978	5.3	7.3	8.4	10.0	10.4	10.6	10.9
1979	5.4	7.7	9.1	10.0	10.4	10.6	10.9
1980	5.5	7.5	9.2	10.1	10.4	10.9	10.9
1981	5.8	7.3	8.4	9.7	10.1	10.5	10.6
1982	6.9	7.4	8.6	9.3	9.9	10.4	11.0
1983	5.4	7.0	8.9	9.5	9.7	10.2	10.8
1984	5.5	6.8	8.5	9.5	9.9	10.1	10.3
1985	5.5	6.8	8.3	9.5	10.0	10.3	10.5
1986	5.5	7.0	8.7	9.6	10.1	10.5	10.5
1987	5.9	7.2	9.0	9.8	10.2	10.5	10.8
1988	5.9	7.4	8.9	10.0	10.4	10.6	10.8
1989	0.0	6.9	9.0	9.8	10.2	10.4	10.6
1990	5.5	6.7	8.6	9.8	10.3	10.6	10.8
1991	0.0	6.8	8.4	9.6	10.2	10.4	10.6
1992	5.7	6.7	8.7	9.6	10.2	10.6	10.9
1993	0.0	7.5	8.9	9.9	10.2	10.6	10.8
1994	6.0	6.9	8.9	9.8	10.2	10.5	10.8
1995	5.9	7.6	9.2	10.3	10.6	10.7	11.0
1996	6.1	7.6	9.3	10.1	10.7	10.8	11.4
1997	5.7	7.2	9.1	9.9	10.5	10.7	11.1
1998	5.8	6.6	8.4	9.8	10.3	10.7	10.7
1999	5.8	6.9	8.3	9.7	10.1	10.6	10.3
2000	5.7	7.0	8.6	9.7	10.1	10.5	10.6
2001	5.8	7.0	9.1	9.6	10.2	10.4	10.6
2002	5.8	7.1	8.9	9.9	10.2	10.5	10.8
2003	5.6	6.6	8.8	9.7	10.3	10.7	10.9
2004	5.7	7.4	9.2	10.0	10.3	10.6	10.8
2005	6.0	7.3	9.1	10.0	10.1	10.8	10.9
2006	5.7	7.7	9.2	10.0	10.6	10.6	11.0

Age	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7
2007	5.7	7.0	9.1	9.8	10.3	10.7	11.1
2008	6.1	6.8	8.8	9.7	10.6	10.8	11.2
2009	5.6	6.5	8.4	9.9	10.3	10.7	11.2
2010	6.4	7.1	8.8	10.4	10.5	11.0	10.9
2011	5.8	6.7	8.8	10.0	10.7	11.0	11.2
2012	6.0	7.4	9.1	10.2	10.7	11.1	11.4
2013	5.9	6.4	8.0	10.4	10.9	11.0	11.2
2014	5.7	6.9	8.5	9.7	10.8	11.0	11.2
2015	5.7	6.9	8.7	9.8	10.2	11.0	11.1
2016	5.8	7.3	8.7	9.6	10.2	10.0	0.0
2017	5.8	7.1	8.8	9.8	10.4	11.0	11.2
2018	5.6	7.1	8.9	9.9	10.5	11.0	11.3
2019	5.6	7.2	8.9	10.2	10.5	10.9	11.1
2020	6.0	7.4	9.4	10.1	10.6	10.9	11.2
2021	6.3	8.2	9.7	10.6	10.9	11.1	11.6
2022	6.0	8.0	9.7	10.4	11.2	11.4	11.7
2023	6.2	7.8	9.7	10.6	11.0	11.5	11.6
2024	5.8	8.3	9.5	10.6	11.2	11.3	11.8
2025	6.0	7.7	9.6	10.3	11.0	11.2	11.9

Table A13. Catch/net-hour of lake sturgeon in large mesh gill nets at 12 standard sites for Oneida Lake since 2002.

