

Lebanon Reservoir Fisheries Survey 2016

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October 2020
Bureau of Fisheries Report #: cr1513

Abstract

A fisheries survey of Lebanon Reservoir in Madison County was conducted in 2016, consisting of two sampling efforts: a spring nighttime electrofishing sample in May and a summer gill net and fyke net sample in July. This survey was conducted to evaluate age, growth, and abundance of the reservoir's sportfish community, survival of stocked rainbow trout, and recruitment of stocked walleye to the fishery. Overall, 442 fish were caught, representing 11 species. Largemouth bass (*Micropterus salmoides*) were the most numerous with 122 caught (33% of catch) followed by bluegill (*Lepomis macrochirus*) (n=120, 33% of catch). Other gamefish caught were walleye (n=7, 2% of catch) and rainbow trout (n=7, 2% of catch). As the popularity and success of the rainbow trout fishery is unknown at this time, an evaluation should be conducted in the future to determine angler effort and catch to determine if future rainbow trout stocking is warranted. The current rainbow trout stocking policy and special angling regulations for trout should continue until that evaluation is conducted. Current statewide regulations should continue for all other species.

Introduction

Lebanon Reservoir (SR-44-79-P153) is a 96 acre waterbody located in the Town of Lebanon, Madison County. It has a maximum depth of 45 ft and a mean depth of 20.9 ft [Citizens Statewide Lake Assessment Program (CSLAP) 2016]. The lake can be characterized as mesotrophic, or moderately productive, based on water clarity, chlorophyll *a* and total phosphorus (CSLAP 2016). Like many of the area reservoirs, it was built to supply water to the Erie Canal. Lebanon Reservoir supports a two-story fishery and is currently stocked yearly by the New York State Department of Environmental Conservation (DEC) with 2,000 yearling rainbow trout (*Oncorhynchus mykiss*). Rainbow trout were stocked, almost annually, from 1938 to 1996, and have been stocked annually since 2001. Additionally, the Lebanon Reservoir Lot Owners Association have stocked walleye (*Sander vitreus*) since 2004 (Appendix 1). These walleye stockings are intended to eventually reduce the size of Lebanon Reservoirs sunfish (*Lepomis spp.*) populations with anticipation that reduced sunfish predation on Eurasian watermilfoil (*Myriophyllum spicatum*) herbivores will result in more milfoil herbivory and a subsequent reduction in the plants impact on the Reservoirs recreational uses (Lord and Johnson 2005).

Statewide angling regulations apply for all species except trout. Rainbow trout are managed under a special regulation with an all year open season, any size minimum length, and a daily limit of 5 with no more than 2 longer than 12 inches; ice fishing is permitted. The intent of this regulation is to allow harvest of trout throughout the year, as there is limited holdover potential, and to allow equitable distribution of larger trout. The size limit also maintains consistency with other Madison County trout waters. There is a DEC boat launch with a hard surface ramp that provides public access for both open water, shore and ice fishing.

The last sportfish survey conducted on the reservoir was in 2009 by SUNY Cobleskill and thus an updated assessment was warranted. The objectives of this

survey were to evaluate age, growth, and abundance of the reservoir's sportfish community, and to assess the status of stocked rainbow trout and walleye.

Methods

Water Chemistry

Surface water temperature, air temperature, pH, dissolved oxygen (DO) and conductivity were recorded on May 24, 2016, prior to electrofishing and on July 11th, prior to the netting sample. Additionally, on July 11th a Secchi disk reading was taken and a temperature and DO profile was taken at 5 ft intervals in 45 ft of water; a Professional Plus model YSI meter was used.

Electrofishing

Lebanon Reservoir was electrofished on the night of May 24th following the protocol outlined in the Centrarchid sampling manual (Green 1989). Five sites (Figure 1) covering the majority of the shoreline was fished for a total of 1.67 hours of “on-time.” A Smith-Root model SR-18 electrofishing boat was operated with the boat hull as negative and two four-dropper umbrella arrays anodes, extended 6 ft in front of the boat. Direct current half-wave (120 pulses per second) with 6 amps and 500 volts was used. Shocking started half an hour before sunset and sampling was conducted along the shoreline in 1 to 5 ft of water. The crew consisted of a driver and two netters. Four 15 minute “all-fish” runs and one 40 minute “gamefish-only” run were conducted. During the all-fish runs attempts (within reason) were made to collect every fish that was shocked. Largemouth bass (*Micropterus salmoides*), walleye, and rainbow trout were the target species during the gamefish run.

Collected fish were identified to species and lengths (mm) and weights (gm) were recorded. Scale samples were collected for age determination from five individual fish per 10 mm size increments of largemouth bass, bluegill (*Lepomis machrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*), black crappie (*Pomoxis nigromculatus*), and yellow perch (*Perca flavescens*). Age structure of the unaged sample of fish was estimated based on the frequency of known age fish in each 10 mm size increment.

Fyke Netting

One fyke net was fished overnight on July 11 for 18.3 hours (Figure 1). The net used was a modified fyke net with a sinking trap and a single lead. Specifications for the net are: netting - 1/2 in bar knot-less nylon, with black asphalt-type coating; lead -100 ft long and 3 ft high; frames - the opening consists of two 3×6 ft rectangular frames each with a center brace; frames are spaced 24 in apart with inwards mesh trap that tapers from the first frame to the second ending in a 4 in diameter opening; these are followed behind by four 30 in diameter hoop frames spaced 24 in apart, with mesh funnel between first and third hoops; cod end - with purse string closure. Net was fished perpendicular to shore in 1 to 7 ft of water.

Collected fish were identified to species, and lengths (mm) and weights (gm) were taken. Scale samples were collected for age determination from five individual fish per 10 mm size increments of bluegill, pumpkinseed, rock bass and largemouth bass.

Age structure of the unaged sample of fish was estimated based on the frequency of known age fish in each 10 mm size increment.

Gill netting

Two DEC standard inland gill nets were set over night on July 11 (Figure 1). The standard gill net is 6 ft deep with 25 ft panels of 1.5, 2.0, 2.5, 3.0, 3.5 and 4.0 in stretch mesh monofilament netting. Nets were set on the bottom perpendicular to shore, starting at a nearshore depth of 15 ft. Depths at the outer end of the nets were 22 and 30 ft. Orientation of gill net mesh size was random, but both nets had small mesh inshore. Gill nets were fished for 18.4 and 18.5 hours.

Collected fish were identified to species and lengths (mm) and weights (gm) were recorded. Scale samples were collected for age determination from five individual fish per 10 mm size increments of bluegill, black crappie, yellow perch, walleye and rainbow trout. Age structure of the unaged sample of fish was estimated based on the frequency of known age fish in each 10 mm size increment. Otoliths were also removed from the one walleye collected to aid in age determination

Ten yellow perch were collected for contaminant monitoring and were individually tagged, bagged and placed on ice. These fish were placed in a freezer when brought back to the office and were taken to the DEC Hale Creek Field Station, Gloversville NY, for lab analysis in February 2017.

Fish Indices

Indices used to assess the quality of the fish population in Lebanon Reservoir included electrofishing catch rates, gill net catch rates, growth rates, proportional stock density (PSD), relative stock density (RSD), and relative weight (Wr). PSD is expressed as the percentage of the stock that is of "quality" size; and RSD is expressed as the percentage of the stock that is of "preferred" size (Anderson 1980). Lengths used for stock, quality, preferred, memorable, and trophy sizes for all species are from Gablehouse (1984) and can be found in Appendix 2. Wr is an index of condition that compares the actual weight with a standard weight for fish of the same length (Anderson 1980). Abundance estimates for largemouth bass were derived from regression equations based on spring nighttime electrofishing catch rates from Green (1989). Abundance estimates for yellow perch and walleye were derived from electrofishing and gill netting catch rates, and mean length at age-4 from Forney et al. (1994).

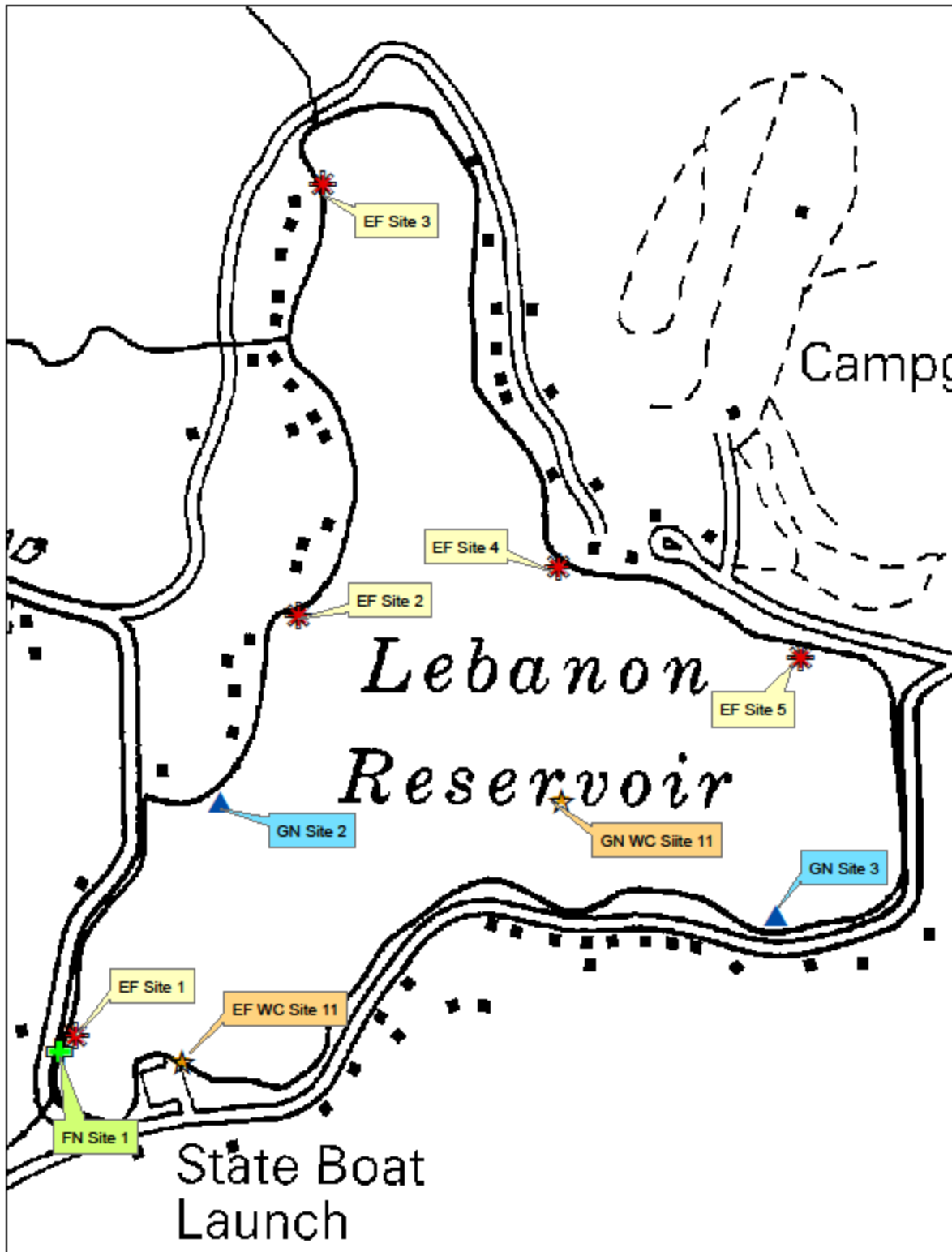


Figure 1. Site locations for gill net (GN), fyke net (FN), water chemistry (WC), and the starting point for electrofishing (EF) runs at Lebanon Reservoir 2016.

