Lake Lemon Conservancy District

LAKE LEMON CONSERVANCY DISTRICT
Board of Directors Meeting
Benton Township Senior Citizens Building
April 17, 2013
6:00 p.m.

AGENDA

I.	Call Meeting to Order / Chairman's Remarks	(JS)
II.	Approval of March 20, 2013 Board Meeting Minutes	(JS)
III.	Treasurer's Report A. March Financial Update B. Report of Claims Approval for March 2013 C. Renewal Advice: Certificates of Deposit D. Resolution 04-13-02: Vegetation Grant Fund	(LE)
IV.	Review 2012 Water Testing Results, Melissa Clark, IU, SPEA A. Renew IU Water Testing Agreement for 2013-2014	(JS)
V.	Proposed Protocol: Board Vacancy	(JS)
VI.	Board By-Laws Discussion	(JS)
VII.	Dredging Study Group Update	(TT)
VIII.	Manager's Report A. Operations Update A. Barge Operations B. Canada Goose Control: Update C. Restricted Towing Area Discussion	(BM) (JVT) (JVT)
IX.	Public Comment	(JS)
X.	New Business / Correspondence for Future Agenda A. Next Board Meeting: May 15, 2013	(JS)
XI.	Adjournment	(JS)

7599 North Tunnel Road, Unionville, IN 47468
Phone 812/334-0233 • Fax 812/335-0038

Lake Lemon Conservancy District

MONTHLY MEETING
Benton Township Senior Citizens Building
6:00 PM

Date: April 17th, 2013

Name	Lake Address	District
MIKE BLACKWELL	4071 SALMON HARBOR	VII
Louie Bowser	4176 Chitwood	VII
Susan Snider	Salmon 7017 E. Spillway	II
SCOTT ADAMSON	4184 WALKER LANE	VII
Melissa Clark	SPEA-IU	
ROB CASSIDY	4169 WATSON	VII
VINCENT ORTH	6486 SOUTHSORE	7
David Shinkle	5930 Southshore	7
Ron Thrasher	6406 Channel Rd.	7

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Lake Lemon Conservancy District
Board of Directors Meeting Minutes
Benton Township Senior Citizens Building
April 17th, 2013

The April 17th, 2013 Board of Directors Meeting of the Lake Lemon Conservancy District was held at the Benton Township Senior Citizens Building and was called to order by Chairman John Schell at 6:03 P.M.

BOARD MEMBERS PRESENT: John Schell, Pam Dugan, Lance Eberle, Tim Specht, Dennis Friesel Tina Thrasher. ALSO PRESENT: Bob Madden, Manager; James Van Tassel, Board Recorder; and LLCD Freeholders (see attached sign-in sheet). ABSENT: Rachel Atz, CBU Representative.

I. Opening Comments (Schell)

II. Approval of March 20, 2013 Board Meeting Minutes (Schell)

DUGAN MOTIONED TO APPROVE THE MARCH 20, 2013 BOARD MEETING MINUTES. THRASHER SECONDED THE MOTION. ALL "AYE'S". THE MOTION CARRIED.

III. Treasurer's Report (Eberle)

a. March Financial Update

i. $13,954.00 in revenue for March

ii. $30,642.00 in revenue for the year

iii. The biggest expense for March is salaries/benefits, partly due to the dredging operation.

b. Report of Claims Approval for March 2013

EBERLE MOTIONED TO APPROVE THE ALLOWANCE OF VOUCHERS FOR MARCH 2013. DUGAN SECONDED THE MOTION. ALL "AYE'S". THE MOTION CARRIED.

c. Renewal Advice: Certificates of Deposit

i. Renew for six months at 0.4 %

ii. This will make the money available again in October 2013. This gives the LLCD time to assess vegetation treatment and private dredging costs.

SPECHT MOTIONED TO APPROVE/RENEW THE CERTIFICATES OF DEPOSIT # 371025937 AND # 371025791 FOR SIX MONTHS AT 0.40%.

THRASHER SECONDED THE MOTION. FIVE "AYE'S". FRIESEL ABSTAINS. THE MOTION CARRIED.

d. Resolution 04-13-02: Vegetation Grant Fund

i. Approval of $5,000.00 grant received from the IDNR LARE Program for treatment of eurasian water milfoil.

EBERLE MOTIONED TO APPROVE RESOLUTION 04-13-02: VEGETATION GRANT FUND. DUGAN SECONDED THE MOTION. ALL "AYE'S". THE MOTION CARRIED.

IV. Review 2012 Water Testing Results, Melissa Clark, IU, SPEA

a. Schell introduced Clark and thanked her for her efforts at Lake Lemon.

b. 2012 Lake Lemon Water Quality Report (See Attached)

i. Sampled 3 inland lake sites

ii. Sampled 3 watershed sites

1. Bear Creek before Bean Blossom Creek

2. Bean Blossom Creek in Trevlac

3. Drainage ditch by North Shore Marina

iii. Lake is classified as eutrophic with some mesotrophic readings depending on seasonal lake and weather conditions.

1. Eutrophic describes the lake as healthy in nutrients and minerals which promotes plant and algae growth. This is the expected trophic level for Lake Lemon.

iv. Little to no change in water quality over the past several years.

v. Fecal Coliform counts are and have been historically below safety standards.

1. Failing septic systems around the lake could be contributing to the fecal bacteria in the lake.

a. Properly functioning leech fields should deposit the bacteria before entering the lake.

2. Can a dye test be performed to test the septic systems?

a. Madden replied this was discussed in the past and if the board recommended a mandatory dye test, both Monroe County and Brown County Health Departments would consider the request.

3. Friesel commented that conscientious homeowners should be pumping their septic systems regularly.

4. Eberle commented when many of the houses were built around the lake, codes for septic systems weren't well in place or enforced.

vi. Schell thanked Melissa Clark for her report.

c. Renew IU Water Testing Agreement for 2013-2014.

i. Approximately $1,000.00 increase due to increased sampling, wages, and supplies.

EBERLE MOTIONED TO ACCEPT THE IU WATER TESTING AGREEMENT FOR 2013-2014. SPECHT SECONDED THE MOTION. ALL "AYE'S". THE MOTION CARRIED.

V. Proposed Protocol: Board Vacancy (Schell)

a. Mailing will be sent to all Freeholders in Sub-Area affected by vacancy.

b. LLCD Office will set a deadline to accept candidate(s) letter of intent/resume to serve.

c. LLCD Office will forward candidate(s) information to existing Board Members.

d. Existing Board members will appoint a candidate at the next appropriate Board Meeting.

e. Should the new director be appointed at the May or June Meeting?

i. Dugan replied Sub-Area III needs representation.

ii. Friesel commented the Board needs more time to review resumes or letters of intent. With a June appointment, Freeholders in Sub-Area III will have more time to appoint a candidate(s).

SCHELL MOTIONED TO APPROVE PROTOCOL AND THE BOARD VACANCY WILL BE FILLED AT THE MAY 15, 2013 BOARD MEETING. THRASHER SECONDED THE MOTION. FIVE "AYE'S". ONE "NAY" (FRIESEL). THE MOTION CARRIED.

VI. Board By-Laws Discussion (Schell)

a. No action.

VII. Dredging Study Group Update (Thrasher)

a. Dredging Study Group Members Include:

i. Directors: Tim Specht (II), Pam Dugan (VI), Tina Thrasher (VII)

ii. Freeholders: Norm Holy (I), Jeff Hartman (III), Greg McAtee (IV), Les Wadzinksi (V)

iii. LLCD Staff: Bob Madden, District Manager; James Van Tassel, Lake Biologist; Levi Warthan, Dredger

b. Our first official meeting was held on April 11, 2013. The meeting started out with introductions and was followed by the history of LLCD dredging operations and reviewed research of the study group to date. The minutes of this meeting will be available after the next Dredging Study Group Meeting on May 11, 2013.

VIII. Manager's Report (Madden)

a. Operations Update

i. Barge Operations

1. The Barge is on the water.

2. LLCD has prepped the disposal site for the 2013 dredging season.

3. Will start off with some shoreline erosion control (rip-rap) on City of Bloomington property (Riddle Point Park).

4. Once this is completed, stump/debris removal will commence.

5. After this, dredging will start at Salmon Harbor.

ii. Canada Goose Control: Update (Van Tassel)

1. Van Tassel treated 22 nests totaling 175 eggs on Cemetery Island in Monroe County.

2. No accessible nests were found outside of Cemetery Island.

iii. Restricted Towing Area Discussion (Van Tassel) (See Attached)

1. In response to the board request, Van Tassel mapped out a potential "restricted tow area" buoy line for the bay just East of Reed Point.

2. Dugan replied if we buoy off this particular shallow area we will have to be sure to buoy off every shallow area.
3. Friesel commented logs are everywhere in the bay East of Reed Point.
4. The LLCD will look into signage that would be posted by the Riddle Point Boat Ramp and North Shore Marina.
    a. Notices would also be sent out via email/list serve to Freeholders.

IX. Public Comment

a. Dave Shinkle (VII) mentioned that several trees at the south end of the BYC cove are falling in.

X. New Business/Correspondence for Future Agenda (Schell)

a. Sub-Area III director will be appointed at May 2013 Meeting.

b. Next Board Meeting: May 15, 2013

XI. Adjournment

DUGAN MOTIONED TO ADJOURN THE APRIL 17, 2013 BOARD OF DIRECTORS MEETING. SPECHT SECONDED THE MOTION. ALL "AYE'S". THE MOTION CARRIED. THE MEETING ADJOURNED AT 7:42 P.M.

Respectfully Submitted By:

James Van Tassel

Board Recorder

Lake Lemon Conservancy District
Budget Summary Report

20-Mar-13

Profit and Loss Summary	January Actuals	February Actuals	March Actuals	YTD Actuals	Notes
Revenue	$7,254	$9,434	$13,954	$30,642	
Income Breakdown					
Marina & Club Fees	$500	$500	$1,000	$2,000	
Sublease & Access Fees	$6,000	$5,575	$10,310	$21,885	
Interest	$179	$84	$155	$418	
Grants & Donations	$0	$0	$10	$10	
Fish Tournaments	$575	$25	$0	$600	
Park/Lake Reservations	$0	$3,250	$125	$3,375	
Expenses & Margin:					
SG&A expenses	$38,985	$14,697	$25,918	$79,601	
Salaries & Benefits	$12,108	$10,037	$12,826	$34,971	*Dredging*
Supplies	$342	$2,326	$3,273	$5,941	*Nautical Markers*
Professional Services	$705	$586	$705	$1,996	
Communication/Travel	$232	$282	$232	$745	
Printing/Advertising	$11	$282		$293	
Insurance	$12,979	$0	$8,272	$21,251	
Utility Services	$400	$483	$385	$1,268	
Repair & Maintenance	$709	$600	$225	$1,534	
Other Services	$11,500	$0		$11,500	
Machinery & Equipment	$0	$102		$102	
Other Capital Outlays	$0	$0		$0	
Pretax operating profit (loss)	($31,732)	($5,263)	($11,964)	($48,959)	
Operating margin	*-437.4%*	*-55.8%*	*-85.7%*	*-159.6%*	

Balance Sheet Summary	January	February Actuals	March Actuals		
Checking/Savings	$122,926	$118,433	$106,219		
General Fund CDs	$216,009	$216,009	$216,009		
Cumulative Maintenance Fund CDs	$66,797	$66,797	$66,797		
Other Balance Sheet Items:					
Fixed Assets	$454,853	$454,853	$454,853		
Accounts payable	$1,714	$2,484	$13,248		
Long-term liabilities	$100,222	$100,222	$100,222		*Dredging Equipment Loan*
Equity	$758,649	$753,386	$731,175		

Certificate Summary	Value	Rate	Maturity
24 Mth	$12,978	0.65%	7-Jul-14
24 Mth	$10,765	0.60%	13-Sep-14
24 Mth	$100,000	0.60%	13-Sep-14
24 Mth	$6,063	0.65%	30-Dec-14
24 Mth	$31,990	0.60%	3-Feb-15
24 Mth	$5,000	0.70%	20-Dec-13
12 Mth	*$35,000*	*0.55%*	*20-Apr-13*
182 Day	*$81,009*	*0.40%*	*7-Apr-13*

LAKE LEMON CONSERVANCY
Financial Statements

For the Period Ending

January 1, 2013 thru March 31, 2013

(UNAUDITED)

Watkins Accounting
113 E. 19th Street
Bloomington, IN 47408

LAKE LEMON CONSERVANCY

I have prepared the financial statements for LAKE LEMON CONSERVANCY as of March 31, 2013 on the basis used in the preparation of its federal income tax returns. The tax returns are prepared on the accrual basis when appropriate.

The following are the company's significant accounting policies under this basis:

Income Tax. No provision or liability for income taxes has been included in the financial statements.

Provision for Doubtful Accounts. No provision for doubtful accounts is made. The company follows the practice of charging off all accounts deemed uncollectible directly to expense.

Property and Equipment. Property and equipment, as well as liabilities pertaining thereto, are recorded at cost as determined for income tax purposes.

Shirley Watkins, CPA
April 9, 2013

LAKE LEMON CONSERVANCY
Balance Sheet
As of March 31, 2013

	Mar 31, 13
ASSETS	
Current Assets	
Checking/Savings	
1000 · Peoples State Bank	105,919.24
1010 · Petty Cash	100.00
1020 · Change Fund	200.00
1030 · CD's General Fund	216,008.85
1040 · CD's Cumulative Maint Fund	66,796.67
1050 · Savings Account	766.86
Total Checking/Savings	389,791.62
Total Current Assets	389,791.62
Fixed Assets	
1510 · Trucks	110,251.25
1520 · Other Asset	35,350.00
1550 · Boats	209,750.00
1680 · Other Fixed Assets	99,501.66
Total Fixed Assets	454,852.91
TOTAL ASSETS	**844,644.53**
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Other Current Liabilities	
2010 · FICA & Federal Taxes Payable	2,257.45
2020 · State & Co. Withholding Payable	742.96
2500 · CREDIT LINE -PEOPLES STATE BANK	10,247.28
Total Other Current Liabilities	13,247.69
Total Current Liabilities	13,247.69
Long Term Liabilities	
2800 · Long Term Notes-Net of Current	100,222.13
Total Long Term Liabilities	100,222.13
Total Liabilities	113,469.82
Equity	
3000 · Opening Balance Equity	101,373.66
3040 · General Fund	569,873.33
3050 · Encumbered Fund	55.00
3060 · Cumulative Maintenance Fund	38,441.47
32000 · Retained Earnings	70,389.44
Net Income	-48,958.19
Total Equity	731,174.71
TOTAL LIABILITIES & EQUITY	**844,644.53**

LAKE LEMON CONSERVANCY
Profit & Loss
March 2013

	Mar 13
Income	
4000 · Watercraft Permits	1,797.00
4010 · Launch Fees	557.00
4020 · Marina & Club Fees	1,000.08
4030 · Sublease & Access Fees	10,310.00
4060 · Interest	155.08
4070 · Grants & Donations	10.00
4090 · Park Reservations	125.00
Total Income	13,954.16
Expense	
6000 · Manager	4,582.58
6010 · FICA	707.21
6030 · Retirement	1,191.48
6040 · Health Insurance	1,681.51
6110 · Lake Biologist	1,372.00
6112 · Dredger (Other)	2,572.50
6114 · Assistant Dredger (Other)	717.50
6140 · Receipt/Tickets Books	289.26
6160 · Printer, Copier & Computer Supp	54.99
6170 · Miscellaneous-Other	11.68
6180 · Postage	95.32
6200 · Regular Gas	75.00
6240 · Building & Grounds	326.96
6250 · Boat/Weed Harvester/Truck	30.94
6251 · Dredging Supplies	547.31
6290 · Signs & Nautical Markers	1,842.00
6300 · Accounting Services	450.00
6320 · Attorney	255.00
6370 · Phone, LDT, Pager, E-Mail	231.67
6450 · Insurance	8,272.00
6460 · Electric	343.95
6470 · Water	42.14
6510 · Building & Grounds Expense	225.00
Total Expense	25,918.00
Net Income	**-11,963.84**

LAKE LEMON CONSERVANCY
Profit & Loss Budget vs. Actual
January through March 2013

	Jan - Mar 13	Budget	$ Over Budget	% of Budget
Income				
4000 · Watercraft Permits	1,797.00	102,000.00	-100,203.00	1.8%
4010 · Launch Fees	557.00	16,000.00	-15,443.00	3.5%
4020 · Marina & Club Fees	2,000.08	8,000.00	-5,999.92	25.0%
4030 · Sublease & Access Fees	21,885.00	26,000.00	-4,115.00	84.2%
4040 · Property Tax - Brown Co.	0.00	54,000.00	-54,000.00	0.0%
4050 · Property Tax -Monroe Co.	0.00	196,000.00	-196,000.00	0.0%
4060 · Interest	417.87	2,500.00	-2,082.13	16.7%
4070 · Grants & Donations	10.00	6,000.00	-5,990.00	0.2%
4080 · Fishing Tournament	600.00	800.00	-200.00	75.0%
4090 · Park Reservations	3,375.00	4,500.00	-1,125.00	75.0%
4100 · Park Admisioin Fees	0.00	27,500.00	-27,500.00	0.0%
4130 · Dredging/Rip-Rap Income	0.00	10,000.00	-10,000.00	0.0%
Total Income	30,641.95	453,300.00	-422,658.05	6.8%
Expense				
6000 · Manager	13,747.74	54,991.00	-41,243.26	25.0%
6010 · FICA	1,793.40	10,564.00	-8,770.60	17.0%
6020 · State Unemployment Tax	11.74	332.00	-320.26	3.5%
6030 · Retirement	3,876.34	7,149.00	-3,272.66	54.2%
6040 · Health Insurance	4,581.67	18,700.00	-14,118.33	24.5%
6050 · Life Insurance	1,263.00	1,263.00	0.00	100.0%
6070 · Gate Attendant	0.00	14,250.00	-14,250.00	0.0%
6090 · Park Maintenance Technician	0.00	2,800.00	-2,800.00	0.0%
6100 · Lake Patrol	0.00	4,800.00	-4,800.00	0.0%
6110 · Lake Biologist	4,165.00	14,000.00	-9,835.00	29.8%
6111 · Dredger	0.00	21,000.00	-21,000.00	0.0%
6112 · Dredger (Other)	4,812.50	10,500.00	-5,687.50	45.8%
6113 · Assistant Dredger	0.00	10,500.00	-10,500.00	0.0%
6114 · Assistant Dredger (Other)	717.50	5,250.00	-4,532.50	13.7%
6120 · Season & Launch Permits	1,486.05	1,000.00	486.05	148.6%
6130 · Daily Permits	199.82	250.00	-50.18	79.9%
6140 · Receipt/Tickets Books	289.26	400.00	-110.74	72.3%
6150 · Checks	0.00	200.00	-200.00	0.0%
6160 · Printer, Copier & Computer Supp	156.67	500.00	-343.33	31.3%
6170 · Miscellaneous-Other	100.05	1,350.00	-1,249.95	7.4%
6180 · Postage	186.42	1,300.00	-1,113.58	14.3%
6190 · General Business Supplies	106.95	500.00	-393.05	21.4%
6200 · Regular Gas	230.00	4,000.00	-3,770.00	5.8%
6210 · Diesel	0.00	12,500.00	-12,500.00	0.0%
6240 · Building & Grounds	459.43	3,500.00	-3,040.57	13.1%
6250 · Boat/Weed Harvester/Truck	322.91	2,000.00	-1,677.09	16.1%
6251 · Dredging Supplies	663.31	8,000.00	-7,336.69	8.3%
6252 · Rip Rap/Erosion Control	0.00	10,000.00	-10,000.00	0.0%
6290 · Signs & Nautical Markers	1,842.00	2,000.00	-158.00	92.1%
6300 · Accounting Services	1,350.00	5,400.00	-4,050.00	25.0%
6310 · Grass	0.00	10,875.00	-10,875.00	0.0%