	6"-12"mesh							6"-14"mesh	
Year	May	June	July	August	September	October	November	May	June
2002		0.39	0.35	0.10	0.10	0.16	-	-	-
2003	0.32	0.17	0.09	0.09	0.56	-	-	-	-
2004	0.35	0.39	0.08	0.37	0.15	-	-	-	-
2005	0.18	0.11	-	-	-	-	-	-	-
2006	0.31	0.11	-	-	-	-	0.06	-	-
2007	0.30	0.11	-	-	-	0.07	-	-	-
2008	0.17	0.13	-	-	-	-	-	-	-
2009	0.20	0.14	-	-	-	-	-	-	-
2010	0.27		0.04	-	-	-	-	-	-
2011	0.34	0.04	-	-	-	-	-	-	-
2012	0.40	0.15	-	-	-	-	-	-	-
2013	0.2	0.19	-	-	-	-	-	-	-
2014	0.09	0.06	-	-	-	-	-	-	-
2015	0.24	0.03	-	-	-	-	-	-	-
2016	0.34	0.06	-	-	-	-	-	-	-
2017	0.11	0.05	-	-	-	-	-	-	-
2018	0.47	0.09	-	-	-	-	-	-	-
2019	0.29	0.16	-	-	-	-	-	0.33	0.21
2020	0.20	0.21	-	-	-	-	-	0.23	0.22
2021	0.27	0.07	-	-	-	-	-	0.36	0.09
2022	0.15	0.11	-	-	-	-	-	0.18	0.11
2023	0.17	0.22	-	-	-	-	-	0.23	0.25
2024	0.26	0.03	-	-	-	-	-	0.35	0.07
2025	0.14	0.16	-	-	-	-	-	0.24	0.21

Table A14. Round goby abundance estimates from camera surveys, and round goby index expressed as percent of the maximum abundance in multiple sampling gear.

Year	# sites	Pop (hard)	Pop (soft)	Pop (total)	Density (#/acre)	90% CL	Goby Index
2014	0	-	-	-	-	-	0.5
2015	0	-	-	-	-	-	18.0
2016	0	-	-	-	-	-	58.9
2017	0	-	-	-	-	-	42.3
2018	46	70,947,800	14,352,390	85,300,190	1,668	863	24.7
2019	46	196,746,000	353,139,670	549,885,670	10,751	5,420	48.2
2020	46	252,788,800	281,377,720	534,166,520	10,443	5,315	51.9
2021	44	313,303,100	508,535,300	821,838,400	16,067	5,878	61.2
2022	42	344,603,600	508,535,300	853,138,900	16,679	6,387	62.3
2023	42	463,514,400	717,627,600	1,181,142,000	23,091	6,387	71.0
2024	46	431,619,840	669,785,760	1,101,405,600	21,533	6,501	72.3
2025	45	191,367,360	369,090,936	560,458,296	10,957	5,913	53.5

Table A15. Abundance and biomass of pelagic fish (emerald shiners (ES), gizzard shad (GS), and *Alosa* spp. (blueback herring and alewife)) for Oneida Lake since 1993.

	Abundance (fish/ac)				Biomass (lb/ac)			
Year	Emerald shiner	Gizzard shad	*Alosa spp.*	Total	Emerald shiner	Gizzard shad	*Alosa spp.*	Total
1993	3004	2592	53	5650	9.0	31.3	1.1	41.4
1994	2000	1018	246	3263	5.6	13.9	5.4	25.0
1995	462	218	233	913	3.4	15.3	8.3	27.0
1996	1291	9	199	1499	2.9	1.2	4.7	8.9
1997	7566	41	6	7613	19.1	0.5	0.2	19.9
1998	3206	17	1	3224	15.3	0.4	0.0	15.6
1999	4707	294	0	5001	14.4	7.8	0.0	22.1
2000	2144	783	0	2928	7.7	5.6	0.0	13.3
2001	7508	995	0	8503	21.6	21.0	0.0	42.6
2002	9326	1183	0	10510	14.8	5.0	0.0	19.8
2003	4368	1001	0	5369	22.3	12.3	0.0	34.5
2004	4235	1078	0	5313	13.4	13.0	0.0	26.4
2005	1580	896	0	2476	6.7	42.6	0.0	49.3
2006	1342	694	0	2037	4.4	13.8	0.0	17.8
2007	159	579	0	739	0.5	12.8	0.0	13.3
2008	3351	839	0	4190	7.0	13.0	0.0	20.1
2009	1021	2416	2	3438	4.5	16.8	0.4	21.8
2010	4202	3093	11	7305	11.9	22.0	0.1	34.0
2011	16182	1894	0	18075	31.2	13.4	0.0	44.6
2012	1355	1122	0	2478	5.3	26.7	0.0	31.9
2013	342	500	2	844	0.9	6.3	0.1	7.3
2014	1135	2003	0	3138	3.7	10.2	0.0	13.8
2015	1768	463	0	2231	5.4	6.1	0.0	11.5
2016	4056	623	0	4679	7.8	14.7	0.1	22.6
2017	2410	1832	100	4342	6.5	22.2	1.5	30.2
2018	1619	2464	0	4083	3.2	24.2	0.0	27.4
2019	2153	249	0	2402	4.8	4.2	0.0	9.0
2020	803	238	0	1040	3.3	11.7	0.0	15.0
2021	976	67	5	1048	5.1	0.6	0.1	5.8
2022	64	467	0	531	0.3	8.1	0.0	8.4
2023	37	65	0	102	0.1	0.7	0.0	0.7
2024	13	743	0	756	0.0	19.7	0.0	19.7
2025	21	159	0	180	0.0	5.5	0.0	5.6