Results

Water Chemistry

During the May 24th electrofishing survey, the surface water temperature was within the range of 59 to 77° F suggested in the Centrarchid Sampling Manual (Green 1989) and was 66° F (Table 1). Lebanon Reservoir was thermally stratified during the July 11th netting with temperatures of 77° F at the surface and 59° F at 25 ft. DO levels ranged from 4.3 parts per million (ppm) at the surface, to 8.5 ppm at 25 ft, to 2.9 ppm near bottom (Figure 2). At the time of the July survey, water temperature and DO levels were sufficient to support rainbow trout down to 40 ft. Whether these conditions lasted for the rest of the summer is unknown.

Table 1. Water chemistry data for Lebanon Reservoir.

Date	Depth (Feet)	Water Temp. (Fahrenheit)	DO (ppm)	pH	Conductivity (umho/cm3)	Secchi Depth (Feet)
5/24/2016	0	66.0	6.7	8.3	208	
7/11/2016	0	77.3	4.3	8.4	237	16.4
	5	75.4	5.4			
	10	75.0	5.8			
	15	73.4	6.0			
	20	66.4	7.6			
	25	59.1	8.5			
	30	53.4	7.8			
	35	50.6	6.6			
	40	48.8	5.0			
	45	48.7	3.8			
	50	48.7	2.9			

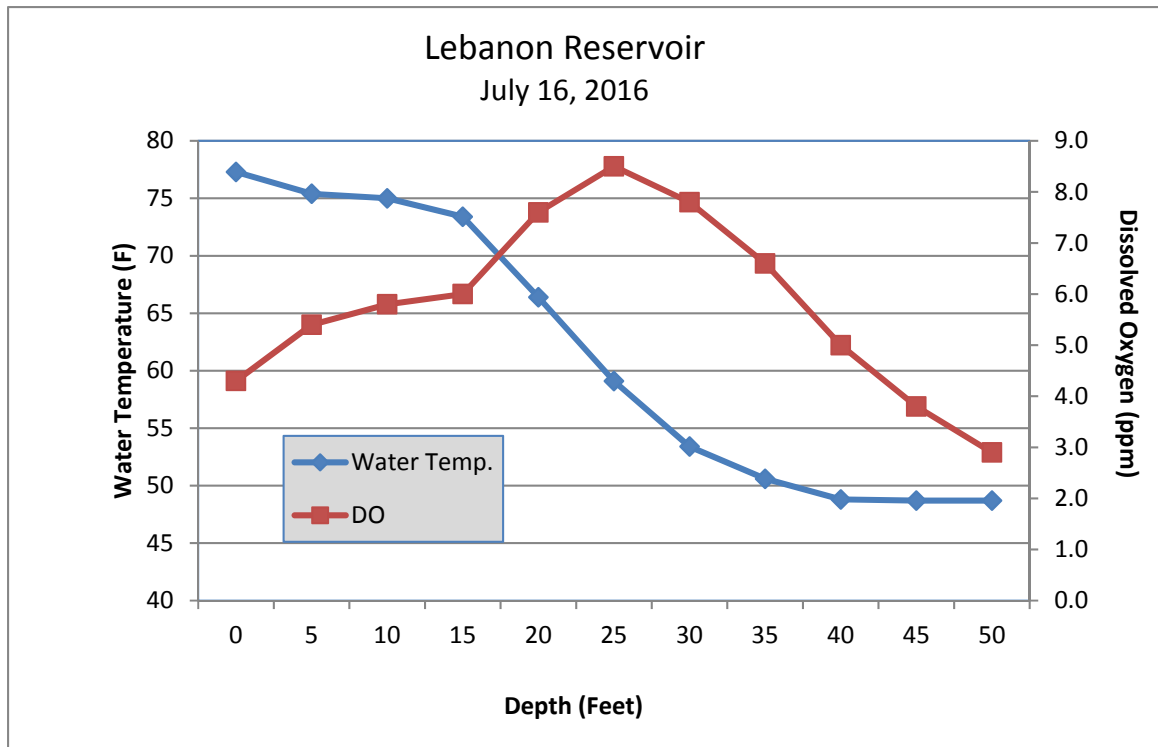


Figure 2. Water temperature and dissolved oxygen (DO) profile for Lebanon Reservoir on July 16, 2016.

Species Collected

Overall, 442 fish were caught, representing 11 species (Table 2). Largemouth bass were the most numerous with 122 caught (33% of catch). The next most numerous species was bluegill ($n=120$, 33% of catch), followed by yellow perch ($n=50$, 14% of catch), and pumpkinseed ($n=45$, 12% of catch). Other gamefish caught were walleye ($n=7$, 2% of catch), and rainbow trout ($n=7$, 2% of catch).

All eleven species were collected via electrofishing, while the gill netting and fyke netting samples consisted of 7 and 4 species, respectively (Table 2).

Gamefish

Largemouth Bass

Largemouth bass electrofishing catch per unit effort (CPUE) ranged from 36 to 104 fish per hour (fish/h) with an average of 72/h (14 standard error, SE) for all size largemouth bass (Table 3). One largemouth bass was collected by fyke net for a CPUE of 1/net night; no largemouth bass were caught by gill net. Largemouth bass lengths ranged from 5 to 18 in, with 12 in bass being most frequent (Figure 3). The PSD for largemouth bass was 43 and the RSD_{15} was 10 (Table 4). The largemouth bass mean W_r was 96 (SE = 1; Table 5). Largemouth bass were slow growing by NYS standards, with the mean age to reach legal size (≥ 12 in) falling between Age-5 and 6 (Figure 4). Age-3 bass were the most frequent age class caught (Figure 5).

Table 2. Fish species collected in Lebanon Reservoir by electrofishing (EF), gill net (GN) and fyke net (FN) in 2016 sampling efforts.

Species	EF	GN	FN	Total	Frequency
Rainbow Trout	6	1		7	2%
Golden Shiner	3	9		12	3%
White Sucker	19	12		31	7%
Brown Bullhead	16			16	4%
Rock Bass	24		1	25	6%
Pumpkinseed	44		1	45	10%
Bluegill	106	5	9	120	27%
Largemouth Bass	121		1	122	28%
Black Crappie	5	2		7	2%
Yellow Perch	19	31		50	11%
Walleye	6	1		7	2%
Total	369	61	12	442	

Table 3. Spring night-time boat electrofishing catch from Lebanon Reservoir, Madison County, on May 24, 2016. CPUE are mean catch rates by run, with standard error in parenthesis.

Species	Total Catch	On-Time (h)	CPUE (fish/h; Standard Error)			
			All	≥Stock	≥Quality	≥Preferred
Rainbow Trout	6	1.7	4 (1)	-	-	-
Golden Shiner	4	1	4 (1)	-	-	-
White Sucker	18	1	18 (8)	18 (8)	17 (8)	17 (8)
Brown Bullhead	16	1	16 (4)	16 (4)	16 (4)	3 (1)
Rock Bass	24	1	24 (8)	24 (8)	8 (4)	3 (1)
Pumpkinseed	44	1	44 (12)	41 (10)	22 (5)	4 (3)
Bluegill	106	1	106 (21)	94 (21)	29 (9)	2 (1)
Largemouth Bass	121	1.7	73 (14)	68 (14)	29 (8)	7 (3)
Black Crappie	5	1	5 (4)	5 (4)	4 (3)	0 (0)
Yellow Perch	19	1	19 (3)	16 (3)	11 (3)	6 (2)
Walleye	6	1.7	4 (2)	3 (2)	2 (2)	0 (0)
Total	369					

Table 4. Number of fish caught of stock, quality, preferred (Pref), memorable (Mem), and trophy lengths and resulting PSD and RSDp in May and July 2016 on Lebanon Reservoir.

Species	Total	Stock	Quality	Pref	Mem	Trophy	PSD	RSDp
White Sucker	31	31	30	17	17	1	97	55
Brown Bullhead	16	16	16	16	3	0	100	100
Rock Bass	25	24	8	3	0	0	33	13
Pumpkinseed	45	42	22	4	0	0	52	10
Bluegill	120	100	29	2	0	0	29	2
Largemouth Bass	122	115	49	12	0	0	43	10
Black Crappie	7	7	6	0	0	0	86	0
Yellow Perch	49	46	33	8	1	0	72	17
Walleye	7	6	5	0	0	0	83	0

Table 5. Mean relative weight (Wr) by size categories from fish sampled on Lebanon Reservoir, Madison County, in May and July 2016. N is number of fish in the size category and standard error is in parenthesis. Qual-quality, Pref-preferred and Mem-memorable.

Species	N	Wr									
		All Mean	≥Stock<Qual		≥Qual<Prefe		≥Prefer<Mem		≥Mem<Trophy		
		N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Rainbow Trout	7	87 (1)	-	-	-	-	-	-	-	-	-
Rock Bass	24	95 (2)	15	93 (6)	5	100 (1)	3	93 (2)	-	-	-
Pumpkinseed	33	94 (6)	13	91 (12)	17	95 (6)	3	101 (29)	-	-	-
Bluegill	98	98 (2)	61	96 (5)	27	92 (1)	2	85 (1)	-	-	-
Largemouth Bass	122	96 (1)	66	95 (1)	37	95 (1)	12	101 (2)	-	-	-
Black Crappie	7	98 (3)	1	103	6	97 (3)	-	-	-	-	-
Yellow Perch	40	84 (5)	13	89 (2)	17	82 (10)	6	82 (13)	1	82	-
Walleye	7	87 (4)	1	84	5	86 (5)	-	-	-	-	-

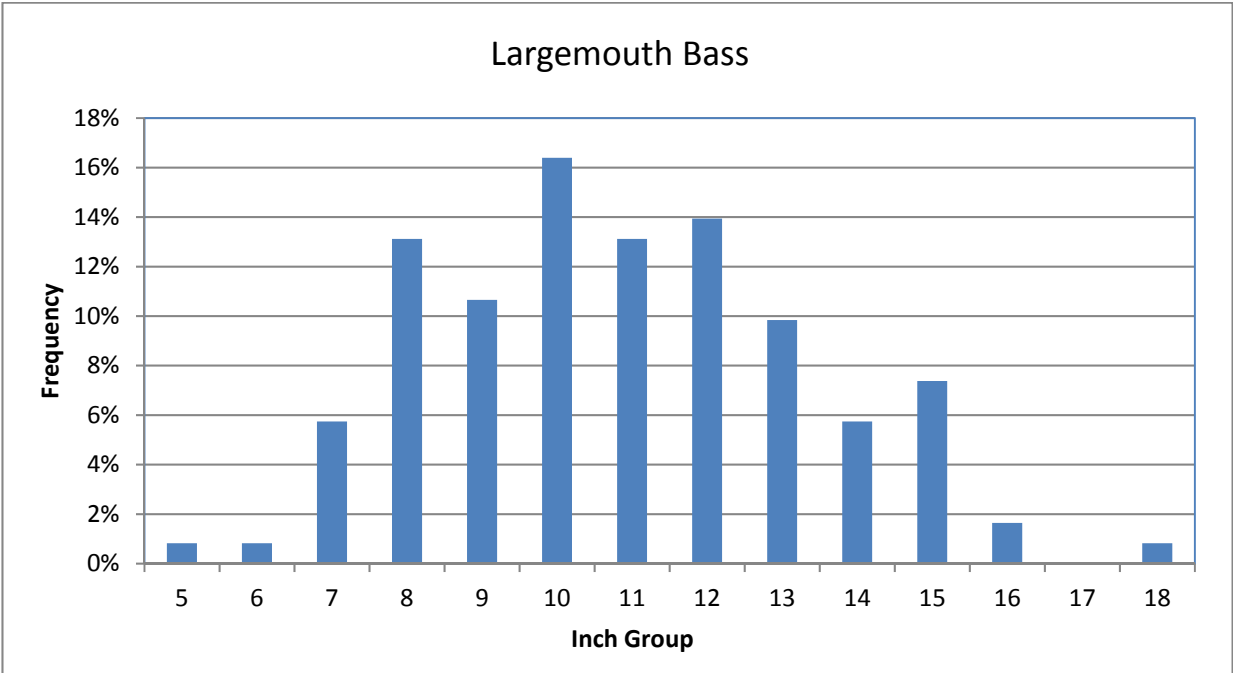


Figure 3. Length frequency distribution of largemouth bass caught in Lebanon Reservoir in May and July 2016.

