The Cataraqui Region Conservation Authority (CRCA) has provided environmental leadership and service to local communities since 1964. It is one of 36 watershed-based agencies within Ontario dedicated to the conservation and protection of the natural environment through a variety of management tools including land ownership, education, monitoring, reporting and regulation.

To learn more about the lakes in our region, the CRCA and partners collect samples, take measurements and compare this information against established standards to identify any significant changes or areas of concern. This Lake Fact Sheet focuses on key parameters to assess the health and resilience of Colonel By Lake with respect to nutrient loading, invasive species colonization and acidification.
Colonel By Lake is near the outlet of the Cataraqui River upstream of Kingston Mills Locks off Highway 15. Nearby waterbodies include Collins Lake and River Styx.

**County:** County of Frontenac  
**Municipality:** City of Kingston  

**Watershed:** Cataraqui River  
**Average Depth (m):** 4.00  
**Coordinates:** 44.243 Lat., -76.472 Long.  
**Volume (m$^3$ x 10$^6$):** 8.50

<table>
<thead>
<tr>
<th>SURFACE AREA (HA)</th>
<th>MAX. DEPTH (M)</th>
<th>SHORE LENGTH (KM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>529</td>
<td>6.10</td>
<td>27.8</td>
</tr>
</tbody>
</table>
The map below shows water depths and the topography of the lake bottom (bathymetry), as well as the direction of water flow. Water flows into Colonel By Lake from River Styx (originally from Cranberry Lake) out to Lake Ontario.
Colonel By Lake is a shallow, warmwater lake created by the construction of a dam and that overlies limestone. As with most lakes within the Cataraqui Region, Colonel By Lake ‘mixes’ in the spring and fall due to the lake water warming and cooling. During this mixing process, nutrients are cycled throughout the lake, giving the water a cloudy appearance as well as a brown or green hue from algae that feed off the cycling nutrients. Later in the spring, summer, and winter, water temperatures vary by depth (thermal stratification) so multiple fish species are found at different depth and temperature ranges. Refer to the Cataraqui Region Lake Assessment Report for more detail.

Water levels are controlled by Parks Canada through the Rideau Canal System at Kingston Mills Dam within a 0.5-meters fluctuation throughout the year. Besides water control structure operations, water level changes are due to changes in evaporation rate, precipitation, snowmelt, and flood or drought conditions. The lake level is also controlled upstream on River Styx at Lower Brewers and Upper Brewers Dams.

**LAKE FEATURES**

**IMPORTANT NATURAL FEATURES:**
Provincially Significant Wetland, Area of Natural & Scientific Interest

**SURROUNDING LAND USE:**
Woodlands, Wetlands, Agriculture, Residential (year-round and seasonal), Parks

**PRIMARY WATER LEVEL CONTROL:**
Parks Canada

**WATER ACCESS:**
Off Aragon Road or at the Rideau Acres Campground (fee applies)
Information about Colonel By Lake has been used to identify whether it is vulnerable to a few common stressors to lake water quality and biodiversity. Stressors include excess nutrient build up (eutrophication), the introduction of invasive species, and pH levels that are too low (acidification). Refer to the scoring card below that grades these risks for Colonel By Lake.

**EUTROPHICATION:** The process of increasing nutrient levels in a waterbody. It results in excess algal growth, lower oxygen levels, and reduced biodiversity. For more information refer to the *Cataraqui Region Lake Assessment Report*.

- **Low:** Low nutrient levels (oligotrophic), minimal algae present
- **Medium:** Moderate nutrient levels (mesotrophic), algae present
- **High:** High nutrient levels (eutrophic), algae bloom presence likely

**INVASIVE SPECIES:** Species that are not native to an environment, but are introduced, establish, and reproduce in a new system. For more information about invaders in the region, refer to *Appendix 5* of the Cataraqui Region Lake Assessment Report.

- **Absent:** No aquatic invaders reported
- **Present:** Aquatic invaders established
**ACIDIFICATION:** The process of lake water becoming more acidic, resulting in reduced biodiversity and increased water clarity.

- **Low:** pH 6.5 to >7.5, not impacted, neutral or alkaline conditions
- **Medium:** pH 6 to 6.5, sensitive but acceptable range
- **High:** pH <6 hyper-sensitive, threatened or critically impaired

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**COLONEL BY LAKE VULNERABILITY SCORES**

<table>
<thead>
<tr>
<th>Eutrophication</th>
<th>Invasive Species</th>
<th>Acidification</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>PRESENT</td>
<td>LOW</td>
</tr>
</tbody>
</table>

- Based on an average total phosphorus concentration of 0.09 mg/L, nutrient levels are in excess with eutrophic conditions suitable for nuisance algae bloom growth
- Observations of severe algae bloom growth were noted along the shoreline by CRCA staff during 2016 sampling events
- Zebra mussels were observed by CRCA staff during 2016 sampling events
- Colonel By Lake maintains a neutral pH with little risk to acidification
The water quality of a lake is affected by many factors including temperature, pH, oxygen, nutrients (trophic status), and transparency (Secchi disk depth). Classifying lakes by these factors can provide a better understanding of lake health. For more information, refer to the Cataraqui Region Lake Assessment Report.

