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 Big Clear Lake with respect to nutrient loading, invasive species colonization and acidification.
Big Clear Lake is located in the Cataraqui River watershed on the northeast corner of Frontenac Provincial Park. Nearby lakes include Devil Lake, Black Lake, Big Salmon Lake, Labelle Lake, Pollywog Lake and Buck Lake.

**County:** Frontenac County  
**Municipality:** Township of South Frontenac  

**Watershed:** Cataraqui River  
**Average Depth (m):** 20.0  

**Coordinates:** 44.587 Lat., -76.549 Long.  
**Volume (m³ x10⁶):** 37.8  

**SURFACE AREA (HA):** 169  
**MAX. DEPTH (M):** 61.0  
**SHORE LENGTH (KM):** 12.4
The map below shows water depths and the topography of the lake bottom (bathymetry), as well as the direction of water flow. Water flows in from Black Lake and out into Labelle Lake through wetland passages.
Lake Characteristics

Big Clear Lake is a natural, deep lake located on the Canadian Shield. As with most lakes within the Cataraqui Region, Big Clear 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 naturally through changes in climate, precipitation, evaporation, and surrounding land use.

Lake Features

**Important Natural Features:**
Frontenac Provincial Park, Area of Natural and Scientific Interest

**Surrounding Land Use:**
Woodlands, Wetlands

**Primary Water Level Control:**
Natural

**Water Access:**
Off Price Road or through Frontenac Provincial Park (fee, small craft, no motor only)
Information about Big Clear 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 Big Clear 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

**BIG CLEAR LAKE VULNERABILITY SCORES**

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

- Based on an average total phosphorus of 0.009 mg/L, nutrient levels are low with no risk of nuisance algae bloom growth
- Zebra mussels, mostly veligers (young mussels) have been observed in Big Clear Lake ¹
- Big Clear 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>Coldwater</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/l):</td>
<td>No data</td>
</tr>
<tr>
<td>Trophic Status:</td>
<td>Oligotrophic²</td>
</tr>
<tr>
<td>Average Secchi Depth (m):</td>
<td>6.75³</td>
</tr>
<tr>
<td>Total Phosphorus (mg/l):</td>
<td>0.009¹</td>
</tr>
<tr>
<td>pH:</td>
<td>7.6³</td>
</tr>
<tr>
<td>Average Calcium(mg/l):</td>
<td>7.0³</td>
</tr>
</tbody>
</table>

Big Clear Lake is home to lake trout and cisco species, both coldwater fishes are highly sensitive to habitat conditions. For their survival, dissolved oxygen should be greater than seven mg/L to allow for small fish growth⁴. Average Secchi disk depth and total phosphorus indicate low nutrients and high visibility. This provides optimal conditions for visual predators and aquatic photosynthesis promoting a healthy, controlled food web for natural lake function.

Average total calcium is crucial for the formation of shells and skeletons of many species. Big Clear Lake’s concentration is low potentially due to the local geology on the Canadian Shield where little runoff occurs from soils and the weathering of rocks. The pH is at a natural, neutral, and healthy condition to support a diversity of aquatic life.
Big Clear Lake hosts a diversity of fish species. The presence of lake trout indicates this lake is highly sensitive habitat, as trout and salmon families have low tolerance to habitat changes such as temperature. Fish species previously caught on Big Clear 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>Pikes</td>
<td>Northern Pike</td>
</tr>
<tr>
<td>Trout &amp; Salmon</td>
<td>Cisco</td>
</tr>
<tr>
<td></td>
<td>Lake Trout</td>
</tr>
<tr>
<td>Suckers</td>
<td>White Sucker</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>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
Lake Partner Program
Loon Watch
Nature Watch (frog, plant, ice, worm)
Nature Watch (frog, plant, ice, worm)
Ontario Reptile & Amphibian Atlas
Water Rangers

www.invadingspecies.com
www.desc.ca
www.birdscanada.org
www.naturewatch.ca
www.ontarionature.org
www.waterrangers.ca

To report large blooms of algae:
KFL&A Public Health 1-800-267-7875
Leeds, Grenville & Lanark Health Unit 613-345-5685
Blue-Green Algae Bloom Sighting (MOECC) 1-800-268-6060

To report invasive species:
EDD Mapping System App
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
Water Level Questions (MNRF) 1-800-667-1940

2 Average total phosphorus concentrations provided by the Lake Partner Program and Queen’s University
3 Data provided by Queen’s University (2013)
5 Ministry of Natural Resources and Forestry Fisheries Data (Fish ON-line and personal communication, 2016)
6 Ontario Nature Reptile and Amphibian Atlas