Hiland Lake, Livingston County
Fisheries Survey
Summer 2017

Fisheries Division
Lake Erie Management Unit

Water: **Hiland Lake**
T/R/S: 01N 04E Sec. 32
Primary County: Livingston
Watershed: Huron
Status: Approved
Survey begin: 05/08/2017 End: 06/08/2017
Special Regs: No
Purpose: General Fish Community

Gear Types

Gear Type: Large-mesh Fyke
Effort date range: 05/08/2017-05/10/2017
No. of gear used: 4
Effort quantity: 8 net nights
Depth range: 0-4 feet
Temperature range: 55-60°F

Gear Type: Boomshocker
Effort date range: 06/08/2017
No. of gear used: 1
Effort quantity: 7, 10-minute transects
Depth range: 0.5-4 feet
Temperature range: 76°F

Gear Type: Small-mesh Fyke
Effort date range: 05/08/2017-05/10/2017
No. of gear used: 3
Effort quantity: 6 net nights
Depth range: 0-3.5 feet
Temperature range: 55-60°F

Gear Type: Gill Net
Effort date range: 05/08/2017-05/10/2017
No. of gear used: 1
Effort quantity: 1 net night
Depth range: 11-11.5 feet
Temperature range: 55-60°F

Gear Type: Limnology
Effort date range: 09/06/2017
No. of gear used: 1
Effort quantity: 1
Depth range: 0-10.1 feet
Temperature range: 69°F

Collection by: Tar, Braunscheidel, Reed, Phillips
Identification by: Tar
Analysis by: Braunscheidel

Lake Description:

Hiland Lake is a 123-acre impoundment of the Portage River, which is a tributary of the Huron River. It straddles the border of Washtenaw and Livingston Counties about 15 miles northwest of the City of Ann Arbor and 7 miles north of the Village of Chelsea (Figure 1). There are two main basins with the river flowing into the western basin from Halfmoon Lake and out over a dam at the northeast end of the eastern basin in the Village of Hell, Michigan. Only the eastern basin is developed for housing since most of the western basin is owned by the State of Michigan and included in the Pinckney Recreation Area. It is a relatively shallow lake with a maximum depth of 12 feet in the eastern basin and 9 feet in the western basin (Figure 2). Most of the western basin is comprised of shallow, heavily vegetated flats with extensive lily pad beds and thick growths of starry stonewort, an invasive aquatic plant. The eastern basin has scattered, dense beds of Eurasian milfoil, also an invasive aquatic plant. This basin has steep depth contours around most of the shoreline with a relatively flat bottom at 10-12 feet in much of the basin. There is a gravel public boat launch on the north shore of the western basin off Hankerd Road.

Limnology profiles were taken in roughly the deepest area of each basin in early September of 2017. Both basins had constant water temperature at around 69^{0}F from top to bottom in the west basin and just over 70^{0}F in the east basin (Figure 3). Dissolved oxygen was also fairly constant with depth in both basins although the west basin did show a slight drop from 8.6 down to 7.0 mg/l in the last foot of depth and the east basin had a slight increase from 8 up to 9 mg/l in the deepest 3 feet of the water column (6-9 feet). Conductivity was 424 uS/cm throughout the water column in both basins and pH was 7.9 in the west basin and 8.1 in the east basin.

History:

The lake was created in 1882 when a dam was built on the Portage River in the Village of Hell, Michigan, to power a grist mill. In 1925 the dam was sold and converted to a hydro-power electric plant that supplied electricity to cottages around the lake and the Town of Pinckney. In the spring of 1982 the dam collapsed and the impoundment was reduced to a stream channel. Over a year passed before a new dam was constructed and the impoundment refilled.