Water Quality Summary

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Regime:</td>
<td>Warmwater</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/l):</td>
<td>No data</td>
</tr>
<tr>
<td>Trophic Status:</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>Average Secchi Depth (m):</td>
<td>0.45¹</td>
</tr>
<tr>
<td>Total Phosphorus (mg/l):</td>
<td>0.090¹</td>
</tr>
<tr>
<td>pH:</td>
<td>7.8¹</td>
</tr>
<tr>
<td>Average Calcium(mg/l):</td>
<td>21.6¹</td>
</tr>
</tbody>
</table>

Colonel By is a warmwater lake with high nutrient levels.

Except for samples taken in 2012, there is no additional water quality information available for Colonel By Lake from 2009 to 2015. The Cataraqui Region Conservation Authority began collecting samples and taking measurements of this lake in 2016. Analysis of this more recent data will be presented in the next edition of the Lake Assessment Report and fact sheet.
Colonel By Lake hosts many common fish species found in the Cataraqui Region. Fish species previously caught on the lake are listed below. There are also a variety of minnows supplementing the food chain along the shallow shoreline areas that have not been recorded.

<table>
<thead>
<tr>
<th>COMMON FISH FAMILIES</th>
<th>SPECIES PRESENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American Catfish</td>
<td>Brown Bullhead</td>
</tr>
<tr>
<td>Bowfin</td>
<td>Bowfin</td>
</tr>
<tr>
<td>Pikes</td>
<td>Northern Pike</td>
</tr>
<tr>
<td>Suckers</td>
<td>White Sucker</td>
</tr>
<tr>
<td>Temperate Basses</td>
<td>White Perch</td>
</tr>
<tr>
<td>Sunfishes &amp; Basses</td>
<td>Largemouth Bass</td>
</tr>
<tr>
<td></td>
<td>Smallmouth Bass</td>
</tr>
<tr>
<td></td>
<td>Pumpkinseed</td>
</tr>
<tr>
<td></td>
<td>Bluegill</td>
</tr>
<tr>
<td></td>
<td>Rock Bass</td>
</tr>
<tr>
<td></td>
<td>Black Crappie</td>
</tr>
<tr>
<td>Carps &amp; Minnows</td>
<td>Variety</td>
</tr>
<tr>
<td></td>
<td>Common Carp</td>
</tr>
<tr>
<td>Perches &amp; Darters</td>
<td>Yellow Perch</td>
</tr>
</tbody>
</table>
There are some species at risk in the region that will benefit from good lake care practices. At the time of reporting, the following species at risk have been observed within the last ten years:

- Blanding’s Turtle
- Eastern Musk Turtle
- Northern Map Turtle
- Snapping Turtle

Additional species may also be present, but have yet to be reported. It is important to conserve shoreline vegetation and woody debris, and reduce pollution to maintain healthy aquatic communities.

For more information, follow the links below:

Fish ON-Line
Reptile and Amphibian Atlas
Zone 18 Fishing Regulations

Guide to Eating Ontario Fish
Species at Risk by Region
Maintain a natural shoreline:
Create a buffer zone by planting native species to control erosion, increase habitat for wildlife, maintain cooler water temperatures (shade), protect from flooding and improve water quality.

Contact Watersheds Canada to learn more about their Natural Edge shoreline naturalization program.

Build low impact-docks:
Increase habitat and reduce sediment disruption. Examples of low impact docks include cantilever, floating or post styles.

Reduce runoff from pollutants:
Use phosphate-free, biodegradable soaps and detergents at a distance from the lake and limit or eliminate fertilizers to decrease nutrient input. Limit the amount of hard surfaces to control runoff of pollutants entering the lake.

Handle and dispose of chemicals properly: Fuel motor craft responsibly to avoid spills and bring extra chemicals and storage containers to a hazardous waste depots.

Manage animal waste and grazing areas: Avoid overgrazing as it can expose soil and increase erosion. Remove animal waste to avoid excess nutrients.

Maintain your septic system:
Septic systems can last 15-25 years if properly maintained; pump out your septic tank every 3-5 years. Keep septic systems far from the shore to reduce risk of water pollution and limit damage.

Prevent the spread of invasive species: Clean, drain, dry and disinfect any watercraft prior to entering the lake. Do not release live fishing bait or aquarium fish.
Become a citizen scientist:
Citizen science is a great way to learn and engage with nature. Volunteers provide valuable research that allow scientists to track environmental changes to a greater extent than if they were to do it alone. Learn how to get involved by visiting the sites below.

- Invading Species Watch Program: www.invadingspecies.com
- Lake Partner Program: www.desc.ca
- Loon Watch: www.birdscanada.org
- Nature Watch (frog, plant, ice, worm): www.naturewatch.ca
- Ontario Reptile & Amphibian Atlas: www.ontarionature.org
- Water Rangers: www.waterrangers.ca

To report large blooms of algae:
- KFL&A Public Health: 1-800-267-7875
- Blue-Green Algae Bloom Sighting (MOECC): 1-800-268-6060

To report invasive species:
- EDD Mapping System App: www.eddmaps.org/ontario
- Invasive Species Hotline (OFAH): 1-800-563-7711 or info@invadingspecies.com

For more information:
- Cataraqui Region Conservation Authority: 1-877-956-2722 or 613-546-4228
- Colonel By Lake Association: www.colonelbylake.org
- Water Level Questions (Parks Canada): 1-888-773-8888

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1 Data provided from Queen’s University (2012)
2 Ministry of Natural Resources and Forestry Fisheries Data (Fish ON-line and personal communication, 2016)
3 Ontario Nature Reptile and Amphibian Atlas