

Understanding Lake Water Quality Data Workshop

Thursday, August 3, 2017, 1- 4 p.m.

County of Lanark Council Chambers, 99 Sunset Blvd., Perth, ON

Note Taker: Melissa Dakers – Watersheds Canada

1 p.m. Welcome and introductions – *Karen Hunt/Lake Networking Group*

- Karen welcomed the group and introduced all the partnering agencies present
 - Mississippi Valley Conservation Authority, Rideau Valley Conservation Authority, Cataraqui Region Conservation Authority, Lake Partner Program – Ministry of the Environment & Climate Change (MOECC), Watersheds Canada

1:15 p.m. Cataraqui Region Conservation Authority (CRCA) Lake Reports

- Overview of the Cataraqui Region
 - Tom Beaubiah (former biologist is now looking after Conservation Lands)
 - Role of the authority is look after development review & planning, watershed monitoring & reporting, source water protection – clean water act, education – schools, children & adult programing, Conservation Lands – both active areas and areas of protection, forestry – tree planting programs
 - Made up of 10 sub watersheds, including the Frontenac Axis – uplifting of Canadian Shield
 - 170 named lakes, most lakes found in Cataraqui & Gananoque sub watershed regions
 - CRCA is first point of contact for many questions
- Description of Lake Assessment Report / highlights, related fact sheets and resources
 - Detailed Lake Reports available –currently 45 lakes included, with a 7 year timeframe (2009-2015 data), region-wide comparisons, include reference section – invasive species, lake associations – Holly is looking for people to comment on any incorrect info.
 - Fact sheets for 45 individual lakes – include info on lake functions, lake statistics, map, characteristics, vulnerability (Eutrophication – nutrient loading), water quality, aquatic diversity, species at risk.
 - Map of Trophic status of lakes sampled by CRCA – according to provincial objectives of 0.02mg/L of phosphorus, **11% Low:** Low nutrient levels (oligotrophic), minimal algae present **53% Medium:** Moderate nutrient levels (mesotrophic), algae abundant **18% High:** High nutrient levels (eutrophic), algae blooms present
 - Trends are showing that phosphorus levels are mainly maintaining levels, while 1 lake is showing an increasing trend.
- Importance of Citizen Science
 - Small staff, need help from citizen scientists, using Lake Partner program data is helpful to fill in gaps.
- Plans for Subsequent Lake Reports
 - CRCA will continue to select 5 lakes at a time where there is limited data and will sample for 5 years annually, in process calling on Lake Stewards to voluntarily continue the sampling through Lake Partner program.
 - Updates to reports will be every 5 years or on an as needed basis
 - Will be adding algal bloom occurrences, ice out period reporting, flushing rates
 - No spiny Water flea reported in the region, need to be proactive and take precautions
 - Reports available online – click on sub watershed to access specific lake

Holly Evans/ Watershed Planning Coordinator / Cataraqui Region Conservation Authority
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1:40 p.m. Rideau Valley Conservation Authority (RVCA) Watershed Watch Program

- Overview of what parameters are analyzed for the Watershed Watch program and why
 - RVCA – Stream Water Quality Monitoring Program, Baseline monitoring – MOECC and Watershed Watch (WW)
 - WW – 36 lakes sampled 4x per year – spring, 2x summer, fall, sample deepest point and shorelines
 - Sample water clarity – secchi disk readings (Provincial objective > 1.2 meters), check changes in colour and clarity, zebra mussels increase water clarity
 - Total phosphorus – (provincial objective <0.02 mg/L), key limiting factor plant & algal growth, RVCA average is 0.012 mg/L
 - Total Kjeldahl, nitrogen – secondary nutrient for plant growth
 - E.coli – contaminated with fecal material, sample shorelines, in RVCA counts average 2-6, 99% are below Provincial Objective of 100
 - DOC –Dissolved Organic Carbon – blocks light, turns water a tea colour
 - Calcium – naturally occurring, determined by underlying geology, factor for zebra mussel production
 - pH – amount of hydrogen ions, 6.5-8.5 is Provincial Average, Trout & Mayflies prefer pH of 7, bass & bluegill prefer pH of 8.5
 - Conductivity – ability to conduct electricity, dissolved solids in the water
 - Dissolved oxygen and water temperature profiles – critical for fish & aquatic organisms, DO can be depleted either due to ice on lake or excessive decay, which consumes oxygen
- How data is analyzed and interpreted (including the Water Quality Index as a summary tool)
 - Sub watershed reports are produced, showing comparisons, uses 6 year data sets, report on annual results too.
 - Use Water Quality Index – compares multiple parameters, individual score for lake
 - Excellent 95-100....Fair 65-79....Poor 0-44
 - Public has access to info and data sets are available www.rvca.ca/watershed-programs

Sarah MacLeod-Neilson / Surface Water Quality Coordinator / Rideau Valley Conservation Authority
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2:05 p.m. Break – Refreshments (courtesy of MVCA) and Networking

2:20 p.m. Mississippi Valley Conservation Authority (MVCA) Watershed Watch Program

- Looking at frequency of monitoring, parameters chosen to study and why; Possible differences in sampling methodology between the various CAs and the Lake Partners program
 - Watershed Watch Program started in 1998 and was developed in partnership with the Lake Stewardship Network
 - MVCA monitors 44 lakes in watershed for: Total Phosphorus (in euphotic zone (depth at which sunlight can penetrate or 2x secchi disk depth and 1 meter off the bottom); water clarity using secchi disk; calcium levels; pH; dissolved oxygen & temperature profiles; and zebra mussels & spiny water flea.
 - Previous rotation of lake sampling was every 5 years
 - New rotation – every 2 years for Mississippi River Watershed, 3 years for large lakes in sub watersheds, 5 years for smaller lakes and 8 years for small headwater lakes.
 - Sampling is organized by sub watersheds
 - Total phosphorus is now being filtered – similar protocol to Lake Partner Program
 - Chlorophyll A – realized not representative of lake with only 3 samples per year, so no longer used

