## Lower Bolton Lake

Status Update March 29, 2018

Northeast Aquatic Research George Knoecklein Hillary Kenyon Hannah Kyer



#### **Bolton Lake**

(removed in 2016)

- Invasive (Non-native) Aquatic Plants
- Severe Cyanobacteria Blooms
- Storm water (?)

## Background 1

Lake water sampling stations

- Station 1
  - Deep water =
  - Top, middle, bottom
- Station 2
  - Shallow water =
  - Top & bottom
- Outflows from Middle, Upper, and Lower Bolton Lake



#### **Depth Area Curve for LBL**



### Invasive (Non-native) Aquatic Plants 1

- Milfoil (sp.) identified as; most abundant in 1978, and sparse in 1979 (CT DEP)
  - Incidentally CT DEP found only 3 other species in LBL
    - White water-lily, cattail, and Musk-grass
- NEAR findings in 2012 (17 native species)
  - Variable milfoil in small isolated pockets along western shore
  - Fanwort in small cove on western shore
  - Mudmat in tiny patches along southern shore



Not found since 2013 treatment

# Invasive (Non-native) Aquatic Plants 2 Curly-leaf pondweed found in late 2014



Curly-leaf pondwee d found in spring 2017



## Targets and thresholds used to assess WQ in Lower Bolton Lake

#### Nutrients

- **Phosphorus** Goal <10ppb / Upper Threshold= 20ppb.
- Nitrogen Goal <200ppb / Upper Threshold= 600ppb.
- Iron Goal <50ppb / Upper Threshold= 150ppb</li>

#### Impacts

- Water Clarity Goal >3m / Upper Threshold= 2m
- Cyanobacteria Cells Goal <20,000 cells/ mL / Upper Threshold= 70,000 cells/mL
- Dissolved Oxygen Goal >5 ppb

#### Lake 226 – Northwest Ontario ~1968

## N, C, and P

N & C

only



#### **CT DEEP trophic categories and paired total phosphorus**

and water clarity (Frink and Norvell 1984)



## **Total phosphorus trends in LBL**



Total Phosphorus in ppb

## **Total phosphorus trend**

#### -bottom water



Total Phosphorus ppb







## Water clarity trend at LBL



#### Trends in plankton cell numbers



## 2017 plankton trends



#### Trends in dissolved oxygen boundary

#### **Anoxic Boundary Layer Depth**



#### Aerial extent of anoxic water



#### **Phosphorus / Water Clarity revisited**



#### Watershed Sampling Stations



Nutrients in storm water to Lower Bolton Lake collected in 2017

	Total Nitrogen (ppb)		Total Phosphorus (ppb)	
Inlet	7/24/2017	10/26/2017	7/24/2017	10/26/2017
1	1,475	465	224	234
1B	2,486		273	
1B_2	730		358	
3	1,620		233	
4	637		81	
5	846		118	
5b	593		77	
6	676	321	122	156
6b	2,318		250	
8		879		137
9	1,407	491	208	41
25	489		87	
41	1,472	682	326	66
42	2,152		862	
44		248		182
95	1,759		277	
168		156		51
169		310		61
Avg.	1,333	463	250	124

## Summary

- No southern naiad was found in 2017
- No fanwort or variable milfoil found in 2017, however, now battling curly-leaf pondweed
- Both Phosphorus and Nitrogen are trending down
- Iron still high but suggestions of a decreasing trend
- Water clarity dramatically improved in 2017
- Dissolved oxygen slightly improved with less anoxia in 2017
- Location of LBL on the phosphorus / clarity model shows LBL was essentially a different lake in 2017 over 2013
- Internal phosphorus loading minor to trace in 2017
- Internal nitrogen loading minor to trace in 2017
- Focus now on watershed sources of nutrients

#### **Creeping Normalcy**

"Perhaps the commonest circumstance under which societies fail to perceive a problem is when it takes the form of a slow trend concealed by wide up-anddown fluctuations"

> - Jared Diamond *Collapse*