Fish sampling conducted in 1983 showed fish were beginning to re-establish in the lake. Subsequent to that survey bluegill, yellow perch, northern pike, largemouth bass, and black crappie were transferred from nearby lakes. A follow-up survey in 1985 indicated the fishery had almost completely recovered with good catches of bluegill, northern pike, and largemouth bass. Another survey in 1992 produced excellent catches of bluegill, largemouth bass, northern pike, black crappie, and bullhead. Most species were found to be growing slightly below state average, but adequate numbers of catchable size fish were present. Carp had a large presence in this system as well. The lake also has a history of profuse growths of aquatic vegetation, especially in the western basin.

Survey Purpose and Methods:

This survey was conducted primarily as a response to reports from lake residents that bass fishing had declined significantly over the past few years. A general fish community survey was conducted along with targeted effort to capture largemouth bass to evaluate the population. Sampling gear used during the

survey included 4 large-mesh and 3 small-mesh fyke nets, 1 gill net, and seven 10-minute, night electrofishing transects with an electrofishing boat specifically targeting only bass and shiners (Figure 2). All fish were identified, counted, measured, and ageing structures (scales or spines) were collected from game fish species to evaluate growth rates.

Survey Results:

This survey found a very diverse fish community in Hiland Lake with the 1,562 fish caught consisting of 21 species of fish that weighed over 394 pounds (Table 1). In addition, 5 species of turtles were collected during the survey as well. Panfish such as bluegill, pumpkinseed, black crappie, warmouth, and rock bass comprised over 77% of the total catch by number and 17% by weight. Bullheads made up another 17% of the catch by number and 37% by weight. Large game fish including largemouth bass and northern pike were another 4% of the total catch by number and 12% by weight, but just under 4% of the catch by weight of the non-targeted survey catch. The large, non-game species (sometimes called rough fish) such as carp and bowfin were only 1% of the catch by number, but 34% by weight. There was also a good diversity of forage fish with 7 species represented.

Panfish

Bluegill was by far the most abundant panfish caught during this survey. The 1,070 bluegill made up over 68% of the total catch by number and almost 8% by weight. They averaged 4.6 inches from all gear combined with only 4% (45 fish) exceeding the minimum size acceptable to anglers of 6 inches (Table 1) and only a single fish reaching 8 inches. All age groups were present from age 1 through age 6 (Table 2). Growth however, was poor with a mean growth index 0.5 inches below the state average. Catch rates in the large-mesh fyke nets were just over 18 fish per net lift (146 fish total). This is slightly lower than the average catch rate of 24 fish/net lift for other lakes in the area (Table 4). The bluegill were also evaluated using Schneider's Index (Schneider 1990). This index provides a relative measure of the quality of the bluegill fishery in a lake based on a scale of 1-7, with 7 being the best. Hiland Lake bluegill received an index of 3.2 which equates to an "acceptable", but below "average", rating.

Pumpkinseed was the next most abundant panfish making up almost 6% of the total catch by number and 4% by weight. The 91 fish caught averaged 5.3 inches with just over half exceeding the minimum size acceptable to anglers of 6 inches (Tables 1 and 3). All ages from 1 through 7 were collected in the survey with a mean growth index of -0.3 indicating they were growing slightly below the state average (Table 2). Catch rates in the large-mesh fyke nets were just under 10 fish per net lift, which was well above both the state average and catch rates in other area lakes (Table 4).

Other panfish caught in the survey included 23 **black crappie** ranging from 7 to 12 inches, 6 **rock bass** (3-10 inches), 3 **yellow perch** (6-11 inches), and 1 **hybrid sunfish** at 6 inches (Tables 1 and 3).

Bullhead and Large Non-Game Fish

Bullheads comprised the next largest group of fish in the survey (17% by number and 37% by weight) with a total of 263 caught (Table 1). **Brown bullhead** was the most abundant of the bullhead species (250 fish) and ranged from 7 to 12 inches with 66% exceeding 10 inches, the minimum size acceptable to anglers (Table 1). Yellow (10 fish) and black (3 fish) bullhead were also collected in the survey.

While only 14 carp were collected in the survey, they accounted for almost a third of the total weight caught (Table 1). Three bowfin ranging from 15-24 inches were also collected.

