

# **Upper and Lower Leland Ponds Fisheries Survey 2015**

Prepared By;  
James F. Everard  
*New York State Department of Environmental Conservation  
Cortland, NY 13045*

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## Abstract

Upper and Lower Leland Ponds are 46 and 55 acre eutrophic lakes located in the Town of Eaton, Madison County. Upper Leland Pond supports a two-story fishery and is stocked yearly by the New York State Department of Environmental Conservation (DEC) with 1,400 yearling brown trout (*Salmo trutta*). Lower Leland Pond is also stocked annually by the DEC, but receives 200 fall fingerling tiger musky (*Esox lucius x masquinongy*). Two sampling efforts were conducted on each pond during 2015, a spring nighttime electrofishing sample and a summer gill netting and fyke netting sample. The primary objective of the survey was to develop an overall picture of the fish community, and to determine if stocked brown trout and tiger musky are recruiting to the fishery.

Overall, 545 fish were caught, representing 18 species. Yellow perch (*Perca flavescens*) were the most numerous with 162 caught (30% of catch). The next most numerous species was alewives (*Alosa pseudoharengus*) (n=81, 15% of catch), followed by largemouth bass (*Micropterus salmoides*) (n= 72, 13% of catch). Other gamefish caught were chain pickerel (*Esox niger*) (n=30, 6% of catch), smallmouth bass (*Micropterus dolomieu*) (n=2, 0.4% of catch) and one brown trout (0.2% of catch). No tiger musky were caught or observed during the survey.

To help determine if the continued stocking of brown trout and tiger musky is warranted, an evaluation of angler effort and catch should be conducted to ascertain the popularity of these fisheries. In the interim, the current brown trout yearling stocking and tiger musky policies should be continued. The current special regulation for trout, and statewide regulations for all other species, should also be continued.

## Introduction

Upper and Lower Leland Ponds are 46 and 55 acre eutrophic lakes located in the Town of Eaton, Madison County. Upper Leland Pond has a maximum depth of 50 ft, while Lower Leland has a maximum depth of 40 ft. Both ponds are glacial kettle holes but their size and depth was increased by the construction of a 15-foot high dam at the outlet of Lower Leland during the 1830's for the purpose of supplying water to the Chenango and Erie Canals. Upper Leland Pond supports a two-story fishery and is stocked yearly by the New York State Department of Environmental Conservation (DEC) with 1,400 yearling brown trout (*Salmo trutta*). Lower Leland Pond is also stocked annually by the DEC, but receives 200 fall fingerling tiger musky (*Esox lucius x masquinongy*). Brown trout have been stocked annually in Upper Leland since 1982, while tiger musky have been stocked annually in Lower Leland since 1990. Statewide angling regulations apply for all species except trout, which 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 on Upper Leland's Pond with a hard surface ramp that provides public access for

both open water and ice fishing; there is also a fishing platform that allows accessible angling. Lower Lelands Pond has an unimproved gravel launch that provides access for hand-launching, small trailered boats, ice fishing and shore fishing.

The last sportfish survey conducted on these ponds was in 2003 by SUNY Cobleskill and thus an updated assessment is warranted. The objectives of this survey were to evaluate age, growth, abundance, and predator/prey balance of the reservoir's sportfish community, and to assess the status of stocked brown trout and tiger musky.

## Methods

Though Upper and Lower Leland Ponds are connected by a small channel that flows through a road culvert, they are considered two different waters in the DEC Fisheries database. Each has a unique Fisheries Index Number (FIN), Upper Lelands FIN is H-240-223-48A-2-P1053, and Lower Lelands is H-240-223-48A-2-P1052. However because they are relatively small and connected, the survey was designed as if it was one waterbody. Data were pooled and assessed for both ponds, and results are presented for the combined Leland Ponds throughout this report. When addressing either pond specifically, Upper or Lower Pond are used. In the database, individual survey numbers for each sampling effort are: 715005, 715006, 715015, and 715016.

### *Water Chemistry*

Surface water temperature of the Upper Pond was recorded on June 2, 2015, prior to electrofishing. Surface water temperature, air temperature, dissolved oxygen (DO), p.H. and conductivity were recorded on June 3<sup>rd</sup>, on the Lower Pond prior to electrofishing. A temperature and DO profile was done in 30 ft of water on both the Upper Pond (July 20<sup>th</sup>) and the Lower Pond (July 21<sup>st</sup>); a Professional Plus model YSI meter was used for both.

### *Electrofishing*

The Upper Pond was electrofished on the night of June 2<sup>nd</sup>, and the Lower Pond on the night of June 3<sup>rd</sup>. Six sites (Figure 1) covering the entire shoreline of both ponds were fished for a total of 2.92 hours of "on-time." A Smith-Root model SR-18 electrofishing boat was operated with the boat hull as negative and two six-dropper umbrella array anodes, extended 6 ft in front of the boat. Direct current half-wave (120 pulses per second) with 7.4 amps and 340 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 (two on each pond) and two "gamefish-only" runs (one in each pond) were conducted. Gamefish-only runs had on-times of 55 and 60 minutes. During the all-fish runs attempts (within reason) were made to collect every fish that was shocked, except large common carp (*Cyprinus carpio*) as they take up a large amount of live-well space. Largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), tiger musky, brown trout and chain pickerel (*Esox niger*) were the target species during gamefish runs.

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, smallmouth bass, chain pickerel, bluegill (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*) redbreast sunfish (*Lepomis auritus*), 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.

The number of common carp observed during all-fish runs were placed on Bulk Fish (BF) forms.

### *Fyke Netting*

A fyke net was fished in the Upper Pond on July 20<sup>th</sup> for 17.3 hours, and in the Lower Pond on July 21<sup>st</sup> for 22.5 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 3x6 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. Nets were fished perpendicular to shore in 1 to 5 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, black crappie, and yellow perch. 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 20<sup>th</sup> in the Upper Pond, and on July 21<sup>st</sup> in the Lower Pond, for a total of four net nights (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 ten feet. Depths at the outer end of the nets ranged from 25 to 43 ft. Orientation of gill net mesh size was random, with some set with the largest mesh close to shore and others with the smaller near shore. Gill nets were fished for 17.3 to 22.3 hours, with a mean of 19.8 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 largemouth bass, smallmouth bass, chain pickerel, bluegill, pumpkinseed sunfish, rock bass, black crappie, yellow perch, and brown 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.

### *Fish Indices*

Indices used to assess the quality of the fish population in Lelands Ponds 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).  $Wr$  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 were derived from electrofishing and gill netting catch rates, and mean length at age-4 from Forney et al. (1994).

