Crescent Lake
Oakland County, T03N R09E Sections 27, 28, 33, 34
Clinton River Watershed, Last Surveyed 2022

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Environment

Crescent Lake is located in Waterford Township, about 3 miles west of the City of Pontiac, in the Lake Erie Management Unit (LEMU). The lake is part of the Clinton River watershed and is connected to Elizabeth Lake through an outlet in the southeast lobe of the lake. There is a very small tributary inlet on the southeast shoreline of the lake as well. Crescent Lake is a small lake (<100 acres), totaling 90 acres. There are three deep basins (20, 30 and 40 feet deep) with a large island near the center of the lake (Figure 1). The lake has a total volume of 1,242 acre-feet. A large shoal area divides the lake into eastern and western main basins, causing half of the lake to be less than 10 feet deep. The deepest point in Crescent Lake is 40 feet deep and about 25% of the lake volume is less than 5 feet deep while 45% is less than 10 feet deep. The perimeter of the lake is 3.4 miles. There is abundant emergent and submerged aquatic vegetation throughout the lake. The riparian zone surrounding the lake is moderately developed (19 dwellings per shoreline mile) and about 49% of the shoreline is armored. Crescent Lake has 19 small docks (can moor 1-2 boats) per mile of shoreline and only 3 large docks (can moor three or more boats) in total. There is a boat access site at the north end of the lake and a residential park along the southwest shoreline (Figure 1).

The surficial geology of the surrounding area is glacial outwash sand, gravel and end moraines of coarse to medium-textured till. This type of geology is well drained and allows good movement of groundwater. The catchment (or lakeshed) of Crescent Lake (Figure 2) is dominated by urban land cover (87%) with some wetland (9%), forest (2%), and water (2%) (Fry et al. 2011). The population of Oakland County is around 1.27 million people (US Census Bureau, 2021), which contributes to the very high level of urban land use (Figure 2 and 3).

Crescent Lake has had water temperature and dissolved oxygen profiles conducted 4 different years since 1952. The most recent profile was conducted on August 25th, 2022 (Figure 4). Lake profiles were collected in the deepest basin to identify stratification zones in the lake. Lake stratification occurs where the water density gradient, caused by warming of the upper waters, is large enough that it prevents wind currents from mixing waters throughout the water column (Wehrly et al. 2015). The epilimnion is the well-mixed, upper layer of warm water with uniform temperatures and dissolved oxygen levels, the metalimnion is the middle layer of cooler water where temperatures change rapidly with depth, and the hypolimnion is the bottom layer of cold water where mixing does not occur, and temperatures decrease slowly with depth. In the lower zones with no mixing, dissolved oxygen is not replenished over time, except where phytoplankton produces oxygen through photosynthesis (Kalff 2002). The most recent profile of Crescent Lake indicated that the epilimnion extends from the surface to a depth of 11 feet. The metalimnion was observed at depths from 11-27 feet and the hypolimnion from 27-40 feet (bottom). The thermocline is the area in the lake with the greatest temperature change and was observed at a depth of 14 feet. Habitats with dissolved oxygen levels of 3.0 mg/L or higher are suitable for most fish species in Michigan require (Schneider 2002). By this definition, dissolved oxygen levels in Crescent Lake were only suitable from the surface to a depth of 15 feet, about 36% of the lake volume. It is likely that around

a one-third of the lake provides suitable habitat for fish during the period of peak summer stratification, which usually occurs sometime in the months of July and August. This habitat limitation is common for class 1 lakes (Wehrly et al 2012) that are very abundant in southeast Michigan.

History

Fish stocking in Crescent Lake has taken place since the 1930's. From 1933-1945, multiple species were stocked including bluegill, yellow perch, largemouth bass, walleye, and an unrecorded crayfish species (Table 1). Stocking of species such as bluegill, yellow perch, and largemouth bass in lakes where they naturally reproduce was found to be ineffective since the populations typically sustain themselves (Cooper 1948). To help increase fishing activity in the lake, managers stocked rainbow trout starting in 1967. In winter 1972, an angler survey was conducted to determine angler effort on Crescent Lake. Despite having over two months of fishable ice, angler effort was deemed almost "nonexistent". The lack of effort led managers to treat the lake in 1973 with a piscicide (rotenone) to remove existing fish populations and then stock with bass, panfish, and trout in 1975 to help develop a better fishery (Table 1). The first walleye stocking occurred in 1937, but a consistent program was not established until 1997, which continues today with a target of about 5,000 spring fingerlings every third year.

The current walleye stocking program began following a research study on multiple lakes (including Crescent Lake) evaluating the effect of various treatment types on stunted bluegill populations (Schneider and Lockwood 1997). In 1990, the lake was treated with antimycin, another piscicide, and stocked with 1,350 fall fingerling walleyes. These two treatments were used as part of the research study to improve bluegill size structure in stunted bluegill lakes (Schneider and Lockwood 1997). The intent of the treatments was to reduce the number of small bluegills in order to promote faster growth with less competition among juvenile bluegills. The Schneider index is used to classify the quality of a bluegill population and is based on a relative scale that ranges from one to seven (Schneider 1990). The index value is calculated based on growth rate, percentage of fish larger than six, seven, and eight inches, and average length. A rating of one represents very poor quality and seven represents high quality bluegill populations. Crescent Lake was found to have a poor (2) Schneider index in 1990 that improved to satisfactory (4) by the end of the study evaluations in 1996 (Schneider and Lockwood 1997). Based on recommendations from the study, Crescent Lake continued to be stocked with walleye. In 2004 the fisheries survey results indicated a satisfactory rating (4) for the bluegill population.

Fisheries surveys of Crescent Lake over the years have found predominately warmwater species, such as bluegill, largemouth bass, and black crappie, with a total of 36 species observed (Table 1). Most species found in Crescent Lake are naturally occurring but four non-native species (redear sunfish, goldfish, common carp, and rainbow trout) and walleye were artificially introduced into the fish community (Table 2). While the first three non-natives species reproduce, natural reproduction has never been observed for walleye or rainbow trout, even with targeted surveys looking for evidence of natural reproduction.