Large Game Fish

Largemouth bass (57 fish) and **northern pike** (5 fish) were the only large game fish species collected during the survey (Table 1). Largemouth bass size ranged from 2 to over 17 inches in length with an overall average length of 9.3 inches. Five bass exceeded the minimum legal size limit of 14 inches (Table 3). Growth rates were poor and averaged 1.5 inches below the state average (Table 2). Only 9 bass were caught with the non-targeted sampling gear, the other 48 bass were caught using the targeted electrofishing. This resulted in an electrofishing catch rate of 0.5 fish per minute which was below the statewide median catch rate of 1.4 fish/min and much less than the 1.9 mean catch rate for other lakes in southeastern Michigan (Table 4). Only one of the northern pike exceeded the minimum legal size limit of 24 inches and growth information from the 5 fish collected indicated the pike were growing approximately equal to the state average.

Forage Fish

Smaller forage species were collected in small numbers and included blacknose shiner (2), brook silverside (1), Iowa darter (1), mimic shiner (1), and sand shiner (1). The slightly larger lake chubsucker (1) and golden shiner (7) were also found (Table 1). Numbers collected were low, but many more forage fish were observed and not captured during the survey.

Miscellaneous

The 48 turtles caught during the survey included 41 map turtles, 13 painted turtles, 2 snapping turtles, 1 spiny softshell, and 1 musk turtle.

Conclusions and Management Recommendations:

The panfish population in Hiland Lake is adequate to support a low-density fishery, but somewhat below what is found in other area lakes. Bluegill numbers, sizes, and growth are at or slightly below state averages while the pumpkinseed population is in slightly better condition. While black crappie were not overly abundant, there were adequate numbers of harvestable-sized fish to support a limited fishery. These results are similar to the 1992 survey and indicate a fairly stable panfish population.

Predator species, including largemouth bass and northern pike are present, but in lower abundance than is typical of other area lakes. Northern pike numbers were especially low and this may be attributed to the decreased quality of the shallow water habitat in the western basin caused by the starry stonewort invasion. The survey boat was not even able to navigate into the shallower areas of this part of the lake due to the density of this invasive plant. The abundance of invasive plant species, such as Eurasian milfoil and starry stonewort, appear to be reducing the habitat quality of both lake basins, but especially the shallower western basin. Pike reproduction is likely hampered by the poor quality of the spawning habitat formerly present in this basin. The bass population was also likely affected by the decreased habitat quality in the western basin. While the lily pads and other floating and emergent vegetation is still abundant, the habitat previously present among these plants is now significantly decreased by dense mats of starry stonewort.

Concerns about a perceived reduction in the largemouth bass population due to over fishing have been expressed by local residents. The number of bass present does appear to be lower than other area lakes, but the poor habitat quality resulting from the heavy infestation of invasive plants is more likely the reason for this difference. Shallow spawning areas are covered by the heavy mats of starry stonewort, which may reduce spawning success and fry survival. Deeper habitats under the floating plants normally used by larger fish in the western basin have also been greatly reduced. The dense growths of Eurasian milfoil in both basins also contributes to reduced habitat quality for both the bass themselves and the panfish that provide their main forage base.

A diverse population of forage species is still present, but in lower numbers than is typical of similar lakes. The poor quality of the habitat due to the invasive vegetation is likely affecting these species as well.

Carp and bullheads continue to comprise a large part of the fish biomass in the lake similar to historical surveys. The number and size distribution of the bullhead indicate a good fishery is present here if anglers choose to target this highly edible species.

Historically only the eastern basin, heavily developed with private residences, has been chemically treated to control nuisance aquatic vegetation. Since most of the western basin is surrounded by publically owned property (Pinckney Recreation Area), there have been no efforts to control nuisance species in this basin. This has allowed the Eurasion milfoil and starry stonewort to become firmly established in the western basin. Our main management recommendation for this lake would be an aggressive program to reduce both the Eurasian milfoil and starry stonewort in the western basin, with a strong emphasis on the starry stonewort. Once habitat has been improved, through at least partial control of these invasive plants, the bass and panfish should recover on their own. No other direct fisheries management actions are recommended at this time. If control of the invasive plants is achieved, then another survey to assess the fisheries response would be warranted a few years afterwards.