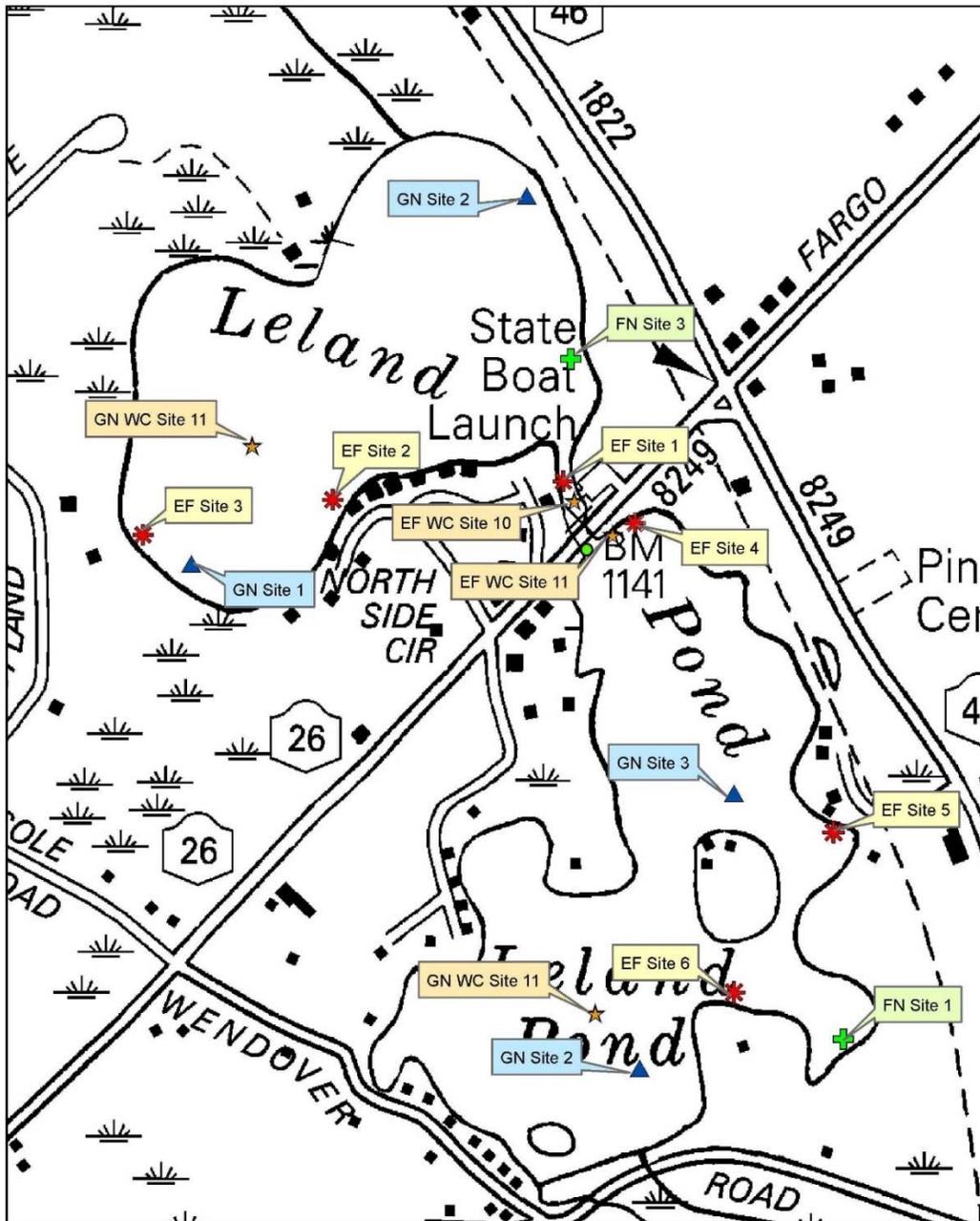


Figure 1. Site locations for gill net (GN), fyke net (FN), water chemistry (WC) and the starting point for electrofishing (EF) at Upper and Lower Leland Ponds 2015.

## Results

### Water Chemistry

During the June 2<sup>nd</sup> and 3<sup>rd</sup> 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 and 71° F, respectively (Table 1). Both ponds were thermally stratified during the July 20<sup>th</sup> and 21<sup>st</sup> gill netting. The Upper Pond had a surface temperature of 80° F, and at 15 ft the temperature was 56° F. Similarly, the Lower Pond had a surface temperature of 78° F and at 15 ft it was 47° F. DO levels were unusual on both ponds with a surface level of 7.8 parts per million (ppm) on the Upper, and 5.7 ppm on the Lower, but increased to 15.3 and 15.4 ppm, respectively, by 10 ft (Figures 2 and 3). The Upper Pond continued to have an elevated DO level of 17.2 ppm at 15 ft, while the Lower had dropped to 7.7 ppm by 15 ft.

Table 1. Water chemistry for Upper and Lower Leland Ponds.

Date	Depth (ft)	Water Temp. (F)	DO (ppm)	pH	Conductivity (umho/cm3)	Secchi Depth (ft)	Location
6/2/2015	0	66.0					Upper
6/3/2015	0	71.3	5.9	7.9	766		Lower
7/20/2015	0	80.0	7.8	8.2	686		Upper
	5	77.3	8.9				
	10	66.8	15.3				
	15	56.1	17.2				
	20	46.8	10.3				
	25	42.3	4.5				
	30	41.8	2.4				
7/21/2015	0	78.2	5.7	8.5	597		Lower
	5	75.4	7.6				
	10	53.2	15.4				
	15	46.7	7.7				
	20	46.4	3.3				
	25	46.4	2.0				
	30	46.5	1.3				
7/27/2016	0	79.0	4.9	8.4	608	10	Upper
	5	78.0	6.4				
	10	74.3	8.5				
	15	58.8	16.5				
	20	47.6	3.9				
	25	44.4	1.8				
	30	43.0	1.5				

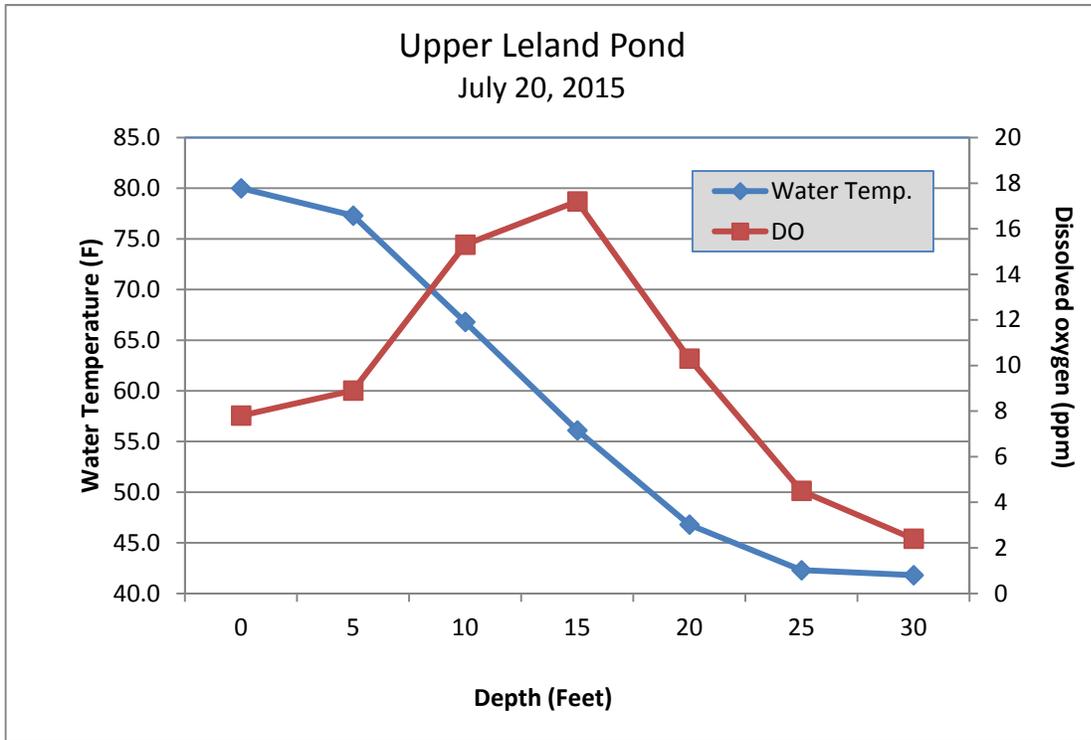


Figure 2. Temperature and dissolved oxygen (DO) profile for Upper Leland Pond on July 20, 2015.

