Harlem Meer Fisheries Report

Data collected: 2008-2013

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Introduction

The Harlem Meer or "the Meer", Dutch for "the Lake", is an approximately ten acre man-made freshwater pond located in the northeast corner of Central Park. The Meer originated from a tidal wetland contiguous with both the East River, and the Hudson River through the now non-existent Harlem Creek (Sanderson 2009). Since its purchase by the City of New York in 1863, the Meer has been through several structural changes including hardening of the lake's edge in the 1940's and softening of its edge in the late 1980's and early 1990's. Additional restorative work included dredging of approximately 20,000 cubic yards of silt, replacement of a clay liner and stocking of warm water species of fish.

NYSDEC Bureau of Fisheries issued the following stocking permits for the Meer: In 1999, for largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescens*) and channel catfish (*Ictalurus punctatus*); in 2001 for triploid grass carp (*Ctenopharyngodon idella*); and, in 2003 for bluegill sunfish (*Lepomis macrochirus*). Other stocked and fishable Central Park water bodies are Central Park Lake, the 100th Street Pool, and the 59th Street Pond. While creel surveys have yet to be performed, anecdotal information and the fact that the Meer is within close walking distance to a highly populated area suggest it receives the most fishing pressure of any Central Park water body. Additionally, the Central Park Conservancy promotes fishing here, exclusively, by lending out bamboo fishing poles and bait to thousands of people annually. A DEC Angler Achievement Award was issued in August 2009 for a 22-inch bass caught from the Meer.

Like most other New York City water bodies the Meer suffers from overgrowth of aquatic vegetation during spring and summer. The Conservancy has tried different methods to combat overgrowing plants and has had success with an on-site weed harvester. Filamentous algae prevailed during DEC's 2009 survey and duckweed growth was heavy during the 2011 survey. Duckweed was also present in 2013 but the dominant aquatic plant appeared to be curly leaf pondweed. Shoreline access limitations due to overgrowth of vegetation are noted in the Methods section below.

The first electrofishing survey of the Meer was performed by the DEC Bureau of Fisheries in spring 2008 with the objective of documenting fish species and estimating ecological balance of predator and prey species. The capture of one northern snakehead (*Channa argus)* prompted follow-up electrofishing surveys in the spring of 2009 and the fall of 2011. While no snakeheads were observed or caught in those surveys, an angler reported catching a northern snakehead in fall 2012. Photographic information and conversations with this angler make this a credible report although staff was not able to retrieve the fish. A fourth electrofishing survey of the Meer in spring 2013 yielded no captured or observed snakeheads despite the survey boat making two full laps around the Meer's shoreline.

This report presents results of DEC's four electrofishing surveys of the Harlem Meer and compares data to other bass waters in New York State and to catch rate data from the New York State Bass Study (Green et al. 1986). Management recommendations are made at the report's conclusion.

Methods

Four night electrofishing surveys were performed between 2008 and 2013. Surveys in 2008, 2009 and 2013 were performed during the spring (4/21, 5/5 and 4/30); a 2011 survey was performed in the fall (10/25).

Surveys generally followed the Bureau of Fisheries Centrarchid Sampling Plan (Green 1989), with exceptions including the 2011 fall survey and no gamefish-only runs being conducted in 2008, 2009, and 2011. All fish were captured using a five meter Smith-Root 16H electrofishing boat with two umbrella arrays, each with six stainless steel dropper cables. Power was supplied by a Kohler 7,500 Watt generator. In 2008 and 2009, water conductivity was 272 and 300 µS/cm, respectively, and water temperatures were 17.8 C and 16.2 C, respectively. Voltage was set to 170 and Amps ranged from 3.0 – 4.0. In 2011 and 2013 conductivity was 204 and 205 µS/cm, respectively, and water temperatures were 15.2 C and 19.5 C, respectively. Voltage was set to 500 and Amps ranged from 6.0 – 7.0. Pulse rate was set at 60 in 2011 and 2013 and was not recorded for the 2008 and 2009 surveys.

Crews consisted of one driver and two dippers each equipped with 0.635 cm mesh nets. Dippers attempted to collect all fish species except common carp (*Cyprinus carpio*) which were not netted for logistical reasons, but all observed individuals were recorded. All netted fish were transferred to live wells for transport to shore, where data were collected.