References:

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report 90-10, Ann Arbor, MI.

Wehrly, K. E., G. S. Carter, J. E. Breck. In Press. Inland Lake Status and Trends Program Sampling Protocols. Michigan Department of Natural Resources, Fisheries internal document, Ann Arbor.

Figure 1. Location of Livingston County and Hiland Lake within the county.

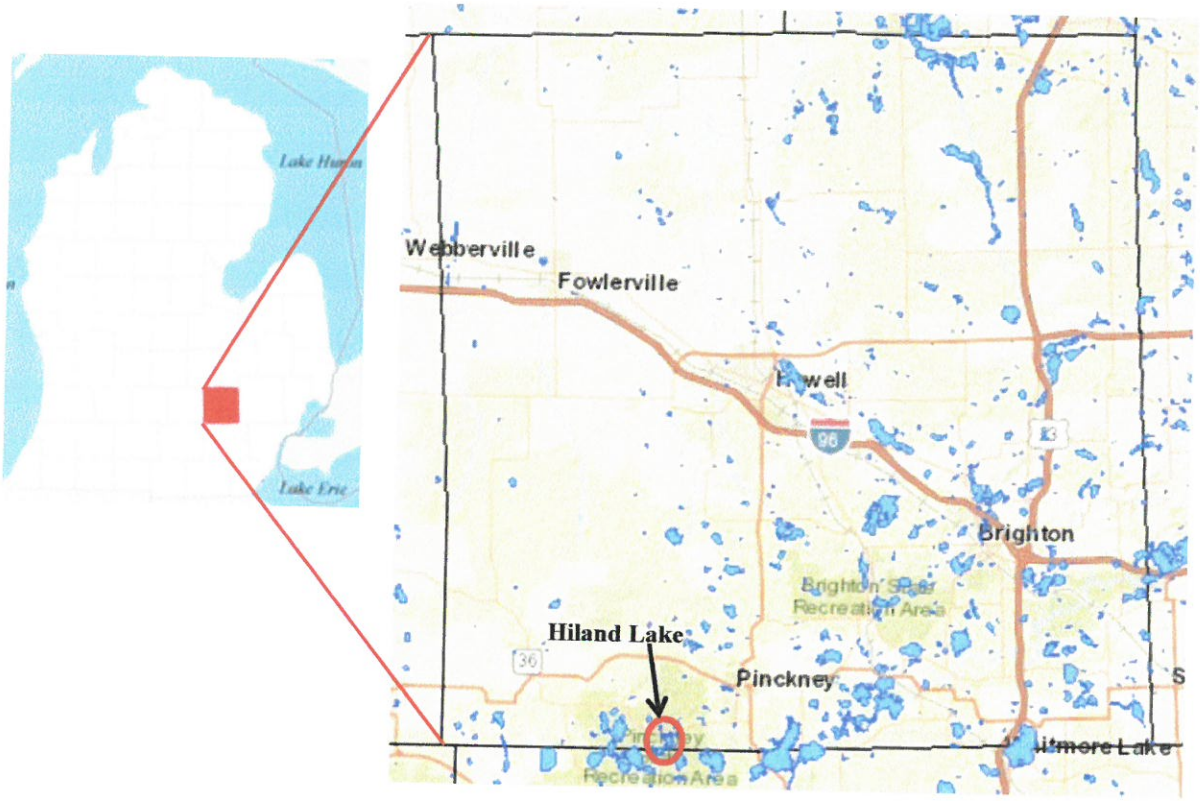


Figure 2. Map of Hiland Lake showing depth contours and locations of sampling gear for 2017 survey.