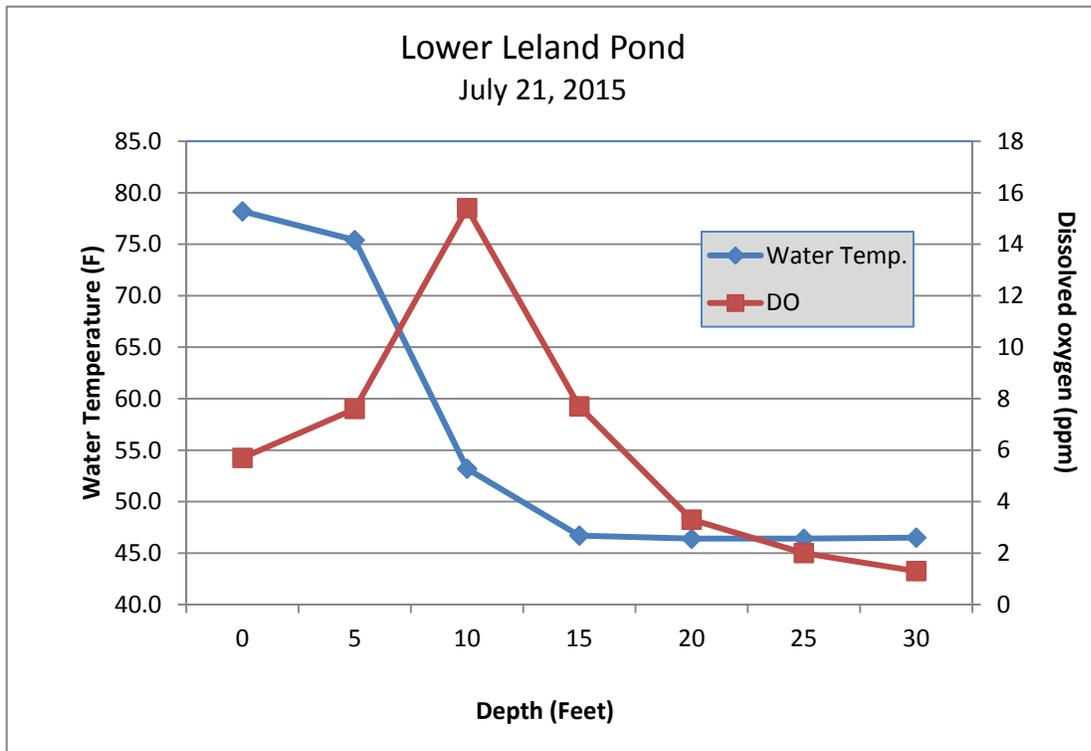


Figure 3. Temperature and dissolved oxygen (DO) profile for Lower Leland Pond, July 21, 2015.

### Species Collected

Overall, 545 fish were caught, representing 18 species (Table 2). Yellow perch were the most numerous with 162 caught (30% of catch). The next most numerous species was alewife (*Alosa pseudoharengus*) (n=81, 15% of catch), followed by largemouth bass (n= 72, 13% of catch), rock bass (n=41, 8% of catch), and pumpkinseed sunfish (n=37, 7% of catch). Other gamefish caught were chain pickerel (n=30, 6% of catch), smallmouth bass (n=2, 0.4% of catch) and one brown trout (0.2% of catch). No tiger musky were caught or observed during the survey. The 15 species collected by electrofishing was similar to the 12 species collected by SUNY Cobleskill in 2003 (unpublished data; Table 3).

The number of individual species caught did vary between the Upper and Lower Ponds (Table 2). The most noticeable differences were: alewives (n=75 Upper, n=6 Lower), golden shiner (*Notemigonus crysoleucas*) (n=14 Upper, n=5 Lower), white sucker (*Catostomus commersoni*) (n=17 Upper, n=1 Lower), creek chubsucker (*Erimyzon oblongus*) (n=3 Upper, n=16 Lower), rock bass (n=31 Upper, n=10 Lower), and largemouth bass (n=49 Upper, n=23 Lower).

Table 2. Fish species caught in Upper and Lower Leland Ponds in 2015.

Species	Scientific Name	Upper	Lower	Total
Alewife	<i>Alosa pseudoharengus</i>	75	6	81
Brown Trout	<i>Salmo trutta</i>	1	0	1
Chain Pickerel	<i>Esox niger</i>	19	11	30
Common Carp	<i>Cyprinus carpio</i>	0	3	3
Golden Shiner	<i>Notemigonus crysoleucas</i>	14	5	19
Spottail Shiner	<i>Notropis hudsonius</i>	1	0	1
White Sucker	<i>Catostomus commersoni</i>	17	1	18
Creek Chubsucker	<i>Erimyzon oblongus</i>	3	16	19
Yellow Bullhead	<i>Ameirus natalis</i>	0	1	1
Brown Bullhead	<i>Ameirus nebulosis</i>	1	4	5
Rock Bass	<i>Ambloplites rupestris</i>	31	10	41
Redbreast Sunfish	<i>Lepomis auritus</i>	15	20	35
Pumpkinseed	<i>Lepomis gibbosus</i>	22	15	37
Bluegill	<i>Lepomis macrochirus</i>	5	12	17
Smallmouth Bass	<i>Micropterus dolomieu</i>	2	0	2
Largemouth Bass	<i>Micropterus salmoides</i>	49	23	72
Black Crappie	<i>Pomoxis nigromaculatus</i>	1	0	1
Yellow Perch	<i>Perca flavescens</i>	82	80	162
<b>Total</b>		<b>338</b>	<b>207</b>	<b>545</b>

Table 3. Fish species caught while electrofishing in Upper and Lower Leland Ponds by the DEC in 2015 and by SUNY Cobleskill in 2003.

Species	DEC 2015			Cobleskill 2003		
	Upper	Lower	Total	Upper	Lower	Total
Alewife	75	6	81		60	60
Chain Pickerel	18	8	26		4	4
Common Carp		2	2	6	5	11
Golden Shiner	1		1	6	1	7
Spottail Shiner	1		1			
White Sucker	12	1	13	17		17
Creek Chubsucker	2	12	14			
Brown Bullhead	1	4	5	4	7	11
Rock Bass	31	10	41	28	19	47
Redbreast Sunfish	15	20	35			
Pumpkinseed	21	15	36	60	91	151
Bluegill	4	6	10	34	55	89
Smallmouth Bass	2		2			
Largemouth Bass	49	23	72	14	28	42
Black Crappie					1	1
Yellow Perch	58	65	123	56	127	183
Unknown Sunfish					2	
<b>Total</b>	<b>290</b>	<b>172</b>	<b>462</b>	<b>225</b>	<b>400</b>	<b>623</b>

### Panfish

#### *Yellow Perch*

The yellow perch mean electrofishing, fyke net, and gill net catch per unit effort (CPUE) was 123 fish per hour (fish/h) (87 standard deviation, SD), 11 fish per net night (fish/net night) (SD = 10) and 2.8 /net night (SD = 3), respectively. Yellow perch were caught equally between the Upper and Lower Ponds (Table 2), and fish in the 6-inch size range were captured most frequently (Table 4). The PSD was 22 and the RSD<sub>10</sub> (yellow perch  $\geq 10$  in) was 6. Only one memorable length ( $\geq 12$  in) yellow perch was collected; no trophy length ( $\geq 15$  in) were caught (Table 5). Yellow perch had a mean  $W_r$  of 79 (SD = 9) and average growth by NY standards (Green et al. 1993), with mean length at age consistent with the NYS means (Figure 4). The population was dominated by young yellow perch between ages 1-4 (Table 6).

Table 4. Length frequency (number captured) of panfish captured in Leland Ponds in 2015 sampling efforts.