Current Status

The most recent fish community survey for Crescent Lake was completed during the spring 2022. The first objective of this survey was to update the MDNR fish community inventory for the lake. The second objective was to evaluate the state of the panfish population to evaluate effectiveness of the walleye stocking in Crescent Lake. The intention of stocking walleye in Crescent Lake is to maintain an improved size structure for the bluegill population.

A variety of sampling gear was used for the fish community survey, including large- and small-mesh fyke nets, a 25-foot seine, electrofishing boat, and experimental gill nets. During the week of May 10th, 2022, both large- and small-mesh fyke nets and experimental gill nets were deployed. Large- and small-mesh fyke nets were set for three net nights and two net nights, respectively, whereas the experimental gill net was set for two net nights. This survey also included three seine hauls and three 10-minute boat electrofishing transects, both of which were conducted on June 9, 2022. The seine hauls were completed during the daylight hours, whereas the electrofishing transects were completed after dark.

Collectively, the 2022 spring survey captured 2,471 fish representing 24 species. Panfish, such as black crappie, bluegill, pumpkinseed, and rock bass composed 67% of the catch by number (Table 3). Large predators (bowfin, largemouth bass, longnose gar, northern pike, smallmouth bass, and walleye) composed 3% of the catch by number (Table 3). Minnows and darters (blackchin shiner, bluntnose minnow, blacknose shiner, brook silverside, greenside darter, Iowa darter, mimic shiner, sand shiner, and spotfin shiner) made up 26% of the catch by number (Table 3).

Bluegill was the most abundant species overall, comprising 56% of the catch by number (Table 3). Bluegill ranged from 1 to 9 inches long and averaged 5.6 inches overall, with 43% in all gear types being 7 inches or larger (Table 3). The average size of bluegill caught in large-mesh fyke nets was 7.3 inches and 85% were 6 inches or larger, 74% were 7 inches or larger and 28% exceeded 8 inches (Table 4). Bluegill ages ranged from 1 to 9 years old and 62% were 4 to 9 years old (Table 5). The mean growth index (MGI) for bluegill was +0.2, suggesting the growth rate for bluegill is near or slightly above average compared to the statewide average. The catch per unit effort (CPE) of bluegill in large-mesh fyke nets was 84.1 fish per net night and 83.8 fish per net night in small-mesh fyke nets (Table 6).

Bluegill populations can be categorized with the Schneider Index (Schneider 1990) or assessment of the proportional size distribution (PSD; Zale et al 2012). PSD values refer to the proportion of the population that is longer than specific, pre-defined length values broken into PSD categories; PSDQ >6 inches, PSDP >8 inches, and PSDM >10 inches (Zale et al 2012). The Schneider Index based on bluegill catch in large-mesh fyke nets was 5.3 (Figure 5), indicating a good bluegill size structure. The PSD values for bluegill from the 2022 fisheries survey are PSDQ = 65, PSDP = 20, and PSDM = 0.

Black crappie were the second most abundant panfish and fourth most abundant species overall, accounting for 5% of the total catch by number (Table 3). Black Crappie sizes ranged from 2-11 inches and averaged 8.2 inches (Table 3). The average CPE of Black Crappie was 12.7 fish/net lift in large-mesh fyke nets, which accounted for 98% of the total Black Crappie catch. PSD categories for black crappie were PSDQ = 56 (>8 inches), PSDP = 5 (>10 inches), and PSDM = 0 (>12 inches) (Zale et al 2012). Other minor panfish species, which includes rock bass, pumpkinseed sunfish, and hybrid sunfish, comprised less than 7% of the total catch by number.

Largemouth bass was the most abundant large predator observed in the survey at 2% of catch by number (Table 3). Largemouth bass lengths ranged from 2-18 inches and averaged 10.9 inches (Table 3). Of the 45 largemouth bass captured, 16% were larger than the state-wide 14-inch minimum size limit (MSL; 2023 Michigan Fishing Guide). PSD categories for largemouth bass were PSDQ = 59 (>12 inches), PSDP = 14 (>15 inches), and PSDM = 0 (>20 inches) (Zale et al 2012). Largemouth bass ages ranged 1-8 years and 53% were ages 3 and 4 (Table 5). The mean growth index (MGI) for largemouth bass was +0.2, suggesting the growth rate for largemouth bass is near average for populations around the state. Average CPE of largemouth bass was 0.9 fish/minute in electrofishing efforts and 1.6 fish/net lift for large-mesh fyke nets (Table 6). Other large predators comprised less than 2% of the catch by number and included bowfin, longnose gar, northern pike, and smallmouth bass, and walleye.

A diverse group of forage species was caught during the Crescent Lake survey, making up 26% of the total catch by number. Bluntnose minnow was the second most abundant species, making up 13% of the total catch and accounting for half of the forage species abundance. Bluntnose minnow lengths ranged from 1-3 inches, which is representative of the other forage species, with none being over 3 inches.

Analysis and Discussion

Crescent Lake supports a diverse fish community and a quality panfish fishery. During the 2022 survey, 24 native fish species were observed with no non-native detections (Table 2). This number of species observed is higher than average for lakes in the LEMU (18 species) and substantially higher than the state-wide median (14 species; Wehrly et al. 2015). About 64% of the species previously found in Crescent Lake (31 total) were observed in the 2022 survey. The remaining species not observed during the survey (Table 2) likely persist in Crescent Lake, except for rainbow trout since it is no longer stocked.

Crescent Lake offers a good bluegill fishery for anglers to target with a high density and good size structure. Schneider index scores ranged from poor in 1990 to satisfactory in 2004, with walleye stocking being identified as the main factor in this improvement (Figure 5; Francis 2009). Based on the 2022 survey, bluegill size structure received a good Schneider index rating, the highest recorded for Crescent Lake. This improved size structure is likely due to the consistent stocking of walleye in the late 1990s in addition to relative abundant largemouth bass.