LAKE LEMON CONSERVANCY
Profit & Loss Budget vs. Actual
January through March 2013

	Jan - Mar 13	Budget	$ Over Budget	% of Budget
6320 · Attorney	510.00	6,000.00	-5,490.00	8.5%
6330 · Consulting Engineer	0.00	4,000.00	-4,000.00	0.0%
6350 · Other Prof/Secretarial Service	136.00	500.00	-364.00	27.2%
6370 · Phone, LDT, Pager, E-Mail	695.01	3,400.00	-2,704.99	20.4%
6410 · Subscriptions	50.00	300.00	-250.00	16.7%
6420 · Newsletter	0.00	800.00	-800.00	0.0%
6430 · Ads	21.84	300.00	-278.16	7.3%
6440 · Other	271.14	1,500.00	-1,228.86	18.1%
6450 · Insurance	21,251.00	45,000.00	-23,749.00	47.2%
6460 · Electric	1,062.85	5,000.00	-3,937.15	21.3%
6470 · Water	126.42	600.00	-473.58	21.1%
6480 · Trash	80.21	1,000.00	-919.79	8.0%
6490 · Port-O-Lets	0.00	2,200.00	-2,200.00	0.0%
6500 · Pump Holding Tank	0.00	600.00	-600.00	0.0%
6510 · Building & Grounds Expense	1,070.00	4,000.00	-2,930.00	26.8%
6520 · Boat	0.00	1,500.00	-1,500.00	0.0%
6530 · Truck	463.91	1,000.00	-536.09	46.4%
6541 · Dredging Equipment Maintenance	0.00	7,000.00	-7,000.00	0.0%
6542 · Equipment Rental	0.00	3,000.00	-3,000.00	0.0%
6560 · Water Testing	0.00	4,000.00	-4,000.00	0.0%
6570 · Lake Weed Treatment	0.00	50,000.00	-50,000.00	0.0%
6590 · Contigency Funds 10%	0.00	5,000.00	-5,000.00	0.0%
6600 · 6% MarinaPermit Sales	0.00	2,300.00	-2,300.00	0.0%
6610 · Cumulative Maintenance Fund	0.00	5,000.00	-5,000.00	0.0%
6630 · Spillway Repairs	0.00	10,000.00	-10,000.00	0.0%
6661 · Disposal Site Preparation	0.00	5,000.00	-5,000.00	0.0%
6662 · Debt Service-Dreding Loan	10,247.28	46,000.00	-35,752.72	22.3%
6670 · Debt Service (Dreding Equip.)	1,252.72			
6680 · Other Services and Charges	0.00	2,000.00	-2,000.00	0.0%
6681 · Fireworks	0.00	7,000.00	-7,000.00	0.0%
6710 · Boat Dock	0.00	23,000.00	-23,000.00	0.0%
6770 · LLCD Pick-up Truck	0.00	20,000.00	-20,000.00	0.0%
Total Expense	79,600.14	506,874.00	-427,273.86	15.7%
Net Income	**-48,958.19**	**-53,574.00**	**4,615.81**	**91.4%**

Lake Lemon Conservancy District

Date: March 31, 2013 **ALLOWANCE OF VOUCHERS** **Lance Eberle**
Treasurer

(Report of Claims)

(IC 5-11-10-2 permits the governing body to sign the Accounts Payable Voucher Register in lieu of signing each claim the governing body is allowing.) We have examined the vouchers listed on the foregoing accounts payable voucher register and payroll journal, consisting of 5 pages, and except for vouchers not allowed as shown on the Register such vouchers are allowed in the total of $22,057.86

Dated this 17th day of April 2013

Signature of Governing Board

JOHN SCHELL, CHAIRMAN

PAM DUGAN, VICE-CHAIR

LANCE EBERLE, TREASURER

TIM SPECHT, Sub-Area II

VACANT, Sub-Area III

DENNIS FRIESEL, Sub-Area V

TINA THRASHER, Sub-Area VII

7599 North Tunnel Road, Unionville, IN 47468
Phone 812/334-0233 • Fax 812/335-0038

LAKE LEMON CONSERVANCY
Check Detail
March 2013

Type	Num	Date	Name	Item	Account	Paid Amount	Original Amount
Check	2509	3/7/2013	B & B WATER CORP		1000 · Peoples Sta...		-42.14
					6470 · Water	-42.14	42.14
TOTAL						-42.14	42.14
Check	2510	3/7/2013	NAPA AUTO PARTS		1000 · Peoples Sta...		-56.91
					6250 · Boat/Weed ...	-30.94	30.94
					6251 · Dredging Su...	-25.97	25.97
TOTAL						-56.91	56.91
Check	2511	3/7/2013	STAPLES CREDIT ...		1000 · Peoples Sta...		-54.99
					6160 · Printer, Copi...	-54.99	54.99
TOTAL						-54.99	54.99
Check	2516	3/18/2013	COMCAST CABLE		1000 · Peoples Sta...		-198.94
					6370 · Phone, LDT,...	-198.94	198.94
TOTAL						-198.94	198.94
Check	2517	3/18/2013	ANDREWS, HARR...		1000 · Peoples Sta...		-255.00
					6320 · Attorney	-255.00	255.00
TOTAL						-255.00	255.00
Check	2518	3/18/2013	WATKINS ACCOU...		1000 · Peoples Sta...		-450.00
					6300 · Accounting ...	-450.00	450.00
TOTAL						-450.00	450.00
Check	2519	3/18/2013	YOUNG TRUCKING		1000 · Peoples Sta...		-245.53
					6240 · Building & G...	-245.53	245.53
TOTAL						-245.53	245.53

LAKE LEMON CONSERVANCY
Check Detail
March 2013

Type	Num	Date	Name	Item	Account	Paid Amount	Original Amount
Check	2520	3/18/2013	VERIZON WIRELE...		1000 · Peoples Sta...		-32.73
					6370 · Phone, LDT,...	-32.73	32.73
TOTAL						-32.73	32.73
Check	2521	3/18/2013	ROLYAN BUOYS		1000 · Peoples Sta...		-1,842.00
					6290 · Signs & Nau...	-1,842.00	1,842.00
TOTAL						-1,842.00	1,842.00
Check	2522	3/18/2013	ANTHEM BLUE CR...		1000 · Peoples Sta...		-1,681.51
					6040 · Health Insur...	-1,681.51	1,681.51
TOTAL						-1,681.51	1,681.51
Check	2523	3/18/2013	ISON'S DOCK AN...		1000 · Peoples Sta...		-225.00
					6510 · Building & G...	-225.00	225.00
TOTAL						-225.00	225.00
Check	2524	3/18/2013	VISA		1000 · Peoples Sta...		-610.69
					6170 · Miscellaneou...	-11.68	11.68
					6180 · Postage	-95.32	95.32
					6200 · Regular Gas	-75.00	75.00
					6251 · Dredging Su...	-428.69	428.69
TOTAL						-610.69	610.69
Check	2525	3/26/2013	FIRST INSURANC...		1000 · Peoples Sta...		-8,272.00
					6450 · Insurance	-8,272.00	8,272.00
TOTAL						-8,272.00	8,272.00
Check	2526	3/27/2013	SCI REMC		1000 · Peoples Sta...		-343.95
					6460 · Electric	-343.95	343.95
TOTAL						-343.95	343.95

LAKE LEMON CONSERVANCY
Check Detail
March 2013

Type	Num	Date	Name	Item	Account	Paid Amount	Original Amount
Check	2532	3/30/2013	LOWE'S COMPANI...		1000 · Peoples Sta...		-141.64
					6240 · Building & G...	-68.78	68.78
					6251 · Dredging Su...	-72.86	72.86
TOTAL						-141.64	141.64
Check	2533	3/30/2013	BOYCE FORMS S...		1000 · Peoples Sta...		-289.26
					6140 · Receipt/Tick...	-289.26	289.26
TOTAL						-289.26	289.26
Check	2534	3/30/2013	KLEINDORFER HA...		1000 · Peoples Sta...		-32.44
					6240 · Building & G...	-12.65	12.65
					6251 · Dredging Su...	-19.79	19.79
TOTAL						-32.44	32.44

$ 14,774.73

LAKE LEMON CONSERVANCY
Payroll Summary
March 2013

	Goshorn, Gregory G			HAYS, LARRY D			MADDEN, ROBERT E			VanTassel, James P			WAR...
	Hours	Rate	Mar 13	Hours	Rate	Mar 13	Hours	Rate	Mar 13	Hours	Rate	Mar 13	Hours
Employee Wages, Taxes and Adjustments													
Gross Pay													
Salary			0.00			0.00			4,582.58			0.00	
HOURLY PAY-6110			0.00			0.00			0.00	98	14.00	1,372.00	
Reg.Pay-6111			0.00			0.00			0.00			0.00	
Reg.Pay-6112			0.00			0.00			0.00			0.00	73.5
Reg.Pay-6114	27	17.50	472.50	14	17.50	245.00			0.00			0.00	
Reg.Pay 6113		17.00	0.00		17.00	0.00			0.00		17.00	0.00	
Total Gross Pay	27		472.50	14		245.00			4,582.58	98		1,372.00	73.5
Deductions from Gross Pay													
Insurance			0.00			0.00			0.00			0.00	
Total Deductions from Gross Pay			0.00			0.00			0.00			0.00	
Adjusted Gross Pay	27		472.50	14		245.00			4,582.58	98		1,372.00	73.5
Taxes Withheld													
Federal Withholding			0.00			0.00			-516.00			-54.00	
Medicare Employee			-6.85			-3.55			-66.45			-19.89	
Social Security Employee			-29.30			-15.19			-284.12			-85.06	
IN - Withholding			-16.07			-8.33			-155.80			-46.65	
Hamilton Co			0.00			0.00			0.00			-13.73	
Monroe Co.			0.00			-2.55			-47.66			0.00	
Owen co			-6.15			0.00			0.00			0.00	
Total Taxes Withheld			-58.37			-29.62			-1,070.03			-219.33	
Net Pay	**27**		**414.13**	**14**		**215.38**			**3,512.55**	**98**		**1,152.67**	**73.5**
Employer Taxes and Contributions													
Federal Unemployment			2.84			1.47			0.00			8.23	
Medicare Company			6.85			3.55			66.45			19.89	
Social Security Company			29.30			15.19			284.12			85.06	
IN - Unemployment Company			2.55			1.32			1.81			7.41	
Total Employer Taxes and Contributions			41.54			21.53			352.38			120.59	

LAKE LEMON CONSERVANCY
Payroll Summary
March 2013

	WARTHAN, LEVI R		TOTAL		
	Rate	Mar 13	Hours	Rate	Mar 13
Employee Wages, Taxes and Adjustments					
Gross Pay					
Salary		0.00			4,582.58
HOURLY PAY-6110		0.00	98.00		1,372.00
Reg.Pay-6111	34.00	0.00			0.00
Reg.Pay-6112	35.00	2,572.50	73.50		2,572.50
Reg.Pay-6114		0.00	41.00		717.50
Reg.Pay 6113		0.00			0.00
Total Gross Pay		2,572.50	212.50		9,244.58
Deductions from Gross Pay					
Insurance		0.00			0.00
Total Deductions from Gross Pay		0.00			0.00
Adjusted Gross Pay		2,572.50	212.50		9,244.58
Taxes Withheld					
Federal Withholding		-273.00			-843.00
Medicare Employee		-37.30			-134.04
Social Security Employee		-159.50			-573.17
IN - Withholding		-87.47			-314.32
Hamilton Co		0.00			-13.73
Monroe Co.		-26.83			-77.04
Owen co		0.00			-6.15
Total Taxes Withheld		-584.10			-1,961.45
Net Pay		1,988.40	212.50		7,283.13
Employer Taxes and Contributions					
Federal Unemployment		15.44			27.98
Medicare Company		37.30			134.04
Social Security Company		159.50			573.17
IN - Unemployment Company		13.89			26.98
Total Employer Taxes and Contributions		226.13			762.17

Lake Lemon Conservancy District

April 17, 2013

Renewal Advice for Certificates of Deposit

Certificate #	Amount	Term	Renewal Date	Fund
371025937	$81,008.85	?	04/0713	General Fund
371025791	$35,000.00	?	04/20/13	General Fund

Current Renewal Interest Rates Available: Same % for Both CD's.

Term	Rate
6 Months	0.40 %
12 Months	0.50 %
18 Months	0.55 %
24 Months	0.65 %

7599 North Tunnel Road, Unionville, IN 47468
Phone 812/334-0233 • Fax 812/335-0038

THE PEOPLES STATE BANK
P.O. BOX 128
ELLETTSVILLE, INDIANA 47429
(812) 876-2228

LAKE LEMON CONSERVANCY DIST
GENERAL FUND
ROBERT E MADDEN
7599 N TUNNEL RD
UNIONVILLE IN 47468-9733

CUSTOMER: 128799

AS OF: 03/25/13

182 DAY CERTIFICATE 371025937

		INTEREST RATE:	.4000 %
ORIGINAL ISSUE DATE:	07/07/12	MATURITY DATE:	04/07/13
ORIGINAL ISSUE VALUE:	81,008.85	TERM:	9 MONTHS

****
* A P P R O A C H I N G R E N E W A L A D V I C E *
****

YOUR CERTIFICATE WILL MATURE ON 04/07/13. INTEREST WILL BE COMPOUNDED ON A DAILY BASIS. INTEREST WILL BE CREDITED TO YOUR CERTIFICATE QUARTERLY. INTEREST WILL BE TRANSFERRED TO CHECKING ACCOUNT 623636, AND THE CURRENT BALANCE OF YOUR 182 DAY CERTIFICATE IS 81,008.85. IF THE CERTIFICATE RENEWS, THE NEW MATURITY DATE WILL BE 10/06/13.

THE INTEREST RATE UPON RENEWAL OF YOUR ACCOUNT HAS NOT BEEN DETERMINED. THE RATE WILL BE DETERMINED ON 04/07/13. YOU MAY CALL 812-876-2228 OR YOUR LOCAL BRANCH TO OBTAIN THE INTEREST RATE AND THE ANNUAL PERCENTAGE YIELD THAT WILL BE PAID ON YOUR ACCOUNT.

THE PEOPLES STATE BANK
P.O. BOX 128
ELLETTSVILLE, INDIANA 47429
(812) 876-2228

LAKE LEMON CONSERVANCY DIST
ROBERT E MADDEN
7599 N TUNNEL RD
UNIONVILLE IN 47468-9733

CUSTOMER: 128799

AS OF: 04/08/13

12 MONTH CERTIFICATE 371025791

		INTEREST RATE:	.5500 %
ORIGINAL ISSUE DATE:	04/20/12	MATURITY DATE:	04/20/13
ORIGINAL ISSUE VALUE:	35,000.00	TERM:	12 MONTHS

****
* A P P R O A C H I N G R E N E W A L A D V I C E *
****

YOUR CERTIFICATE WILL MATURE ON 04/20/13. INTEREST WILL BE COMPOUNDED ON A DAILY BASIS. INTEREST WILL BE CREDITED TO YOUR CERTIFICATE QUARTERLY. INTEREST WILL BE TRANSFERRED TO CHECKING ACCOUNT 623636, AND THE CURRENT BALANCE OF YOUR 12 MONTH CERTIFICATE IS 35,000.00. IF THE CERTIFICATE RENEWS, THE NEW MATURITY DATE WILL BE 04/20/14.

THE INTEREST RATE UPON RENEWAL OF YOUR ACCOUNT HAS NOT BEEN DETERMINED. THE RATE WILL BE DETERMINED ON 04/20/13. YOU MAY CALL 812-876-2228 OR YOUR LOCAL BRANCH TO OBTAIN THE INTEREST RATE AND THE ANNUAL PERCENTAGE YIELD THAT WILL BE PAID ON YOUR ACCOUNT.

Lake Lemon Conservancy District

RESOLUTION 04-13-02

WHEREAS, the Lake Lemon Conservancy District (LLCD), on March 12, 2013, was awarded a $5,000.00 Grant for exotic vegetation control from the Indiana Department of Natural Resources Lake and River Enhancement Program, and

WHEREAS, the LLCD Board of Directors, by unanimous vote, officially accepted the grant at it's March 20, 2013 Board Meeting, and

THEREFORE, IT IS RESOLVED THAT the Board of Directors of the Lake Lemon Conservancy District here-by establishes a pass-thru vegetation grant fund for 2013, and appropriates $5,000.00 for this fund.