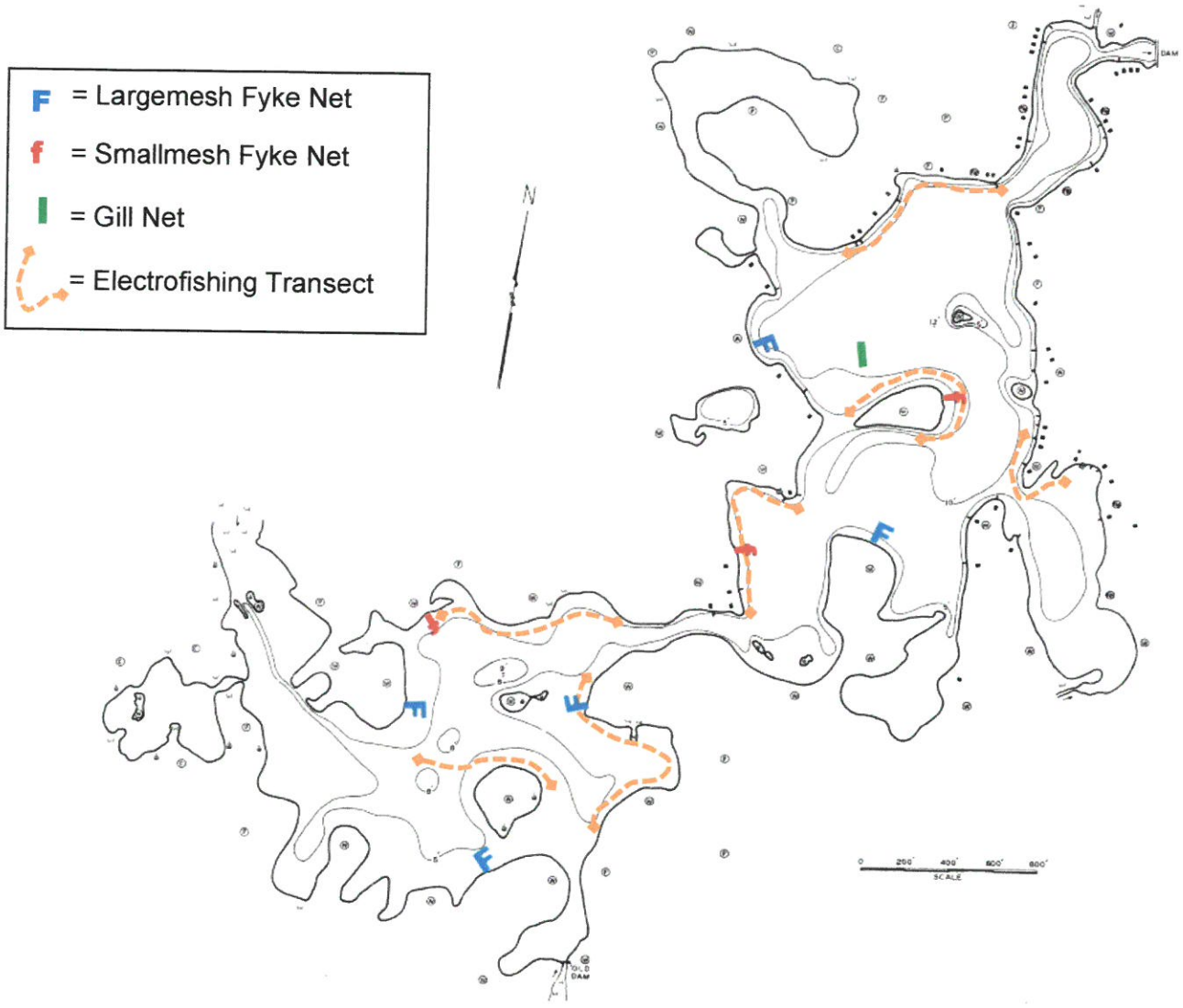
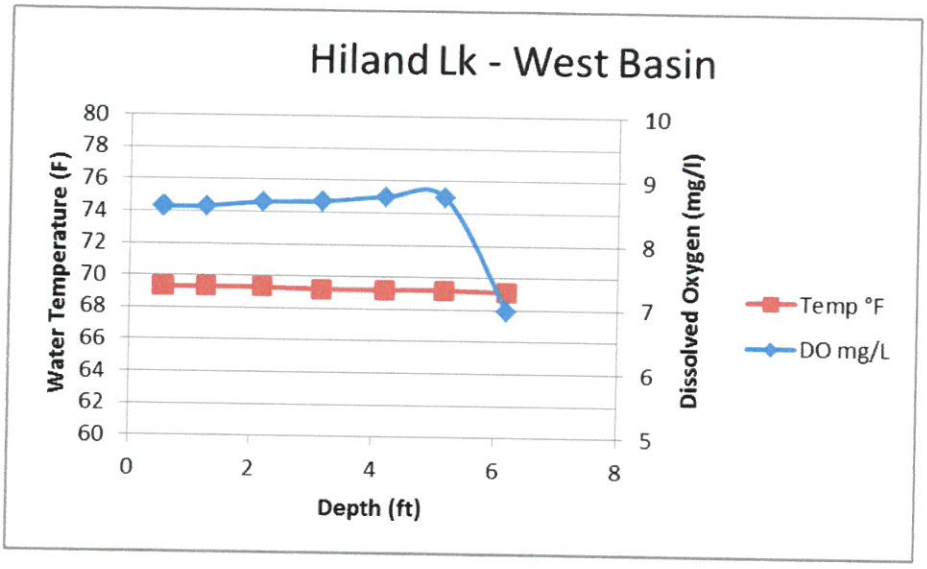