In 2008, the majority of shoreline was fished with the exception of the extreme northeast corner of the lake. Most of the shoreline was also fished in the 2009 and 2011 surveys except in areas with heavy growth of filamentous algae in 2009 and heavy duckweed growth in 2011. In 2013 the entire shoreline was fished two times during the survey: all fish species were targeted during the first lap; only gamefish were targeted during the second lap.

Proportional Stock Density (PSD) and Relative Stock Density (RSD) indices were used to describe the size structure of the largemouth bass and panfish populations of the Meer. PSD is expressed as the percentage of the fish stock that is of "quality" size or greater. Fish "stock" size is the size at or near which fish reach maturity. "Quality" size is larger than stock size and, in general, represents the size of fish anglers most like to catch. Both stock and quality sizes differ among different fish species. RSD is similar to PSD but usually compares a size larger than "quality", to "stock" size. In this case RSD-preferred (RSDp) was calculated for largemouth bass to account for larger fish found during the survey. Largemouth bass stock, quality and

preferred sizes are 200 mm (8 in), 300 mm (12 in) and 380 mm (15 in), respectively. Stock and quality sizes for bluegills and pumpkinseeds are 80 mm (3 in) and 150 mm (6 in), respectively.

Largemouth bass relative weights were calculated in accordance with methods described in Anderson and Neumann (1996). Relative weights were not calculated for other fish species captured.

Catch per hour (CPUE), for each survey was determined for largemouth bass less than ten inches in length, greater than ten and twelve inches in length, and young-of-the-year (YOY), for all for surveys. Limited fish scale data and size vs. frequency distributions were used to determine size and number of YOY bass, none of which were captured in 2013. A gamefish run was conducted only during the 2013 survey and largemouth bass data for that survey is inclusive of the gamefish run.

Results were compared to data from other DEC Fisheries electrofishing centrarchid surveys. Water bodies for these comparisons were somewhat randomly selected, but, since the Harlem Meer is a relatively small lake, smaller water bodies of neighboring DEC Regions (1 and 3) for which largemouth bass CPUE data was available were chosen first. Other factors used in selecting water bodies for bass catch rate comparisons were the availability of multiple surveys with at least one performed within the last ten years. Harlem Meer largemouth bass catch rates were also compared to those from the New York State Bass Study (Green et al. 1986).

Results

Fish Species Composition

Fish common to all four surveys were largemouth bass, bluegills and pumpkinseeds (*Lepomis gibbosus*) (Figure 1). Largemouth bass ranged from 31% - 42% of the total catch of the surveys. Bluegills composed over 57% of total catch for all except the 2009 survey in which many sunfish were too small to be distinguished to species and labeled as *Lepomis sp*. Pumpkinseeds were a small percentage (1% - 6%) of each of the catches. Both yellow perch and green sunfish (*Lepomis cyanellus*) were found in 2011 and 2013 at small percentages (0.60 % and 0.74% for yellow perch and 0.01% and 0.37% for green sunfish). Black crappies (*Pomoxis nigromaculatus*) were found in the 2008, 2011 and 2013 surveys from 0.8% - 4.0% with the greatest number found in 2013. Individual catches of smallmouth bass (*Micropterus dolomieu*) in 2011 and northern snakehead in 2008 are not included in Figure 1.

No American eels (*Anguilla rostrata*) were observed during any of the four surveys, unlike what is observed during most other electrofishing surveys in other NYC waters. Numbers of carp observed were also relatively low: One during each of the 2008 and 2009 surveys, none during the 2011 survey and four during the 2013 survey.