The rest of the panfish community in Crescent Lake appears to be abundant as well. Black crappie CPE for large-mesh fyke nets was higher than the state and regional average (Table 6). The MGI for black crappie was also slightly above average suggesting a good growth rate. Proportional size distribution from the 2022 survey found a fair proportion of black crappie in the quality range (PSDQ), a low proportion in the preferred range (PSDp), and none in the memorable range (PSDm). However, since 2018, there have been three black crappie from Crescent Lake recorded in the Master Angler Program. The Master Angler Program acknowledges an angler's catch of a black crappie reaching 14" or larger. Rock bass and pumpkinseed contribute to the quality of the panfish fishery as well. These fish were captured at a quality rate, when compared regionally and statewide (Table 6).

Large predators such as largemouth bass, smallmouth bass, northern pike and walleye support a balanced predator-prey ratio in Crescent Lake. Largemouth bass is consistently reported as the most abundant top predator in Crescent Lake, which is supported by the 2022 survey. Proportional size distribution of largemouth bass found a fair number in the quality range (PSDQ), a low proportion in the preferred range (PSDp), and none in the memorable range (PSDm). Growth for largemouth bass in Crescent Lake

has consistently been around state average. Multiple age classes of northern pike and smallmouth bass were observed (Table 5), suggesting that natural reproduction of these species continues for these species. There were also multiple age classes of walleye (Table 5) suggesting that post stocking survival continues, though a survival rate cannot be calculated due to low catch numbers.

Crescent Lake has a fair amount development in the nearshore area. When compared regionally, the 19 dwellings/mile and 19 docks/mile found on Crescent Lake is lower than the LEMU averages of 35.9 dwellings/mile and 38.9 docks/mile. This development is likely a contributing factor for the low number of submersed trees (3.8 trees/mile) compared to the LEMU average (13.8 trees/mile). Crescent Lake is also known to be a popular water recreation lake and that use may also lead to boaters and riparian owners removing submersed trees. O'Neal and Soulliere (2006) reported that alterations or development of the shoreline that is higher than 25% can have detrimental effects on a lake's nearshore ecosystem through habitat degradation and loss of woody material. There remain vestiges of natural shoreline, including wetland complexes that are beneficial for the aquatic community, and those remaining natural shorelines should be protected.

Water temperatures and dissolved oxygen levels in Crescent Lake are primarily suitable for warmwater fish species. As previously mentioned, suitable dissolved oxygen levels were only present from the surface to depths of 15 feet when the most recent water temperature and dissolved oxygen profile was collected. This is similar to previous profiles collected on Crescent Lake. Corresponding water temperatures at these depths ranged 67-78ºF, which suggests limited cool and coldwater habitat during periods of peak summer stratification. Thus, abundance of cool water fish species, such as walleye, northern pike, and smallmouth bass, may ultimately be limited by suitable habitat area in the summer months. The dominance of warmwater fish species, such as bluegill, black crappie, and largemouth bass throughout the history of fisheries surveys on Crescent Lake support this finding.

Management Direction

Crescent Lake provides a quality fishery for bluegill, potentially due to good numbers of large predators that is increased through walleye stocking efforts. Adding in walleye along with other predators such as largemouth bass, bowfin, and northern pike puts increased predation pressure on the abundant bluegill population. Although walleye catch was low, this was to be expected as Crescent Lake walleye stocking was to increase predation on small bluegill. Walleye predation studies have found that walleye densities as low as 0.5 walleye/acre are adequate to affect the bluegill population (Schneider and Lockwood 1997). Lakes in the LEMU region where a walleye fishery has been created typically have a density exceeding 1 walleye/acre. While there are no population estimates for walleye in Crescent Lake, the abundance is likely closer to 0.5 walleye/acre instead of 1 walleye/acre due to the lack of a developed walleye fishery. The main objective of the walleye stocking program is to improve panfish, more specifically bluegill, size structure and the 2022 survey results provide evidence of that objective being met. The walleye stocking program in Crescent Lake should continue based on the improved bluegill fishery noted by the increase in the Schneider index score from 2004 (average) to 2022 (good). Other panfish species such as black crappie, rock bass, and pumpkinseed seem to be benefiting from the additional predators and contribute to the high-quality panfish fishery as well.

With the fairly developed shoreline and aquatic nuisance control treatments of Crescent Lake, protecting the remaining wetlands, emergent vegetation, and submersed woody material (e.g., trees and root wads) is important. These natural features provide quality spawning and juvenile habitat for multiple fish

species, such as black crappie, northern pike, and yellow perch. Because of the high percentage of armored shoreline (49%), opportunities to encourage natural or soft engineered shorelines should also be pursued. Additionally, aquatic nuisance control treatments should focus on removing or limiting invasive species, while preserving and restoring native species.

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Table 1. Stocking history of Crescent Lake, Oakland County (N/A = data not available).