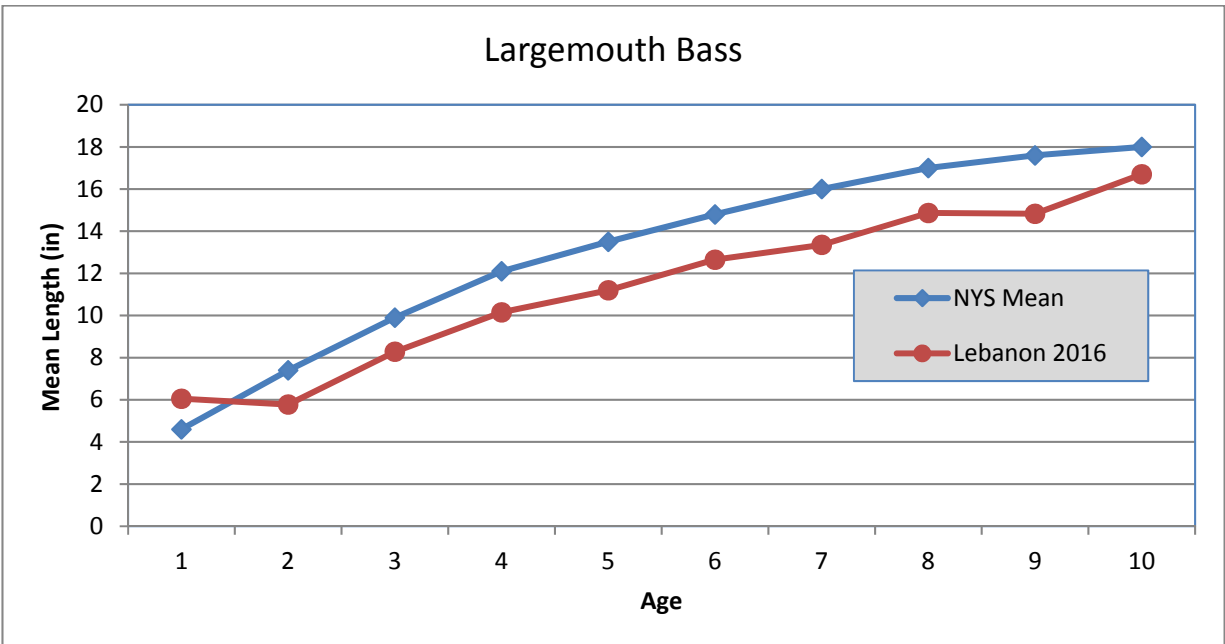


Figure 4. Observed mean length at age of largemouth bass caught in Lebanon Reservoir in May and June 2016 and the NYS mean (Brooking et al. 2018)

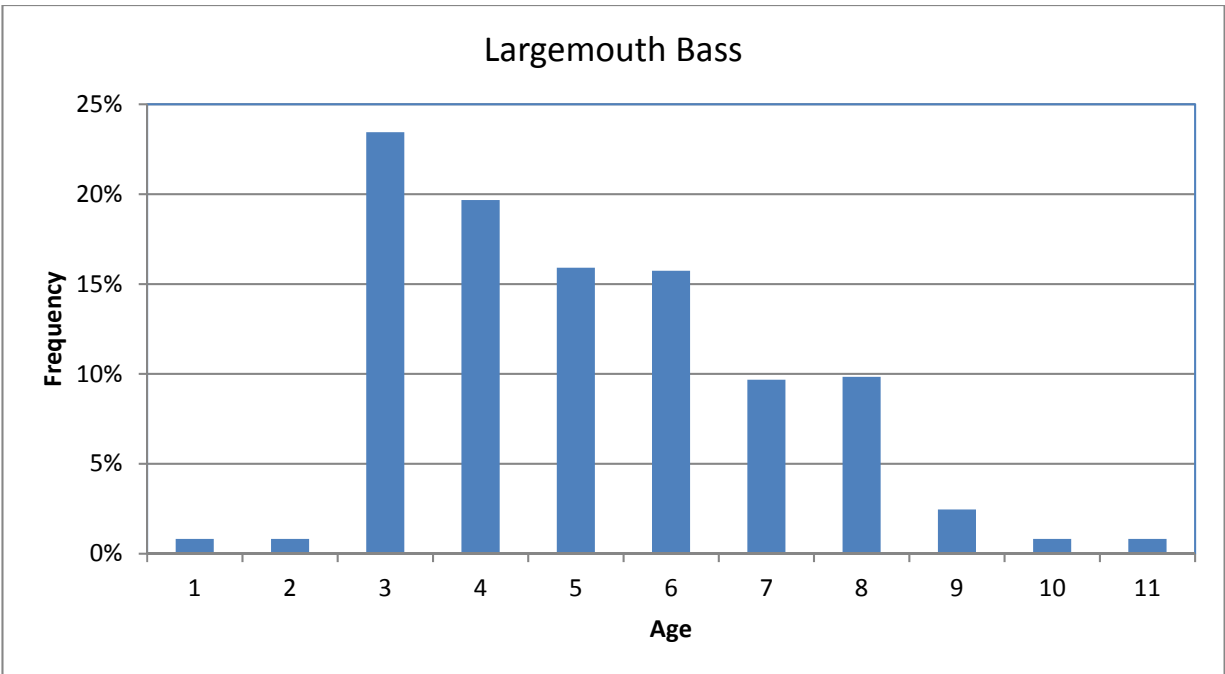


Figure 5. Age frequency distribution of largemouth bass caught in Lebanon Reservoir in May and July 2016.

Walleye

Only seven walleye were collected during the survey yielding electrofishing and gill netting mean CPUE's of 4.3/h (SE = 2; Table 3) and 0.5/net night (SE =1), respectively. Walleye were on the "thin" side with a mean W_r of 87 (SE = 4; Table 5). As only seven walleye were collected, the data set was not sufficient to calculate an accurate PSD and RSD_{20} . Walleye ranged in size from 9.2 to 19.1 in (Figure 6). Mean length at age was also below the NYS mean for all ages (Figure 7). Walleye ages ranged from Age-2 to Age-9 (Figure 8).

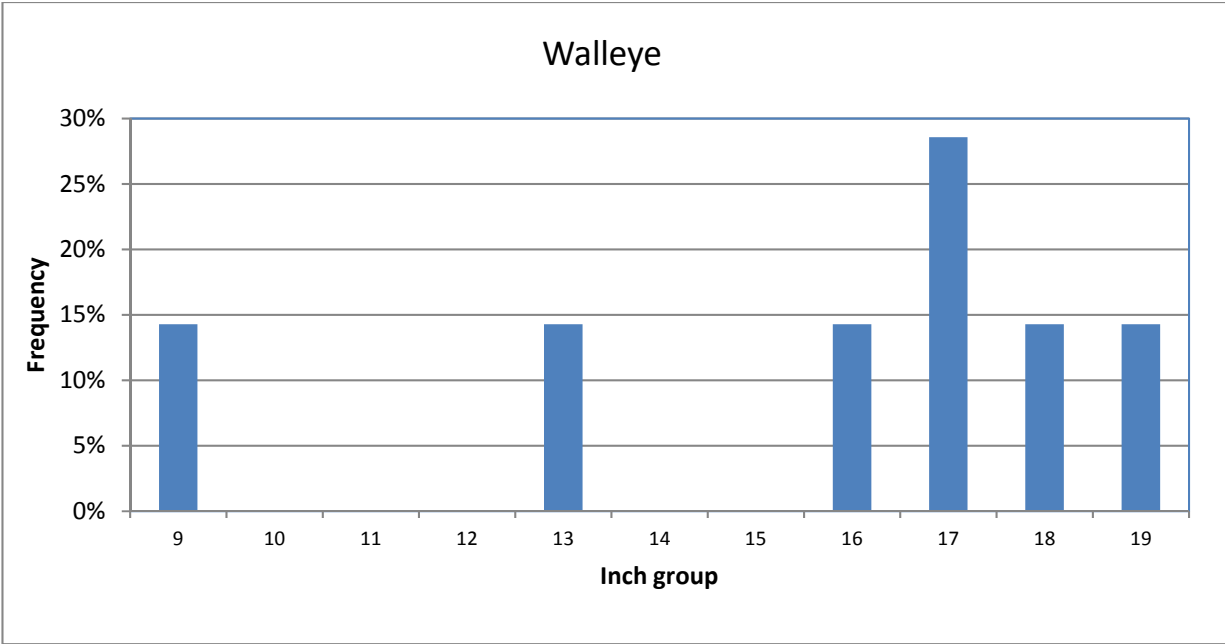


Figure 6. Length frequency distribution of walleye caught in Lebanon Reservoir in May and July 2016.