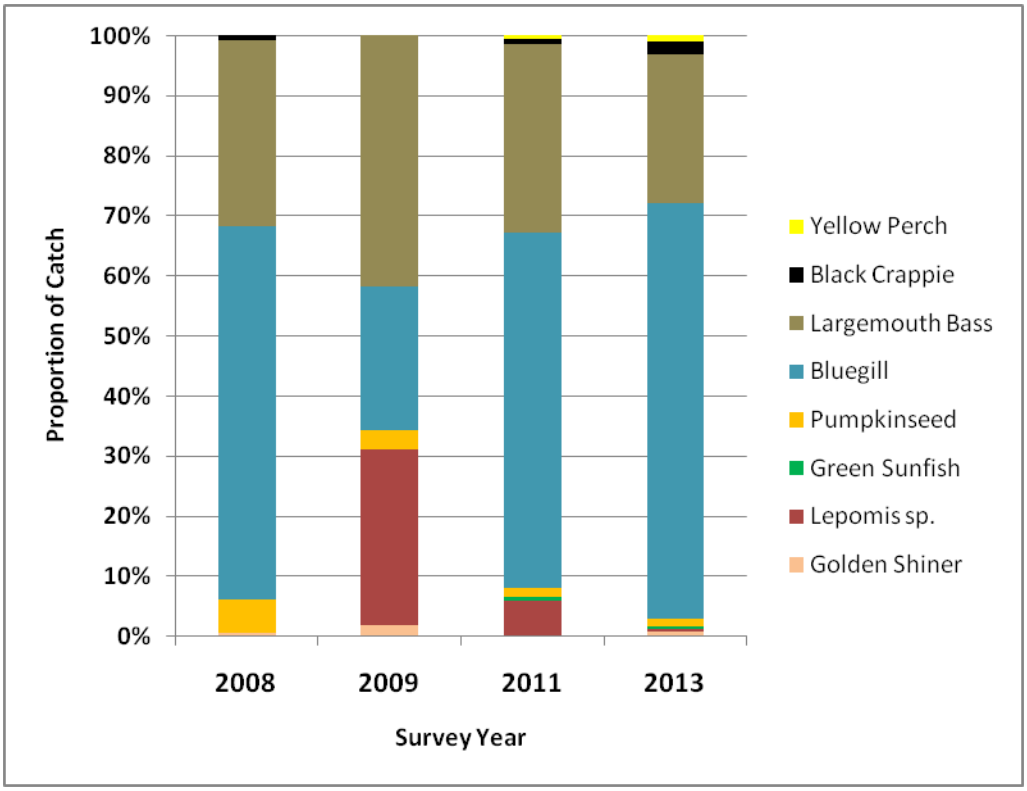

Figure 1 Harlem Meer fish species composition from all-fish electrofishing runs, 2008, 2009, 2011, and 2013.

Catch per unit effort

The highest catch rates for all fish were obtained in the last two surveys (2011 and 2013) (Table 1). On both nights turbidity was relatively low; Secchi disc readings were 3.0 feet in 2011 and 5.0 feet in 2013, high for New York City waters. This visibility likely contributed to higher catch rates. Water turbidity was high during the 2008 survey and moderate during the 2009 survey. Secchi disc readings were not obtained for the 2008 and 2009 surveys therefore water clarity was not measured for those surveys.

Table 1. CPUE for all fish captured in 2008, 2009, 2011 and 2013 Electrofishing Surveys

Survey Year	Time fished (minutes)	# fish caught	CPUE (catch/hour)
2008	60	389	389
2009	51	214	263.53
2011	47.4	503	636.71
2013*	50	675	810

*Does not include gamefish only run.

Total CPUE of largemouth bass ranged from 106 bass/hr in 2009, to 223 bass/hr in 2013 (Table 2). CPUE of bass less than ten inches in length ranged from 53/hr in 2009 to 187/hr in 2011; CPUE of bass greater than or equal to ten inches in length ranged from 13/hr in 2011 to 60/hr in 2013; and CPUE of bass greater than or equal to twelve inches in length ranged from 5/hr in 2011 to 20/hr in both 2008 and 2013 surveys (Table 2). All CPUEs exceeded mean spring CPUEs from the NYS Bass Study with the exception of CPUE for bass greater than or equal to ten inches in length from the fall, 2011 survey, which was similar to that calculated for fall night electrofishing surveys of the NYS Bass Study (Table 2).

Table 2. Largemouth bass CPUE comparisons for Harlem Meer Electrofishing Surveys

Survey Year	**Number caught**	**CPUE YOY**	**CPUE All sizes**	**CPUE <10”**	**CPUE >=10”**	**CPUE >12”**
2008	120	19	120	83	37	20
2009	90	33	106	53	53	6
2011	158	84	200	187.34	13	5
2013	290	0	223	163	60	20
NYS Bass Study* Spring night electrofishing	**-**	**-**	**15.78**	**7.89**	**8.89**	**-**
NYS Bass Study Fall night electrofishing	**-**	**-**	**29.48**	**16.52**	**12.96**	**-**

*Green et al. (1986)

Size Indices

Largemouth bass PSD was highest in the 2008 survey and RSDp was highest in the 2013 survey; however, all bass size indices were relatively low (Table 3). Sunfish PSD’s were within a normal range and sunfish RSDp’s were all low except that for the 2009 survey which was just within the normal RSDp range of 5 – 20 (Anderson and Neumann 1996).