Year	Species	Stage of Development	Number Stocked	Total Weight (lbs.)	Mean Length (in.)
1933	Bluegill	Fall fingerling	5,000	N/A	N/A
1934	Bluegill	Fall fingerling	2,000	N/A	N/A
1935	Bluegill	Fall fingerling	3,000	N/A	N/A
1935	Yellow perch	Fall fingerling	2,000	N/A	N/A
1936	Bluegill	Fall fingerling	3,000	N/A	N/A
1936	Largemouth bass	Fall fingerling	525	N/A	N/A
1937	Bluegill	Fall fingerling	10,000	N/A	N/A
1937	Walleye	Swim-up fry	156,000	N/A	N/A
1937	Yellow perch	Fall fingerling	2,000	N/A	N/A
1938	Bluegill	Fall fingerling	4,000	N/A	N/A
1938	Bluegill	Fall fingerling	3,000	N/A	N/A
1938	Largemouth bass	Fall fingerling	400	N/A	N/A
1939	Bluegill	Fall fingerling	13,000	N/A	N/A
1939	Crayfish	Fall fingerling	11,250	N/A	N/A
1939	Largemouth bass	Fall fingerling	500	N/A	N/A
1940	Bluegill	Fall fingerling	19,000	N/A	N/A
1940	Largemouth bass	Fall fingerling	500	N/A	N/A
1941	Bluegill	Fall fingerling	5,000	N/A	N/A
1941	Largemouth bass	Fall fingerling	500	N/A	N/A
1942	Bluegill	Fall fingerling	4,000	N/A	N/A
1943	Bluegill	Fall fingerling	4,000	N/A	N/A
1943	Largemouth bass	Fall fingerling	200	N/A	N/A
1944	Bluegill	Fall fingerling	2,000	N/A	2.25
1945	Bluegill	Fall fingerling	3,200	N/A	1.5
1945	Largemouth bass	Fall fingerling	400	N/A	2.0
1967	Rainbow trout	Fall fingerling	1,070	N/A	N/A
1967	Rainbow trout	Yearling	2,431	N/A	N/A
1968	Rainbow trout	Yearling	4,500	N/A	N/A
1969	Rainbow trout	Yearling	4,500	N/A	N/A
1975	Largemouth bass	Fall fingerling	792	N/A	N/A
1975	Rainbow trout	Fall fingerling	10,000	N/A	N/A
1976	Bluegill	Fall fingerling	45000	N/A	N/A
1976	Largemouth bass	Fall fingerling	9000	N/A	N/A
1976	Rainbow trout	Yearling	4000	N/A	N/A
1976	Rainbow trout	Yearling	5000	N/A	N/A
1977	Rainbow trout	Yearling	9000	N/A	N/A
1978	Rainbow trout	Yearling	9000	N/A	N/A
1979	Rainbow trout	Yearling	4500	136.7	4.4
1980	Rainbow trout	Yearling	9000	1439.6	7.4
1985	Walleye	Spring fingerling	6500	28.7	2.5
1990	Walleye	Fall fingerling	1103	N/A	6.5
1990	Walleye	Fall fingerling	247	N/A	5.4
1997	Walleye	Spring fingerling	10978	31.5	2.2
1998	Walleye	Fall fingerling	495	64.2	6.8
1998	Walleye	Spring fingerling	45152	23.2	1.3

Table 1 continued.

1999	Walleye	Spring fingerling	11968	32.8	2.2
2001	Walleye	Spring fingerling	10075	5.4	1.3
2003	Walleye	Spring fingerling	5607	2.1	1.1
2005	Walleye	Spring fingerling	7260	8.8	1.8
2009	Walleye	Spring fingerling	7720	4.6	1.3
2010	Walleye	Spring fingerling	4315	5.9	1.8
2012	Walleye	Spring fingerling	5517	3.5	1.3
2014	Walleye	Spring fingerling	4665	7.2	1.9
2016	Walleye	Spring fingerling	6256	19.7	2.4
2018	Walleye	Spring fingerling	10113	3.4	1.1
2021	Walleye	Spring fingerling	4530	3.7	1.6

Table 2. Fish species historically observed in Crescent Lake. Origin: N = Native and I = Introduced; Status: P = Present, O = Extirpated, and U = Unknown; X indicates the species was caught in recent fisheries survey during 2022.

Common name	Family	Scientific name	Origin	Status	2022
Bowfin	Amiidae	Amia calva	N	P	X
Brook silverside	Atherinidae	Labidesthes sicculus	N	P	X
White sucker	Catostomidae	Catostomus commersonii	N	U	
Lake chubsucker	Catostomidae	Erimyzon sucetta	N	U	
Rock bass	Centrarchidae	Ambloplites rupestris	N	P	X
Green sunfish	Centrarchidae	Lepomis cyanellus	N	U	
Pumpkinseed	Centrarchidae	Lepomis gibbosus	N	P	X
Warmouth	Centrarchidae	Lepomis gulosus	N	U	
Bluegill	Centrarchidae	Lepomis macrochirus	N	P	X
Redear sunfish	Centrarchidae	Lepomis microlophus	I	U	
Northern sunfish	Centrarchidae	Lepomis peltastes	N	U	
Smallmouth bass	Centrarchidae	Micropterus dolomieu	N	P	X
Largemouth bass	Centrarchidae	Micropterus salmoides	N	P	X
Black crappie	Centrarchidae	Pomoxis nigromaculatus	N	P	X
Goldfish	Cyprinidae	Carassius auratus	I	U	
Spotfin shiner	Cyprinidae	Cyprinella spiloptera	N	P	X
Common carp	Cyprinidae	Cyprinus carpio	I	U	
Common shiner	Cyprinidae	Luxilus cornutus	N	U	
Golden shiner	Cyprinidae	Notemigonus crysoleucas	N	U	
Blackchin shiner	Cyprinidae	Notropis heterodon	N	P	X
Blacknose shiner	Cyprinidae	Notropis heterolepis	N	P	X
Sand shiner	Cyprinidae	Notropis stramineus	N	P	X
Mimic shiner	Cyprinidae	Notropis volucellus	N	P	X
Bluntnose minnow	Cyprinidae	Pimephales notatus	N	P	X
Grass pickerel	Esocidae	Esox americanus	N	U	
Northern pike	Esocidae	Esox lucius	N	P	X
Black bullhead	Ictaluridae	Ameiurus melas	N	P	X
Yellow bullhead	Ictaluridae	Ameiurus natalis	N	P	X
Brown bullhead	Ictaluridae	Ameiurus nebulosus	N	P	X
Longnose gar	Lepisosteidae	Lepisosteus osseus	N	P	X
Greenside darter	Percidae	Etheostoma blennioides	N	P	X
Iowa darter	Percidae	Etheostoma exile	N	P	X
Yellow perch	Percidae	Perca flavescens	N	P	X
Walleye	Percidae	Sander vitreus	I	P	X
Rainbow trout	Salmonidae	Oncorhynchus mykiss	I	O	
Central mudminnow	Umbridae	Umbra limi	N	U	

Table 3. Catch summary for the Crescent Lake fishery survey, May 10 through June 9, 2022. Total weights are estimated (N/A = data not available).