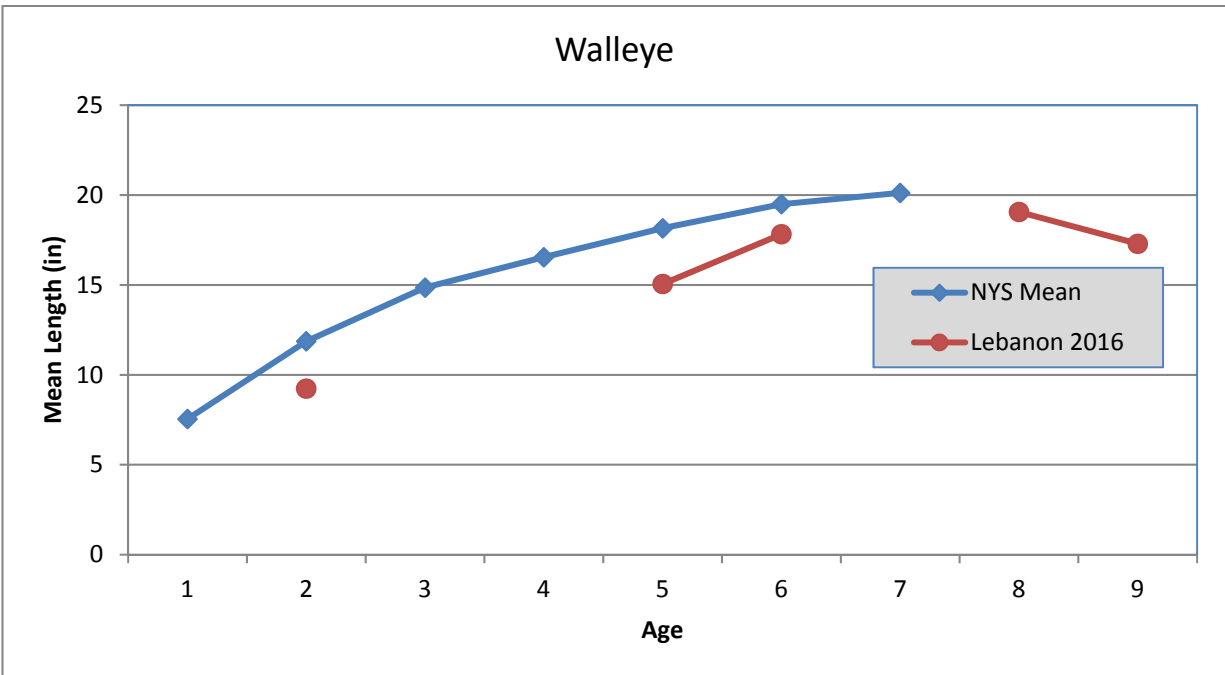


Figure 7. Observed mean length at age of walleye caught in Lebanon Reservoir in May and June 2016 and the NYS mean (Forney et al. 1994).

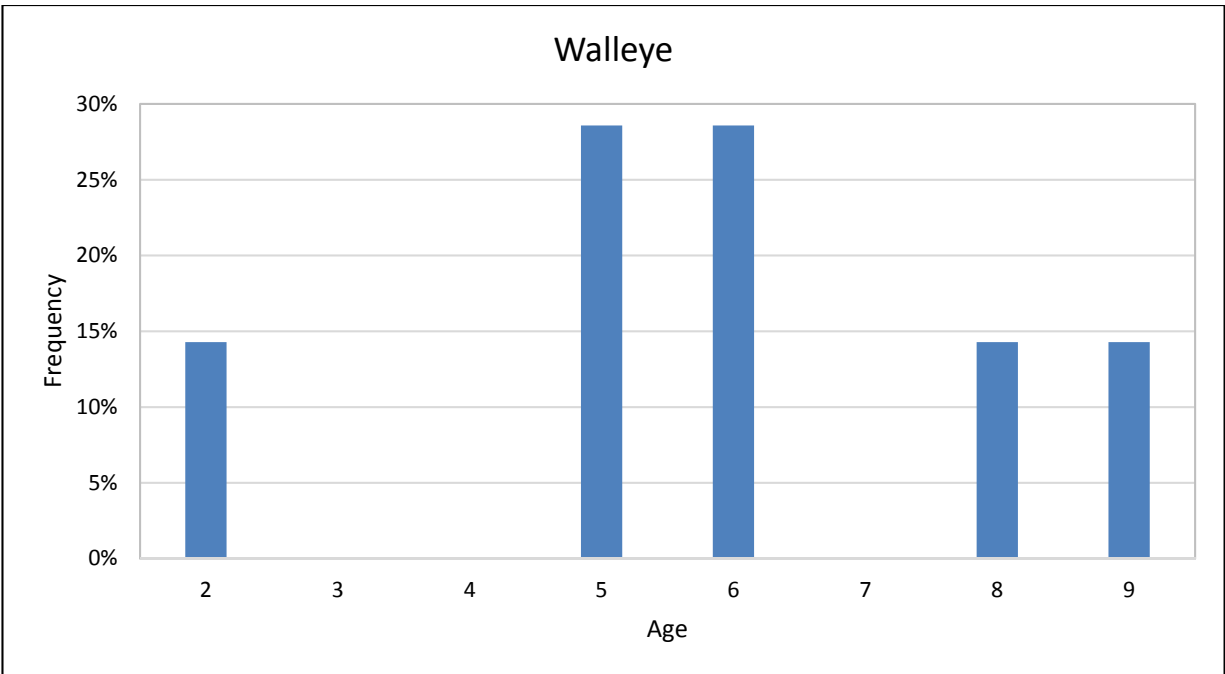


Figure 8. Age frequency distribution of walleye caught in Lebanon Reservoir in May and July 2016.

Rainbow Trout

Six rainbow trout were collected during the electrofishing survey for a mean CPUE of 4/h (SE = 1; Table 3). One 13.7 in rainbow trout was collected during the gill netting survey and was aged at two years-old and would have been from the 2015 stocking. The resulting CPUE was 0.5/net night (SE = 1). This rainbow trout was on the “skinny” side though, with a Wr of 86 (Table 5).

Panfish

Bluegill

The bluegill mean electrofishing, fyke net and gill net CPUE’s were 106/h (SE = 21; Table 3), 9/net night, and 2.5/net night (SE = 2), respectively. Bluegill in the 4 in size range were most frequent (Figure 9). Bluegill PSD was 29 and RSD₈ was 2. No bluegill were of memorable size (≥ 10 in) or trophy (≥ 12 in) size (Table 4). Bluegill were in good condition with a mean Wr of 98 (SE = 2; Table 5). Bluegill had slow growth rates by NY standards, with mean length at age just below the NYS mean for all ages, except for Age-7 and 8 (Figure 10). Age-4 bluegill were the most frequently collected age class (Figure 11).

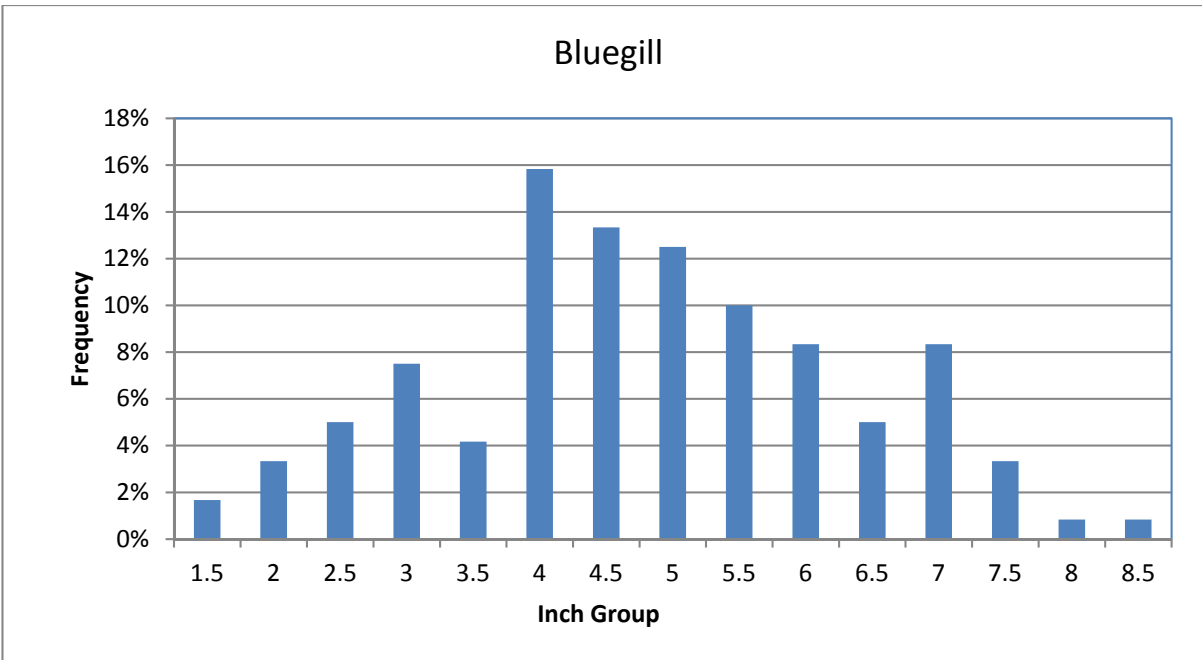


Figure 9. Length frequency distribution of bluegill caught in Lebanon Reservoir in May and July 2016.

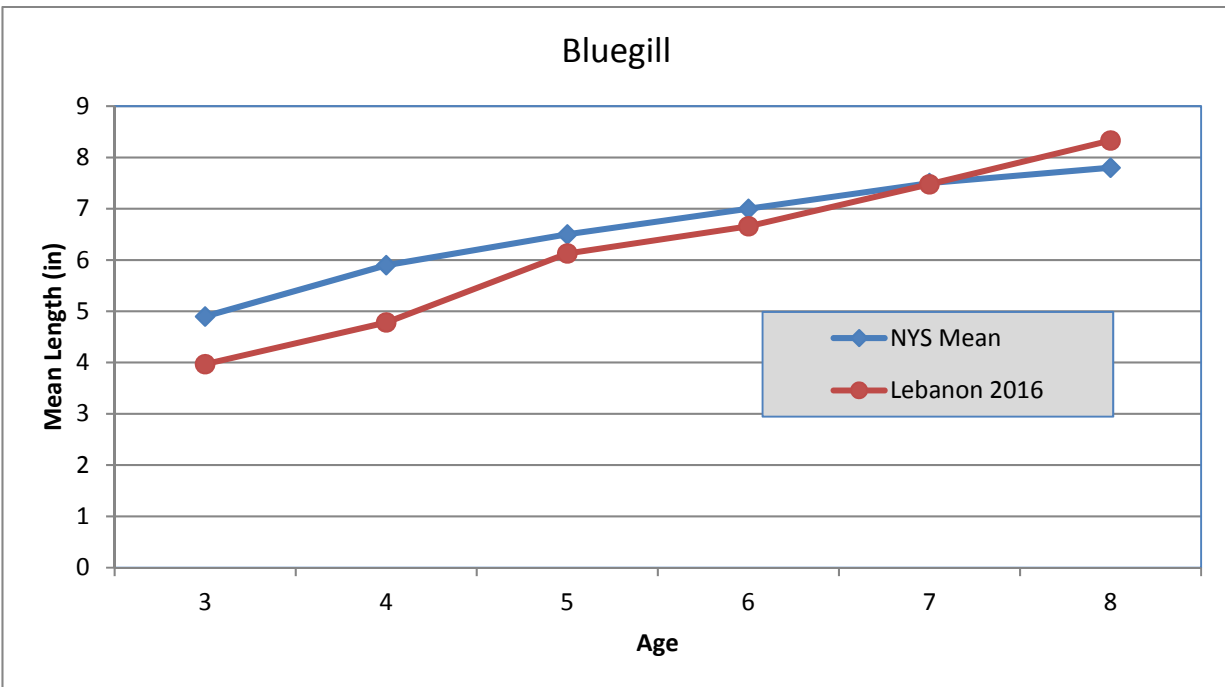


Figure 10. Observed mean length at age of bluegill caught in Lebanon Reservoir in May and June 2016 and the NYS mean (Brooking et al. 2018).