ADOPTED BY THE FOLLOWING VOTE: This 17th Day of April 2013.

	AYE	NAY	ABSTAIN
JOHN SCHELL, CHAIRMAN			
PAM DUGAN, VICE-CHAIR			
LANCE EBERLE, TREASURER			
TIM SPECHT, Sub-Area II			
VACANT, Sub-Area III			
DENNIS FRIESEL, Sub-Area V			
TINA THRASHER, Sub-Area VII			

ATTEST: _____ LLCD Board Recorder

7599 North Tunnel Road, Unionville, IN 47468
Phone 812/334-0233 • Fax 812/335-0038

Acknowledgments

We'd like to thank the following SPEA students for their help in collecting and analyzing the data used in this report: Sarah Powers, Matt Kerby, Nick Cooper, Kelsey Thetonia, Kassia Groszewski, Bridget Borrowdale, Dan Warner, Tammy Behrman, Amari Malone, and Shannon Madden. We'd also like to thank Bob Madden and James Van Tassel of the Lake Lemon Conservancy District for their help in facilitating our sampling efforts.

CONTENTS

1.0 INTRODUCTION

The Lake Lemon Conservancy District (LLCD) has entered into a lease agreement with the City of Bloomington Utilities Service Board (USB) to maintain Lake Lemon in such condition necessary to protect the lake's water quality consistent with its potential use as a drinking water source. LLCD also agreed to maintain the lake in such condition to meet all state and federal requirements for recreational waters and to maintain the quality of the water in the lake at least at its present level.

The LLCD has contracted with Indiana University's School of Public & Environmental Affairs (SPEA) to evaluate the condition of Lake Lemon since 1997. This report is the result of SPEA's 2012 monitoring efforts.

2.0 METHODS

The water sampling and analytical methods used for Lake Lemon were consistent with those used in IDEM's Indiana Clean Lakes Program and IDNR's Lake and River Enhancement Program. We collected water samples for various parameters on 4/17/12, 6/14/12, and 7/31/12 from over the point of maximum depth off Cemetery Island near Riddle Point and in the channel off Reed Point in the eastern end of Lake Lemon.

We collected water samples from one meter below the surface (***epilimnion***) and from one meter above the bottom (***hypolimnion***) at each lake site that was thermally stratified, except the Chitwood site where we only sampled the epilimnion due to the very shallow channel. These samples were preserved as needed, placed in coolers and transported to our laboratory for analysis. Chlorophyll was determined only for the epilimnetic sample. Other parameters such as Secchi disk transparency, light transmission, and oxygen saturation are single measurements. In addition, dissolved oxygen and temperature were measured at one-meter intervals from the surface to the bottom. A tow to collect zooplankton was made from the 1% light level to the water surface. An integrated sampler was used to collect phytoplankton within the first two meters of the water column.

Because Lake Lemon's condition is heavily influenced by runoff from its watershed, it was also important to monitor the main inlet to the lake - Beanblossom Creek. Therefore, we sampled Beanblossom Creek on 4/17/12 and 7/31/12, at one location at mid-depth near its discharge point to the lake.

The following parameters were measured for both the lake and stream samples:

- pH
- alkalinity
- conductivity
- dissolved oxygen
- temperature
- total phosphorus
- soluble reactive phosphorus
- nitrate+nitrite
- ammonia
- total organic nitrogen
- total suspended solids
- fecal coliform bacteria

In addition to the water sampling stations described above, we also monitored several other locations for fecal coliform bacteria. At the Chitwood addition, we collected water samples from just inside the entrance (Chitwood #1) and ¾ of the way down the main channel (Chitwood #2), Bear Creek and the North side Marina drainage inlet to Lake Lemon.

All sampling techniques and laboratory analytical methods were performed in accordance with procedures in *Standard Methods for the Examination of Water and* Wastewater, 21th Edition (APHA, 2005). Phytoplankton counts were made using a nannoplankton chamber (PhycoTech, Inc.) and a phase contrast light microscope and zooplankton counted using a standard Sedgewick-Rafter counting cell. Fifteen fields per cell were counted for phytoplankton and the entire slide was counted for zooplankton. Plankton identifications were made according to: Wehr and Sheath (2003), Prescott (1982), Ward and Whipple (1959) and Whitford and Schumacher (1984).

The comprehensive evaluation of lakes and streams require collecting data on a number of different, and sometimes hard-to-understand, water quality parameters. Some of the more important parameters that we analyze include:

Temperature. Temperature can determine the form, solubility, and toxicity of a broad range of aqueous compounds. Likewise, life associated with the aquatic environment in any location has its species composition and activity regulated by water temperature. Since essentially all aquatic organisms are 'cold-blooded' the temperature of the water regulates their metabolism and ability to survive and reproduce effectively (EPA, 1976). The Indiana Administrative Code (327 IAC 2-1-6) sets maximum temperature limits to protect aquatic life for Indiana streams. For example, temperatures during the month of May should not exceed 80 ^{o}F (23.7 ^{o}C) by more than 3 ^{o}F (1.7 ^{o}C). June temperatures should not exceed 90 ^{o}F (32.2 ^{o}C).

Dissolved Oxygen (D.O). D.O. is the dissolved gaseous form of oxygen. It is essential for respiration of fish and other aquatic organisms. Fish need at least 3-5 mg/L of D.O. Cold-water fish such as trout generally require higher concentrations of D.O. than warm water fish such as bass or Bluegill. The IAC sets minimum D.O. concentrations at 6 mg/L for cold-water fish. D.O. enters water by diffusion from the atmosphere and as a byproduct of photosynthesis by algae and plants. Excessive algae growth can over-saturate (greater than 100% saturation) the water with D.O. Conversely, dissolved oxygen is consumed by respiration of aquatic organisms, such as fish, and during bacterial decomposition of plant and animal matter.

Conductivity. Conductivity is a measure of the ability of an aqueous solution to carry an electric current. This ability depends on the presence of ions: on their total concentration, mobility, and valence (APHA, 1998). During low discharge, conductivity is higher than during storm water runoff because the water moves more slowly across or through ion containing soils and substrates during base flow. Carbonates and other charged particles (ions) dissolve into the slow-moving water, thereby increasing conductivity measurements.

pH. The pH of water is a measure of the concentration of acidic ions (specifically H^+) present in the water. The pH also determines the form, solubility, and toxicity of a wide range of other aqueous compounds. The IAC establishes a range of 6-9 pH units for the protection of aquatic life.

Alkalinity. Alkalinity is a measure of the acid-neutralizing (or buffering) capacity of water. Certain substances, if present in water, like carbonates, bicarbonates, and sulfates can cause the water to resist changes in pH. A lower alkalinity indicates a lower buffering capacity or a decreased ability to resist changes in pH. During base flow conditions, alkalinity is usually high because the water picks up carbonates from the bedrock. Alkalinity measurements are usually lower during storm flow conditions because buffering compounds are diluted by rainwater and the runoff water moves across carbonate-containing bedrock materials so quickly that little carbonate is dissolved to add additional buffering capacity.

Nitrogen. Nitrogen is an essential plant nutrient found in fertilizers, human and animal wastes, yard waste, and the air. About 80% of the air we breathe is nitrogen gas. Nitrogen gas diffuses into water where it can be "fixed", or converted, by Blue-green algae to ammonia for their use. Nitrogen can also enter lakes and streams as inorganic nitrogen and ammonia. Because of this, there is an abundant supply of available nitrogen to aquatic systems. The three common forms of nitrogen are:

> ***Nitrate (NO_3^-)*** – Nitrate is an oxidized form of dissolved nitrogen that is converted to ammonia by algae. It is found in streams and runoff when dissolved oxygen is present, usually in the surface waters. Ammonia applied to farmland is rapidly oxidized or converted to nitrate and usually enters surface and groundwater as nitrate. The Ohio EPA (1999) found that the median nitrate-nitrogen concentration in wadeable streams that support modified warmwater habitat (MWH) was 1.6 mg/L. Modified warmwater habitat was defined as: aquatic life use assigned to streams that have irretrievable, extensive, man-induced modification that preclude attainment of the warmwater habitat use (WWH) designation; such streams are characterized by species that are tolerant of poor chemical quality (fluctuating dissolved oxygen) and habitat conditions (siltation, habitat amplification) that often occur in modified streams (Ohio EPA, 1999). Nitrate concentrations exceeding 10 mg/L in drinking water are considered hazardous to human health (Indiana Administrative Code IAC 2-1-6).
>
> ***Ammonia (NH_4^+)*** – Ammonia is a form of dissolved nitrogen that is the preferred form for algae use. It is the reduced form of nitrogen and is found in water where dissolved oxygen is lacking. Important sources of ammonia include fertilizers and animal manure. In addition, bacteria produce ammonia as a by-product as they decompose dead plant and animal matter. Both temperature and pH govern the toxicity of ammonia for aquatic life.

Organic Nitrogen (Org N) – Organic nitrogen includes nitrogen found in plant and animal materials. It may be in dissolved or particulate form. In the analytical procedures, total Kjeldahl nitrogen (TKN) was analyzed. Organic nitrogen is TKN minus ammonia.

Phosphorus. Phosphorus is an essential plant nutrient, and the one that most often controls aquatic plant (algae and macrophyte) growth in freshwater. It is found in fertilizers, human and animal wastes, and yard waste. There are few natural sources of phosphorus to streams other than what is attached to soil particles, and there is no atmospheric (vapor) form of phosphorus. For this reason, phosphorus is often a ***limiting nutrient*** in aquatic systems. This means that the relative scarcity of phosphorus may limit the ultimate growth and production of algae and rooted aquatic plants. Therefore, management efforts often focus on reducing phosphorus inputs to receiving waterways because: (a) it can be managed and (b) reducing phosphorus can reduce algae production. Two common forms of phosphorus are:

Soluble reactive phosphorus (SRP) – SRP is dissolved phosphorus readily usable by algae. SRP is often found in very low concentrations in phosphorus-limited systems where the phosphorus is tied up in the algae themselves. Because phosphorus is cycled so rapidly through biota, SRP concentrations as low as 0.005 mg/L are enough to maintain eutrophic or highly productive conditions in lake systems (Correll, 1998). Sources of SRP include fertilizers, animal wastes, and septic systems.

Total phosphorus (TP) – TP includes dissolved and particulate phosphorus. TP concentrations greater than 0.03 mg/L (or 30μg/L) can cause algal blooms in lakes and reservoirs. The Ohio EPA (1999) found that the median TP in wadeable streams that support MWH for fish was 0.28 mg/L.

Total Suspended Solids (TSS). A TSS measurement quantifies all particles suspended and dissolved in stream water. Closely related to turbidity, this parameter quantifies sediment particles and other solid compounds typically found in stream water. In general, the concentration of suspended solids is greater during high flow events due to increased overland flow. The increased overland flow erodes and carries more soil and other particulates to the stream. Although the State of Indiana sets no standard for TSS, total dissolved solids should not exceed 750 mg/L. In general, TSS concentrations >80 mg/L have been found to be deleterious to aquatic life (Waters, 1995).

***Fecal Coliform* Bacteria -** is used as an indicator organism to identify the potential for the presence of pathogenic organisms in a water sample. Pathogenic organisms can present a threat to human health by causing a variety of serious diseases, including infectious hepatitis, typhoid, gastroenteritis, and other gastrointestinal illnesses. *Fecal coliforms* can come from the feces of any warm-blooded animal. Wildlife, livestock, and/or domestic animal defecation, manure fertilizers, previously contaminated sediments, and failing or improperly sited septic systems are common sources of the bacteria. The IAC sets the maximum standard at 200 colonies/100 ml in any one sample

within a 30-day period or a geometric mean of 125 colonies per 100 ml for five samples collected in any 30-day period. In general, fecal coliform bacteria have a life expectancy of less than 24 hours.

Secchi Disk Transparency. This refers to the depth to which the black & white Secchi disk can be seen in the lake water. Water clarity, as determined by a Secchi disk, is affected by two primary factors: algae and suspended particulate matter. Particulates (for example, soil or dead leaves) may be introduced into the water by either runoff from the land or from sediments already on the bottom of the lake. Many processes may introduce sediments from runoff; examples include erosion from construction sites, agricultural lands, and riverbanks. Bottom sediments may be resuspended by bottom feeding fish such as carp, or in shallow lakes, by motorboats or strong winds.

Light Transmission. Similar to the Secchi disk transparency, this measurement uses a light meter (photocell) to determine the rate at which light transmission is diminished in the upper portion of the lake's water column. Another important light transmission measurement is determination of the 1% light level. The 1% light level is the water depth to which one percent of the surface light penetrates. This is considered the lower limit of algal growth in lakes and is referred to as the *photic zone*.

Plankton. Plankton are important members of the aquatic food web. The plankton include the algae (microscopic plants) and the zooplankton (tiny shrimp-like animals that eat algae). The zooplankton net is towed up through the lake's water column from the one percent light level to the surface utilizing a 80-micron mesh on the net and bucket. Beginning in 2010, phytoplankton were sampled using a 2-meter integrated sampler and in the lab whole water samples of phytoplankton were concentrated using Utermoehl settling chambers. Either 25-ml or 50-ml of sample is concentrated to insure sufficient cell density. Settled concentrate is transferred into a 2-mL micro-centrifuge tube for storage. Counts are made using a nanoplankton chamber (PhycoTech, Inc.) and a phase contrast light microscope. Historically in our analysis of Lake Lemon algae are reported as *natural units*, which records one colonial filament of multiple cells as one natural unit and one cell of a singular alga also as one natural unit. According to the literature, (Ward and Whipple, 1959; Prescott, 1982; Whitford and Schumacher, 1984; Wehr and Sheath, 2003; and St. Amand, 2010) in order to provide a more accurate representation of lake algal community composition, in 2011, we have also included counts of only individual cells. For example, the previous method would count a single filamentous green algae (ie: *Ulothrix*) with 20 cells or 10 cells as one unit, whereas the new method would default to a count of 20 or 15 individual cells. Ten to thirty (based on variability of cells per *natural unit*) representative specimens were selected at random and a mean number of cells per natural unit was calculated. Final counts of each genera appear lower however, because they are reported as # of cells per milliliter as opposed to natural units per L. In this report we report only cell counts in replacement of *natural units*. Of the many different algal species present in the water, we are particularly interested in the blue-green algae. Blue-green algae are those that most often form nuisance blooms and their dominance in lakes may indicate poor water conditions.

Chlorophyll-*a*. The plant pigments of algae consist of the chlorophylls (green color) and carotenoids (yellow color). Chlorophyll-*a* is by far the most dominant chlorophyll pigment and occurs in great abundance. Thus, chlorophyll-*a* is often used as a direct estimate of algal biomass.

Figure 1. Phytoplankton can be counted with two techniques: natural unit per liter (N.U./L) and cells per milliliter (cells/ml). Colonial species, like this blue-green algae can be enumerated using both methods. This *Anabaena* is counted as one (1) N.U./L, whereas it would be also counted as 74 cells/ml.

3.0 RESULTS

3.1 Water Quality

Just following spring turnover, when the lake temperatures are the same throughout the water column, the temperature profile in April is almost isothermal with the surface temperature slightly warmer. Temperature profiles for June and July indicated slight thermal stratification at Riddle Point, while Reed Point primarily illustrates no stratification (Figures 2 and 3). In most Indiana lakes, thermal stratification is weakest in the spring and gets stronger as summer progresses. The April temperatures at Riddle Point range less than 2°C, with the warmer surface 17.3°C surface temperature and 15.4°C bottom temperature. By June, the Riddle Point temperature profile was stratified with the hypolimnion starting at 3m deep. The whole water column continued to warm with the July surface temperature reaching 28.9°C and the hypolimnion reaching 23.8°C. Reed Point basically was isothermal throughout the whole summer, with a slight temperature decrease in at the 3m depth, which is likely due to calm water conditions reducing the mixing of this shallow sampling site. Reed Point is shallow enough that turbulence from winds and boating activity usually keeps it well mixed.

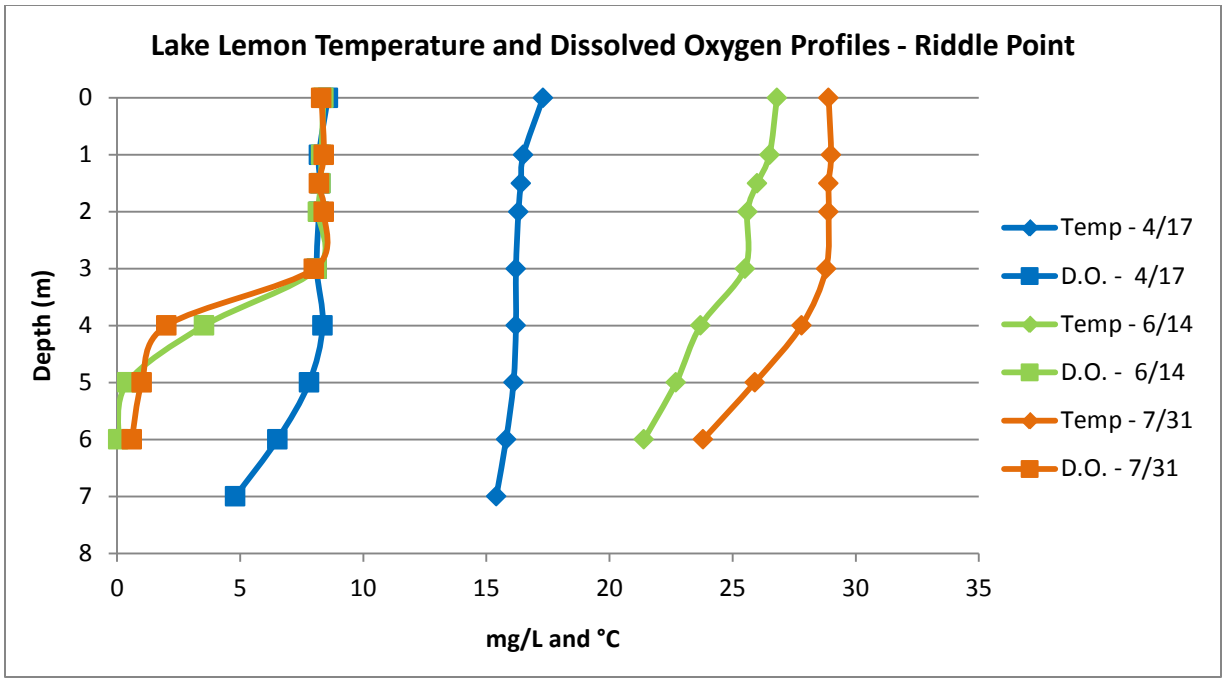

Figure 2. Temperature and dissolved oxygen profiles for Lake Lemon at Riddle Point on 4/17/12, 6/14/12, and 7/31/12.