Table 3. PSD and RSDp comparisons for bass and sunfish for Harlem Meer electrofishing surveys.

	Largemouth Bass		**Sunfish**	
Survey Year	**PSD**	**RSDp**	**PSD**	**RSDp**
2008	20.41	1.02	46.2	0.01
2009	8.3	1.67	56.4	5.1
2011	6.7	0	42.2	3.07
2013	8.8	2.2	28	1

Table 4 shows bass and sunfish catch rates and PSD and RSDp averaged for the four Meer surveys, compared to other NYS bass waters. Largemouth bass catch rates for the Meer are high while size indices are low. Waneta Lake in Region 8 and White Pond in Region 3 are the only other two lakes listed with bass catch rates greater than 100. PSD and RSDp however, are within normal ranges whereas those for the Harlem Meer are low. Data from Table 1 is also shown graphically in Figure 2.

Table 4. CPUE and size index comparisons with other NYS waters. Numbers presented are averages with number of surveys in the first column and standard deviations of means in the third column

Water	**CPUE bass**	**Std dev**	**Ave # bass sampled**	**CPUE sunfish**	**PSD bass**	**RSDp bass**	**PSD sunfish**	**RSDp sunfish**
Belmont Lake (R1) n=4	14	2.5	35	125.6	75.8	35	23.3	5.2
Artist Lake (R1) n=4	33	18.4	102	280.4	53.5	7.9	32	4.5
White Pond (R3) n=2	103	15.6	155	223	41	15	48.3	2
Copake Lake (R4) n=3	54.5	12.2	204	492	44.9	20.8	89	13.9
Waneta Lake (R8) n=3	133.3	21	361	287	50.3	18.3	41.1	0.3
Silver Lake (R9) n=3	36.7	22.1	152	342.4	64	21.8	44.1	1.1
Harlem Meer (R2) n=4	**162**	**58.3**	**164**	**353**	**11.1**	**1.25**	**43.2**	**2.3**