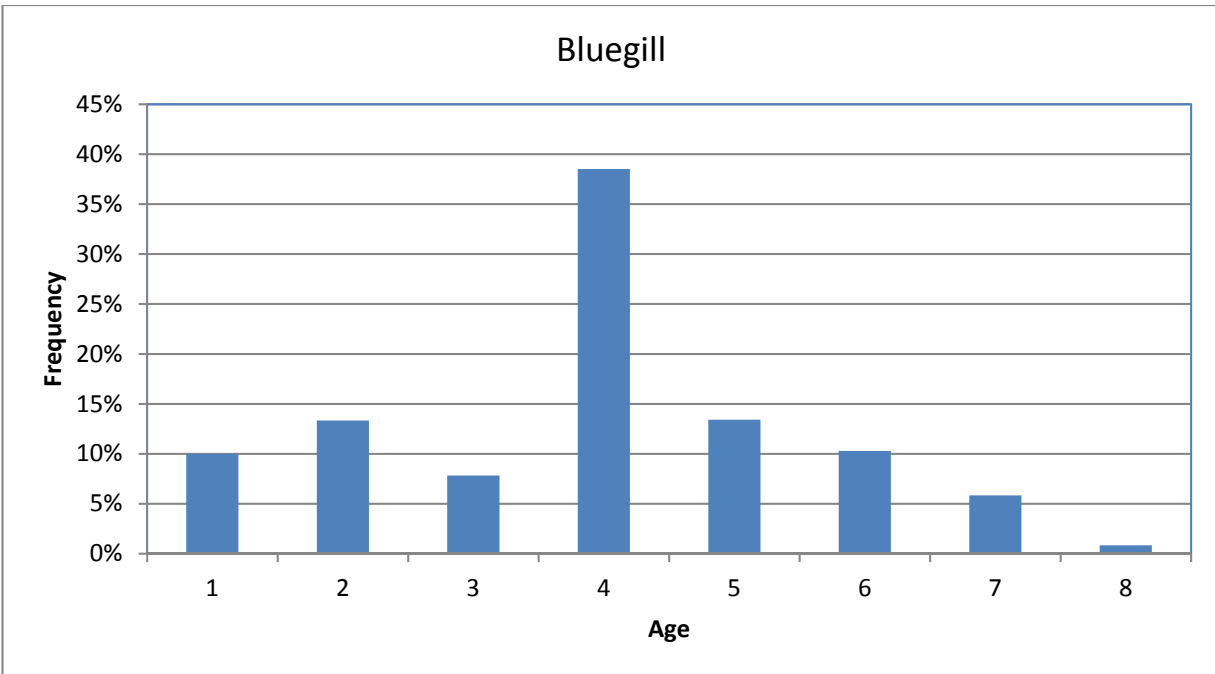


Figure 11. Age frequency distribution of bluegill caught in Lebanon Reservoir in May and July 2016.

Yellow Perch

The yellow perch mean electrofishing and gill net CPUE was 19/h (SE = 3; Table 3), 16/net night (SE = 10), respectively. No yellow perch were collected by fyke net. Yellow perch were in poor condition with a mean W_r of 84 (SE = 5; Table 5). Perch in the 8 in size range were most frequent (Figure 12). The resulting PSD was 72 and RSD_{10} was 17. Only one memorable length (≥ 12 in) yellow perch was collected; no trophy length (≥ 15 in) were caught (Table 4). Yellow perch had average growth rates by NY standards (Forney et al. 1994), with mean length at age consistent with the NYS mean for all ages, except for Age-4 (Figure 13). Age-4 were most frequently collected age class (Figure 14).

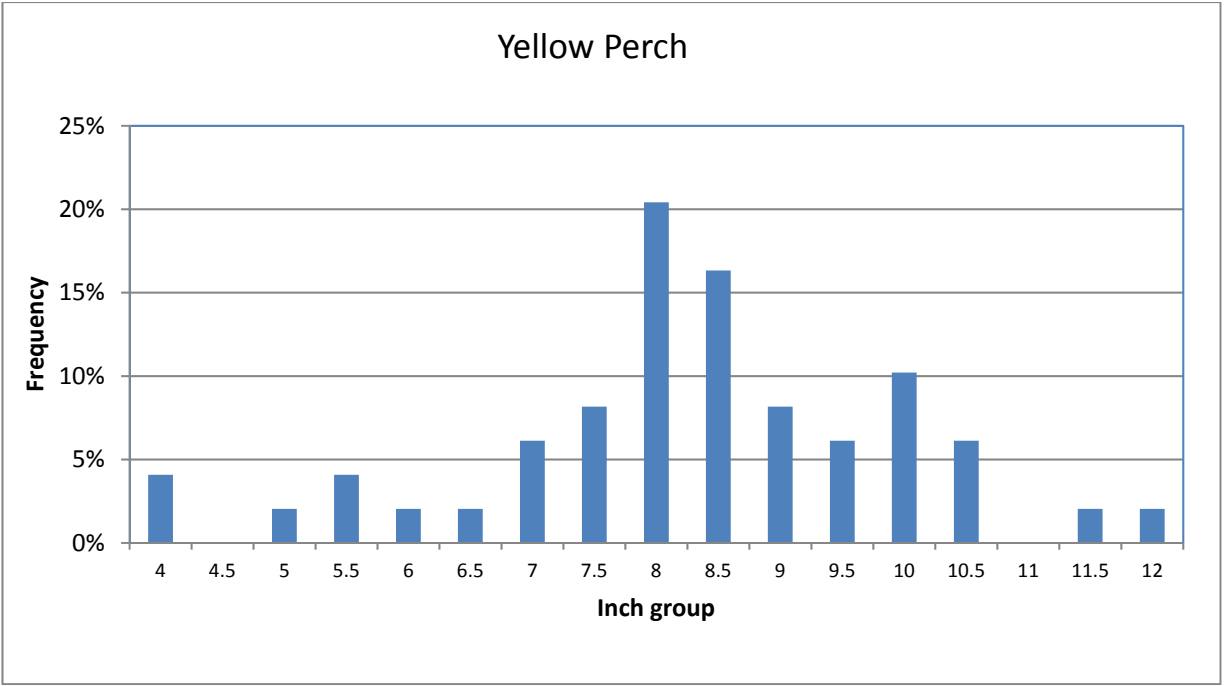


Figure 12. Length frequency distribution of yellow perch caught in Lebanon Reservoir in May and July 2016.

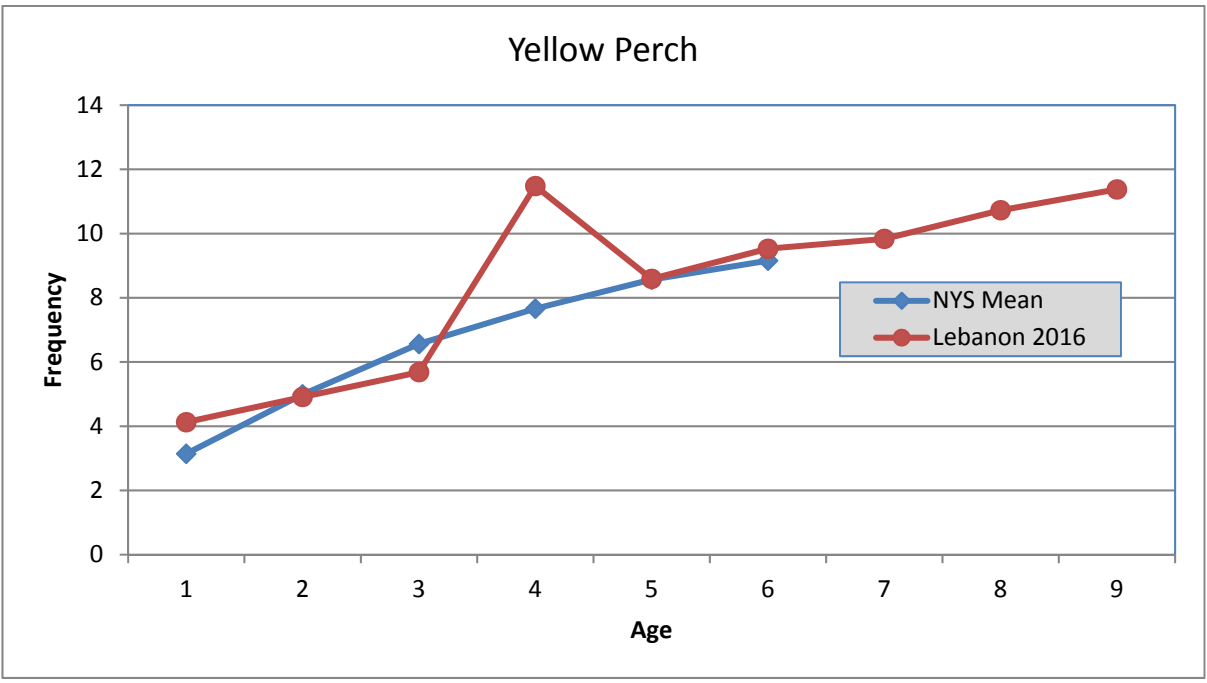


Figure 13. Mean length at age of yellow perch caught in Lebanon Reservoir in May and June 2016 and the NYS mean (Forney et al. 1994.)

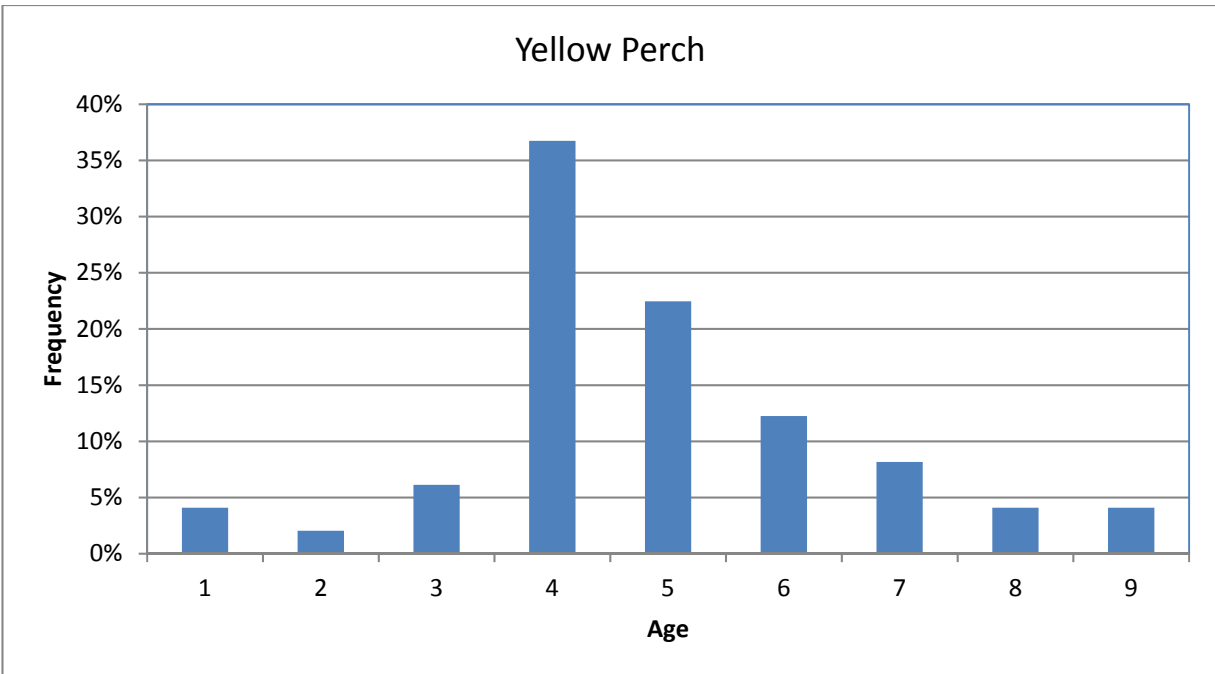


Figure 14. Age frequency distribution of yellow perch caught in Lebanon Reservoir in May and July 2016.