Species	Number	Percent by number	Length range (in.)	Average length (in.)
Bluegill	1,380	56%	1-9	5.6
Bluntnose minnow	327	13%	1-3	2.4
Mimic shiner	142	6%	1-2	2.4
Black crappie	116	5%	2-11	8.2
Rock bass	98	4%	2-9	6.4
Spotfin shiner	88	4%	1-3	2.8
Pumpkinseed	63	2%	2-8	6.5
Yellow perch	57	2%	2-4	3.5
Largemouth bass	45	2%	2-18	10.9
Blackchin shiner	39	2%	1-2	2.1
Brown bullhead	26	1%	6-12	10.3
Yellow bullhead	16	<1%	4-12	9.5
Blacknose shiner	13	<1%	1-2	2.1
Sand shiner	13	<1%	2-2	2.5
Iowa darter	10	<1%	1-2	1.7
Northern pike	10	<1%	15-26	20.6
Smallmouth bass	9	<1%	9-16	13.1
Walleye	9	<1%	10-23	18.1
Black bullhead	3	<1%	12-14	13.8
Brook silverside	2	<1%	3-3	3.5
Hybrid sunfish	2	<1%	3-7	5.5
Bowfin	1	<1%	22-22	22.5
Greenside darter	1	<1%	1-1	1.5
Longnose gar	1	<1%	24-24	24.5
Total caught	2,471			

Table 4. Number per inch group of select species collected with all gears combined during the Crescent Lake fishery survey, May 10 through June 9, 2022.

Inch group	Black crappie	Bluegill	Pumpkinseed	Rock bass	Largemouth bass	Northen pike	Walleye
1		150					
2	1	144	1	3	2		
3		116	1	1	3		
4	2	122	2	15	1		
5	2	142	8	18	1		
6	5	119	33	23			
7	43	370	17	26	1		
8	30	211	1	10	2		
9	27	6		2	5		
10	4				5		1
11	2				3		
12					11		
13					4		
14					2		
15					1	1	1
16					1		2
17					1	1	1
18					2		
19						2	1
20						2	1
21						1	
22						2	1
23							1
26						1	
Total	116	1,380	63	98	45	10	9

Table 5. Mean length-at-age of select species collected with all gears combined during the Crescent Lake fishery survey, May 10 through June 9, 2022.

Species	Age	Number Aged	Length Range (in.)	Mean Length (in.)	State Average Length (in.)
Black Crappie	2	4	4.6-5.6	5.1	6
	3	11	6.3-7.8	7.23	7.5
	4	18	7.8-9.8	8.65	8.6
	5	4	9.3-9.7	9.5	9.4
	6	6	10.6-11.9	10.9	10.2
Bluegill	1	18	1.3-2.4	1.8	1.8
	2	6	2.5-3.4	2.9	3.8
	3	16	3.5-6.5	4.6	5
	4	34	4.7-8.9	6.8	5.9
	5	7	8.0-9.1	8.1	6.7
	6	4	8.4-9.3	8.5	7.3
	7	1	9.4-9.4	9.4	7.8
	9	2	9.1-9.4	9.25	8.6
Largemouth bass	1	5	2.7-3.5	3.1	4.2
	2	6	4.5-9.5	7.2	7.1
	3	9	8.8-10.5	9.8	9.4
	4	14	10.5-13.5	12.2	11.6
	5	6	12.8-16.5	14.1	13.2
	6	3	13.2-18.6	15.8	14.7
	7	1	17.8-17.8	17.8	16.3
	8	1	18.5-18.5	18.5	17.4
Northern pike	3	6	15.0-22.5	19.7	20.8
	4	3	19.1-20.3	19.9	23.4
	5	1	26.4-26.4	26.4	25.5
Smallmouth bass	3	3	9.9-13.6	11.8	10.8
	4	5	12.0-16.0	13.9	12.6
	5	1	12.9-12.9	12.9	14.4
Walleye	1	1	10.8	10.8	7.1
	3	2	15.2 - 16.7	16.0	13.9
	4	1	16.8	16.8	15.8
	5	3	17.5 - 20.1	19.2	17.6
	7	2	22.5 - 23.3	22.9	20.6

Table 6. Comparison of catch-per-effort (CPE) for select species in Crescent Lake with statewide and Lake Erie Management Unit (LEMU) CPE generated from the Status and Trends Program (Wehrly et al. 2015). CPE for electrofishing is number of fish/minute. CPE for Large-mesh fyke, small-mesh fyke, and experimental gill nets is number of fish/lift.

		State-Wide CPE				
Species	Gear	25th Percentile	Median (50th Percentile)	75th Percentile	**Crescent Lake**	LEMU Median CPE
Bluegill	Electrofishing	1.2	3.9	7.6	**8.9**	8.4
	Large-mesh fyke net	2.5	11.7	31.9	**84.1**	21.8
	Small-mesh fyke net	2.3	8.5	36.5	**83.8**	25.5
Black Crappie	Electrofishing	0.0	0.1	0.2	**0.0**	0.1
	Large-mesh fyke net	0.5	2.2	4.3	**12.7**	2.4
	Small-mesh fyke net	0.5	1.1	3	**0.3**	0.3
Pumpkinseed	Electrofishing	0.2	0.4	1	**0.6**	0.2
	Large-mesh fyke net	0.7	1.9	5.5	**4.7**	1.7
	Small-mesh fyke net	0.5	2.3	8	**0.3**	1.3
Rock Bass	Electrofishing	0.1	0.3	0.7	**0.2**	0.6
	Large-mesh fyke net	1.3	3.6	8.2	**8.8**	2.7
	Small-mesh fyke net	1	2.8	6	**2**	1.0
Largemouth Bass	Electrofishing	0.3	0.8	1.6	**0.9**	0.9
	Large-mesh fyke net	0.5	1.4	2.7	**1.6**	1.6
	Small-mesh fyke net	0.5	1.0	2.8	**1.3**	0.9
Walleye	Electrofishing	<0.1	0.1	0.4	**0.1**	0.1
	Large-mesh fyke net	0.1	0.4	0.8	**0.7**	0.4
	Inland gill net	0.5	1.0	2.6	**0.0**	1.0