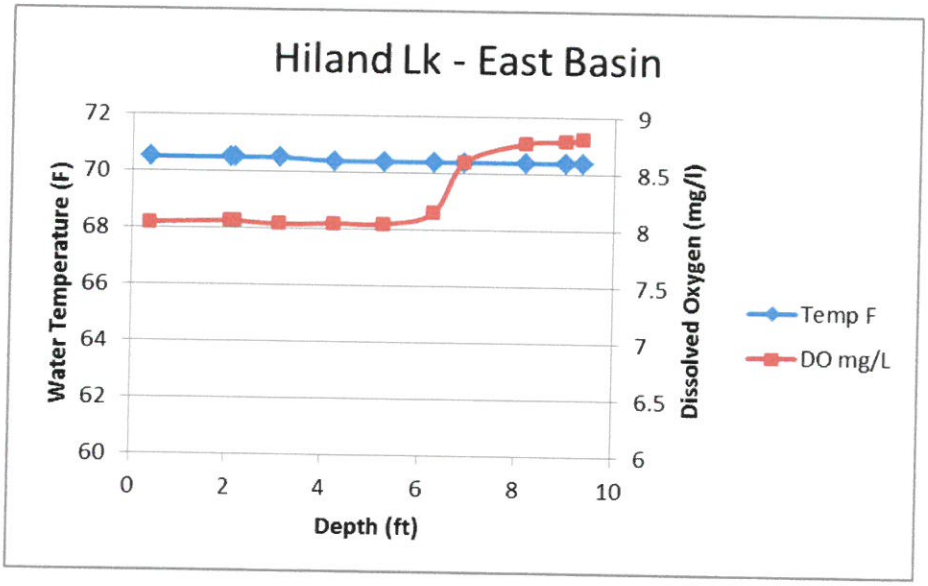
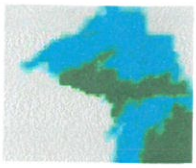