Length (Inches)	Yellow Perch	Rock Bass	Pumpkinseed	Redbreast	Bluegill	Black Crappie
1					1	
2	1					
3	11			6	1	
4	21	1	2	13	2	
5	37	8	4	7	5	
6	40	11	21	7	4	
7	24	12	10	1	4	
8	12	5		1		
9	8	3				
10	4	1				1
11	3					
12	1					
<b>Totals</b>	<b>162</b>	<b>41</b>	<b>37</b>	<b>35</b>	<b>17</b>	<b>1</b>

Table 5. Number of fish captured of stock, quality, preferred, memorable, and trophy lengths in Leland Ponds in 2015. Number in ( ) is length in inches for stock, quality, preferred, memorable and trophy for each species.

Species	Stock		Quality		Preferred		Memorable		Trophy	
Chain Pickerel	23	(10)	16	(15)	4	(20)	0	(25)	0	(30)
Rock Bass	41	(4)	21	(7)	4	(9)	0	(11)	0	(13)
Redbreast Sunfish	35	(3)	9	(6)	1	(8)	0	(10)	0	(12)
Pumpkinseed	37	(3)	31	(6)	0	(8)	0	(10)	0	(12)
Bluegill	16	(3)	8	(6)	0	(8)	0	(10)	0	(12)
Smallmouth Bass	1	(7)	0	(11)	0	(14)	0	(17)	0	(20)
Largemouth Bass	70	(8)	55	(12)	25	(15)	1	(20)	0	(25)
Black Crappie	1	(5)	1	(8)	1	(10)	0	(12)	0	(15)
Yellow Perch	129	(5)	28	(8)	8	(10)	1	(12)	0	(15)
Brown Trout	1	(6)	1	(9)	0	(12)	0	(15)	0	(18)

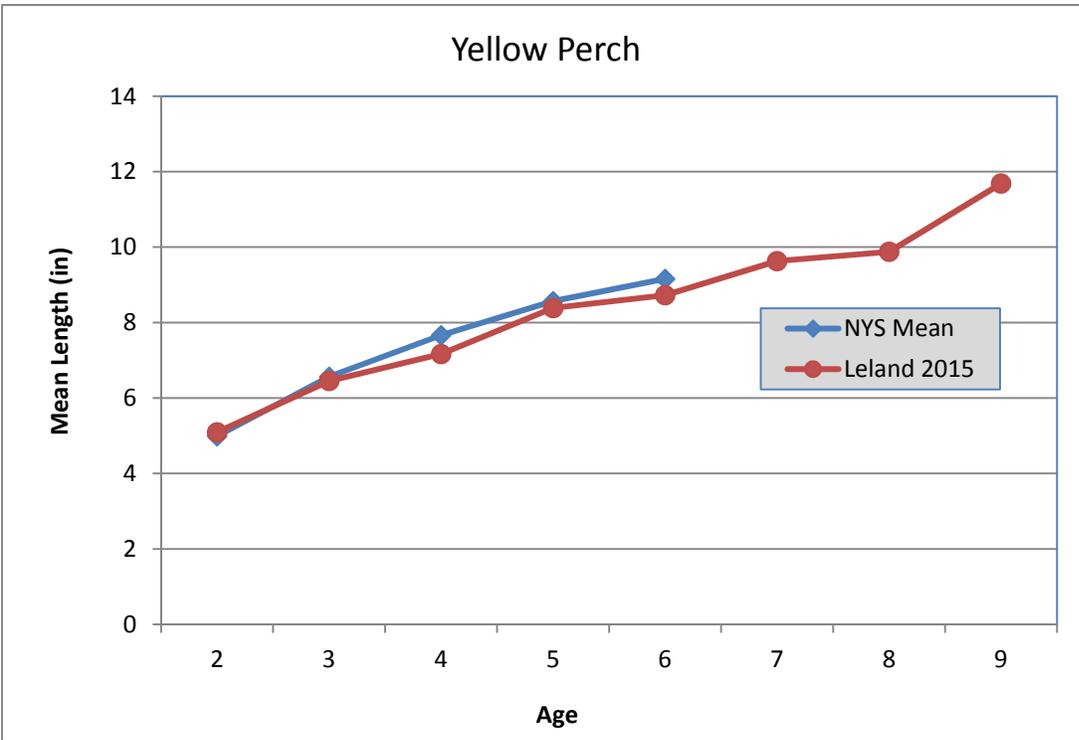


Figure 4. Observed mean lengths at age for yellow perch sampled in Leland Ponds in 2015 and the New York State mean growth rate (Green et al. 1993).

Table 6. Percent age frequency distribution of panfish captured in Leland Ponds in 2015 sampling efforts.

(Years)	Yellow Perch	Rock Bass	Pumpkinseed	Redbreast	Bluegill	Black Crappie
1	15%			3%	6%	
2	23%			26%	6%	
3	26%	23%	5%	14%	6%	
4	17%	11%	3%	31%	29%	
5	5%	18%	23%	14%	6%	100%
6	3%	29%	25%	6%	29%	
7	4%	5%	10%		18%	
8	4%	7%	10%			
9	2%	7%	23%			
10				6%		

### Rock Bass

Rock bass mean electrofishing CPUE was 41/h (SD = 45); none were collected with fyke or gill net. The majority (76%) of the rock bass were collected on the Upper Pond (Table 2). More than 50% of the rock bass captured were 7 in or greater (Table 4). The resulting PSD was 51 and RSD<sub>9</sub> was 10. No memorable ( $\geq 11$  in) or trophy ( $\geq 13$  in) length rock bass were collected (Table 4). Rock bass had a mean Wr of 95 (SD = 8). Rock bass mean length at age was at, or above, the NYS mean (Green et al. 1993) for all ages (Figure 5).

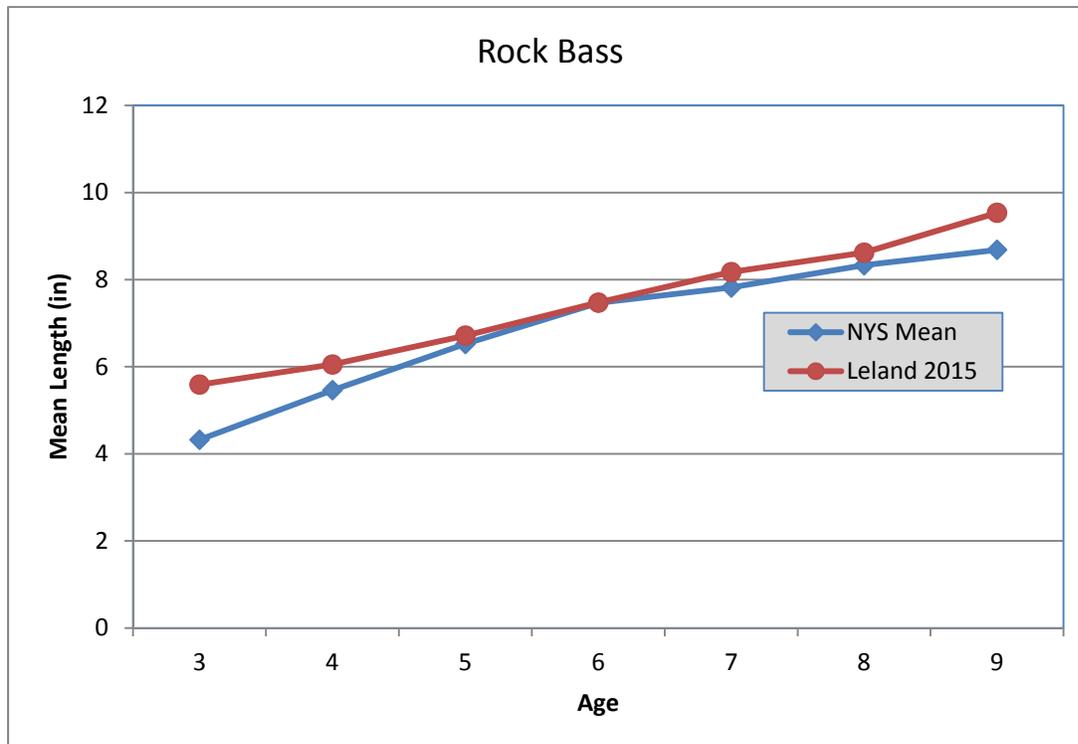


Figure 5. Observed mean length at age for rock bass sampled in Leland Ponds in 2015 and the New York State mean growth rate (Green et al. 1993).