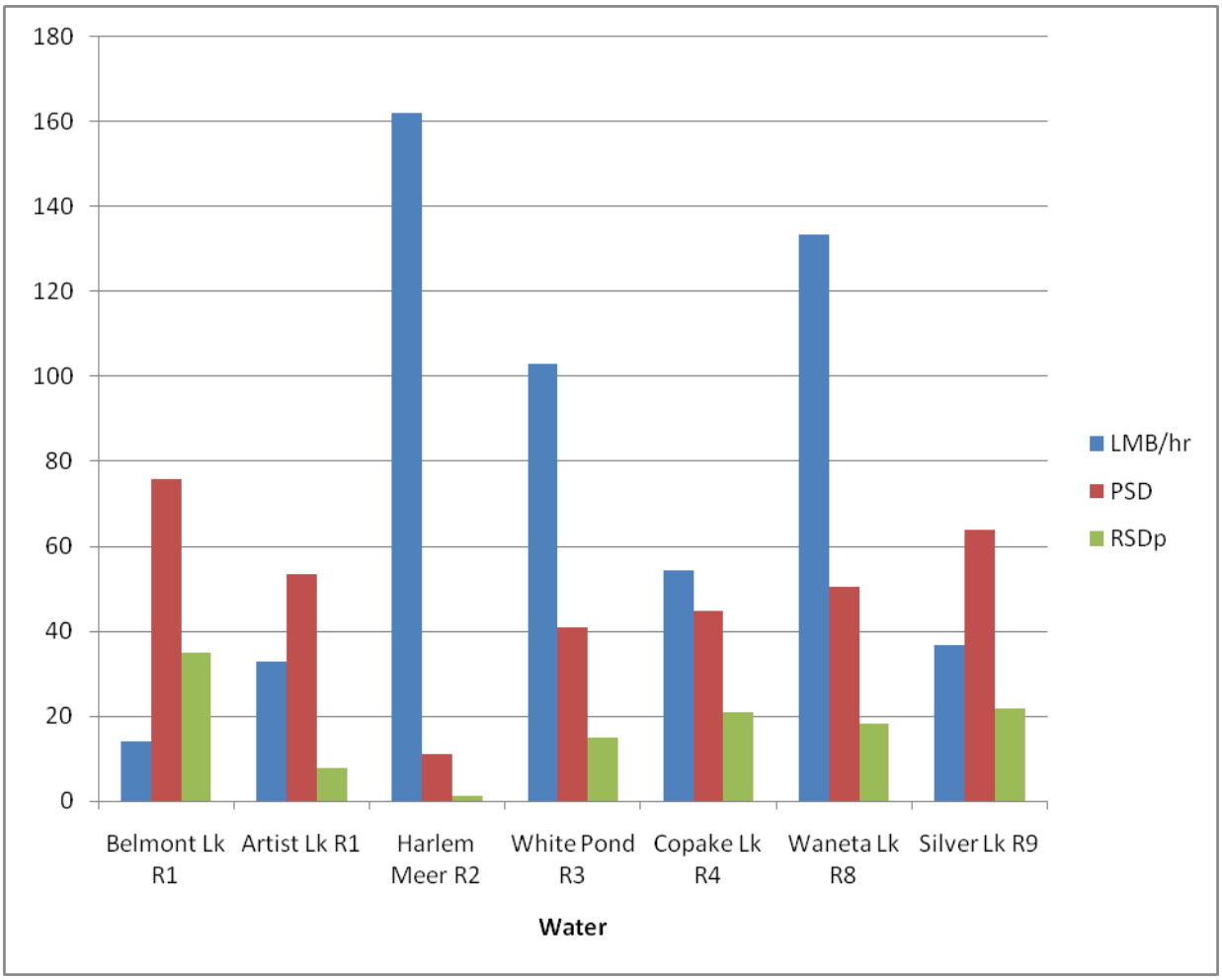

Figure 2 Largemouth bass CPUE and size index comparisons between the Harlem Meer and other NYS waters

Largemouth bass CPUEs of the Harlem Meer are also high compared to other New York City water bodies, except for Willowbrook Lake in Staten Island and Prospect Park Lake in Brooklyn, which are comparable (Table 5, Figure 3).

Table 5. Largemouth bass CPUE and size indices for other NYC water bodies

Water	**CPUE**	**PSD**	**RSDp**
Baisely Pond, Queens	39	89	45.2
Central Park Lake, Manhattan	31	92	50
Harlem Meer, Manhattan	**162**	**11**	**1**
Kissena Lake, Queens	117	52	10
Oakland Lake, Queens	22	44	28
Ohrback Lake, Staten Island	48	75	16
Prospect Park Lake, Brooklyn	147	36	18
Van Cortlandt Lake, Bronx	32	45	6
Willowbrook Lake, Staten Island	153	37	1