Table A16. Total annual consumption (US tons) by double-crested cormorants and numbers of percids consumed by age-class for Oneida Lake since 1978. Feeding days up to 2010 are based on Coleman et al. (2016), which also includes numbers consumed by age class for 1995 – 2010. Consumption estimate assumes a double-crested cormorant consumes 1.0 pound of fish per day.

Year	Feeding Days	Consumption (Tons)	Walleye				Yellow perch			
			Age-0	Age-1	Age-2	Age-3+	Age-0	Age-1	Age-2	Age-3+
1978	7,315	3.66	-	-	-	-	-	-	-	-
1979	11,497	5.75	-	-	-	-	-	-	-	-
1980	13,138	6.57	-	-	-	-	-	-	-	-
1981	18,184	9.09	-	-	-	-	-	-	-	-
1982	19,910	9.96	-	-	-	-	-	-	-	-
1983	23,872	11.94	-	-	-	-	-	-	-	-
1984	24,243	12.12	-	-	-	-	-	-	-	-
1985	30,118	15.06	-	-	-	-	-	-	-	-
1986	32,340	16.17	-	-	-	-	-	-	-	-
1987	44,252	22.13	-	-	-	-	-	-	-	-
1988	51,171	25.59	-	-	-	-	-	-	-	-
1989	60,326	30.16	-	-	-	-	-	-	-	-
1990	72,718	36.36	-	-	-	-	-	-	-	-
1991	90,878	45.44	-	-	-	-	-	-	-	-
1992	93,212	46.61	-	-	-	-	-	-	-	-
1993	118,756	59.38	-	-	-	-	-	-	-	-
1994	88,004	44.00	-	-	-	-	-	-	-	-
1995	105,412	52.71	-	-	-	-	-	-	-	-
1996	164,612	82.31	-	-	-	-	-	-	-	-
1997	178,794	89.40	-	-	-	-	-	-	-	-
1998	130,609	65.30	-	-	-	-	-	-	-	-
1999	125,317	62.66	-	-	-	-	-	-	-	-
2000	89,968	44.98	-	-	-	-	-	-	-	-
2001	116,868	58.43	-	-	-	-	-	-	-	-
2002	87,380	43.69	-	-	-	-	-	-	-	-
2003	90,479	45.24	-	-	-	-	-	-	-	-
2004	39,375	19.69	-	-	-	-	-	-	-	-
2005	31,899	15.95	-	-	-	-	-	-	-	-
2006	27,706	13.85	-	-	-	-	-	-	-	-
2007	23,275	11.64	-	-	-	-	-	-	-	-
2008	23,639	11.82	-	-	-	-	-	-	-	-
2009	25,203	12.60	-	-	-	-	-	-	-	-
2010	35,809	17.90	-	-	-	-	-	-	-	-
2011	36,335	18.17	-	-	-	-	-	-	-	-
2012	58,186	29.09	13,586	0	0	0	87,805	13,482	2,214	0
2013	57,051	28.53	9,231	17,208	1,801	0	63,336	391,991	29,237	17,004
2014	37,702	18.85	4,180	529	2,502	480	30,168	16,835	1,472	7,231
2015	61,447	30.72	16,841	6,975	8,783	7,062	233,179	85,044	1,766	14,173
2016	76,967	38.48	29,803	44,705	0	0	268,231	100,111	0	0
2017	108,900	54.45	5,188	4,932	2,857	7,534	124,311	54,027	20,781	35,066
2018	96,195	48.10	22,480	6,747	4,928	12,204	97,048	93,232	24,936	49,766
2019	96,701	48.35	5,397	6,047	4,649	25,588	445,281	37,781	19,441	47,895
2020	62,486	31.24	13,221	6,611	1,671	14,065	277,646	28,811	2,020	26,808
2021	77,552	38.78	4,852	1,213	0	17,271	258,384	110,203	13,632	50,188
2022	72,292	36.15	18,389	3,678	1,839	16,533	49,651	23,897	12,829	42,209
2023	73,885	36.94	21,622	9,322	3,632	16,150	377,808	37,922	17,242	66,545
2024	95,242	47.62	47,374	6,588	2,907	10,175	76,530	53,292	19,587	84,424
2025	85,274	42.86	1,356	0	5,424	10,453	80,011	41,603	17,186	58,565