### Pumpkinseed

Pumpkinseed mean electrofishing and fyke net CPUE was 36/h (SD = 21) and 0.5/net night (SD = 0.7). No pumpkinseeds were collected by gill net. Pumpkinseeds in the 6-inch range accounted for 57% of the catch (Table 4). The resulting PSD was 84 and  $RSD_8$  was zero. No preferred ( $\geq 8$  in), memorable ( $\geq 10$  in) or trophy size ( $\geq 12$  in) pumpkinseeds were collected (Table 5). Pumpkinseeds had a mean  $W_r$  of 98 (SD = 10). Mean length at age was consistent with the NYS mean for ages 3-7, but somewhat lower for ages 8-9 (Figure 6). The pumpkinseed age frequency was dominated by older fish, ages 5, 6 and 9, while ages 1-4 were absent or poorly represented (Table 6).

### Redbreast Sunfish

Redbreast sunfish mean electrofishing CPUE was 35/h (SD = 25); none were collected by fyke or gill net. Redbreast in the 4-inch range accounted for 37% of the catch (Table 4). The resulting PSD was 26 and  $RSD_8$  was 3. As with pumpkinseeds, no memorable ( $\geq 10$  in) or trophy ( $\geq 12$  in) size fish were collected (Table 5). Mean length at age was above the NYS mean for all ages of redbreast (Green 1989; Figure 7). Age-4 redbreast were the most frequent and no ages 7-9 were collected (Table 6).

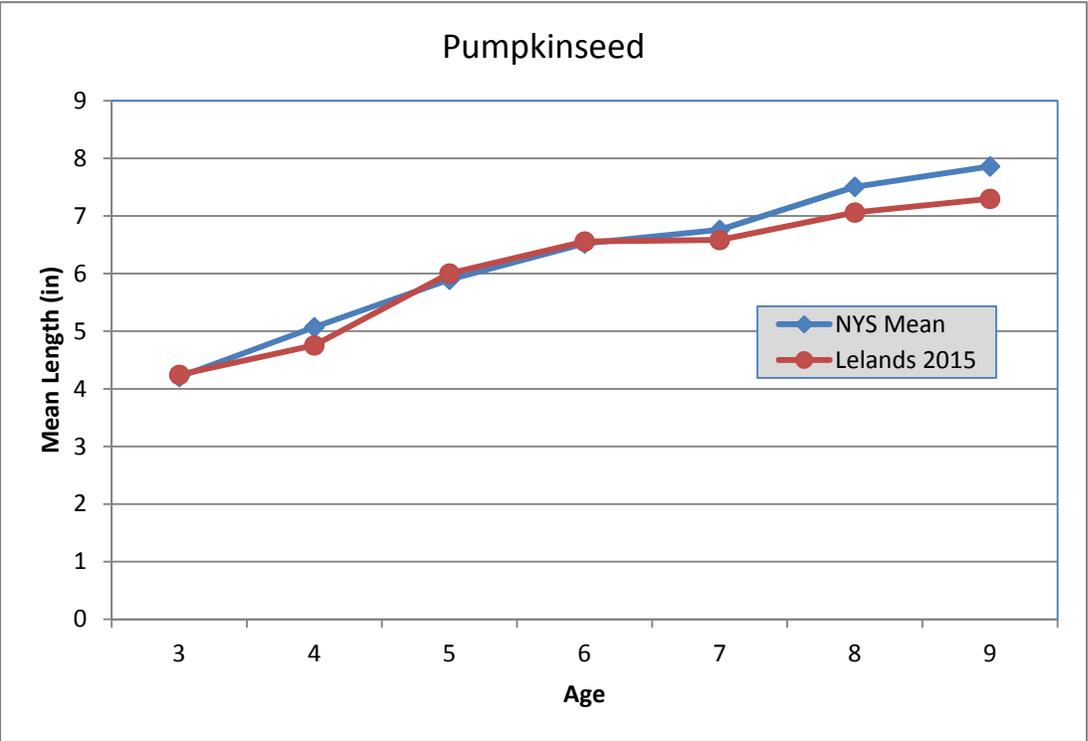


Figure 6. Observed mean lengths at age for pumpkinseeds sampled in Leland Ponds in 2015 and the New York State mean growth rate (Green 1989).

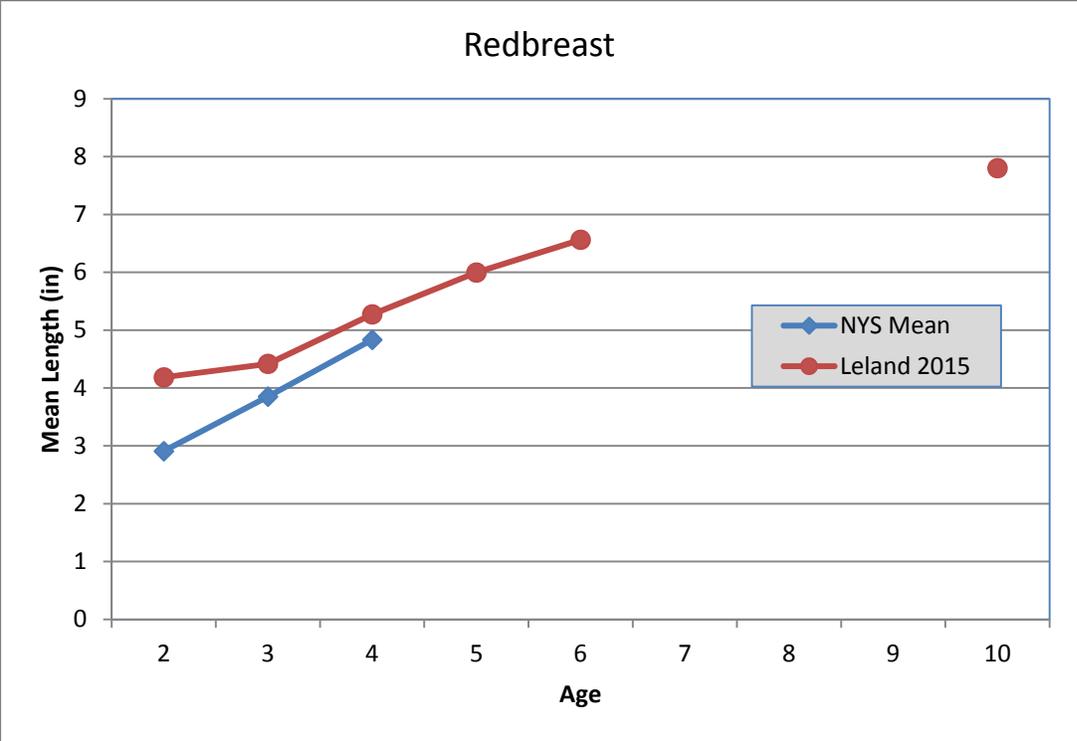


Figure 7. Observed mean length at age for redbreast sunfish sampled in Leland Ponds in 2015 and the New York State mean growth rate (Green 1989).