Figure 3. Water temperature and dissolved oxygen profiles of Hiland Lake basins on September 6, 2017.







HILAND LAKE, LIVINGSTON COUNTY
Fisheries Survey
May 8 – June 8, 2017

Table 1. Species composition and numbers of fish caught with all gear combined from the Hiland Lake fisheries survey May 8-10 and June 8, 2017.

Species	Number of Fish	Percent by number	Weight (lb.)	Percent by weight	Length range (in.)	Average length (in.)	Percent legal size*
Bluegill	1,070	68.5	30.1	7.6	0-8	4.6	4
Brown Bullhead	250	16.0	138.7	35.2	7-12	10.1	67
Pumpkinseed	91	5.8	16.6	4.2	2-8	5.3	57
Largemouth Bass	57	3.6	36.8	9.3	2-17	8.7	9
Black Crappie	23	1.5	15.3	3.9	7-12	10.3	100
Common Carp	14	0.9	124.5	31.6	12-37	22.0	--
Warmouth	11	0.7	2.4	0.6	4-8	6.1	--
Yellow Bullhead	10	0.6	3.6	0.9	7-10	8.3	10
Golden Shiner	7	0.4	0.8	0.2	4-8	7.1	--
Rock Bass	6	0.4	2.4	0.6	3-10	7.6	50
Northern Pike	5	0.3	9.6	2.4	15-25	20.1	20
Black Bullhead	3	0.2	3.7	0.9	12-14	14.0	100
Bowfin	3	0.2	8.4	2.1	15-24	19.2	--
Yellow Perch	3	0.2	1.0	0.2	6-11	8.5	67
Blacknose Shiner	2	0.1	0	0	2	2.5	--
Brook Silverside	1	0.1	0	0	2	2.5	--
Grass Pickerel	1	0.1	0.2	0	9	9.5	--
Hybrid Sunfish	1	0.1	0.2	0.1	6	6.5	100
Iowa Darter	1	0.1	0	0	1	1.5	--
Lake Chubsucker	1	0.1	0.2	0	6	6.5	--
Mimic Shiner	1	0.1	0	0	2	2.5	--
Sand Shiner	1	0.1	0	0	2	2.5	--
Species Totals	1,562		394.3				

*Percent legal or acceptable size for angling

Table 2. Mean length and age composition of selected species collected from the Hiland Lake survey, May 8-10 and June 14, 2017.

Species	Age	No. aged	Length range (in.)	State avg. length (in.)	Average length (in.)	Mean growth index*
Black Crappie						+0.6
	III	1	8.2	7.5	8.2	
	IV	2	7.8-8.1	8.6	8.0	
	V	11	8.2-11.2	9.4	9.8	
	VI	5	10.3-11.8	10.2	11.0	
	VII	2	12.5-12.7	10.8	12.6	
	VIII	2	12.1-12.3	11.4	12.2	
Bluegill						-0.5
	I	19	1.7-2.6	1.8	2.0	
	II	3	2.8-3.1	3.8	3.0	
	III	6	3.4-4.8	5.0	3.7	
	IV	17	3.8-7.5	5.9	4.8	
	V	23	4.8-8.5	6.7	6.4	
	VI	6	5.9-7.3	7.3	6.6	
Largemouth Bass						-1.5
	I	4	2.5-2.8	4.2	2.7	
	II	2	2.8-5.6	7.1	4.2	
	III	23	5.8-10.5	9.4	7.1	
	IV	17	6.8-13.9	11.6	11.0	
	V	5	11.7-13.7	13.2	12.6	
	VI	4	13.7-17.8	14.7	15.9	
	VII	2	16.5-17.0	16.3	16.8	
Northern Pike						
	II	1	18.7	17.7	18.7	
	III	4	15.5-25.5	20.8	20.5	
Pumpkinseed						-0.3
	I	2	2.4-2.5	1.8	2.5	
	II	3	2.9-3.2	3.8	3.0	
	III	8	3.4-4.5	4.9	4.0	
	IV	8	4.1-7.1	5.6	4.8	
	V	19	4.7-8.1	6.2	6.1	
	VI	11	5.9-7.7	6.6	6.8	
	VII	2	5.9-7.6	7.1	6.8	

*Mean growth index is the average deviation from the state average length at age based on ages with at least 5 individuals aged.