Pumpkinseed

Pumpkinseed mean electrofishing and fyke net CPUE's were 44/h (SE = 12; Table 3), and 1/net night, respectively. No pumpkinseed were collected by gill net. Pumpkinseeds in the 6 in range were most frequent (Figure 15). The resulting PSD was 52 and RSD_8 was 10 (Table 4). Pumpkinseeds were in good condition with a mean Wr of 94 (SE = 6; Table 5). Mean length at age was just below the NYS mean for ages 4-7, but at the mean for ages 8-9 (Figure 16). Age-6 pumpkinseed were most frequently collected age class (Figure 17).

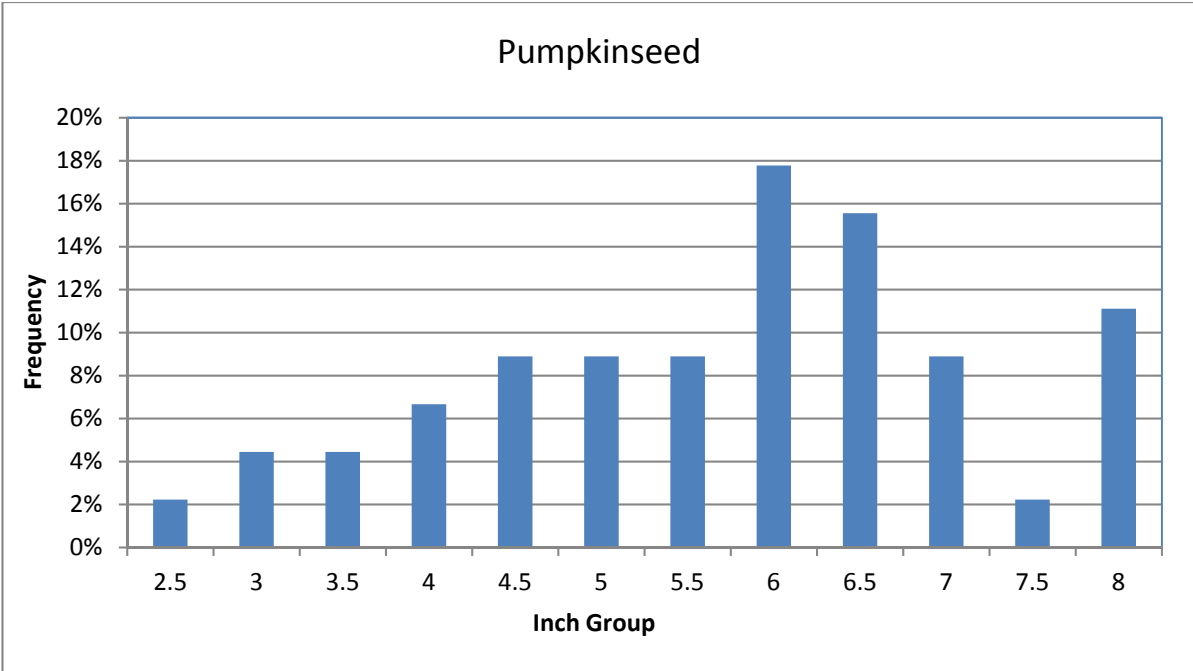


Figure 15. Length frequency distribution of pumpkinseed caught in Lebanon Reservoir in May and July 2016.

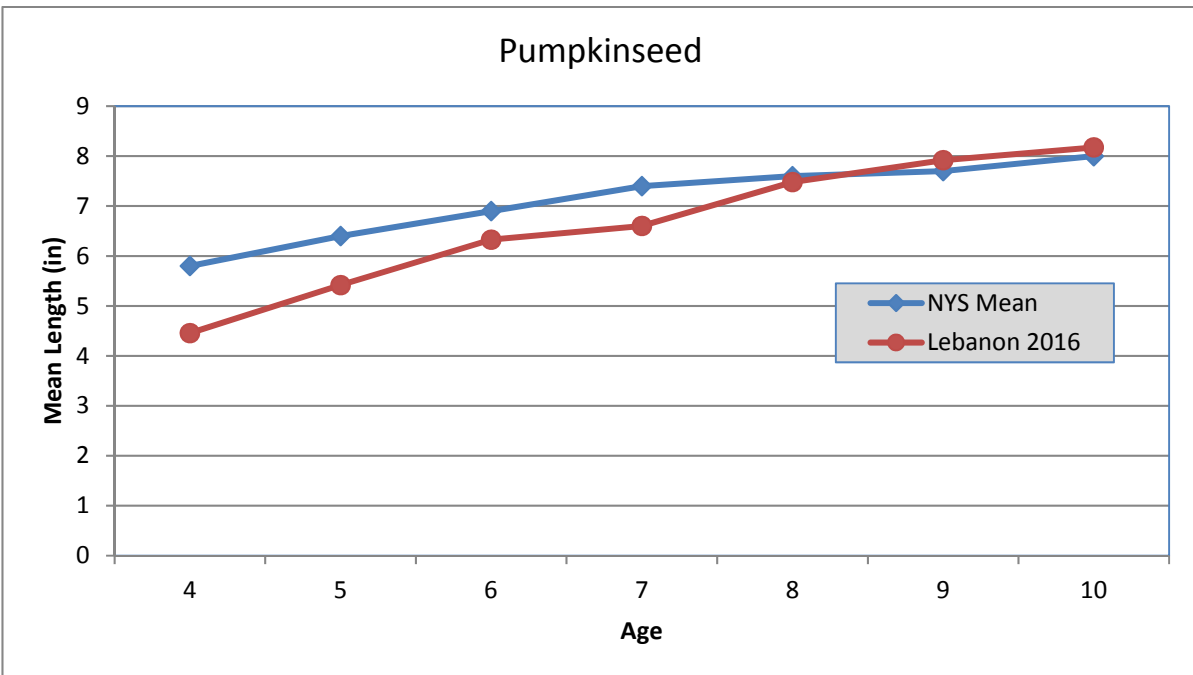


Figure 16. Mean length at age of pumpkinseed caught in Lebanon Reservoir in May and June 2016 and the NYS mean (Brooking et al. 2018).

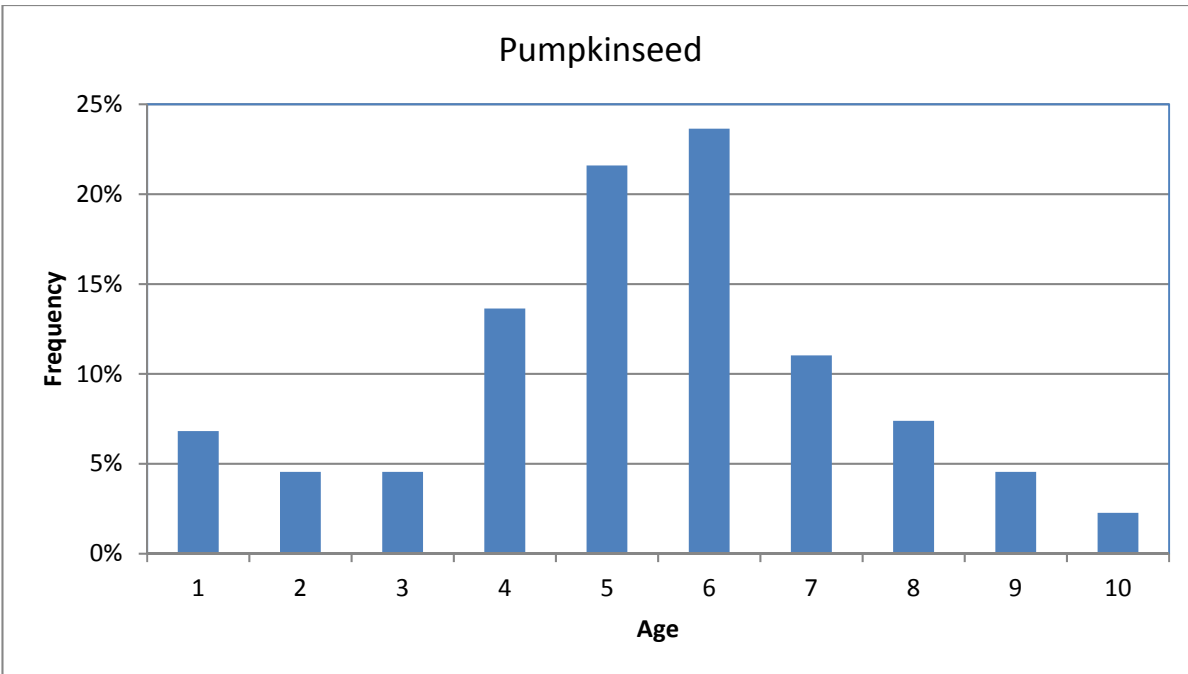


Figure 17. Age frequency distribution of pumpkinseed caught in Lebanon Reservoir in May and July 2016.

Rock Bass

Rock bass mean electrofishing and fyke net CPUE's were 24/h (SE = 8; Table 3) and 1/net night; none were collected by gill net. Rock bass in the 5 and 6 in ranges were most frequent (Figure 18). The resulting PSD was 33 and RSD₉ was 13 (Table 4). Rock bass were in good condition with a mean Wr of 95 (SE = 2; Table 5). Rock bass were slow growing by NY standards, with mean length at age below the NYS mean for all ages (Figure 19). Age 3, 5 and 6 were most frequently collected (Figure 20).