## Bluegill

The bluegill mean electrofishing, fyke net and gill net CPUE was 10/h (SD = 4), 3/net night (SD = 3), and 0.5/net night (SD = 0.6), respectively. The majority of the bluegill (71%) were caught in the Lower Pond (Table 2). Bluegill PSD was 28 and RSD<sub>8</sub> was zero. Bluegill in the 5-inch size range were captured most frequently (Table 4). Bluegill had a mean Wr of 91 (SD = 14). Ages 4 and 6 bluegills were the most common age-classes in the sample (Table 6). Mean length at age was consistent with the NYS mean (Green 1989), for all ages except age-5, which was just below (Figure 8).

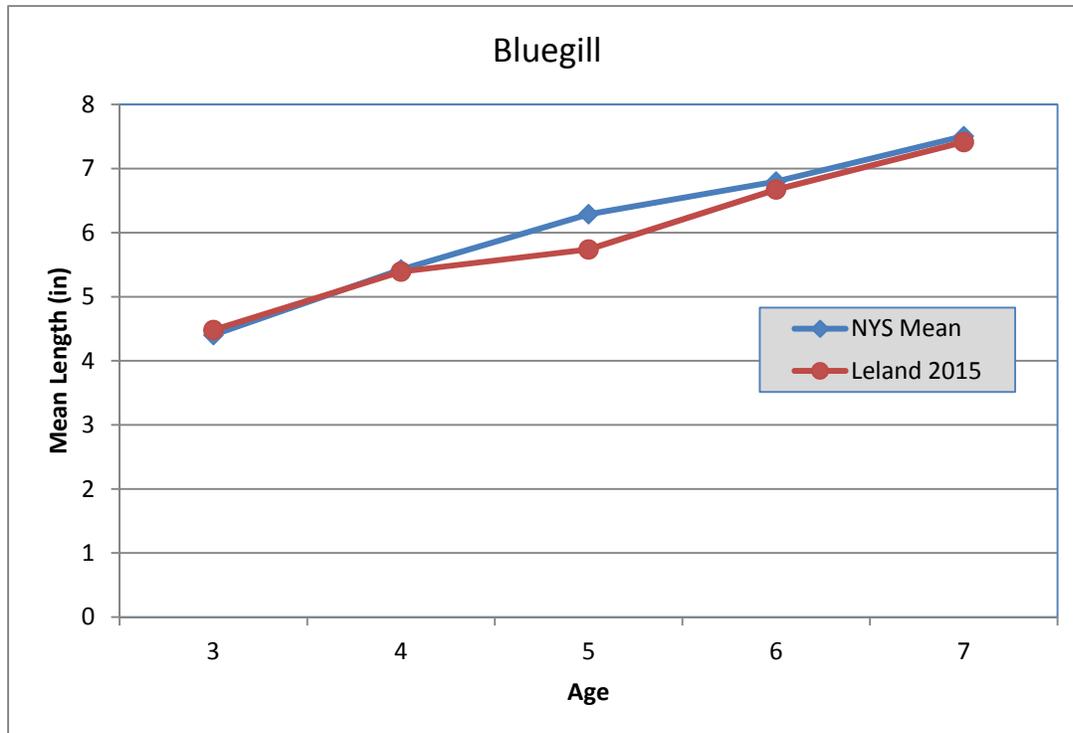


Figure 8. Observed mean length at age for bluegill sampled in Leland Ponds in 2015 and the New York State mean growth rate (Green 1989).

## Black Crappie

Black crappie were very poorly represented, with only one captured in a fyke net for a CPUE of 0.5/net night. The one collected was 10.2 inches in length, had a Wr of 102, and was age-5.

## Gamefish

### Largemouth Bass

Largemouth bass electrofishing CPUE ranged from 8 to 40 fish/h, with an average of 25/h (SD = 12) for all size largemouth bass. For largemouth bass  $\geq 10$  in, the average catch was 23/h (SD = 13). No largemouth bass were collected with either fyke or gill nets. The majority (68%) were collected in the Upper Pond (Table 2). Largemouth bass lengths ranged from 5 to 20 inches, with 12-inch bass being the most frequently captured size group (Table 7). The resulting PSD for largemouth bass was 79

and the  $RSD_{15}$  was 35. One memorable length ( $\geq 20$  in) bass was collected while no trophy length bass ( $\geq 25$  in) were caught (Table 5). Largemouth bass had a mean  $W_r$  of 95 (SD = 9). Largemouth bass were slow growing, by NYS standards (Green 1989), with the mean age to reach legal size ( $\geq 12$  in) age-5; the NYS mean is age-4 (Figure 9). Age-5 bass were the most common age-class in the sample (Figure 10).

Table 7. Length frequency of gamefish captured in Leland Ponds in 2015 sampling efforts.

Length (Inches)	Number Captured			
	Largemouth Bass	Smallmouth Bass	Chain Pickerel	Brown Trout
5	1	1		
6				
7	1	1	3	
8	2		1	
9	1		3	1
10	7		1	
11	5			
12	13		3	
13	8		1	
14	9		2	
15	11		2	
16	7			
17	3		6	
18	3		3	
19			1	
20	1		3	
21			1	
<b>Totals</b>	<b>72</b>	<b>2</b>	<b>30</b>	<b>1</b>

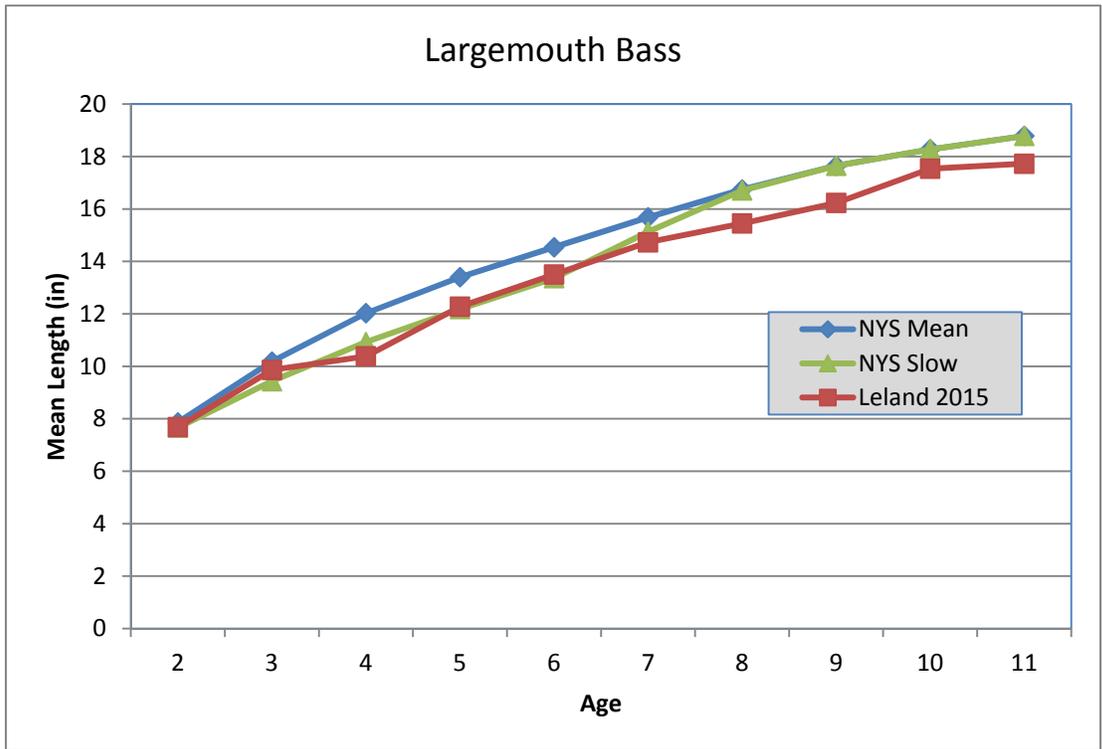


Figure 9. Observed mean lengths at age for largemouth bass sampled in Leland Ponds in 2015, and the New York State mean and slow growth rates (Green 1989).