- How can data be best presented/analyzed in ways that are most useful to lake associations?
- New reporting- individual reports are now integrated into one monitoring report – looking at all data collected in the sub watershed, and how they work together; more holistic; includes weather, benthic macro-invertebrates (aquatic insects etc.).
- Also looking at overall trends in data, not the “spikes”, more time, more data
- Please review the new integrated report and send comments to Kelly Stiles in order to improve them
- Comment from floor – it was noted that accessing the online integrated reports difficult – need to improve or simplify the access

Kelly Stiles | Aquatic Biologist | Mississippi Valley Conservation Authority kstiles@mvc.on.ca

Alyson Symon | Watershed Planner | Mississippi Valley Conservation Authority asymon@mvc.on.ca

2:45 p.m. Lake Partner Program

- Goal/scope of the Lake Partner Program. How does the Program work?
 - Water quality and cottage price in Ontario – 6% increase in property value for every 1 meter increase in water clarity
 - Lake Partner lab located in Dorset Ontario since 1976 – all samples analyzed here
 - Limited capacity to monitor and study so many lakes, so uses volunteers
 - More than 600 volunteers monitor over 500 lakes at over
 - Largest volunteer-based water quality monitoring network in Canada, Ontario based, partnership with FOCA (Federation of Ontario Cottage Association)
 - 2016 – 350-450 volunteer monitored lakes across Ontario
- Why does the LPP analyze Total Phosphorus and Calcium specifically?
 - Total phosphorus (TP) is measured as it affects water clarity, algal blooms and helps avoid nuisance algae; Provincial Objective is 0.02 mg/L,
 - TP is reliable and inexpensive
 - 93% of inland lakes sampled are below provincial objective
 - Calcium is a required element for all living organisms, levels have been declining in Ontario inland lakes – LPP monitoring it since 2008
 - Acid rain – removes calcium, calcium is found in the biomass of tree bark – harvesting trees removes calcium from the watershed
 - 1.5-2 mg/L of calcium – see biological affects in organisms, negative effects, shells and bones affected
 - Majority of inland lakes sampled are sufficient in calcium levels, only 15% of lakes are at calcium concentrations less than 2.0 mg/L
- What use is made of the Secchi Depth measurement data?
 - Secchi disk – invented in 1865
 - Influenced by turbidity (fine particles), algal biomass
 - Shows colour of the water – influenced by dissolved organic carbon (DOC) – wetland areas cause tea stained orange/brown colour
 - 20% of inland lakes show a decline in secchi levels

*Dr. Andrew Paterson / Inland Lakes Research Scientist / Dorset Environmental Science Centre/
Ontario Ministry of the Environment and Climate Change*

3:10 p.m. Discussion with Panel: Holly Evans (CRCA), Sarah Macleod-Neilson & Mike Yee (RVCA), Alyson Symon & Kelly Stiles (MVCA), Dr. Andrew Paterson (Lake Partner Program)

- Zebra mussels (ZM) affect the lake – take out nutrients through filtration, affects the food chain and water column, increases water clarity (increase secchi disk readings) which increases vegetation growth; displaces phosphorus to more shoreline areas, ZM populations cycle like tent caterpillars – high and low
- Flushing rates of lake affect impact of TP and DO in deep areas same as shallow areas of lake, most flushing is in spring before stratification and thermocline occur, colder water is denser and lakes only mix 2x per year
- Secchi depth for sampling phosphorus vs 2x secchi depth (1% of sunlight can penetrate – depth at which algae can grow) – difference in sampling protocols between each conservation authority (CAs) and Lake Partner Program (LPP)– any composite sample within that water column will show similar results
- Mandatory septic re-inspection program – opinions – need willing partners, a lot of things need to come together because people push back (back off gov't), Tay Valley only Township involved on 6 lakes, lake associations willing – townships not, experience from one lake – no records of older systems so were only re-inspecting new systems, costs \$\$\$, some twp. keep septic info with health unit or conservation authority, Leeds & Thousand Islands twp. will provide loans for upgrading septic systems
- Effects of flooding and higher water levels – Summer 2017 – still waiting to see results, Mississippi Lake changed colour to orange/brown – always been blue/green last 15 years
- Changes in lake colours – LPP science is studying it, recovery from acid rain (it dissolves DOC), climate is a factor in changes
- CA's using Lake Partner data for reporting? CRCA – uses data, RVCA – collect both their own and LPP – 2 sets of data used, MVCA – uses it as a comparison
- Lake Associations are seeing increase in membership, collecting data is good but how can we improve or make changes – need more stewardship actions (i.e. Planting native vegetative buffers, positive changes), data collection will better understand climate change, science will lead to positive changes – it takes time, scientists not best communicators – more info need to be distributed to public.
- Vegetation is like the skin of the lake – need to thicken the skin to prevent problems on lake
- Lake Links Workshop – October 21, 2017 Beyond the Shoreline, Perth Ontario, contact Watersheds Canada to register.

3:50 p.m. Wrap-up

What have we learned? Where do we go from here?

- Everyone is passionate about what we do, we have limited resources and need help from citizen science
- Need to communicate better, need long term data sets to help change policy; to understand trends
- Need to fine tune and refine sampling techniques and reporting – constantly adapting
- Better water quality, increase in property values
- If we understand and appreciate water science, we can make a difference
- We have high expectations and we should, preventing a problem is tough but fixing is tougher

Terry Rees/ Executive Director/ Federation of Ontario Cottagers' Associations (FOCA)