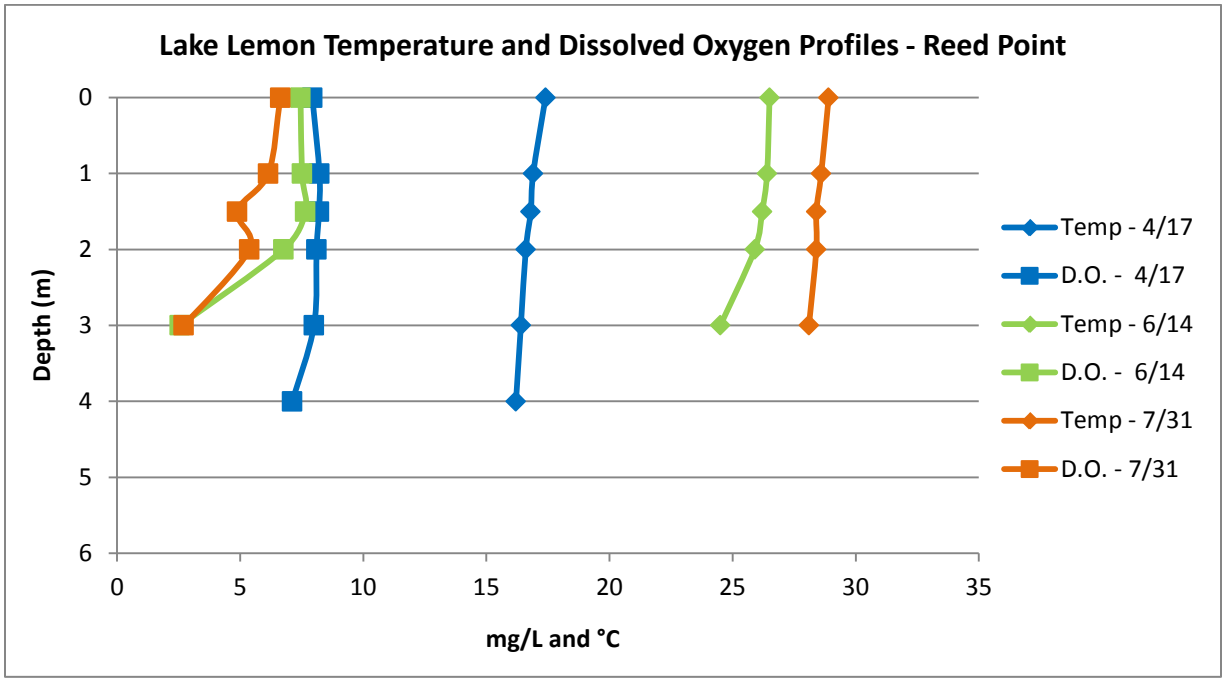

Figure 3. Temperature and dissolved oxygen profiles for Lake Lemon at Reed Point on 4/17/12, 6/14/12, and 7/31/12.

Dissolved oxygen (D.O.) profiles generally follow the temperature profiles. Typically, early spring profiles are characterized by an orthograde oxygen profile, where the oxygen concentrations remain uniform throughout the water column because of recent spring turnover. This profile was illustrated at both Riddle and Reed Points April. There was a slight oxygen decrease in the bottom 3m of Riddle Point, but that portion of the water column still had 4.8 mg/L dissolved oxygen. Riddle Point was characterized by a clinograde oxygen profile by June, where oxygen levels decrease below the thermocline and continue to decrease rapidly. The upper 4 meters of water remained oxygenated during both June and July sampling at Riddle Point (Figures 2). The July dissolved oxygen concentrations averaged 8.3 mg/L in the epilimnion, which was above 100% saturation. Anoxic conditions develop below 4 meters depth, which are likely due to significant organic matter on the lake bottom, creating a biochemical oxygen demand (BOD) that results in decomposition processes consuming all the available oxygen. Because stratification does not allow surface water to mix into this deeper water, oxygen is not replenished. The shallow depth of Reed Point and lake turbulence keep this portion of the lake well-mixed and oxygenated (Figure 3).

Water quality data for Lake Lemon are presented in Tables 1- 3. Phosphorus and nitrogen are the primary plant nutrients in lakes. Typically, mean total phosphorus (TP) concentrations increase throughout the summer within Lake Lemon due to watershed inputs (Figure 4). Soluble phosphorus (SRP) concentrations are lower than total phosphorus because algae rapidly take up and use soluble phosphorus. Mean SRP concentrations were below the method detection (0.01 mg/L) limit in all samples with exception of the July Riddle Point sample (0.0.62 mg/L). Summer (June and July) TP concentrations were greater than the level indicative of eutrophication (0.030 mg/L).

Typically we only detect low concentrations of nitrate-nitrogen throughout the sampling season. The 2012 spring sampling event captured spring runoff following spring fertilizer application, which resulted in elevated nitrate concentrations during April and June. Nitrate concentrations decreased to the minimum detection level (0.013 mg/L) in June and July at Riddle and Reed Points (Figure 5). Nitrate, an oxidized form of inorganic nitrogen, is highly soluble in water and is carried into the lake from fertilized agricultural fields, livestock, and other sources by watershed runoff. Ammonia, a reduced form of inorganic nitrogen, is the primary by-product of bacterial decomposition of organic matter and is also found in animal wastes. Riddle Point ammonia concentrations increased throughout the summer in the hypolimnion from 0.018 mg/L to 0.952 mg/L (Figure 6). The increased ammonia concentrations are due to thermal stratification and anoxic conditions within the hypolimnion coupled with significant decomposition of organic matter, which generates ammonia as a by-product. The Reed Point ammonia concentrations typically remain lower throughout the summer, however in 2012 the spring and late summer concentrations were much higher, 0.433 mg/L and 0.485 mg/L, respectively. Sufficient mixing within the shallower waters of Reed Point usually keep the water column oxygenated preventing the concentration of the chemically-reduced ammonia. Very calm water and wind conditions can allow short-term and temporary thermal stratification within the bottom 2 meters. During these periods

ammonia concentrations can increase due to the reduced environment, then mixing throughout when turbulence returns.

Table 1. Water Quality Characteristics of Lake Lemon – Riddle Point and Reed Point, 4/17/12.

Parameter	Riddle		Reed
	Epilimnion	Hypolimnion	Epilimnion
Secchi (m)	1.5	--	0.9
Light trans @ 3' (%)	21.3	--	12
1% Light Level (ft)	13.5	--	9.5
% Water Column Oxic	100	--	100
pH	7.5	7.4	7.5
Conductivity (uS/cm))	125.4	123.4	135.1
Alkalinity (mg/L)	53	54	62
Total Suspended Solids (mg/L)	5.6	6.2	9.6
Nitrate (mg/L)	0.108	0.101	0.099
Ammonia (mg/L)	0.018*	0.035	0.433
Total Organic Nitrogen (mg/L)	0.289	0.260	0.212
Soluble Reactive Phosphorus (mg/L)	0.010*	0.010*	0.010*
Total Phosphorus (mg/L)	0.02	0.025	0.033
Chlorophyll-*a* (ug/L)	5.015	--	7.42
Plankton (Cells/ml)			
Plankton (#/L)			
Blue-green dominance NU (%)			
Blue-green dominance – cells/ml (%)			

* Method Detection Limit

Table 2. Water Quality Characteristics of Lake Lemon – Riddle Point and Reed Point, 6/14/12.

Parameter	Riddle		Reed
	Epilimnion	Hypolimnion	Epilimnion
Secchi (m)	1.3	--	1.05
Light trans @ 3' (%)	20.3	--	66.6
1% Light Level (ft)	12.5	--	10
% Water Column Oxic	83	--	100
pH	7.1	7.1	7.35
Conductivity (uS/cm))	169.2	183.2	173.3
Alkalinity (mg/L)	64.5	66.0	72.5
Total Suspended Solids (mg/L)	4.5	18.5	15.6
Nitrate (mg/L)	0.043	0.013*	0.013*
Ammonia (mg/L)	0.018*	0.131	0.018*
Total Organic Nitrogen (mg/L)	0.308	0.318	0.355
Soluble Reactive Phosphorus (mg/L)	0.010*	0.010*	0.010*
Total Phosphorus (mg/L)	0.029	0.048	0.029
Chlorophyll-*a* (ug/L)	6.9	--	6.7
Plankton (Cells/ml)	180,708		160,716
Plankton (#/L)	7,267,555		33,083,302
Blue-green dominance NU (%)	54.9		85.9
Blue-green dominance – cells/ml (%)	91.6		83.5

* Method Detection Limit

Table 3. Water Quality Characteristics of Lake Lemon – Riddle Point and Reed Point, 7/31/12.

Parameter	Riddle		Reed
	Epilimnion	Hypolimnion	Epilimnion
Secchi (m)	0.55	--	1.05
Light trans @ 3' (%)	5	--	2.6
1% Light Level (ft)	6.5	--	10
% Water Column Oxic	67	--	100
pH	7.7	7.1	7.3
Conductivity (uS/cm))	0.201	0.26	208
Alkalinity (mg/L)	86	122	87
Total Suspended Solids (mg/L)	14.0	7.2	14.3
Nitrate (mg/L)	0.013*	0.013*	0.013*
Ammonia (mg/L)	0.018*	0.952	0.018*
Total Organic Nitrogen (mg/L)	1.239	0.808	0.949
Soluble Reactive Phosphorus (mg/L)	0.010*	0.062	0.010*
Total Phosphorus (mg/L)	0.051	0.086	0.334
Chlorophyll-*a* (ug/L)	40.51	--	34.88
Plankton (Cells/ml)			
Plankton (#/L)			
Blue-green dominance NU (%)			
Blue-green dominance – cells/ml (%)			

* Method Detection Limit

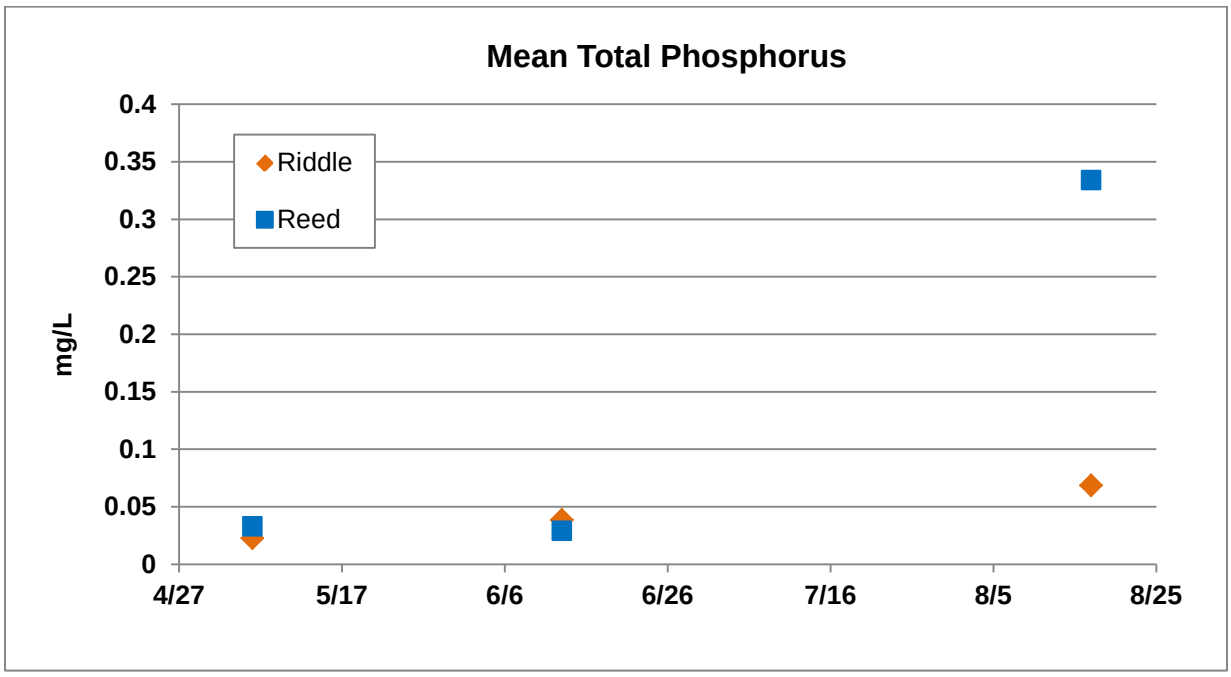

Figure 4. Mean total phosphorus concentrations at Riddle and Reed Point during summer 2012.

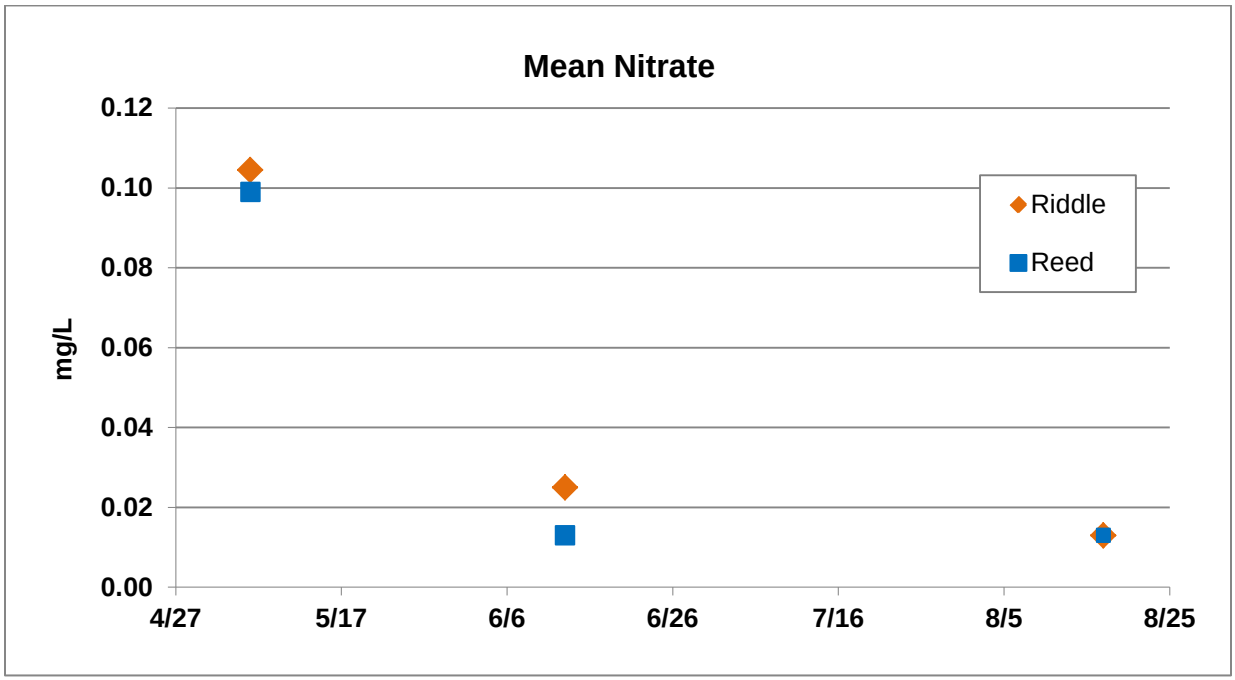

Figure 5. Mean nitrate concentrations at Riddle and Reed Point during summer 2012.

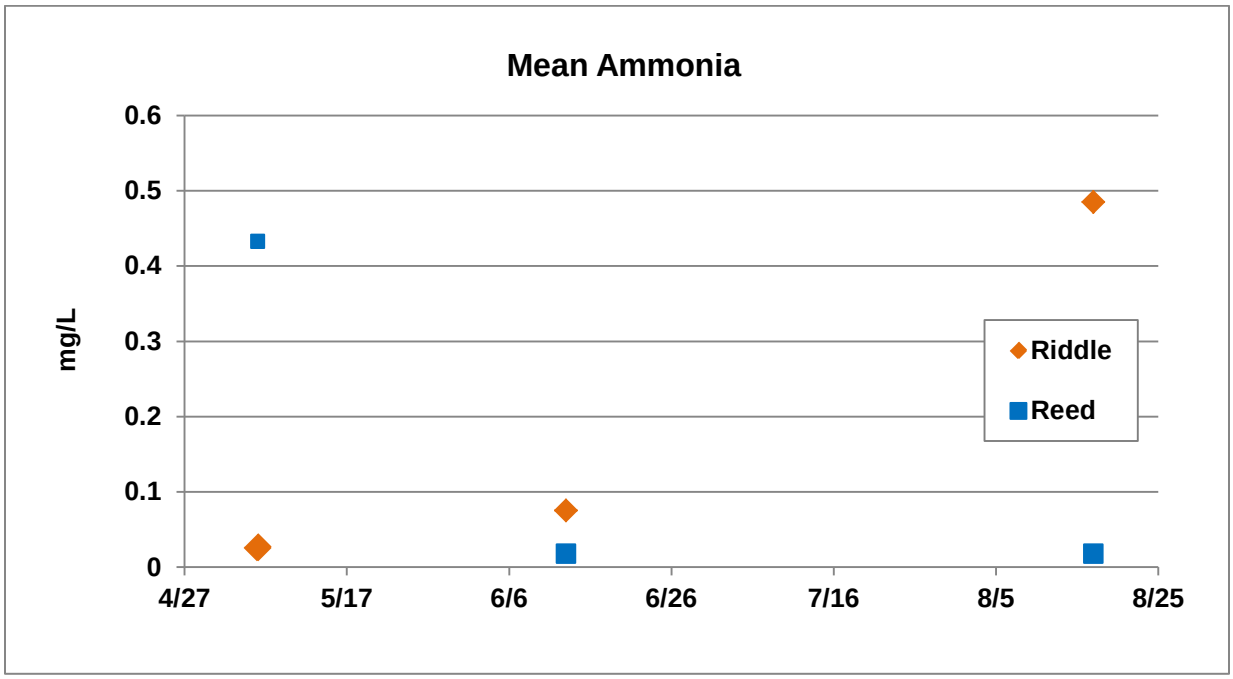

Figure 6. Mean ammonia concentrations at Riddle and Reed Point during summer 2012.