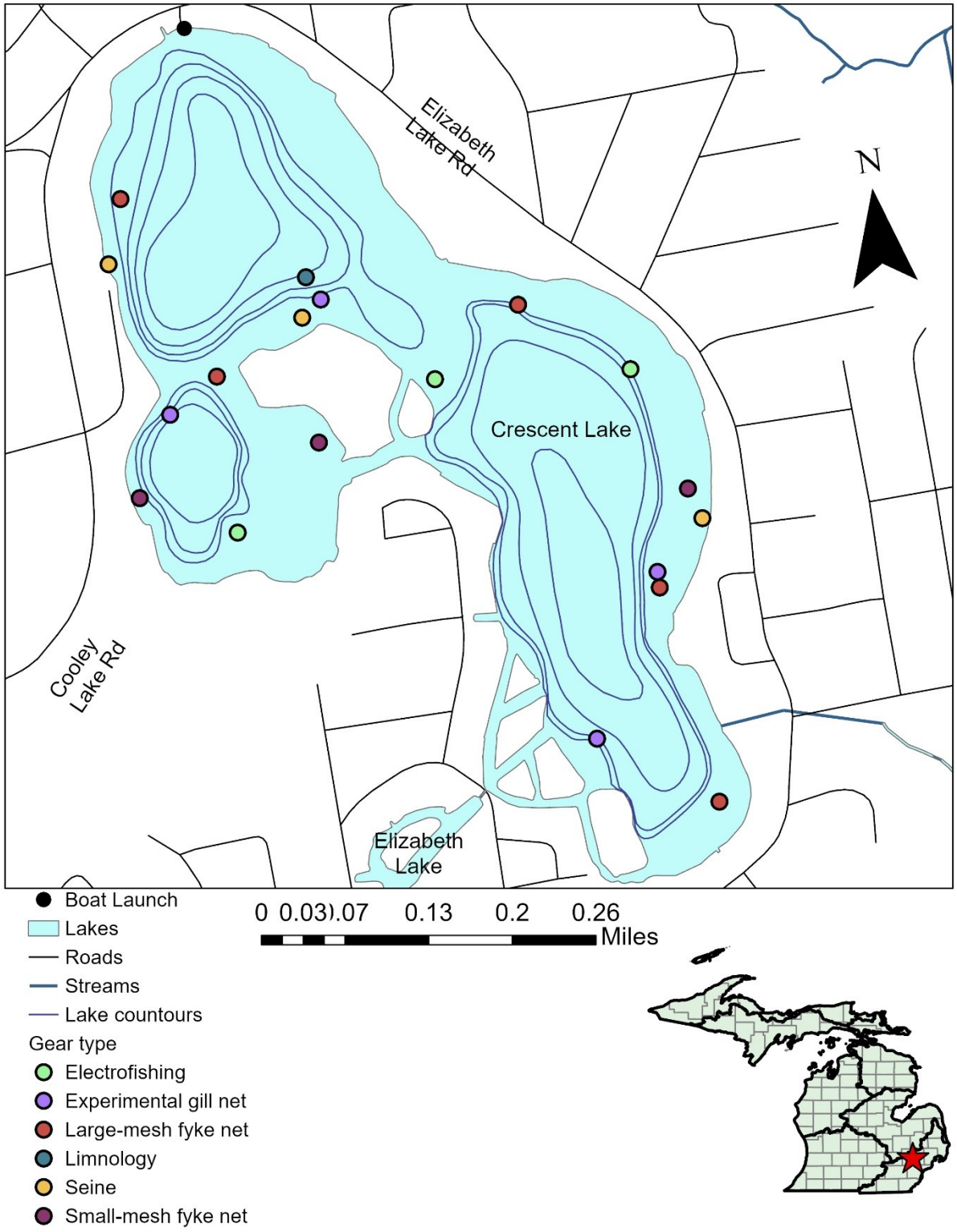

Figure 1. Map of Crescent Lake, Oakland County with gear effort indicators for the fisheries survey conducted, spring and summer 2022. Dark blue lines represent contour lines with the outer two representing 5, 10, 20, and 30 feet from outer to inner lines.