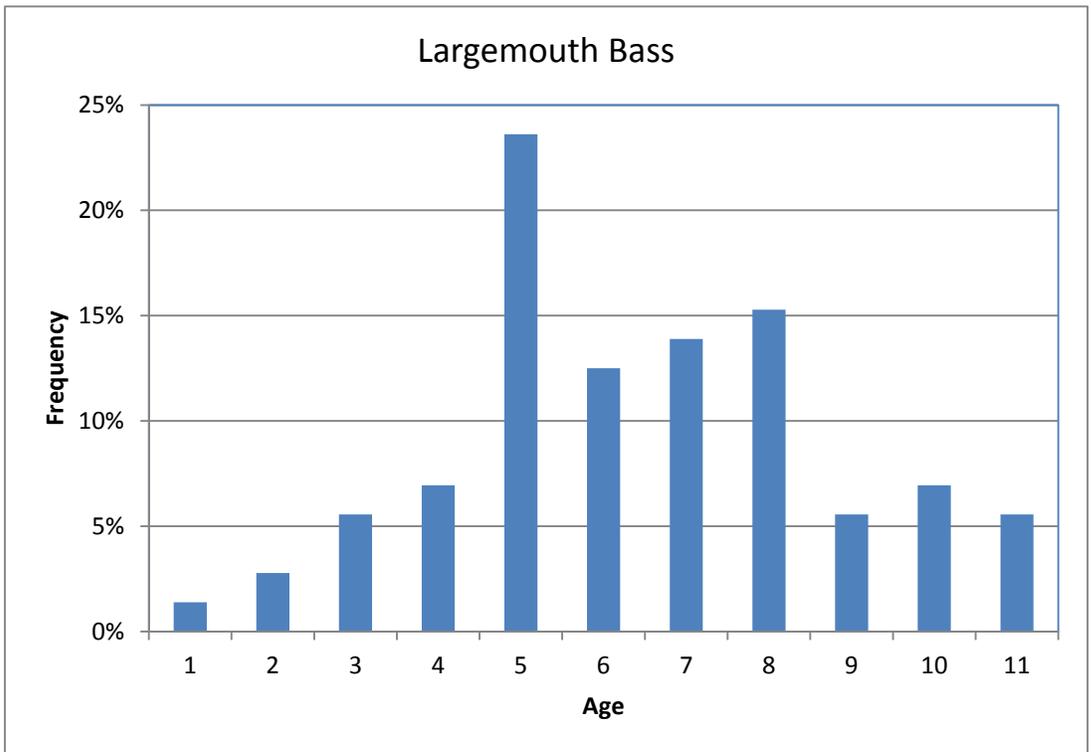


Figure 10. Age frequency distributions of largemouth bass sampled in Leland Ponds in 2015.

### *Chain Pickerel*

Chain pickerel mean electrofishing and gill netting CPUE were 9/h (SD = 6) and 1/net night (SD = 1). No chain pickerel were collected by fyke net. The mean electrofishing CPUE for pickerel  $\geq 15$  inches was 4/h (SD = 3). Pickerel lengths ranged from 7 to 21 inches, with the majority (53%) being at or above the 15-inch legal size (Table 7). Four pickerel were of preferred size ( $\geq 20$  in); no pickerel were collected of memorable ( $\geq 25$  in) or trophy size ( $\geq 30$  in; Table 5). Pickerel had a mean  $W_r$  of 85 (SD = 9). No age frequency was done as scale analysis for chain pickerel is generally unreliable.

### *Smallmouth Bass*

Only two smallmouth bass were caught, both while electrofishing and both on the Upper Pond, for a CPUE of 0.68/h (SD = 3). The two smallmouths had  $W_r$  of 104 and 106.

### *Brown Trout*

One 9.5 inch brown trout was collected during the gill netting survey and was aged at one year-old, and would have been from the spring of 2015 stocking. The resulting CPUE was 0.25/net night. This brown trout had a  $W_r$  of 79.

### Other Fishes

Alewives were the second most abundant species collected and had a mean electrofishing CPUE of 81/h (SD = 89). No alewives were collected with gill net or fyke net. The majority (93%) of alewives were collected on the Upper Pond (Table 2). Alewife lengths ranged from 3.4 to 5.8 inches, with a mean length of 4.8 inches (SD = 1).

Five brown bullhead (*Amerius nebulosis*) were collected with an average size of 12 in (SD = 1). One yellow bullhead (*Ictalurus natalis*) was also caught. Two common carp were observed during the all-fish electrofishing runs. One carp was caught by gill net and was 27.5 in in length. Four “non-sport fish” species were also collected with golden shiner (*Notemingonus crysoleucas*) and creek chubsucker being most numerous with 19 of each caught (Table 2). Golden shiners had a mean length of 7.1 in (SD = 1), while creek chubsuckers mean length was 9.3 in (SD = 3). The other species captured were spottail shiner (*Notropis hudsonius*), and white sucker (*Catostomus commersoni*).

### **Discussion**

Electrofishing accounted for the greatest number of species collected, 15 of the 18 (83%), followed by gill net (44%) and fyke net (33%; Table 8). However, the overall gill net catch seemed low with an average of 12.3 fish/net (SD = 8.5), when compared to the average number of fish collected by gill nets from other nearby waters. Average gill net catches for Cazenovia Lake were 62.4 fish/net (SD = 22.0; Everard 2013), Lake Moraine 58.0 fish/net (SD = 31.2; Everard 2015), and Lebanon Reservoir 30.5 fish/net (SD = 20.5; Everard in press). A low gill net catch was observed on Eaton Brook Reservoir during a 2013 sample, with an average of just 11.3 fish/net (SD = 9.9; Everard 2016). The reason for the low gill net catch on Leland Ponds is unknown, as

there appeared to have been no net tampering on either the Upper or Lower Pond. It's very possible that the lakes thermal stratification had fish residing shallower than the depths at which most of gill nets were deployed.

*Table 8. Number of fish captured by gear type in Leland Ponds in 2015.*

<b>Species</b>	<b>Electrofishing</b>	<b>Fyke Net</b>	<b>Gill Net</b>	<b>Sum</b>	<b>Sum Percent</b>
Alewife	81			81	15%
Brown Trout			1	1	0%
Chain Pickerel	26		4	30	6%
Common Carp	2		1	3	1%
Golden Shiner	1		18	19	3%
Spottail Shiner	1			1	0%
White Sucker	13		5	18	3%
Creek Chubsucker	14	3	2	19	3%
Yellow Bullhead		1		1	0%
Brown Bullhead	5			5	1%
Rock Bass	41			41	8%
Redbreast Sunfish	35			35	6%
Pumpkinseed	36	1		37	7%
Bluegill	10	6	1	17	3%
Smallmouth Bass	2			2	0%
Largemouth Bass	72			72	13%
Black Crappie		1		1	0%
Yellow Perch	123	22	17	162	30%
	<b>462</b>	<b>34</b>	<b>49</b>	<b>545</b>	

## Water Chemistry

At the time of the July 2015 sample, water temperature and DO levels in the Upper Pond were sufficient to support brown trout down to 30 ft. Whether these conditions lasted for the rest of the summer is unknown.