Lake Lemon is characterized by relatively low to average plankton densities. Usually, Lake Lemon is characterized by lower spring densities that increase by July and August. In 2012, Riddle and Reed plankton counts increased by over 6-fold by mid-June (Table 4). Reed plankton counts were elevated on all sample dates (Table 5). Typically, the plankton assemblage shifted towards a strongly dominant blue-green algae proportion by August, which is definitely the case with blue-green dominating both August samples at >99%. Blue-green algae are less desirable in lakes because they: 1) may form extremely dense nuisance blooms; 2) may cause taste and odor problems; and 3) are unpalatable as food for many zooplankton grazers.

Green algae typically decrease throughout the summer (Figure 7). By late July, both Riddle and Reed Point green algal counts have decreased <1% of the plankton assemblage. These algae, as a rule, make great food for the zooplankton, however the green algae cannot compete well with the blue-greens for resources (light, nutrients, carbon dioxide) necessary for continued growth in the summer. Green algae are usually outcompeted by blue-green algae. Blue-green algae usually have an advantage over other plankton tend to dominate reaching nuisance proportions. These competitive advantages include: 1) ability to regulate buoyancy and thus stay up in the light, 2) nitrogen fixation, and 3) more efficient use of nutrients. Dominant blue-green algae populations are typical of temperate lakes with high nutrient availability, especially from a large watershed that is predominately agriculture.

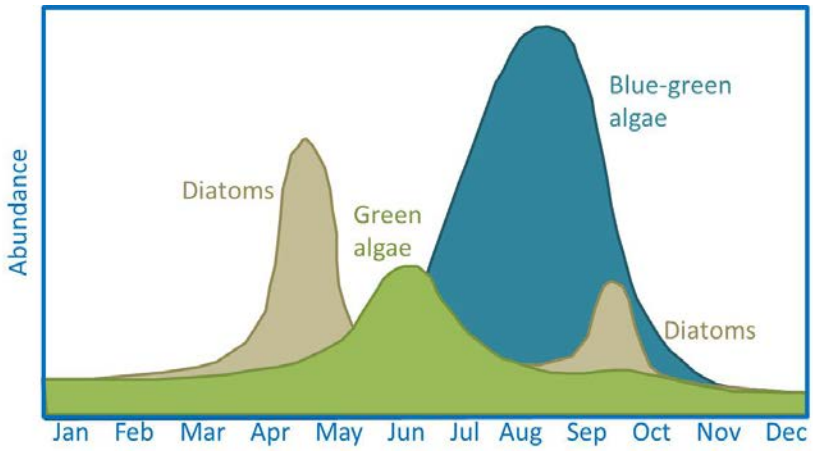

Figure 7. Generic seasonal phytoplankton succession.

Diatoms typically have higher concentrations early in the sampling season, which falls closer to spring turnover (Figure 7). Diatom numbers increase with turnover because of the increased supply of available dissolved silica (Kalff and Watson, 1986). The diatom numbers generally decrease throughout the growing season (Tables 4 and 5), which could result from less available silica. Diatom densities typically are barely represented by the end of the growing season. Plankton diversity typically decreases in Lake Lemon in regard to Phylum throughout the summer.

Zooplankton,which are microscopic animals equivalent to cows grazing in the pasture, feed on phytoplankton (Figure 8). Zooplankton densities significantly increased by late July. Both Riddle and Reed Point samples were dominated by rotifer populations. Many rotifer populations have a population peak in late summer in conjunction with peaked blue-green algae populations.

The low Secchi disk transparencies in Lake Lemon are a reflection of the relatively high amount of suspended material (sediments, algae, etc.) in the water. Transparencies closely matched the concentrations of suspended material. The transparencies for Reed Point remain fairly stable around 1m depth. Riddle Point transparency decreased while the total suspended solids (TSS) and the TP concentrations increased (Figure 9 and 10). Sources of suspended sediments to Lake Lemon include soils washed in from the watershed, resuspended lake sediments, and algal cells produced within the lake. The fine clays and silts of the sediments (Zogorski et al., 1986) can be suspended in the shallow east end of the lake by wind directed along the main west-east axis of the lake. In addition, turbulence from motorboats is capable of resuspending fine clay sediments from a depth exceeding ten feet (Yousef et al., 1978). All of these actions likely contribute to the poor clarity of Lake Lemon and of shallow lakes in general.

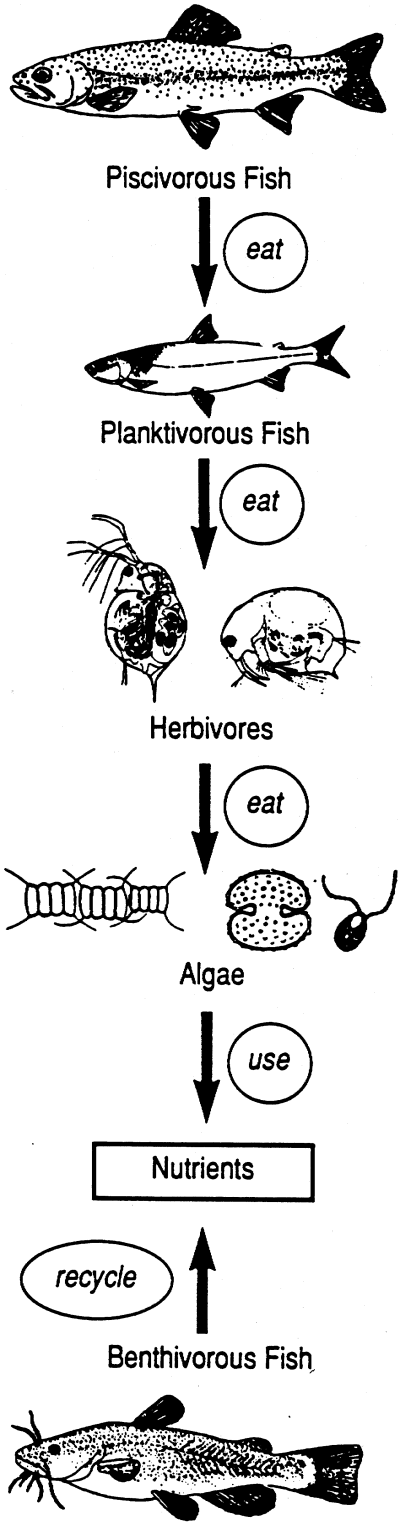

Figure 8. Generalized aquatic food chain. Tiny shrimp-like animals called zooplankton eat algae. Zooplankton, in turn, are eaten by small plankton-eating fish such as minnows, gizzard shad and young sunfish.

Table 4. Phytoplankton and Zooplankton Community for Lake Lemon at Riddle Point, enumerated as # cells/ml for phytoplankton and # Natural Units per liter for zooplankton.

	4/17/12		6/14/12		7/31/12	
Phytoplankton (Algae)	**Total (Cells/ml)**	**%**	**Total (Cells/ml)**	**%**	**Total (Cells/ml)**	**%**
Blue-greens	26,326	85.8%	165,559	91.6%	108,176	99.55%
Greens	1,951	6.4%	11,383	6.3%	216	0.20%
Diatoms	1,003	3.3%	1,541	0.9%	54	0.05%
Other algae	1,400	4.6%	2,225	1.2%	217	0.20%
Total Phytoplankton	30,680		180,708		108,663	
Zooplankton	**Total (#/L)**		**Total (#/L)**		**Total (#/L)**	
Rotifers	24		2		2,301	
Zooplankton*	26		46		866	

*Zooplankton counts include Cladocera and Copepods.

Table 5. Phytoplankton and Zooplankton Community for Lake Lemon at Reed Point, enumerated as # cells/ml for phytoplankton and # Natural Units per liter for zooplankton.

	4/17/12		6/14/12		7/31/12	
Phytoplankton (Algae)	**Total (Cells/ml)**	**%**	**Total (Cells/ml)**	**%**	**Total (Cells/ml)**	**%**
Blue-greens	100,629	95.8%	134,175	83%	129,932	99.4%
Greens	3,956	3.8%	20,056	12%	684	0.5%
Diatoms	326	0.3%	1,842	1%	144	0.1%
Other algae	118	0.1%	4,643	3%		
Total phytoplankton	105,029		160,716		130,760	
Zooplankton	**Total (#/L)**		**Total (#/L)**		**Total (#/L)**	
Rotifers	0		13		1,388	
Zooplankton*	10		23		723	

*Zooplankton counts include Cladocera and Copepods.

Chlorophyll-*a,* which is a measure of the primary pigment in algae, is a direct measure of algal productivity. In the integrated samples from the surface to the 2-meter depth, the chlorophyll-*a* concentrations ranged from 5.015 µg/L in April to 40.51 µg/L in July. Chlorophyll-*a* concentrations >7 µg/L are indicative of eutrophic lake conditions. Overall, we see a seasonal pattern of nutrient increase by late summer, which is characteristic of Lake Lemon. This pattern is mirrored by increases in chlorophyll-*a* concentrations. This suggests that conditions exist for increasing growth of algae (Figure 9 and 10).

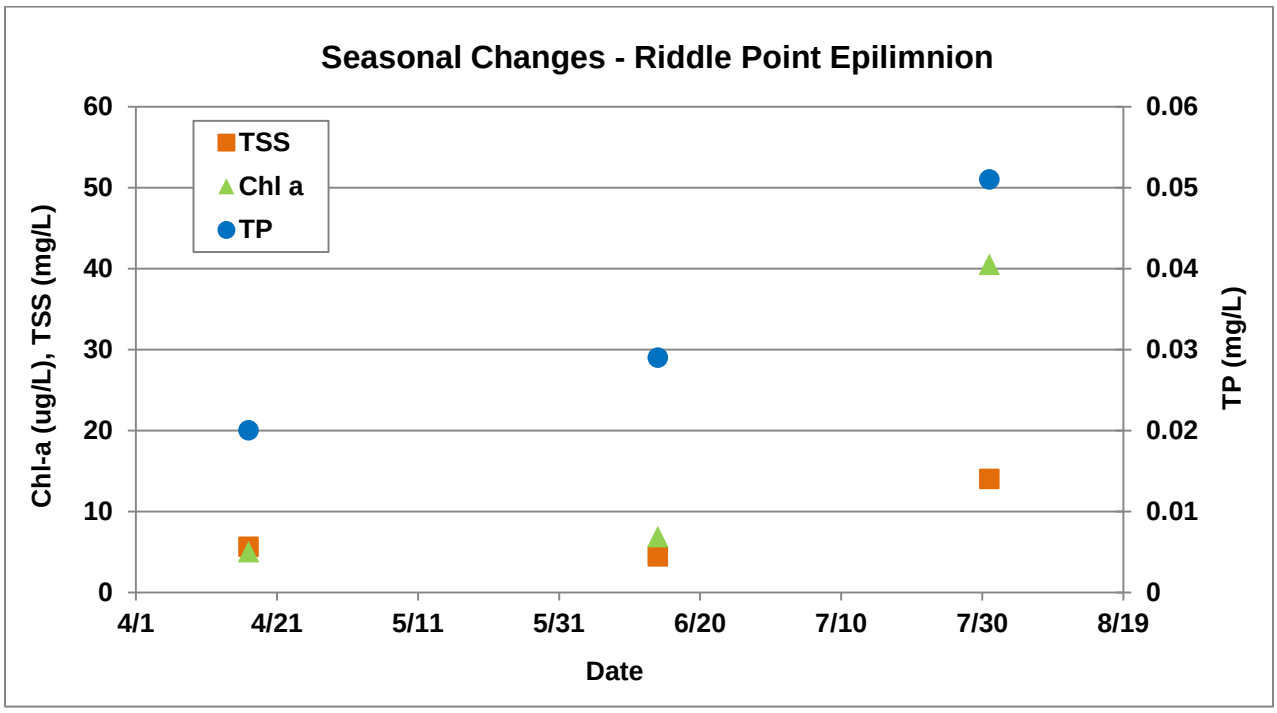

Figure 9. Seasonal changes in total phosphorus, total suspended solids, and chlorophyll-*a* in the surface waters (epilimnion) at Riddle Point in Lake Lemon in 2012.

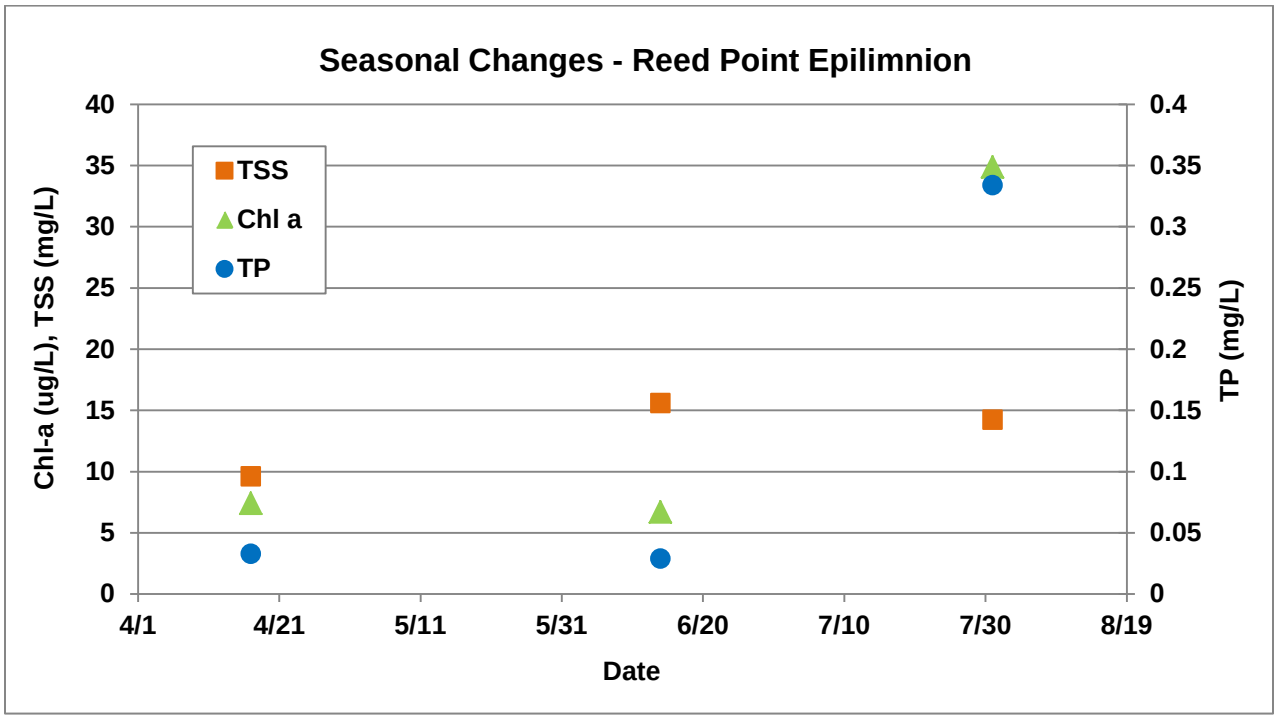

Figure 10. Seasonal changes in total phosphorus, total suspended solids, and chlorophyll-*a* in the surface waters (epilimnion) at Reed Point in Lake Lemon in 2012.

3.2 Comparison with Other Indiana

Table 6 gives values of water quality parameters determined for 355 Indiana lakes during July-August 1998-2010 by the Indiana Clean Lakes Program. This table can be used to compare values determined for Lake Lemon with other Indiana lakes. Table 6 shows that ammonia, TP, SRP and chlorophyll-*a* exceeded the median values for these 355 lakes, but fell well below the maximum concentrations.

Table 6. July-August Water Quality Characteristics of 355 Indiana Lakes Sampled From 1998 thru 2010 by the Indiana Clean Lakes Program compared to Riddle Point of Lake Lemon (7/31/12). Means of epilimnion and hypolimnion samples were used for Lake Lemon.

	Secchi Disk (m)	NO_3 (mg/L)	NH_4 (mg/L)	TKN (mg/L)	TP (mg/L)	SRP (mg/L)	Chl. *a* (μg/L)
Median	1.7	0.046	0.455	1.199	0.082	0.028	4.42
Maximum	16	16.679	16.348	20.873	4.894	1.427	380.38
Minimum	0.1	0.013*	0.018*	0.230*	0.010*	0.010*	0.010
Mean Values for Riddle Pt. (7/31/12)	**0.55**	**0.013***	**0.485**	**1.509**	**0.069**	**0.036**	**40.51**

* Method Detection Limit

3.3 Stream Results

Results from the Beanblossom Creek samples are given in Table 7. Stream values generally fell within the range of lake parameters. Variation among the sample parameters was slight. Historically, most of the parameters increased throughout the summer. This trend continued with the exception of dissolved oxygen concentrations and fecal coliform counts which were slightly higher in April compared to July. Solubility of oxygen in water is influenced by temperature, with less dissolved oxygen dissolving in warmer water. Beanblossom Creek's late July temperature (29.8°C) resulted in a decreased dissolved oxygen concentration (6.5 mg/L).

In addition to collecting fecal coliform bacteria at Riddle Point and Reed Point, two locations adjacent to the Chitwood neighborhood and three stream locations within 1) Bear Creek, 2) the North Shore Marina tributary, and 3) Beanblossom Creek (Table 8). All samples were below the state standard of 200 colonies per 100 ml threshold. These data illustrate a marked improvement from historic records. The summer drought conditions most likely contributed to the lower concentrations. The lack of precipitation reduced the possibility of surface runoff and groundwater inputs to carry bacteria into the streams and lake.