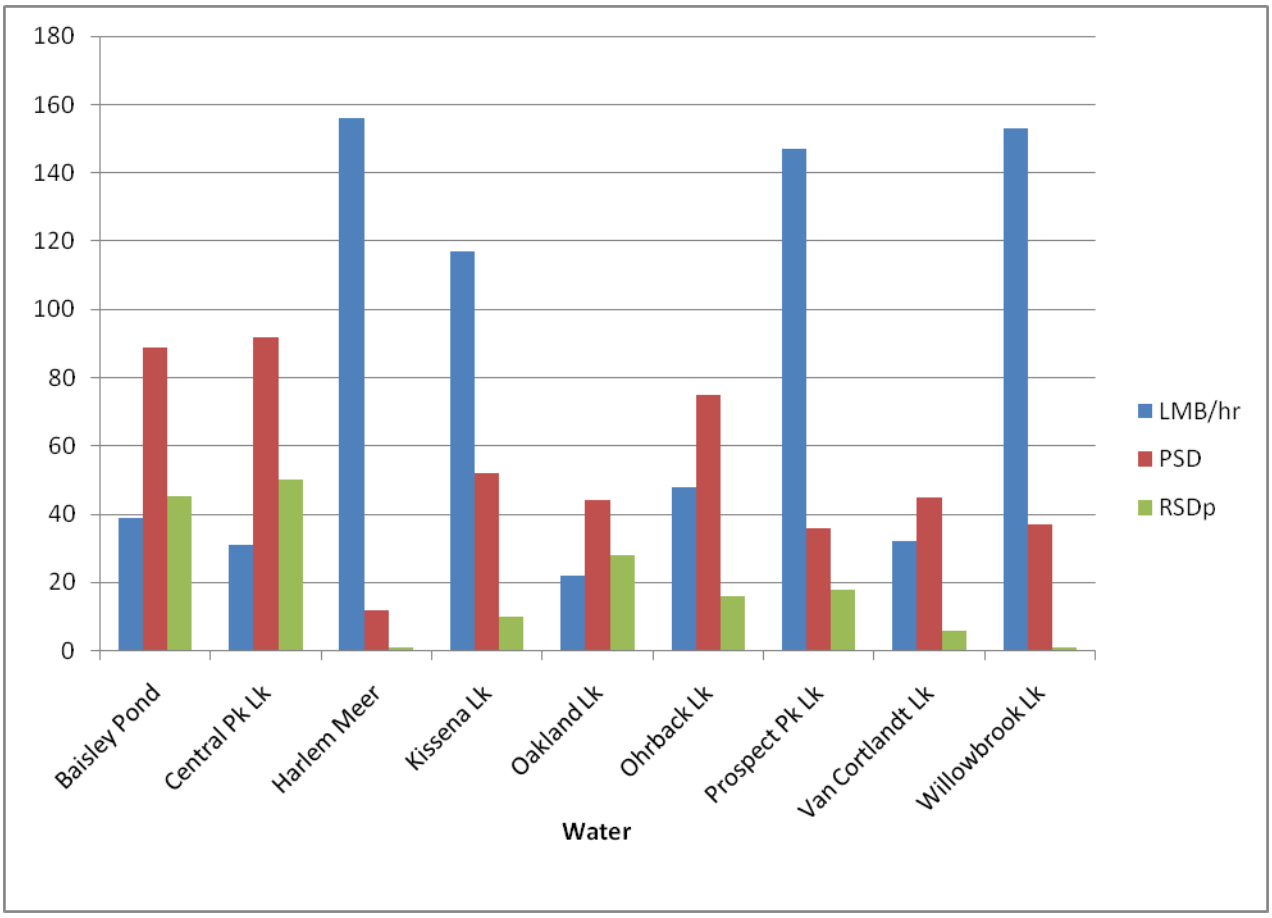

Figure 3 Largemouth bass CPUE and size index comparisons between the Harlem Meer and other NYC waters

Largemouth bass relative weights were calculated and are grouped by percent above and below 95 (Table 6). These were used to assess the biological condition of this fish population according to the Centrarchid Sampling Plan (Green 1989). Most largemouth bass of the 2008, 2009 and 2013 surveys had relative weights less than 95; percentages were over 85% in the 2008 and 2013 surveys (Table 6).

Table 6. Percentages of total largemouth bass totals of relative weights above and below 95 for largemouth bass of Harlem Meer surveys

Survey Year	**>95**	**<95**
2008	14	86
2009	34	66
2011	51	49
2013	12	88

Discussion

Survey results consistently showed that the Harlem Meer largemouth bass population was overabundant, skewed towards smaller fish, and was in relatively poor condition as indicated by low relative weights. These characteristics are all indicative of unstable, widely fluctuating, recruitment Green et al. (1986). PSD's of less than thirty (30) and RSDp's well below 10 are clear indications of an unbalanced population (Green et al. 1986). The highest largemouth bass PSD of any of the four Meer surveys was 20, far from the generally accepted PSD range of 40-70 (Anderson and Neumann, 1996), and well below 30. RSDp was also low for all surveys with the highest near two (2), well below 10 and also below the acceptable largemouth bass RSDp range of 10-40 (Anderson and Neumann 1996).

Also, catch rates for all four Meer surveys exceeded rates that would indicate unstable recruitment (30-40 or more bass/hour, Green et al. 1986) and were the highest of any water body surveyed in New York City. Bass catch rates also exceeded those of DEC water bodies in other regions used in comparisons and were significantly higher than that from the NYS Bass Study. 2011 and 2013 Meer surveys had catch rates over ten times greater than the spring electrofishing catch rate from the NYS Bass Study, primarily for bass less than ten inches in length. Catch rates for larger sized fish of the Meer were also greater than for those for the NYS bass study although by not as great an amount.