The likely explanation for the unusually high DO levels found at the 10 ft depth of both ponds in 2015 was a combination of light penetration into and below the thermocline (area of rapid temperature change also known as the metalimnion) and an abundance of phytoplankton at that depth. If light can penetrate beyond the thermocline and photosynthesis occurs in this strata, the metalimnion can achieve an oxygen maximum. No Secchi disk readings were taken in 2015, but during July 2016, a Secchi disk reading of 10 feet was recorded on the Upper Pond. A very similar DO pattern was also observed in 2016 (Table 1). With the highest DO level, 16.5 ppm, occurring at 15 ft in 2016. Secchi disk transparency is influenced by concentrations of phytoplankton, suspended inorganic material and dissolved organic substances. Secchi disk transparency often serves as a surrogate measurement of algae levels in clear lakes (NYSFOLA 2009).

## Panfish

### *Yellow Perch*

Electrofishing catch rates of >50 yellow perch/h would suggest a high abundance, while a gill net catch of <5 yellow perch/net would suggest that perch abundance is low (Forney et al. 1994). So, there is some discrepancy on yellow perch abundance between the two sampling methods as CPUE for electrofishing was 123/h while the gill net CPUE was 2.8/net night. Yellow perch mean length at age-4 was 7.2 in (182 mm) which indicates somewhat slow growth. Slow growth is usually a symptom of intense inter-or intra-specific competition (Forney et al. 1994), and can suggest high yellow perch abundance. This supports the electrofishing CPUE, but contradicts the gill net CPUE of low abundance. However, considering that overall gill net catch rates were low for all species, as discussed above, Leland Ponds yellow perch population abundance can be categorized as high relative to other NY waters.

The yellow perch PSD of 22 falls below the accepted range of 30 to 60 (Anderson and Weithman 1978) for a balanced population, and indicates that there are few “keeper” sized fish in the current population. Though the mean  $W_r$  was low (79), given that mean lengths at age were consistent with NYS means it’s likely that “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. Given that the age frequency was dominated by young perch between ages 1-4 (Table 6) the lack of quality size perch is most likely due to angler harvest, or poor or varied recruitment of the older age classes.

### *Pumpkinseed*

If we assume pumpkinseed stock density ranges are similar to bluegill, the high PSD (84) and low  $RSD_8$  (0) would represent an unbalanced population. Anderson (1985) suggested that a bluegill population with a PSD of 20 to 60, and  $RSD_8$  of 5 to 20 would represent a balanced population. The lack of memorable and trophy sized pumpkinseeds may be due to the slow growth of older aged fish, plus poor or varied recruitment. As the age frequency was dominated by older age fish, ages 5, 6 and 9, while pumpkinseeds in ages 1-4, were absent or poorly represented (Table 6). Angler harvest may also be contributing to this lack of preferred ( $\geq 8$  in) length pumpkinseeds.

### *Redbreast Sunfish*

Age-4 redbreast were the most abundant year class and none between the ages of 7-9 were collected (Table 6). Because of this three year gap, redbreast appear to have poor or varied recruitment on Leland Pond and/or may be subject to angler harvest.

### *Bluegill*

Though the PSD (28) falls within the balanced range, the  $RSD_8$  of zero would indicate an unbalanced population with no bluegill  $\geq 8$  in. Given that bluegills were in fair condition with a mean  $W_r$  of 91 (SD = 14), and their mean length at age was consistent with the NYS mean, it’s safe to assume “stunting” is not an issue. The data suggest

that the lack of larger size bluegill in Lelands Pond is most likely related to limited reproduction and/or angler harvest, and not an overabundant population.

### *Black Crappie*

Though there have been reports from anglers having some good success black crappie fishing on Leland Ponds, it would appear that black crappie are a very minor component of the lakes fishery. It should be noted that crappie can often be difficult to collect by electrofishing and gill nets. Trap nets (like fyke nets) are generally considered a more effective gear for collecting crappie, but even though fyke nets were used, it still resulted in only one black crappie being collected. Black crappie recruitment can also be highly variable from year to year and the lack of crappie in the sample may simply be a result of poor recruitment in recent years.

### Gamefish

#### *Largemouth Bass*

For largemouth bass  $\geq 10$  inches, the average electrofishing CPUE was 23/h (SD = 13). This CPUE is above the statewide average of 17/h (SD = 19; Perry et al. 2014). According to Green (1989), this catch rate yields a first order density estimate of 8.9 largemouth bass  $\geq 10$  inches per acre, which indicates a moderate bass population density. Anderson (1980) suggest a balanced largemouth bass population has a PSD range of 40 to 70, and RSD<sub>15</sub> of 10 to 40. So, the Leland Pond largemouth bass PSD (79) is just above the upper limit while the RSD<sub>15</sub> (35) falls within the balanced range. Largemouth bass were slow growing by NYS standards (Green 1989), with the mean age to reach legal size ( $\geq 12$  in) age-5; the NYS mean is age-4 (Figure 9). Everard (2013) found similar mean length at age for largemouth bass on Cazenovia Lake, a nearby Madison County water. However, the slow growth was surprising for Lelands Pond, considering one of the main forage fish is alewives.

#### *Chain Pickerel*

When comparing predator abundance, chain pickerel appear to comprise a major component of the Leland Pond fish community, and many of the pickerel are of quality size or larger. The mean electrofishing CPUE of 9/h for quality size pickerel is comparable to nearby Lake Moraine, which is often considered a good chain pickerel angling destination. Everard (2015) found a mean electrofishing CPUE of 10.6/h (SD = 6) for quality size pickerel on Lake Moraine in 2014. These quality size pickerel can offer a good angling opportunity, and are most likely an underutilized resource by Lelands Pond anglers.

#### *Smallmouth Bass*

Only two smallmouth bass were caught, both while electrofishing and both on the Upper Pond, for a CPUE of 0.68/h (SD = 3). This CPUE is well below the statewide smallmouth mean CPUE of 4/h (SD = 8; Perry et al. 2004). Smallmouth bass are most likely a very minor component of the Leland Ponds predator fish community.

### *Brown Trout*

With the near shore water temperature being 66-71° F, during the electrofishing survey, it was not surprising that no brown trout were collected. While water temperature and DO levels during the July gill netting were sufficient to support trout survival, it is unknown whether these conditions lasted through the rest of the summer period. There is, however, also anecdotal reports of anglers catching brown trout while ice fishing on the Upper Pond.

### Other Fishes

#### *Alewives*

With the long cold winter of 2014-2015 it was interesting to see that alewives were able to survive the winter. Excessive cold water temperatures can cause alewife mortality through cold thermal stress; mortality begins to occur at 37°F (Colby 1975). Alewives are most likely a major component of the Leland Pond prey fish community.

In summary, largemouth bass appear to be the primary sportfish, and based on catch rates and size structure, should provide a good angling experience for anglers targeting them on either the Upper or Lower Pond. Chain pickerel should provide a nice secondary fishery for anglers. Panfish abundance and size structure indicates that anglers are harvesting the larger fish. Lack of brown trout and tiger musky in the survey may reflect low abundance, or they may have avoided the gears used. An angler survey is warranted to confirm their status.

### **Recommendations**

Management recommendations based on the results of this survey are:

- Evaluate the popularity and catch rates of both brown trout and tiger musky to determine if continued stocking is warranted. Example; Angler Survey card box at boat launch. This can be combined with evaluations for rainbow trout/walleye on Eaton Brook Reservoir and rainbow trout in Lebanon Reservoir. This should be undertaken in the spring of 2018 or 2019.
- In the interim, continue with the current stocking policy of 1,400 spring yearling brown trout, and 200 fall fingerling tiger musky. Though sampling reflects low abundance, angler catch rates are unknown at this time. Anglers may be catching/harvesting brown trout shortly after they are stocked.
- Conduct dissolved oxygen and temperature profiles of both ponds in late summer to determine whether suitable conditions exist for trout survival throughout the entire summer.
- Continue with current special regulation for trout, and statewide angling regulations for all other species.
- Repeat the Centrarchid and General Biological Survey, or conduct a Full Community Survey, in 2023.

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