Total suspended solids (TSS) were sampled at the three stream sites. While the concentrations increased at Beanblossom and Bear Creek in July, the values are significantly below the cautionary value of 80 mg/L, considered harmful to aquatic life (Waters, 1995).

Table 7. Water Quality Characteristics of Beanblossom Creek, Bear Creek, and the small stream that enters Lake Lemon from the North Shore Marina in 2012. Bear Creek and the North Shore Marina Creek only included TSS and F. coliform bacteria analysis.

	Beanblossom Creek		Bear Creek		North Shore Marina Creek	
	4/17	**7/31**	**4/17**	**7/31**	**4/17**	**7/31**
pH	7.3	7.6				
Conductivity (mS/cm)	127.8	285.0				
Alk (mg/L)	61	107				
Temperature	14.2	29.8				
D.O. (mg/L)	8.5	6.5				
% D.O. Saturation	89.6	82.3				
TSS (mg/L)	8.8	10.8	2.4	12.0	4.0	3.0
NO_3^- (mg/L)	0.111	0.013*				
NH_4^+ (mg/L)	0.018*	0.018*				
TKN (mg/L)	0.283	0.570				
SRP (mg/L)	0.010*	0.010*				
Total Phos (mg/L)	0.028	0.048				
Fecal Coliform (col/100ml)	110	50	38	24	50	0

* Method Detection Limit

Table 8. Fecal coliform bacteria summary for 2012 Lake Lemon samples. The state standard for full body contact and recreation is 200 colonies per 100mls.

	Fecal Coliform Bacteria (#/100mls)	
	4/17/12	**7/31/12**
Riddle Point	64	6
Reed Point	74	4
Chitwood #1	148	52
Chitwood #2	28	122
Beanblossom Creek	110	50
Bear Creek	38	24
N. Shore Marina Creek	50	0

3.4 Trophic State

3.4.1 Introduction

The most widely used standard for assessing the condition of a lake is by considering its *trophic state*. The trophic state of a lake refers to its overall level of nutrition or biological productivity. Trophic categories include: *oligotrophic, mesotrophic, eutrophic* and *hypereutrophic*, with productivity increasing from oligotrophic to eutrophic (Table 9).

Table 9. Some characteristics of the different trophic state index classifications. Note, that while those salmonid fisheries, which have higher oxygen requirements, are lost in more eutrophic lakes, there are still many fish species present.

Classification	Transparency	Nutrients	Algae	D.O.	Fish
Oligotrophic	clear	Low TP < 6 µg/L	few algae	Hypo has D.O.	can support salmonids (trout and salmon)
Mesotrophic	Less clear	Moderate TP 10-30 µg/L	healthy populations of algae	Less D.O. in hypo	lack of salmonids
Eutrophic	transparency <2 meters	High TP > 35 µg/L	abundant algae and weeds	No D.O. in the hypo during the summer	
Hypereutrophic	transparency <1 meter	extremely high TP > 80 µg/L	thick algal scum Dense weeds	No D.O. in the hypo during the summer	

The changes in a lake from oligotrophy to a higher trophic state is called *eutrophication*. Eutrophication is defined as the excessive addition of inorganic nutrients, organic matter and silt to lakes and reservoirs at rates sufficient to increase biological production and to lead to a decrease in lake volume. By this definition, high phosphorus alone does not make a lake eutrophic. The phosphorus levels must also cause an increase or potential increase in plant production and/or sedimentation.

3.4.2 Trophic State Indices

The large amount of water quality data collected during lake water quality assessments can be confusing to evaluate. Because of this, Indiana and many other states use a trophic state index (TSI) to help evaluate water quality data. A TSI condenses water quality data into a single, numerical index. Different index (or eutrophy) points are assigned for various water quality concentrations. The index total, or TSI, is the sum of individual eutrophy points for a lake.

The most widely used and accepted TSI is one developed by Bob Carlson (1977) called the Carlson TSI (Figure11). Carlson analyzed total phosphorus, chlorophyll-*a*, and Secchi disk transparency data for numerous lakes and found statistically significant relationships among the three parameters. He developed mathematical equations for these relationships that form the basis for the Carlson TSI. Using this index, a TSI value can be generated by one of three measurements: Secchi disk transparency, chlorophyll-*a* or total phosphorus. Data for one parameter can also be used to predict a value for another. The TSI values range from 0 to 100. Each major TSI division (10, 20, 30, etc.) represents a doubling in algal biomass.

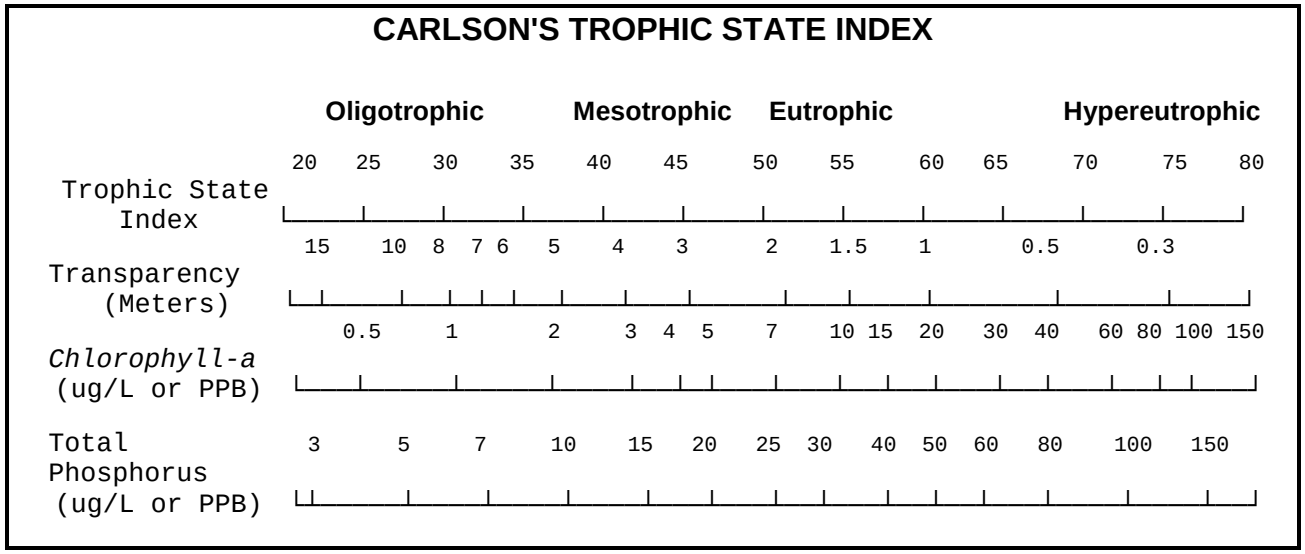

Figure 11. Carlson's trophic state index.

3.4.3 Trophic State Scores

Using Carlson's TSI for the April, June, and July data, Lake Lemon varied by parameter and month, and ranged from mesotrophic to hypereutrophic (Table 10). The earlier April TSI scores start the growing season with eutrophic conditions. Except the June chlorophyll classification, all the TSI scores increased throughout the growing season, which is the historic trend for Lake Lemon.

Table 10. Summary of Trophic State Index Scores Using Mean 2012 Water Quality Data for Riddle/Reed Points.

DATE	Carlson's Secchi Disk TSI	Carlson's Total Phosphorus TSI	Carlson's Chlorophyll TSI
April	54/62	49/54	46/50
	Eutrophic	Mesotrophic/Eutrophic	Mesotrophic/Eutrophic
June	53/59	53/54	37/49
	Eutrophic	Eutrophic	Mesotrophic
July	69/59	65/88	67/82
	Eutrophic	Eutrophic/Hypereutrophic	Eutrophic/Hypereutrophic

How to read:

Riddle Pt. TP = 0.051mg/L = 51ug/L
⇩
Graph on Carlson's TP scale
⇩
Carlson's TSI value

Carlson's TP TSI
65 / 88
Eutrophic/Hypereutrophic

Reed Pt. TP = 0.334mg/L = 334ug/L
⇩
Graph on Carlson's TP scale
⇩
Carlson's TSI value

4.0 TROPHIC STATE TRENDS

Using Riddle Point Carlson TSI scores to look at the historic trend for Lake Lemon shows that the lake generally hoovers around eutrophic conditions. Figures 12-14 illustrate the Carlson TSI historic trends for Secchi disk, total phosphorus, and chlorophyll-*a*. Overall, a pattern is seen within the seasonal variation with the late spring months scoring significantly lower (less eutrophic) while increasing during the late summer months to a hypereutrophic status. While there is an overall slight decrease in TP concentrations over the last 14 years, the last 5 years showed a greater decreasing trend (Figure 13).

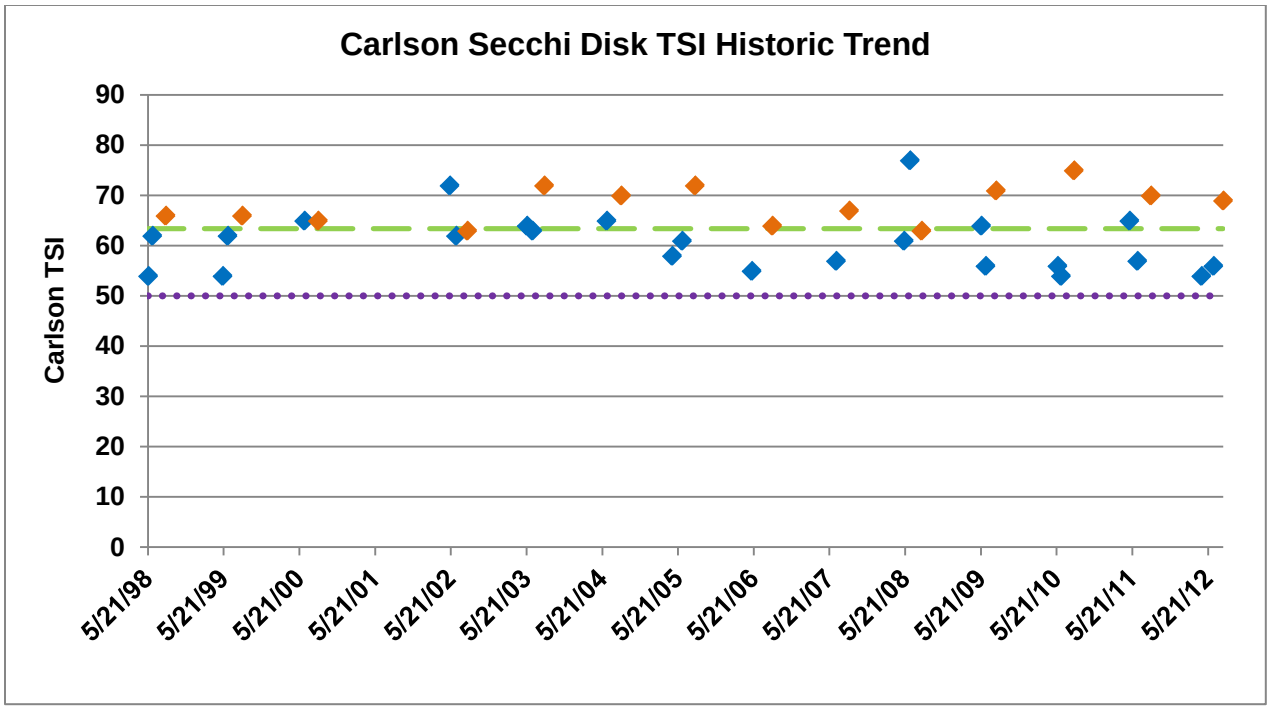

Figure 12. The 14-year historic trend for Carlson Secchi disk TSI scores. All but three late summer (August) samples, shown in orange, scored above the mean for eutrophic status. The green dashed line illustrates the 14-year mean. The purple dotted line illustrates eutrophic status for the Carlson TSI.

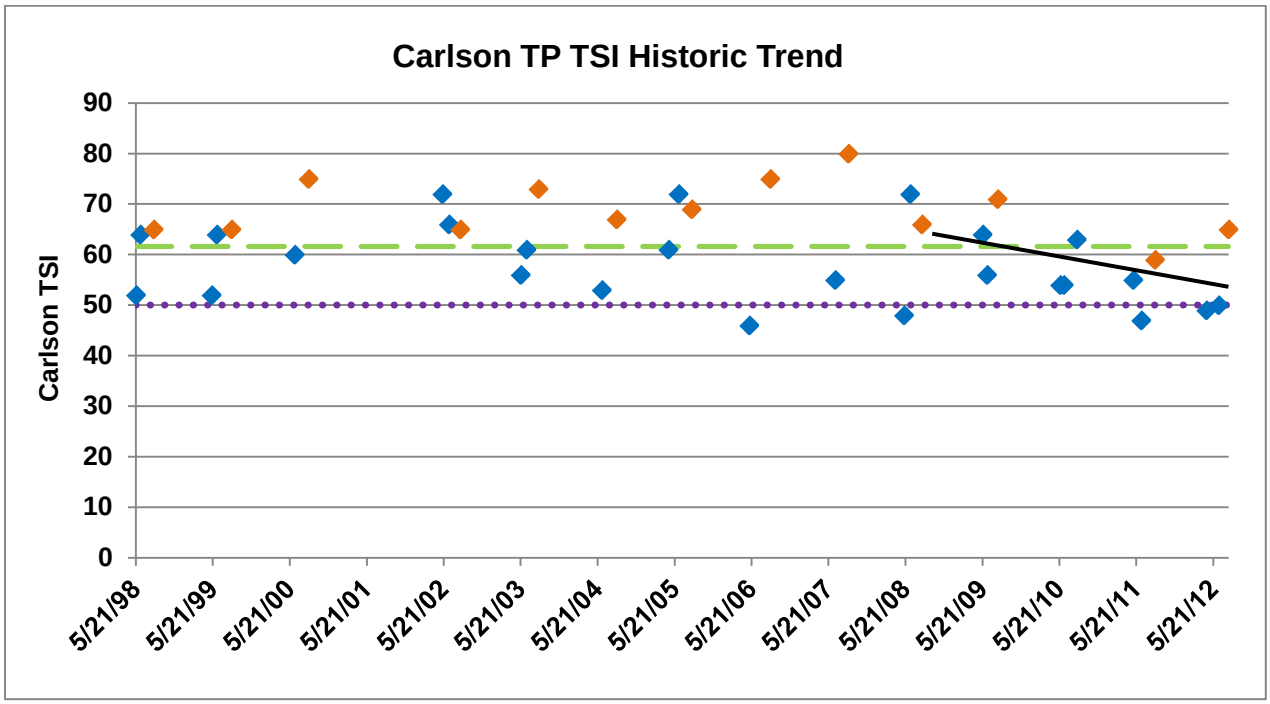

Figure 13. The 14-year historic trend for Carlson total phosphorus TSI scores. All August samples, shown in orange, score above the mean for eutrophic status. The green dashed line illustrates the 14-year mean. The purple dotted line illustrates eutrophic status for the Carlson TSI. The black line shows a decreasing trend for the last 5 years.

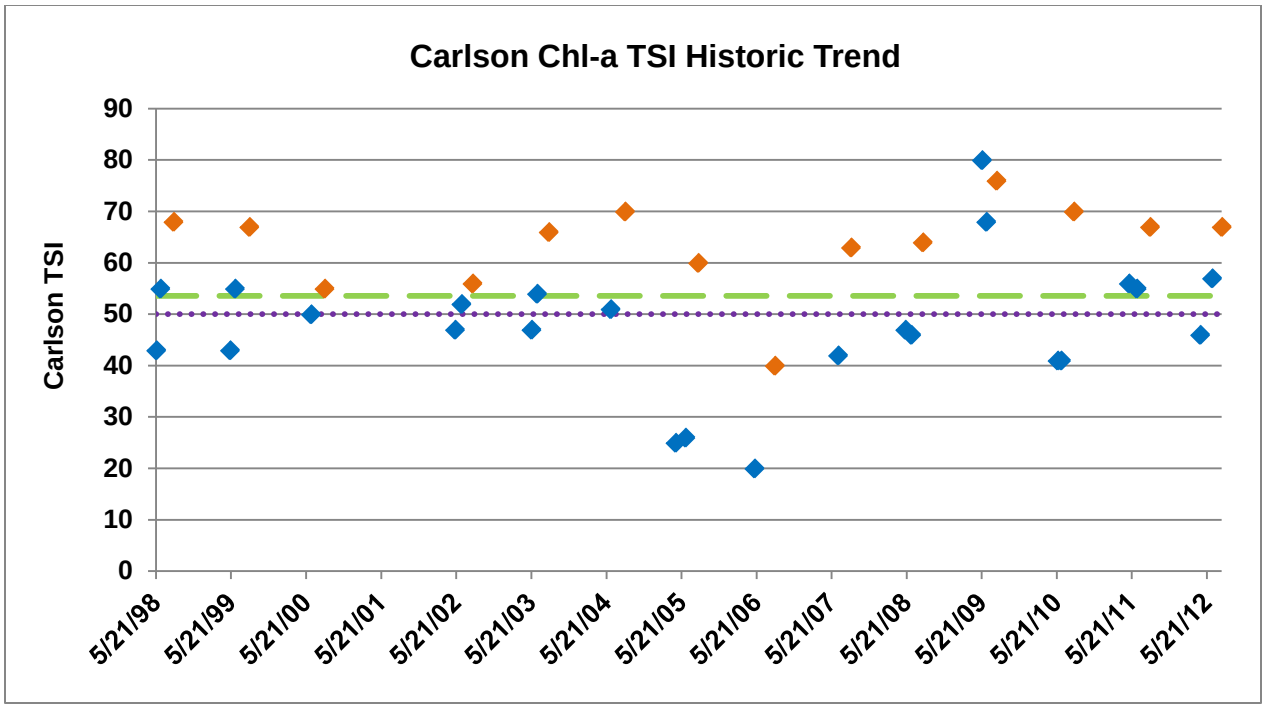

Figure 14. The 14-year historic trend for Carlson chlorophyll-*a* TSI scores. Most August samples, shown in orange, score above the mean for eutrophic status. The 14-year mean is just above the Carlson TSI eutrophic status score of 50 (purple dotted line).