Table 3. Number of fish per inch group for selected species collected with all gear types combined during the 2017 Hiland Lake fisheries survey.

Inch group	Black Crappie	Bluegill	Largemouth Bass	Pumpkinseed
0		1		
1		380		
2		395	5	3
3		108		6
4		54		11
5		87	4	19
6		32	11	43
7	1	12	9	8
8	5	1	2	1
9	3		4	
10	6		1	
11	4		2	
12	4		5	
13			9	
14				
15			1	
16			2	
17			2	
18				
19				
20				
Total	**23**	**1070**	**57**	**91**

Table 4. Comparison of catch-per-effort (CPE) for selected species in Hiland Lake. The statewide and LEMU CPEs were obtained from Wehrly et al. 2015.

Species	Gear	Statewide CPE 25th perc.	Statewide CPE Median	Statewide CPE 75th perc.	**Hiland Lake 2017**	LEMU CPE Mean
Bluegill	Largemesh Fyke (#/lift)	2.5	8.5	25.9	**18.2**	23.6
Pumpkinseed	Largemesh Fyke (#/lift)	0.4	1.7	4.7	**9.8**	0.6
Largemouth Bass	Largemesh Fyke (#/lift)	0.4	1.4	2.8	**0.5**	1.9
	Electrofishing (#/min)	0.4	0.7	1.6	**0.5**	0.8

Water: Hi-Land Lake
Watershed: Portage
Survey begin: 05/08/2017 end: 05/10/2017
Survey purpose: Discretionary survey
Fish community

County T/R/S: Livingston
01N 04E
Status: In Progres

Species	Inch group	Number		Pounds	
Black crappie					
	7	1	A	0.22	C
	8	5	A	1.66	C
	9	3	A	1.42	C
	10	6	A	3.91	C
	11	4	A	3.49	C
	12	4	A	4.55	C
Species total:		23		15.25	
Black bullhead					
	12	1	A	0.90	C
	14	2	A	2.76	C
Species total:		3		3.66	
Bluegill					
	0	1	A	0.00	
	1	380	A	0.68	C
	2	395	A	3.59	C
	3	108	A	2.87	C
	4	54	A	3.19	C
	5	87	A	9.66	C
	6	32	A	6.05	C
	7	12	A	3.57	C
	8	1	A	0.44	C
Species total:		1070		30.05	
Blacknose shiner					
	2	2	A	0.01	C
Species total:		2		0.01	
Bowfin					
	15	1	A	1.34	C
	24	1	A	5.18	C
Species total:		2		6.52	
Brown bullhead					
	7	5	A	1.04	C
	8	14	A	4.14	C
	9	66	A	26.98	C

A = Actual, C = Computed

Species	Inch group	Number		Pounds	
Largemouth bass					
	12	1	A	1.00	C
	13	7	A	8.89	C
	15	1	A	1.95	C
	16	1	A	2.38	C
	17	1	A	2.86	C
Species total:		32		21.70	
Mimic shiner					
	2	1	A	0.00	
Species total:		1		0.00	
Northern pike					
	15	1	A	0.77	C
	18	2	A	2.68	C
	22	1	A	2.48	C
	25	1	A	3.68	C
Species total:		5		9.61	
Pumpkinseed					
	2	3	A	0.03	C
	3	6	A	0.18	C
	4	11	A	0.77	C
	5	19	A	2.50	C
	6	43	A	9.70	C
	7	8	A	2.86	C
	8	1	A	0.53	C
Species total:		91		16.57	
Rock bass					
	3	1	A	0.03	C
	4	2	A	0.14	C
	8	1	A	0.46	C
	10	2	A	1.74	C
Species total:		6		2.37	
Sand shiner					
	2	1	A	0.00	
Species total:		1		0.00	
Warmouth					
	4	2	A	0.14	C
	5	3	A	0.39	C
	6	3	A	0.64	C
	7	2	A	0.68	C

A = Actual, C = Computed