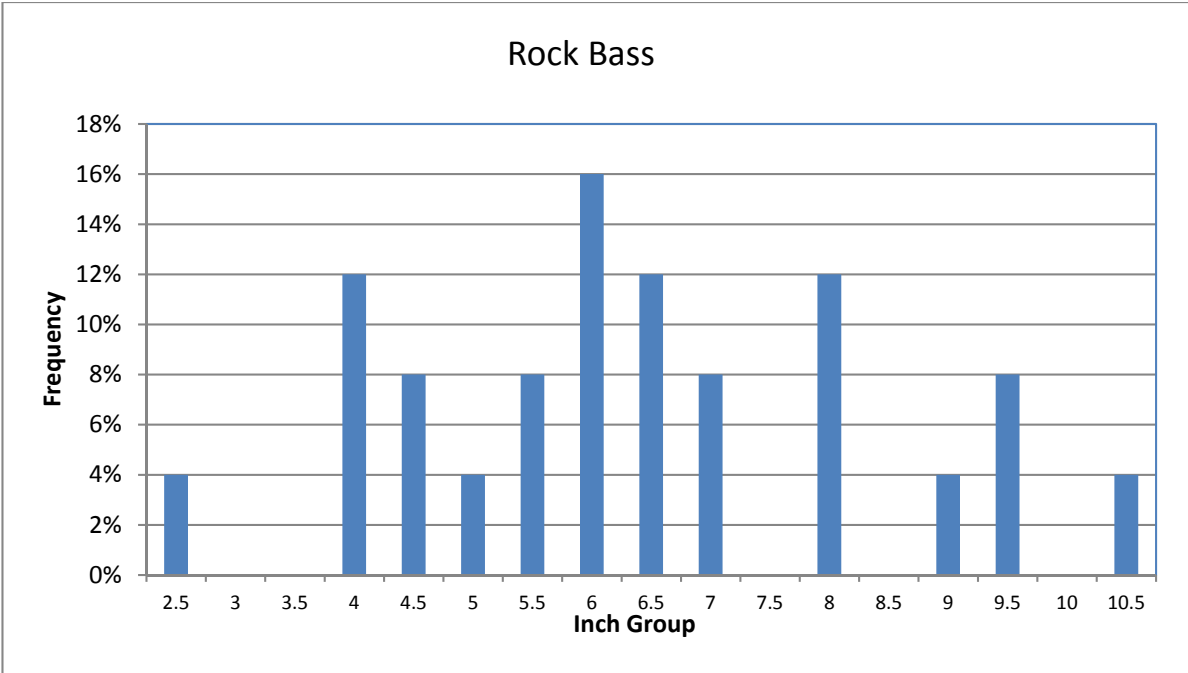


Figure 18. Length frequency distribution of rock bass caught in Lebanon Reservoir in May and July 2016.

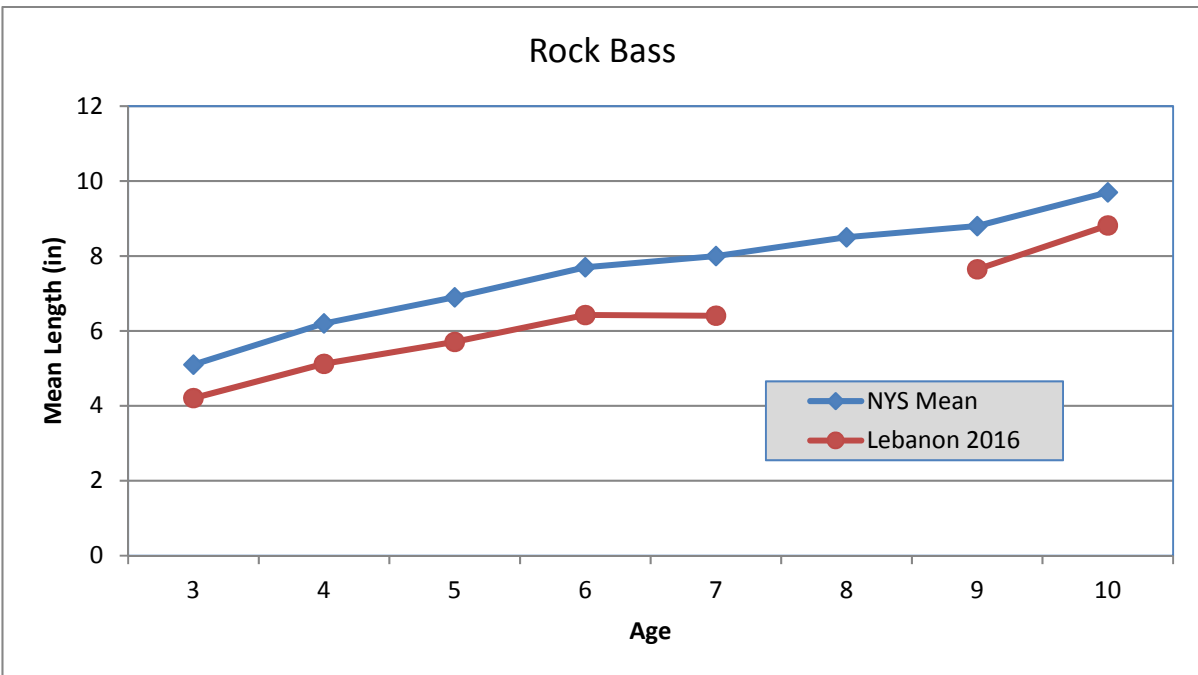


Figure 19. Observed mean length at age of rock bass caught in Lebanon Reservoir in May and June 2016 and the NYS mean (Brooking et al. 2018).

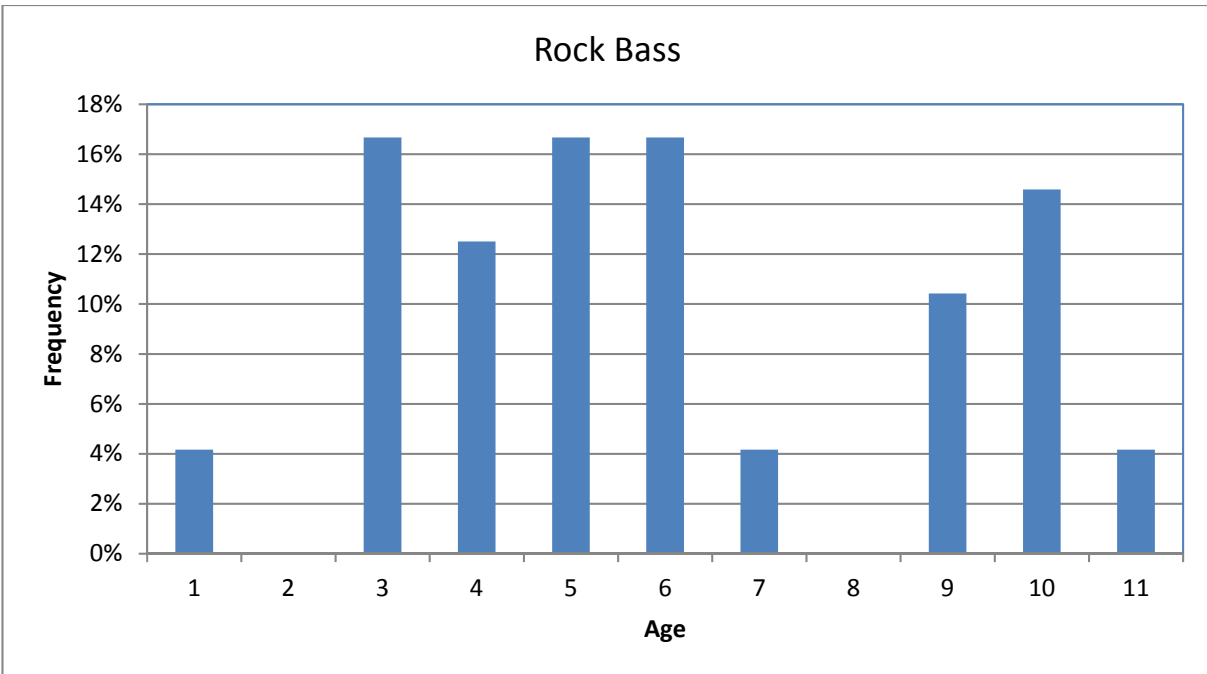


Figure 20. Age frequency distribution of rock bass caught in Lebanon Reservoir in May and July 2016.

Black Crappie

The black crappie mean electrofishing and gill netting CPUE's were 5/h (SE = 4; table 3) and 1/net night (SE = 1), respectively. The seven crappie collected had a length range of 7 to 10 in and a mean length of 8.9 in (SE = 0). They were in good condition with a mean Wr of 98 (SE = 3; Table 5). On average, black crappie are reaching the 9-inch legal size at Age-4 (Figure 21).

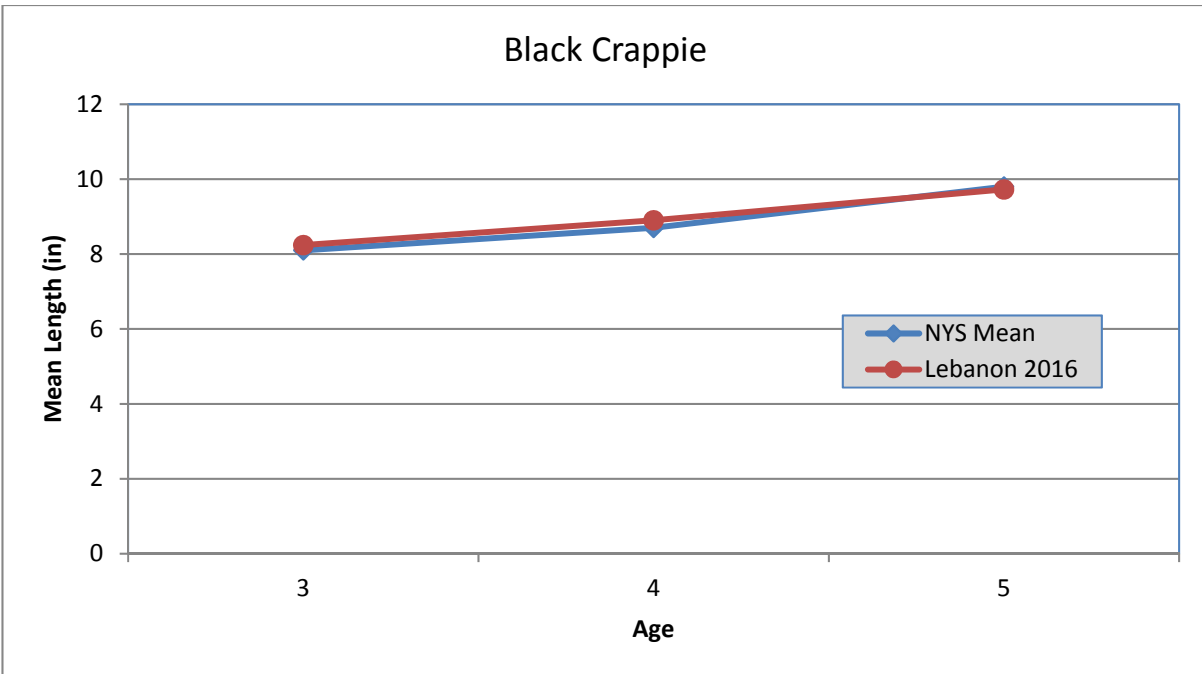


Figure 21. Observed mean length at age of black crappie caught in Lebanon Reservoir in May and June 2016 and the NYS mean (Brooking et al. 2018).

Other Fishes

Sixteen brown bullhead (*Ameiurus nebulosis*), 12 golden shiner (*Notemimonus crysoleucas*) and 31 white sucker (*Catostomus commersoni*) were also collected. Mean lengths were 13.4 in (SE = 0), 7.8 in (SE = 1), and 16.5 in (SE = 1), respectively.

Discussion

Eleven species were collected by electrofishing which was the same number of species collected during a 2009 summer electrofishing survey conducted by SUNY Cobleskill (unpublished data; Table 6). The 11 species observed in Lebanon Reservoir is the lowest number of species collected thus far for Madison County waters surveyed in recent years. Seventeen species were collected in Cazenovia Lake (Everard 2013), 16 in Eaton Brook Reservoir (Everard 2016), 15 in Lake Moraine (Everard 2015), and 18 in Upper and Lower Leland Ponds (Everard 2017; Table 7).