5.0 WATER QUALITY TRENDS

Compiled Secchi disk transparency data from volunteer monitors and SPEA monitoring studies over the past 19 years are shown in Figure 15. There is no apparent long-term trend in transparency except that late July and August samples are generally lower in transparency. All measures of record would be considered indicative of eutrophic conditions.

Total phosphorus (TP) concentrations are quite variable over the past 19 years at Lake Lemon's Riddle Point sampling site (Figure 16). There is little visible long-term trend. Most of the values were above the eutrophic threshold of 0.030 mg/L. The earlier April and June 2012 samples were below this threshold, but exceed the concentration by late July. The variable concentrations have tightened over the years with the average just about 0.030 mg/L.

Epilimnetic total phosphorus concentrations at Riddle Point are mostly in the eutrophic range but the resulting chlorophyll-*a* concentrations (Figure 17) do not always reach the eutrophic range of greater than 7 μg/L; however, the majority of the August chlorophyll-*a* samples over the eighteen years do fall above the eutrophic classification. It is typical that the chlorophyll-*a* concentrations would align with the TP concentrations; however, Lake Lemon watershed inputs of suspended solids contribute and elevate the TP concentrations, which also shade out the photic zone.

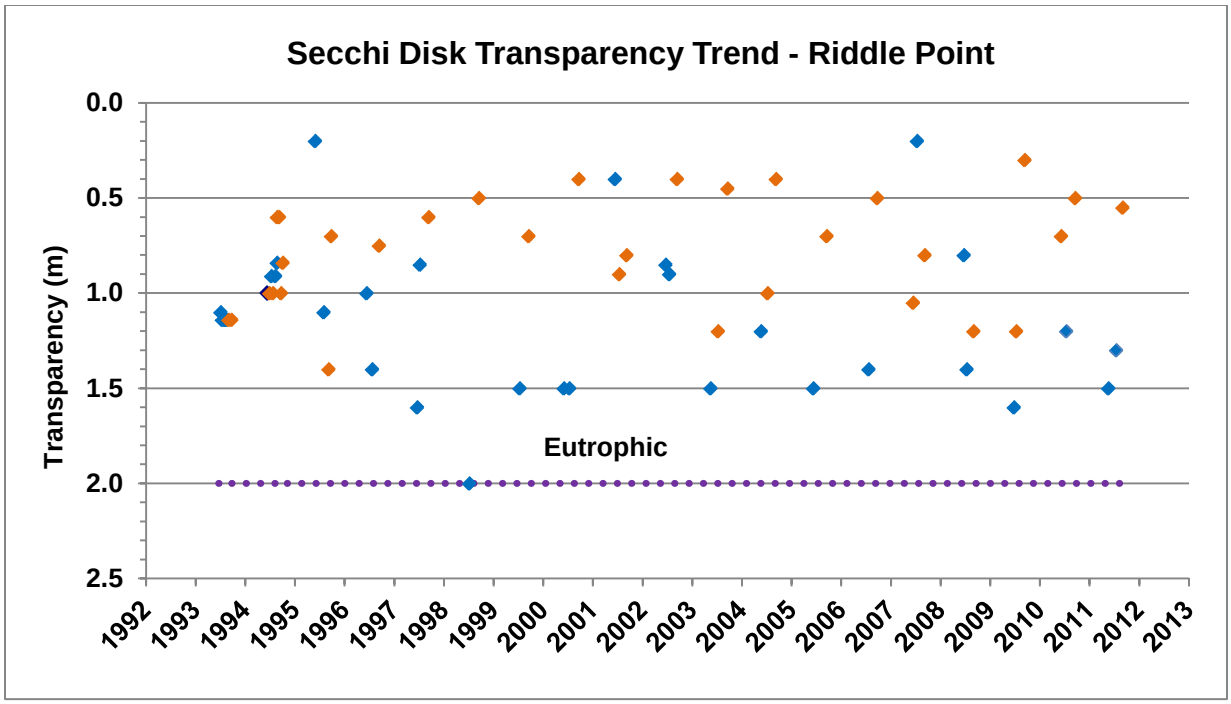

Figure 15. Historic Secchi disk transparency data for Lake Lemon. All data are less than the general eutrophic indicator of 2 meters (dotted line). Orange markers indicate August or late July samples.

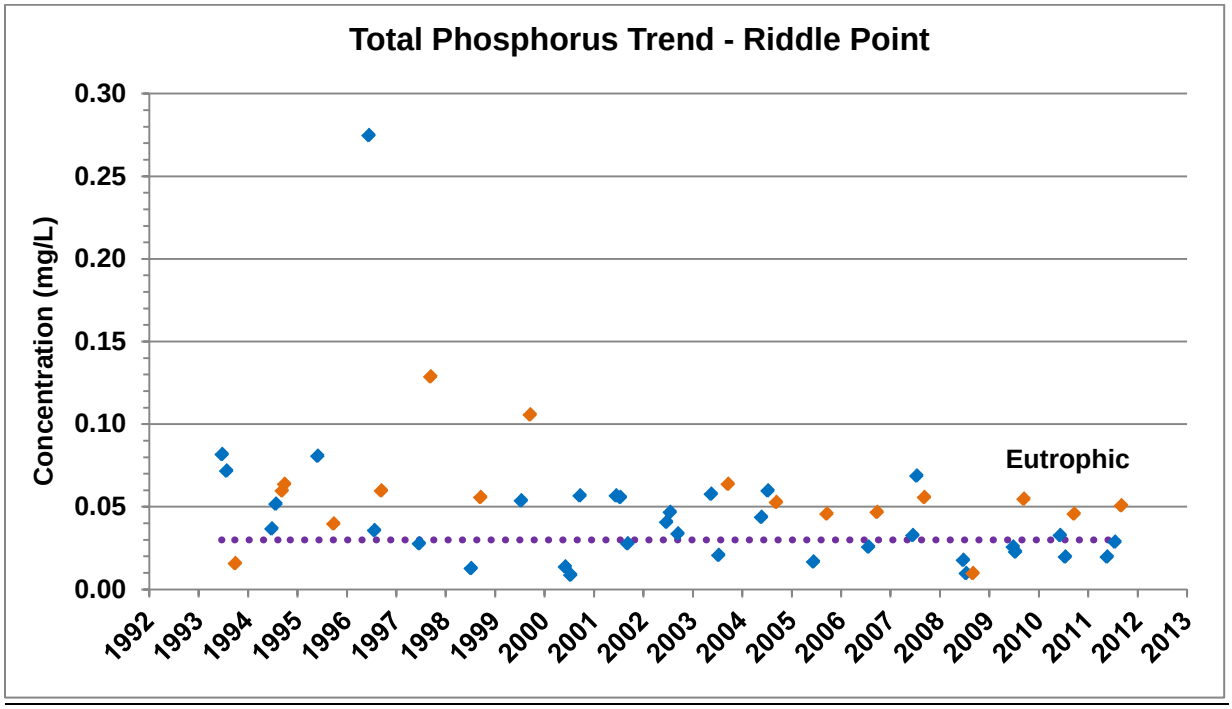

Figure 16. Historic epilimnetic total phosphorus trend for Lake Lemon. Most concentrations are higher than 0.030 mg/L (dotted line), the level generally considered high enough to support eutrophic conditions. Orange markers indicate August or late July samples.

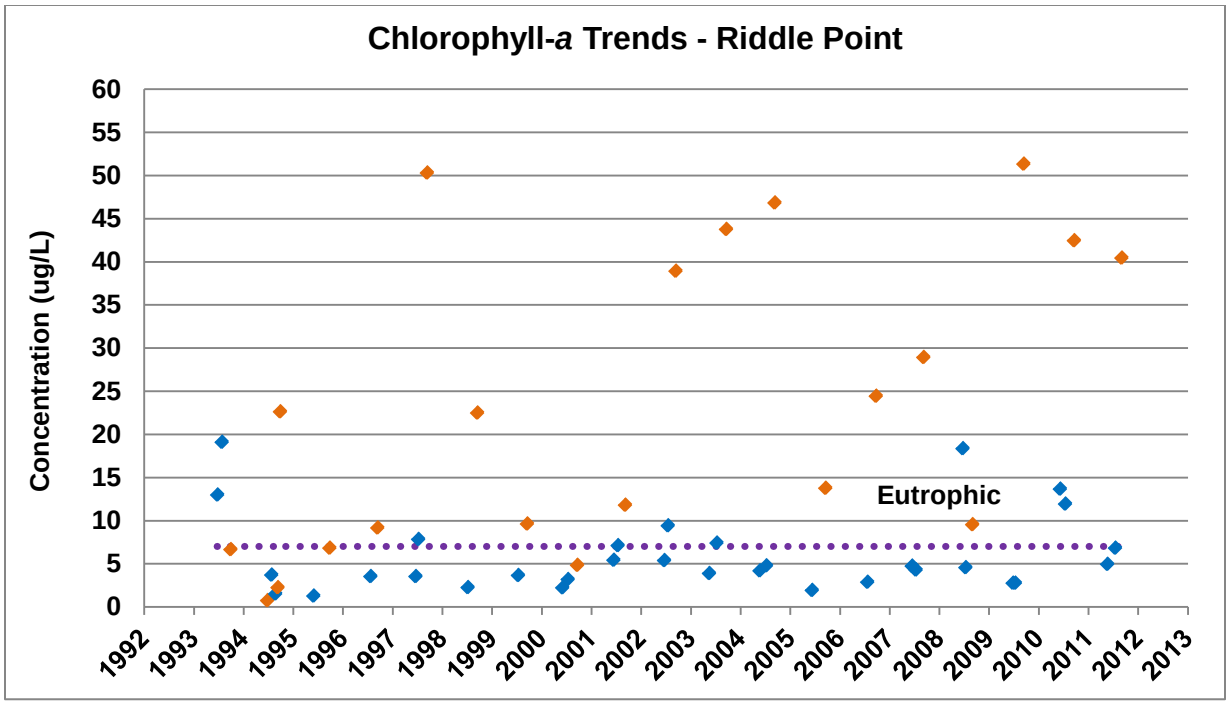

Figure 17. Historic chlorophyll-*a* data for Lake Lemon. The dotted line illustrates concentrations indicative of eutrophic conditions. Orange markers indicate August or late July samples.

6.0 CONCLUSIONS

The water characteristics of Lake Lemon are highly variable due, in large part, to runoff from the very large watershed that can replace the entire lake volume in a relatively short time (Figure 18). This causes difficulties in monitoring because the water conditions at any particular time depend on several immeasurable variables, including: time since the last major storm and the intensity and duration of that storm. The extreme drought conditions of 2012 impacted all lakes and reservoirs throughout Indiana. While these variables affect other Indiana lakes and reservoirs, they have a much greater influence at Lake Lemon because of its very large watershed and short residence time. The watershed drainage area to lake area ratio is very large at 31:1 for Lake Lemon. This makes this reservoir very responsive to watershed inputs. The drought conditions reduced the watershed inputs, which lengthen the residence time and decreased nutrient deliver.

Lake Lemon suffers from seasonally high levels of phosphorus, and suspended sediments and relatively low Secchi disk transparency throughout the year; however, the overall trend for Lake Lemon has not changed in over 18 years (Figures 15-17). Current water conditions unquestionably place the lake into the 'eutrophic' or over-productive trophic category. Eutrophic lakes produce more algae and rooted plants than the bacteria and microbes can decompose annually. As a result, decaying organic matter

accumulates on the sediments where it contributes to low dissolved oxygen levels and decreased lake volume.

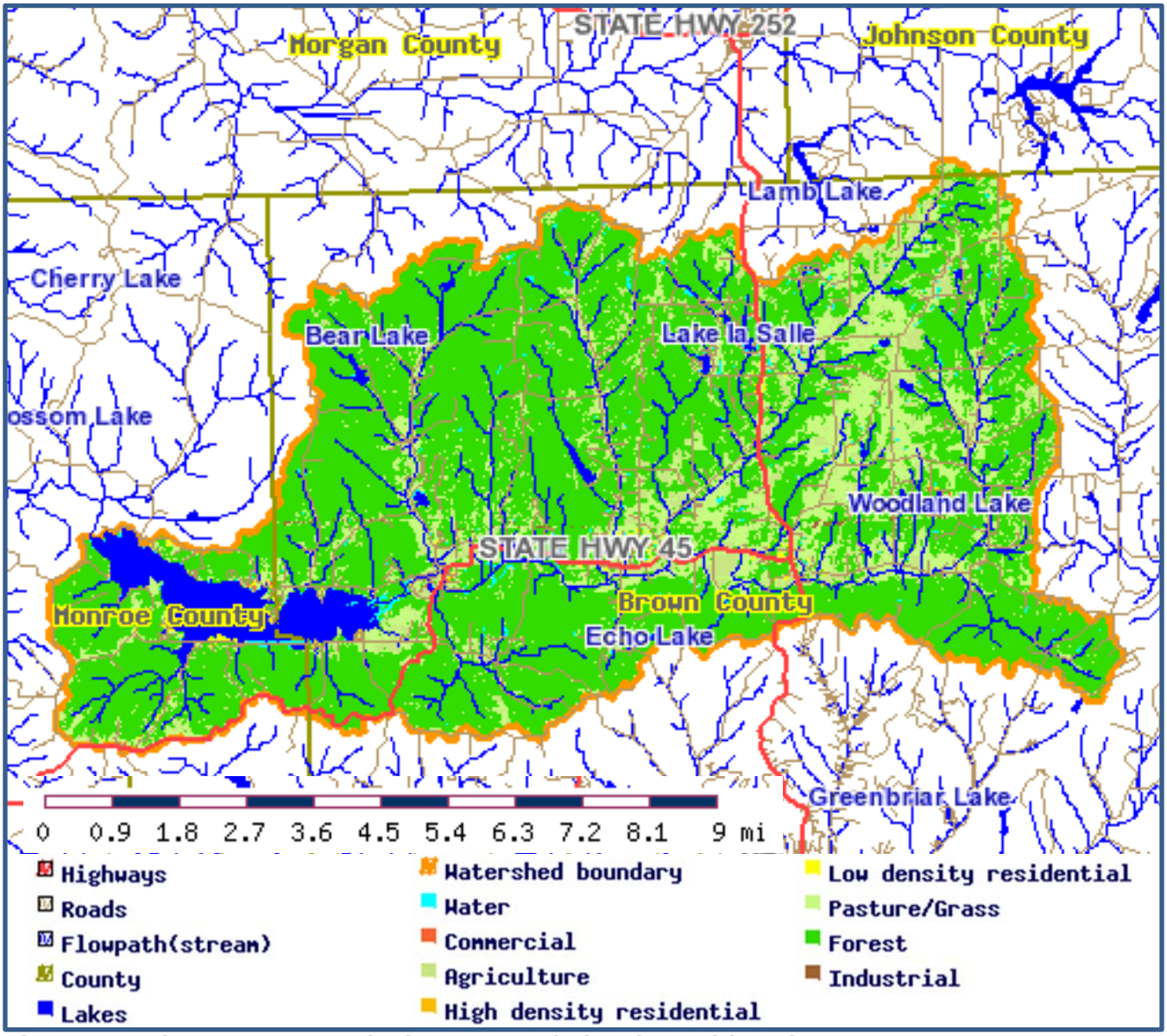

Figure 18. Lake Lemon watershed. Source: Choi and Engel (2005).

The delivery of eroded watershed soils to the lake has created bars and shallow water depths in the eastern end of the lake. In addition to posing navigation problems, sediment accumulations provide more potential habitat for rooted aquatic plants. The abundant shallow water and freshly deposited sediments in Lake Lemon provide ideal conditions for the growth of rooted plants. These rooted aquatic plants then provide additional hydraulic resistance encouraging sedimentation, which exacerbates the siltation in the eastern end of the lake. While the overabundance of macrophytes has

decreased over the years by active harvesting and most recently dredging, watershed sedimentation continues to deliver excessive suspended solids.

Sedimentation and its consequences are likely the most pervasive problems continuing to face Lake Lemon. The LLCD initiated a dredging program at Lake Lemon. Dredging, along with controlling the watershed sources of sediment delivery, continue to be the most needed lake management activities.

While Lake Lemon continues to face watershed and lake challenges ranging from eutrophic water conditions that peak towards the end of the summer season due to watershed land uses, there has been no significant change over the last 19-years. Key eutrophy parameters (total phosphorus, chlorophyll-*a*, Secchi disk transparency) have produced similar annual trends. While Lake Lemon's eutrophy status has shown a slight decrease for the TP trophic state index, it has not significantly deviated from the 14-year average.

7.0 **REFERENCES**

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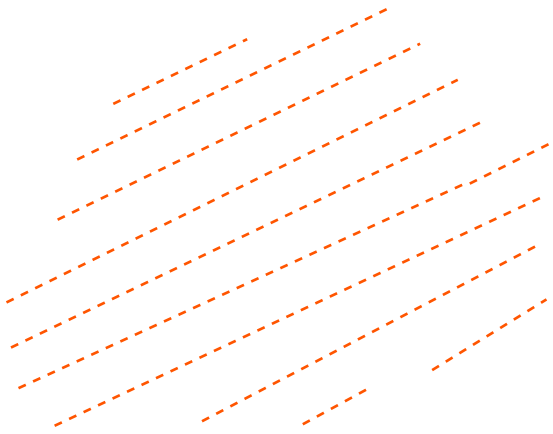

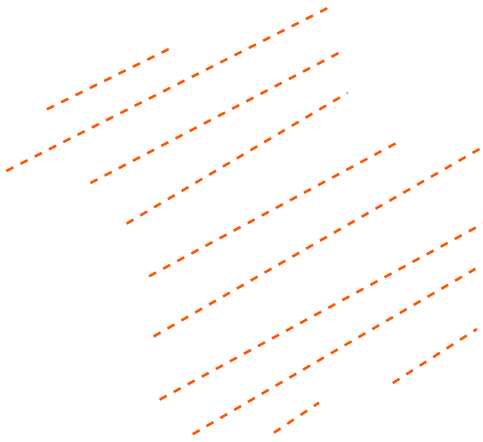

AGREEMENT

between

INDIANA UNIVERSITY

and

LAKE LEMON CONSERVANCY DISTRICT

This agreement is entered into between the Lake Lemon Conservancy District (hereinafter referred to as LLCD) and Indiana University (hereinafter referred to as Indiana).