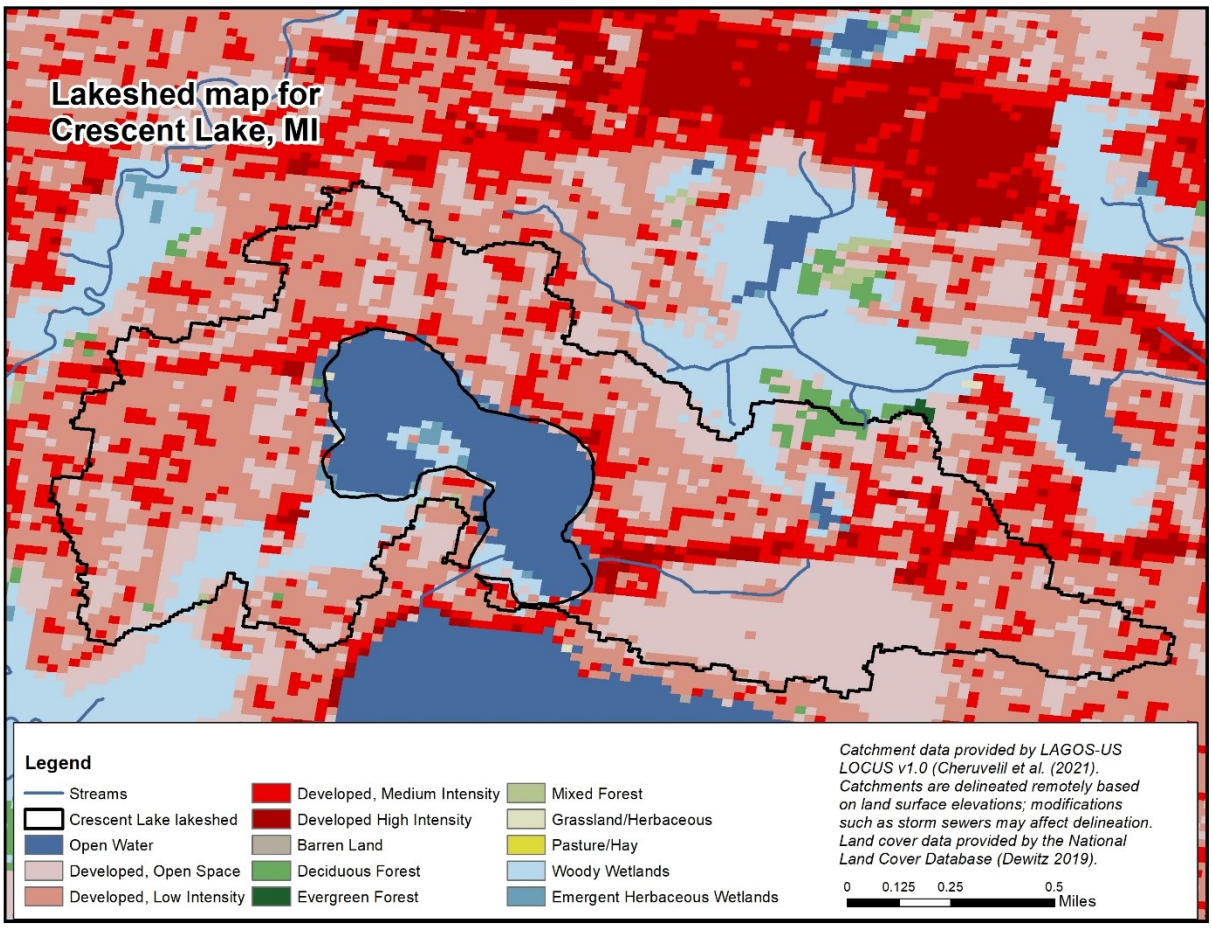

Figure 2. Land cover image from 2021 of the Crescent Lake lakeshed (catchment), Oakland County, Michigan, with land cover imagery.

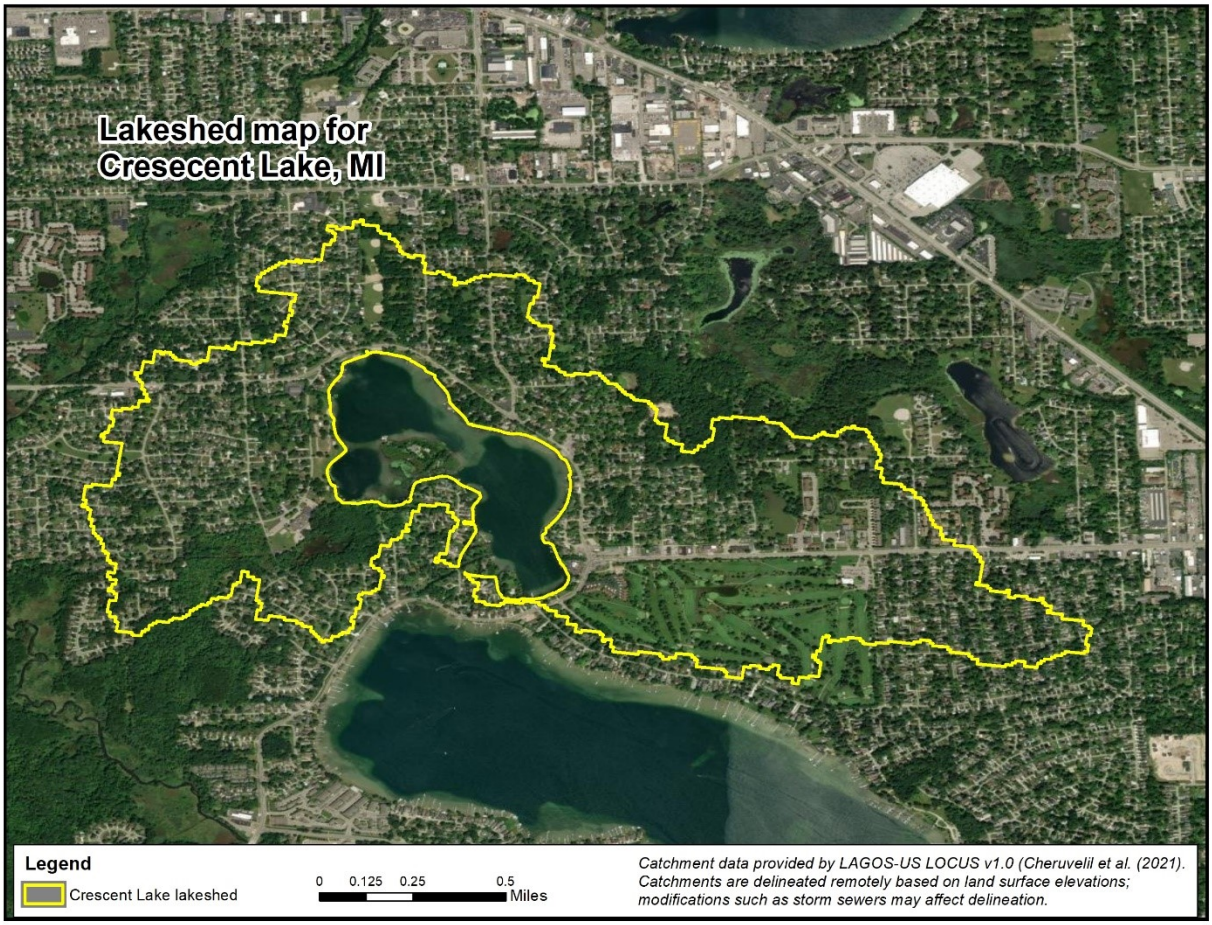

Figure 3. Aerial image from 2021 showing major land uses within the Crescent Lake lakeshed (outlined in yellow), Oakland County, Michigan.

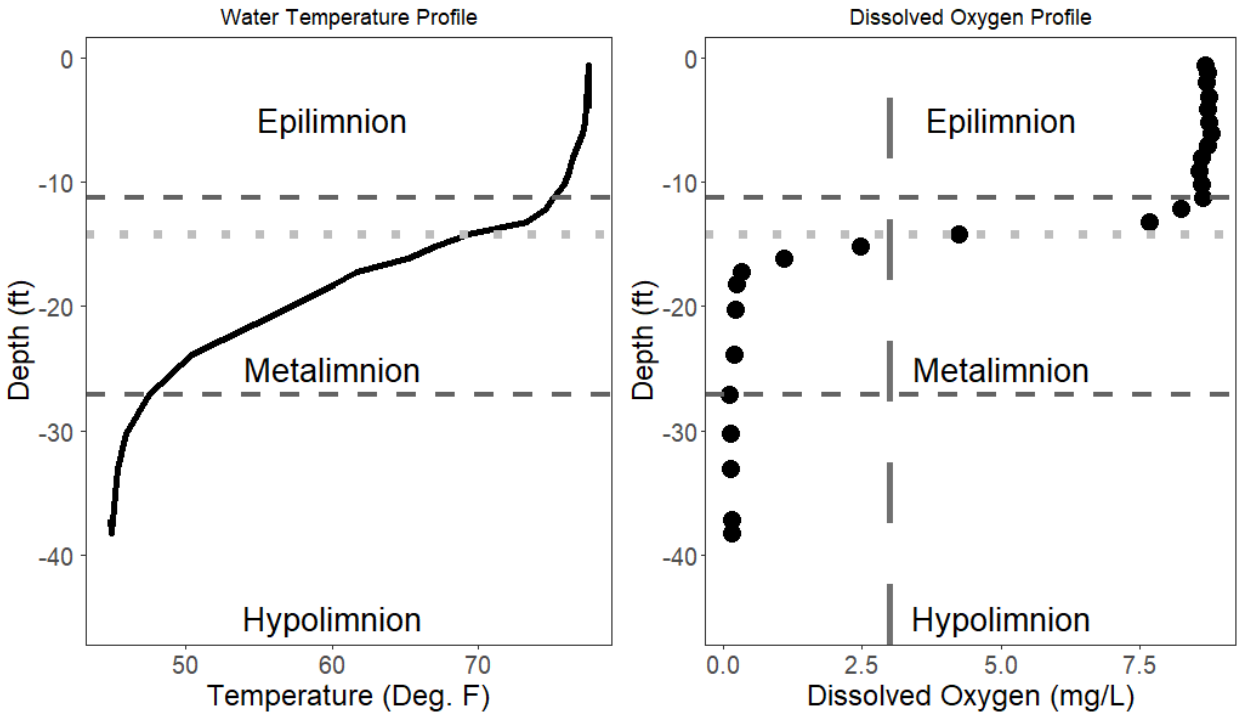

Figure 4. Water temperature (left panel) and dissolved oxygen (right panel) profiles for Crescent Lake collected August 25, 2022. In the left panel, the solid black line indicates water temperature, whereas the horizontal dashed lines indicate the upper and lower bounds of the metalimnion, and the horizontal dotted line indicates the thermocline. In the right panel, the dashed black line indicates dissolved oxygen concentration, whereas the vertical dashed line represents the lower limit of suitable dissolved oxygen (3.0 mg/L); the horizontal dashed lines represent the upper and lower bounds of the metalimnion, whereas the horizontal dotted line indicates the thermocline.

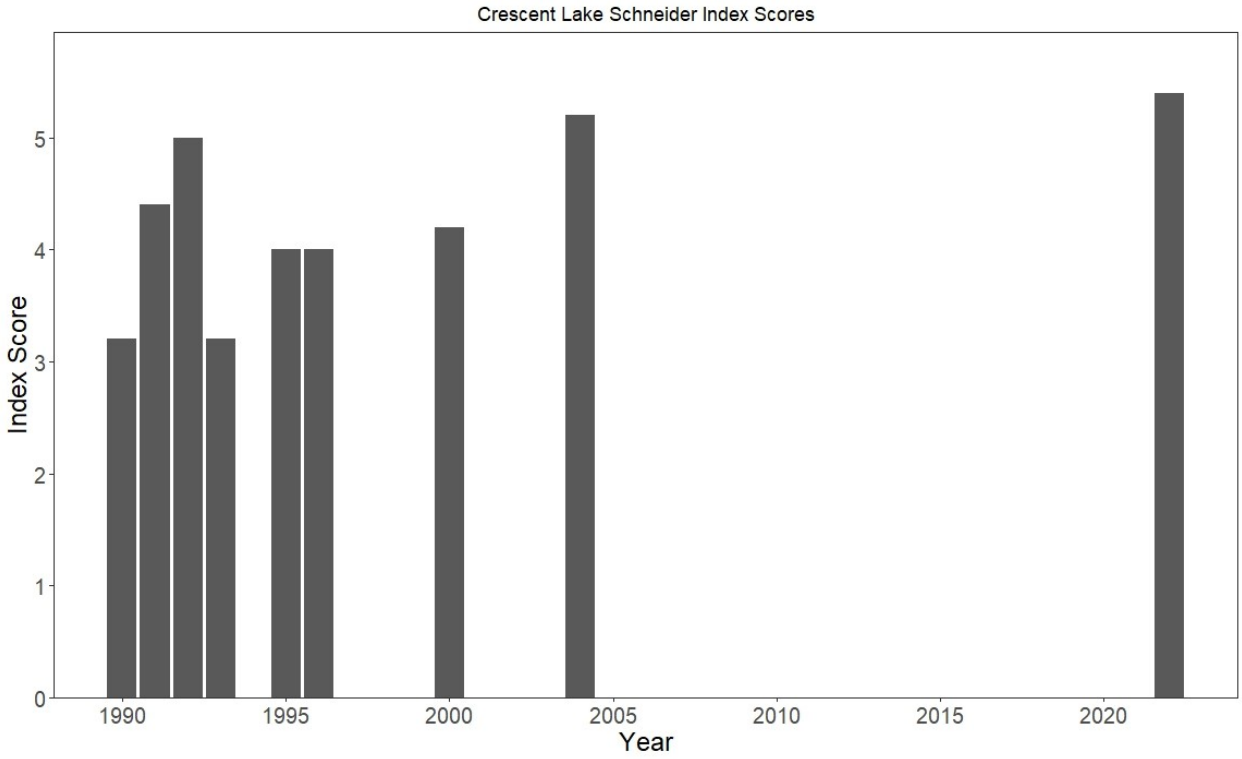

Figure 5. Schneider Index scores (Schneider 1990) for Crescent Lake (Oakland County) fisheries surveys from 1990 through 2022. Each bar represents the total score for the bluegill population for the year of an individual

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