Table 6. Fish species collected by boat electrofishing on Lebanon Reservoir by the DEC in 2016 and SUNY Cobleskill in 2009.

Species	DEC 2016	Cobleskill 2009
Rainbow Trout	6	
Golden Shiner	3	5
White Sucker	19	8
Yellow Bullhead		1
Brown Bullhead	16	28
Rock Bass	24	201
Pumpkinseed	44	191
Bluegill	106	1,232
Largemouth Bass	121	126
Black Crappie	5	
Tessellated Darter		9
Yellow Perch	19	56
Walleye	6	11
Total	369	1,868

Gamefish

Largemouth Bass

The electrofishing CPUE of 48/h (SE = 11) for largemouth bass ≥ 10 in is well above the statewide average of 17/h (19 Standard Deviation, SD)(Perry et al. 2014). According to Green (1989), this catch rate yields a first order density estimate of 13.4 largemouth bass ≥ 10 in per acre, which indicates a high bass population density. The overall CPUE of 73/h is also well above the NYS spring nighttime average of 36 (SE =2; Brooking et al. 2018). As is the CPUE of 68/h (SE=14) for legal size largemouth bass; state mean is 14/h (SE=1; Brooking et al. 2018)

Anderson (1980) suggests a balanced bass population has a PSD range of 40 to 70, and RSD₁₅ of 10 to 40. So, the Lebanon Reservoir largemouth bass PSD of 43 and RSD₁₅ of 10, just falls within the balanced population range. The Wr for Quality-Preferred length was 95 (SE = 1) which is just below the statewide of 96 (SE = 1) for spring electrofishing (Brooking et al. 2018). The Wr index uses a range of 95 to 105 as the benchmark for fish in good condition (Pope and Kruse 2007).

Largemouth bass were somewhat slow growing, by NYS standards, with the mean age to reach legal size (≥ 12 in) falling between Age-5 and 6; the NYS mean is Age-4 (Figure 3; (Brooking et al. 2018)). This is the slowest observed mean growth rate for largemouth bass for Madison County waters sampled in recent years (Everard 2013; Everard 2015; Everard 2016; Everard 2017). Given that largemouth bass had good Wr and balanced PSD and RSD₁₅, its likely “stunting” is not an issue. Many definitions of stunting exist, but Heath and Roff (1987) define stunting as a population with “drastically” reduced growth rates. The reason for this slow growth is unknown at this time but may be due to competition with other predators, such as the stocked walleye

and/or rainbow trout. This will be discussed further under the walleye section. The largemouth bass and panfish PSD values for the Lebanon Reservoir population suggests a balanced population (Green 1989).

Table 7. Fish species collected by the DEC in recent sampling efforts on Madison County waters and year sampled. Cazenovia Lake (CL), Eaton Brook Reservoir (EBR), Lake Moraine (LM), Upper and Lower Leland Ponds (LP) and Lebanon Reservoir (LR).

Species	EBR				
	CL 2012 ¹	2013 ¹	LM 2014 ²	LP 2015 ²	LR 2016 ²
Alewife				X	
Brown Trout				X	
Rainbow Trout		X			X
Chain Pickerel	X	X	X	X	
Common Carp				X	
Golden Shiner	X	X	X	X	X
Emerald Shiner		X			
Spottail Shiner	X	X		X	
Spotfin Shiner	X				
White Sucker	X	X	X	X	X
Creek Chubsucker			X	X	
Yellow Bullhead	X		X	X	
Brown Bullhead	X	X	X	X	X
Banded Killifish	X				
Rock Bass	X	X	X	X	X
Redbreast Sunfish			X	X	
Pumpkinseed	X	X	X	X	X
Bluegill	X	X	X	X	X
Smallmouth Bass	X	X	X	X	
Largemouth Bass	X	X	X	X	X
Black Crappie	X	X	X	X	X
Tessellated Darter	X	X			
Yellow Perch	X	X	X	X	X
Walleye	X	X	X		X
Species	17	16	15	18	11

¹ boat electrofishing and gill net

² boat electrofishing, gill net and fyke net

Walleye

Both the electrofishing and gill netting CPUE's were below the low abundance estimate CPUE's of 8/h and 1/net night (Forney et al. 1994). Back-calculation was used

to determine an average Age-4 mean length of 12.9 in (329 mm) for the seven aged walleye in the sample (Table 9). For NYS populations, a mean length at Age-4 of 18 in (457 mm) would suggest low abundance, while a mean length of 15 in (380 mm) would suggest high abundance (Forney et al. 1994). So, there is discrepancy in abundance estimates with the electrofishing and gill netting CPUEs showing low abundance and mean length at Age-4 suggesting high abundance. It should be noted that fall electrofishing catch rates for walleye are generally higher than those for spring (Forney et al. 1994) so the observed electrofishing catch rate likely underestimates the walleye density.

One of the objectives of the survey was to determine if recent year classes of walleye stocked by the Lebanon Reservoirs Lot Owners Association were recruiting to the fisheries. Though walleye have been stocked annually since 2004, only five age classes were collected, with Age-6 walleye being most frequent (Table 5). So, it would appear that walleye recruitment is highly variable. Lebanon Reservoir does appear to have an abundance of potential walleye fry and fingerling predators. Research conducted by Cornell University indicated that low survival of stocked walleye was observed in lakes with electrofishing catch rates of >5 fish/h of largemouth bass and esocids >15 in (Jackson et al. 2003). Though no esocids are found in the reservoir, the average electrofishing catch rate for largemouth bass >15 in was 7 fish/h, indicating that we would expect survival of stocked walleye to be low. However, that being said, it does appear that on at least some years the walleye stocking is successful. It will most likely be necessary to determine if walleye and rainbow trout should continue to be stocked into the same water. Though information from Owasco Lake suggests that walleye are major predators on rainbow trout and the stocking of both species in the same water should be avoided (Prindle et al. 2015), we recommend continuing with the current stocking policies for both species in Lebanon Reservoir over the next several years. An evaluation of angler effort and catch should be conducted to ascertain the popularity and success of the rainbow trout fishery before any changes are made to the current stocking policies. Ultimately a choice must be made to stock either rainbow trout or walleye, since the stocking of both is not a wise long-term use of these limited resources.

Rainbow Trout

The rainbow trout fishery is primarily a put-and-take fishery, but collection of the one two-year-old rainbow trout does indicate some summer hold-over occurring. While water temperatures and DO levels during the July gill netting were sufficient to support trout survival, it is unknown whether these conditions lasted the rest of the summer. A R7 Fisheries Biologist who ice fishes the reservoir, has caught rainbow trout during the winter months. So, at least on some years, there is holdover potential. Survival through the summer months is critical to maximizing angler harvest of stocked trout and justifies the special regulation which allows ice fishing for them.

Panfish

Bluegill

Anderson (1985) suggests a balanced bluegill population should have a PSD range of 20 to 60, and a RSD_8 of 5 to 20. Though the Lebanon Reservoir overall bluegill PSD falls within the balanced range, the RSD_8 of two would indicate an unbalanced population with few bluegill ≥ 8 in. The electrofishing RSD_8 of two is also below the statewide spring electrofishing average of 5 (SE = 1; Brooking et al. 2018). Bluegill had slow growth rates by NY standards, but as with largemouth bass, it's safe to assume "stunting" is not an issue as growth rates were slow, but not "drastically" so. The data suggest that the lack of larger size bluegill is most likely related to angler harvest, and not an overabundant population.

Yellow Perch

Electrofishing catch rates of 16 to 49 yellow perch/h would suggest a moderate abundance, as would a gill net catch of 6 to 24 yellow perch/net (Forney et al. 1994). Yellow perch mean length at Age-4 can also be used to estimate abundance with a mean length of 8.5 in (215 mm) suggesting low abundance, while a mean length of 7 in (180 mm) suggesting high abundance. The Lebanon Reservoir yellow perch mean length at Age-4 of 7.8 in (197 mm) falls right in the middle, suggesting moderate abundance which corresponds with the electrofishing and gill net CPUEs estimates. The yellow perch PSD of 72 is above the accepted range of 30 to 60 (Anderson and Weithman 1978) for a balanced population and along with the RSD_{10} of 17 indicates the population has many "keeper" size fish.

Pumpkinseed

Stock density ranges are similar to bluegill, thus the PSD of 52 and RSD_8 of 10 indicates a balanced population. The lack of memorable and trophy sized pumpkinseeds, as with the other panfish species, is most likely due to angler harvest.

Black Crappie

It should be noted that black crappie can often be difficult to collect by electrofishing and gill nets. Trap nets (like fyke nets) are generally considered to be a more effective gear for collecting crappie; though a fyke net was used, no crappie were collected with it. Black crappie recruitment can also be highly variable from year to year. Black crappie are therefore, more than likely, more abundant than the sampling indicates. As with the rainbow trout, a R7 Biologist who fishes the lake also catches black crappie fairly consistently while ice fishing the Reservoir; the majority have been under the 9-inch size limit.

Recommendations

Management recommendations based on the results of this survey are:

- Continue with the current stocking policy of 2,000 spring yearling rainbow trout. However, evaluate the popularity and catch rates of rainbow trout to determine if future stocking is warranted. This can be incorporated with two other nearby Madison County trout stocked lakes, Eaton Brook Reservoir and Upper Lelands Pond. Example; Angler Survey card box at boat launch sites.

- Continue to allow the Lebanon Reservoir Lot Owners Association to stock walleye into the reservoir at current levels. However, if after evaluation future rainbow trout stocking is deemed warranted then discontinue with the walleye stocking program.
- Continue with current special regulation for trout and statewide angling regulations for all other species.

Acknowledgement

I would like to thank Scott Prindle (Aquatic Biologist), Ian Blackburn (Aquatic Biologist), Kyle Hodgson (Fisheries and Wildlife Technician), and Kate Williams (Seasonal Fish and Wildlife Technician) for their hard work during fish sampling efforts on Lebanon Reservoir in 2016. I would also like to thank David Lemon (Region 7 Fisheries Manager, retired) and Jeff Loukmas (Warmwater Unit leader) for their careful review and comments on early drafts of this report.

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Appendix 1. Lebanon Reservoir Lot Owners Association Walleye Stocking for Lebanon Reservoir.

Year	Number	Size
2004	17,390	Fall Fingerling
2005	3,300	Fall Fingerling
2006	3,900	Fall Fingerling
2007	130,000	Fry
2008	7,250	Fall Fingerling
2009	4,000	Fall Fingerling
2010	??	
2011	5,000	Fall Fingerling
2012	5,000	Fall Fingerling
2013	6,000	Fall Fingerling
2014	3,000	Fall Fingerling
2015	2,500	Fall Fingerling
2016	2,500	Fall Fingerling

Appendix 2. Lengths used in inches for stock, quality, preferred, memorable, and trophy sizes for species collected from Lebanon Reservoir, NY in 2016 sampling.

Species	Stock	Quality	Preferred	Memorable	Trophy
White Sucker	6	10	13	16	20
Brown Bullhead	5	8	11	14	17
Rock Bass	4	7	9	11	13
Pumpkinseed	3	6	8	10	12
Bluegill	3	6	8	10	12
Largemouth Bass	8	12	15	20	25
Black Crappie	5	8	10	12	15
Yellow Perch	5	8	10	12	15
Walleye	10	15	20	25	30