Additionally, the percentage of bass six to twelve inches in length from the 2013 survey was 91%, although these percentages for the three other surveys ranged from 61% - 69%. Green et al. (1986) mentions a sample of bass with greater than 80% within six to twelve inches is further evidence of unstable recruitment.

Sunfish size indices from the four surveys suggest the Meer's sunfish population is more ecologically balanced than its bass population. Sunfish PSD for each of the four surveys was within the generally accepted PSD range of 20-60 for a balanced population. RSDp for sunfish was low for the 2008, 2011 and 2013 surveys but within an acceptable range in the 2009 survey (Anderson and Neumann 1996).

When predator (bass) and prey (sunfish) size indices are considered together and Table 5 of the Centrarchid Sampling Plan (Green 1989) is referenced, "excessive and highly variable" largemouth bass reproduction is indicated. Confirming information includes a majority of bass, less than 12 inches in length, with relative weights less than 95 which was the condition for bass of the 2008, 2009 and 2013 surveys. In contrast, a greater number of bass from the 2011 survey had relative weights greater than 95. Time of year could have been a contributing factor to this as the 2011 survey was performed in the fall after fish had the spring and summer to feed. Green (1989) specifies spring sampling as the standard Centrarchid sampling procedure, therefore using

relative weights from the fall 2011 survey to interpret largemouth bass population condition should be treated with caution.

Low largemouth bass size indices and high catch rates have persisted since electrofishing surveys at the Meer began in 2008, indicating unstable recruitment has been the case for at least five (5) years. The management strategy recommended by Green et al. (1986) to increase numbers of quality-sized bass is to remove the smaller-size bass (those under 12 inches in length) while protecting those in the 12 to 15 inch size range. Unfortunately, current New York State and New York City regulations require catch and release, only, of all fish in NYC-owned lakes and ponds therefore this action would not be within current regulations; however, changes to fishing regulations occur regularly (NYS regulations are on a two-year cycle) and this type of strategy should be considered in the near future. If the New York City Parks Department was amenable, both state and city jurisdictions could concomitantly implement a change is existing regulations allowing for harvest of largemouth bass in the 6 – 12 inch size range, protecting those fish greater than 12 inches in length. This action could potentially remedy the over-abundance of bass and could be implemented as a five-year experiment.

The DEC Bureau of Fisheries plans creel surveys for Central Park Lake and the Harlem Meer in 2015. Angler reactions to the management strategy described above could be assessed through these creel surveys. The creel surveys could also be used to bring awareness of potential temporary regulation changes. Contaminant testing as part of DEC's toxic substances monitoring program has not yet been conducted on the Harlem Meer and should be performed as soon as possible to provide information on the safe consumption of bass from the Meer should regulations change to allow anglers to take fish from this water body.

The number of carp observed in these surveys is low compared to other New York City water bodies, which may be a reason why the Meer's water is relatively clear. For both the 2011 and 2013 electrofishing surveys water turbidity did not appear to hinder catching fish as it often does in other NYC waters. No American eels were observed in any of these surveys, which was expected as there is no connection to tidal waters.

The Harlem Meer is the only water body in New York City in which green sunfish have been found. The few captured during the more recent surveys (2011 and 2013) may indicate a recent introduction or could simply be a result of better sampling visibility during these surveys. Subsequent surveys will indicate the nature of this population.

One snakehead was caught in the 2008 survey, none were captured or observed in subsequent surveys, and one was caught by an angler in 2012. Two snakeheads caught over four years suggests snakeheads are not present in significant numbers in the Meer but this condition could change over time and monitoring for these fish should continue.

Recommendations

Conduct a spring boat electrofishing survey in 2015 following methods described in the DEC Centrarchid Sampling Manual.

Obtain largemouth bass scales for aging to determine growth rates.

Conduct creel surveys of the Harlem Meer and Central Park Lake in 2015. Compare these results to those of creel survey reports for Prospect Park Lake from 2001 (Van Maaren, 2001) and one planned for Prospect Park Lake in 2014.

Explore the possibility of changing State and City regulations to allow take of bass less than 12 inches in length to stimulate growth and recruitment of bass into quality sizes, in accordance with Green et al. (1986).

Perform contaminant testing of Meer fish as part of DEC's toxic substances monitoring program as this would be a step towards the above strategy.

Continue to maintain posted snakehead signs warning anglers to report catches of these fish.

Acknowledgements

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