Table A17. Open water daytime (0800-dusk) angling effort (boat-hours) as determined by tower counts for Oneida Lake. Data for 2025 are preliminary and from roving boat counts using different methods (see text). 1957-59 from Grosslein (1961) and total boat-hours include October.

Year	May	June	July	August	September	TOTAL
1957	-	-	-	-	-	334,000
1958	-	-	-	-	-	271,200
1959	-	-	-	-	-	496,100
1997	17,000	34,600	38,600	32,400	16,700	139,300
2002	12,773	21,132	24,983	19,156	15,465	93,509
2003	15,675	24,041	33,281	28,375	20,859	122,231
2004	22,230	37,240	34,681	32,012	17,925	144,088
2005	30,738	35,344	38,622	29,799	21,564	156,069
2006	25,004	41,381	63,308	30,230	19,807	179,730
2007	30,942	40,203	41,183	35,748	26,844	174,921
2010	49,180	40,749	43,819	48,552	26,179	208,479
2011	58,774	41,997	52,025	38,090	23,774	214,660
2012	53,554	49,933	56,295	35,629	18,159	213,570
2013	42,479	59,037	62,224	35,169	19,480	218,389
2014	43,253	57,078	55,955	40,951	20,312	217,548
2015	50,372	51,784	58,005	48,020	24,957	233,139
2016	32,828	50,517	52,422	-	-	194,366
2017	23,396	49,789	54,560	-	-	184,731
2018	32,079	36,615	43,775	29,127	21,343	162,900
2019	27,511	48,730	44,538	-	-	176,634
2021	43,102	57,700	51,917	-	-	214,725
2022	38,638	46,606	62,627	34,266	19,196	201,332
2023	39,170	40,419	45,515	-	-	180,781
2024	-	-	-	-	-	-
2025	37,740*	42,680*	34,263*	21,884*	23,447*	173,455*

* Preliminary data from 2025, using roving boat counts instead of tower counts. Comparability between the two methods is unknown and will be explored further in a final report on the creel survey.

Table A18. Open water daytime angler catch rates (fish/angler-hour) for walleye and smallmouth bass as determined by angler interviews for Oneida Lake. Launch catch rates are from completed trips in June and July only. Roving catch rates from incomplete trips from May through October.

Year	Survey type	Walleye		Smallmouth bass	
		All trips	Targeted	All trips	Targeted
1957	roving	0.04	-	0.02	-
1958	roving	0.08	-	0.03	-
1959	roving	0.34	-	0.02	-
1997	roving	0.19	0.21	0.10	0.32
2002	roving	0.23	0.35	0.19	0.52
2003	roving	0.43	0.58	0.24	0.84
2004	roving	0.63	0.75	0.15	0.62
2005	roving	0.19	0.25	0.17	0.70
2006	roving	0.22	0.31	0.19	0.69
2007	roving	0.19	0.30	0.19	0.74
2011	launch	0.22	0.57	0.16	0.35
2012	launch	0.31	0.55	0.30	0.64
2013	roving	0.21	0.32	0.18	0.42
2014	launch	0.22	0.42	0.41	0.78
2015	launch	0.23	0.38	0.19	0.46
2016	launch	0.08	0.22	0.20	0.27
2017	launch	0.16	0.28	0.30	0.59
2018	roving	0.23	0.36	0.16	0.51
2019	launch	0.44	0.72	0.20	0.47
2021	launch	0.27	0.38	0.19	0.42
2022	roving	0.42	0.55	0.09	0.52
2023	launch	0.40	0.56	0.15	0.53
2024	launch	0.49	0.61	0.18	0.52
2025*	Roving*	0.71*	0.83*	0.07*	0.37*

* Preliminary data from 2025. We will prepare a final report on the creel survey.