WHEREAS LLCD seeks assistance in the form of an Agreement to Indiana.

WHEREAS Indiana has proposed to furnish such services to LLCD; and

NOW THEREFORE, in consideration of the foregoing and the payments and the mature agreements of the parties contained, the parties do hereby agree as follows:

The terms and conditions of this Agreement are incorporated herein and by reference and subject to the approval of the signature hereto, and the amendments made herein, to with:

Services to Be Provided:

Indiana will provide the following services relative to this Agreement:

Implement the monitoring program as identified in Attachment A.

Term:

The performance of this agreement will commence May 1, 2013 and will terminate on December 31, 2014.

Consideration and Payment:

The cost to LLCD for Indiana's performance of the work described in this Agreement is $8388.00. It is understood that this is fixed-price Agreement. LLCD will make payment to Indiana as follows:

$4194.00 -upon acceptance of agreement
$2097.00 -January 1, 2014
$2097.00 -December 31, 2014

Termination:

This agreement may be terminated by either party providing the other party receives written notice thirty (30) days prior to the effective date of termination. In the event this Agreement is terminated prior to the ending date, LLCD will pay Indiana for all costs and all non-cancelable commitments incurred up to the date of termination.

Modification:

Any modification to this agreement will be in writing and signed by both LLCD and Indiana.

Terms and Conditions:

Authority to Bind Contract: Both parties hereto: in the performance of this Agreement, will be acting in an individual capacity, and not as agents, employees, partners, joint ventures or associates of one another. The employees or agents or one party shall not be deemed or construed to be employees or agents of the other party for any purposes whatsoever. Neither party will assume any availability for any injury (including death) to any persons, or any damage to any property out of the acts of omissions of the agents, employees or subcontractors of the other party.

Nondiscrimination: Pursuant to IC22-9-1-10, Indiana and its subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Agreement, with respect to his/her hire, tenure, conditions or privileges of employment, because of race, color, religion, sex, handicap, national origin or ancestry. Breach of this covenant may be regarded as a material breach of contract.

Maintaining a Drug-Free Workplace: Indiana hereby covenants and agrees to make a good faith effort to provide and maintain during the term of this Agreement a drug free workplace, and that it will give written notice to New and the Indiana Department of Natural Resources within ten (10) days after receiving actual notice that an employee of Indiana has been convicted of a criminal drug violation occurring in Indiana's workplace. It is further expressly agreed that the failure of Indiana in good faith to comply with these terms shall constitute a material breach of this Agreement, and shall entitle the State to terminate this Agreement.

Lake Lemon Conservancy District
Robert G Mosier
DISTRICT MANAGER
Title:

Date: 4/17/13

Indiana University
Trisha Adams
Trisha Adams
Title: Manager, Grant Services
Office of Research Administration

Date: 3/6/13

Attachment A

Lake Lemon Monitoring Program

2013-2014

1.0 INTRODUCTION

The Lake Lemon Conservancy District (LLCD) has entered into a lease agreement with the City of Bloomington Utilities Service Board (USB) to maintain Lake Lemon in such condition necessary to protect the lake's water quality consistent with its potential use as a drinking water source. LLCD also agreed to maintain the lake in such condition to meet all state and federal requirements for recreational waters and to maintain the quality of the water in the lake at least at its present level.

The LLCD has requested assistance from the School of Public and Environmental Affairs (SPEA) to provide long-term monitoring of the lake's condition. The purpose of this contract is to establish the monitoring program and fees necessary for LLCD to meet the monitoring requirements of the USB for the years of 2013 and 2014.

2.0 WATER QUALITY SAMPLING AND ANALYSIS

In-Lake Sampling. Previous studies (Zogorski et al., 1986; Jones and Clemency, 1992) have shown that water characteristics in Lake Lemon follow typical patterns for run-of-the-river reservoirs. The eastern end is riverine in nature and is influenced strongly by Beanblossom Creek. The western end is more lake-like (*lacustrine*), and the middle is a transitional zone. To characterize these differences, the established protocol specifies sampling the lake in at least two locations - at mid-lake just east of Reed Point, and near Riddle Point over the deepest water in the lake. One set of samples will be collected during the spring and another set during July/August of 2013 and again in 2014.

At each of the two sampling sites, we will collect water samples for the following parameters at one meter below the surface (*epilimnion*) and from one meter off the bottom (*hypolimnion*):

- alkalinity
- pH
  conductivity
- total phosphorus
- soluble reactive phosphorus
- nitrate+nitrite
- ammonia
- total organic nitrogen
- suspended solids

These samples will be placed into an appropriate bottle with preservative (if needed) and stored in an ice chest until analysis in SPEA's laboratory.

Temperature and dissolved oxygen will be measured at one-meter depth intervals from the surface to the bottom at each lake site with a YSI Model 85 Meter. At each lake site, the following additional collections or measurements will be made:

- Secchi disk transparency
- determination of the one percent light level (Beckman Enviroeye)
- chlorophyll *a* (in epilimnion only; filtered in the field and stored on ice)
- zooplankton genera density (tow from the 1% light level with a 55 micron net)
- phytoplankton genera density (2 meter integrated sample)
- fecal coliform bacteria (from epilimnion only)

Results from the lake analyses will be used to calculate the Carlson Trophic State Index according to IDEM guidelines. The trophic state index is a useful tool for tracking water quality changes over time. All analyses will be conducted using methods consistent with *Standard Methods for the Examination of Waters and Wastewater, 20th Edition* (APHA, 2005). An Alpkem FLOW SOLUTION autoanalyzer (Model 3570) will be used to analyze nitrate, ammonia, organic nitrogen and total phosphorus. A QA/QC plan is available for the SPEA limnology lab.

Additional lake samples for fecal coliform bacteria will be collected on both sampling dates in and around the Chitwood Addition at the southeast corner of Lake Lemon. This area has had high historical bacteria counts.

Stream Sampling. Because Lake Lemon's condition is heavily influenced by runoff from its watershed, it is also important to monitor the main inlet to the lake - Beanblossom Creek. Up to 80% of the annual sediment and nutrient load into a lake comes during the 4-5 largest runoff events. Therefore, we will sample Beanblossom Creek in the spring and summer of 2013 and 2014 during runoff events, if possible, at one location at mid-depth near its discharge point to the lake. The following parameters will be measured: temperature, dissolved oxygen, pH, alkalinity, conductivity, SRP, total phosphorus, nitrate+nitrite, ammonia, organic nitrogen, total suspended solids, and fecal coliform bacteria.

Furthermore, we will sample Bear Creek, near its confluence with Beanblossom Creek and lower Beanblossom Creek, for fecal coliform bacteria and total suspended solids. We will also sample the small tributary/ditch that flows through the trailer park on North Shore Drive just north of the marina for fecal coliform bacteria. These two additional tributary sites will be sampled on the regularly scheduled spring and summer sampling events and during the storm event.

3.0 PRODUCTS PRODUCED

SPEA will prepare an annual written report documenting the results of the monitoring efforts for each year. The report will include a determination of the Carlson Trophic State Index for each lake site and for each sampling date. All data will be included in tables and interesting trends will also be displayed in graphs. The current year's data will be compared to historical data to assess relative changes in the lake.

SPEA will also be available to present its report and answer questions to the Lake Lemon Conservancy District Board.

4.0 CAPABILITIES AND QUALIFICATIONS

Melissa Clark is a Lecturer at Indiana University's School of Public and Environmental Affairs (SPEA) in Bloomington. Melissa teaches courses in limnology, lake and watershed management, aquatic habitat assessment, terrestrial habitat assessment, introductory water resources and environmental management. In addition, for the past 13 years Melissa has managed SPEA's limnology research laboratory that was directed by Bill Jones. Melissa has assumed leadership roles on numerous LARE projects and Directorship of the Indiana Clean Lakes Program. Melissa is the only Certified Lake Professional in Indiana.

Sarah Powers is the Volunteer Coordinator of the Indiana Clean Lakes Program. Sarah has worked closely with Melissa Clark in managing all LARE and other lake/watershed projects in the SPEA limnology research laboratory. She is also an Adjunct Faculty for SPEA teaching environmental science for science majors.

Qualified graduate students from SPEA's Master of Science in Environmental Science Program will assist with the collection and analysis of samples collected under this contract.

5.0 REFERENCES CITED

APHA. 2000. Standard Methods for the Examination of Water and Wastewater, 20th edition. American Public Health Association, Washington, D.C.

Jones, W.W. and L. Clemency. 1992. Lake Lemon T by 2000 Feasibility Study. School of Public and Environmental Affairs, Indiana University, Bloomington.

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LAKE LEMON 2013-2014 MONITORING PROGRAM
Proposed Budget
May 1, 2013 - December 31, 2014

SALARIES

	TIME	RATE	Year One	Year Two	Total
Melissa Clark	120	28.65	1,719	1,719	3438
Clark benefits		27.41%	471	471	942
Powers	40	17.98	360	360	719
Powers benefits		40.06%	144	144	288
Grad Assistants	150	12.00	900	900	1800
			3,594	3,594	7,188

TRAVEL

In State Travel			100	100	200
			100	100	200

OTHER DIRECT

Lab Supplies			200	200	400
GIS Software			250	250	500
Expendable Supplies/Copies			50	50	100
			500	500	1,000

TOTAL DIRECT COST			4,194	4,194	8,388

Lake Lemon Conservancy District

Proposed LLCD Protocol for Replacing a Board Member
Due to a Board Vacancy

1. A mailing will be sent to all Freeholders in Sub-Area affected by vacancy (See Attached Sample).
2. LLCD Office will set a deadline to accept candidate(s) letter of intent/resume to serve.
3. LLCD Office will forward candidate(s) information to existing Board Members.
4. Existing Board Members will appoint a candidate at the next appropriate Board Meeting.
5. Reference IC 14-33-5-12 (See Attached).

7599 North Tunnel Road, Unionville, IN 47468
Phone 812/334-0233 • Fax 812/335-0038

Sample

April 17, 2013

To: Sub-Area III Freeholders of the Lake Lemon Conservancy District

The Board of Directors of the Lake Lemon Conservancy District seeks a Sub-Area III Freeholder to fill the LLCD Sub-Area III Board of Director's position made vacant by the resignation of Director Kristin Spickelmier.

Interested candidates should submit a letter of intent/resume to the LLCD Office by mail to: LLCD Office, 7599 N. Tunnel Rd., Unionville, IN 47468; or by email to llcdoffice@aol.com; or by fax to 812-335-0038.

By: May 6, 2013.

Per Indiana Code 14-33-5-12 (*Indiana Conservancy Act*), "If a vacancy occurs on the Board, the Board shall vote to appoint a member to serve until the next annual meeting." This appointment will expire on Wednesday, February 5, 2014.

An election will be held at the 2014 LLCD Annual Meeting to elect a Sub-Area III Director to complete the remaining two (2) years of this term.

Bob Madden, Manager
Lake Lemon Conservancy District

Sec. 11. (a) The board of commissioners of the county shall appoint the initial directors for the following terms:

(1) If there are three (3) or five (5) directors, the terms are as follows:

(A) One (1) term expires at the next annual meeting.

(B) One (1) term expires at the second annual meeting.

(C) One (1) term expires at the third annual meeting.

(D) Any other terms expire at the fourth annual meeting.

(2) If there are seven (7) or nine (9) directors, the terms are as follows:

(A) Two (2) terms expire at the next annual meeting.

(B) Two (2) terms expire at the second annual meeting.

(C) Two (2) terms expire at the third annual meeting.

(D) All other terms expire at the fourth annual meeting.

(b) As the terms expire, each new director shall be elected for a term of four (4) years.

As added by P.L.1-1995, SEC.26.

IC 14-33-5-11.5

Single nominee considered elected; no election required when only one nominee in each district

Sec. 11.5. (a) Notwithstanding the other provisions of this chapter, if there is only one (1) nominee for election to the board to represent an area, the nominee for election to the board to represent that area is considered elected.

(b) Notwithstanding the other provisions of this chapter, if there is only one (1) nominee for election to the board for each area for which a director is to be elected, the following apply:

(1) The election otherwise required to be held under this chapter is not required to be held.

(2) Each of the nominees for election to the board is considered elected as if the election had been held and each nominee was elected as provided in this chapter.

As added by P.L.16-2010, SEC.2.

IC 14-33-5-12

Vacancies

Sec. 12. (a) If a vacancy occurs on the board, the board shall vote to appoint a member to serve until the next annual meeting.

(b) If the vote held under subsection (a) results in a tie, a judge of the circuit court of the county in which the district was established shall designate a person to serve as a member until the next annual meeting.

(c) At the next annual meeting a director shall be elected to complete the term.

As added by P.L.1-1995, SEC.26. Amended by P.L.4-2004, SEC.2.

IC 14-33-5-13

Meetings

Sec. 13. The board shall by resolution fix the time for holding

03/13/2013

LLCD Board of Directors

It is with great regret, that I must resign from the LLCD Board of Directors, due to medical issues. It has been a very interesting experience that I wish that I could have continued until the end of my term.

Very Sincerely,

Kristin Spickelmier

1/15/1997
Revised – 11/18/1998
Revised – 10/18/2000
Revised – 12/19/2001

BY-LAWS
OF THE LAKE LEMON CONSERVANCY DISTRICT

ARTICLE I.

NAME:
The name of this organization shall be the Lake Lemon Conservancy District, hereinafter designated as the District, and abbreviated "LLCD."

ARTICLE II.

PURPOSE:
The purpose of the District shall be to manage the recreational and environmental potential of Lake Lemon in the best interests of the Freeholders and in strict compliance with the Indiana Conservancy Act 14-33.

ARTICLE III.

AUTHORITY:
The power of LLCD shall be vested in the Board of Directors who shall have management and control of the operation of the Conservancy District. They shall employ such people as deemed necessary and advisable and fix the rates of compensation and duties.

ARTICLE IV.

DIRECTORS:
The Board of Directors shall consist of seven (7) members, one from each of the seven (7) areas of the District.

SECTION A: The voting process and election of Directors will be in compliance with the District's Procedure for Voting and Absentee Balloting

SECTION B: Individual Directors may not incur financial obligations without the authorization of the Board of Directors.

SECTION C: No Proxy votes are allowed by Directors at Board Meetings.

ARTICLE V.

COMPENSATION:
Directors shall serve without pay but may be reimbursed actual expenses while conducting LLCD business providing that these expenses receive authorization from the Board.

ARTICLE VI.

OFFICER QUALIFICATIONS:
One year **minimum** length of service will be required for any Director to be eligible for election to a Board Officer position unless experienced candidates are not available.

ARTICLE VII.

MEETINGS:

SECTION A: Board meeting shall be held monthly with the Annual February Meeting serving as that month's Board Meeting with a targeted time of ninety (90) minutes unless majority agrees to continue.

SECTION B: Freeholders are encouraged and may submit agenda items to their District Director for consideration at the next available Board meeting. Directors must submit agenda items to the Chairman ten (10) days in advance of the next scheduled meeting.

ARTICLE VIII.

ATTENDANCE:
Regular attendance at Board Meetings by all Directors is expected. In the event of a Board Member's absence at two or more consecutive Board Meetings, the Board at its discretion may act to declare the absentee Board Member's position vacant.

ARTICLE IX.

RULES OF ORDER:
Establishment of specific "Rules of Order" will be deferred for later action.

ARTICLE X.

AMENDEMENT PROCEDURES:
Amendment to By-Laws previously passed; Motions; and Resolutions require a two-thirds (2/3) vote of the Directors.

“No Towing” Zone

Pros:

Safety
Liability
No Speed Restrictions

Cons:

Enforcement
Boaters coming from East End

Option A

Description:
1,000 Feet South from the Tip of Reed Point to Long Causeway

4-6 Buoys (Approx. $100 Each)

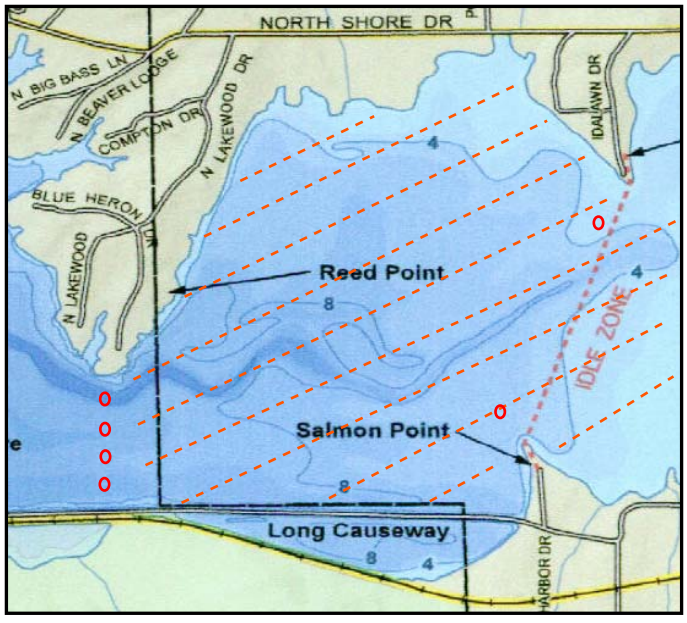
Pros:

- More Obvious Buoy Line
- Less Buoys Needed

Cons:

- Entire East Bay is restricted to “No Towing”

Image:



Option B

Description:
1,000 Feet North of Reed Point on East Shoreline
1,000 Feet East into the Bay
1,700 Feet South to Long Causeway

15-20 Buoys (Approx. $100 Each)

Pros:

- Increased Ski Area

Cons:

- More Buoys Needed

Image: