LAKE FACT SHEET (2017)

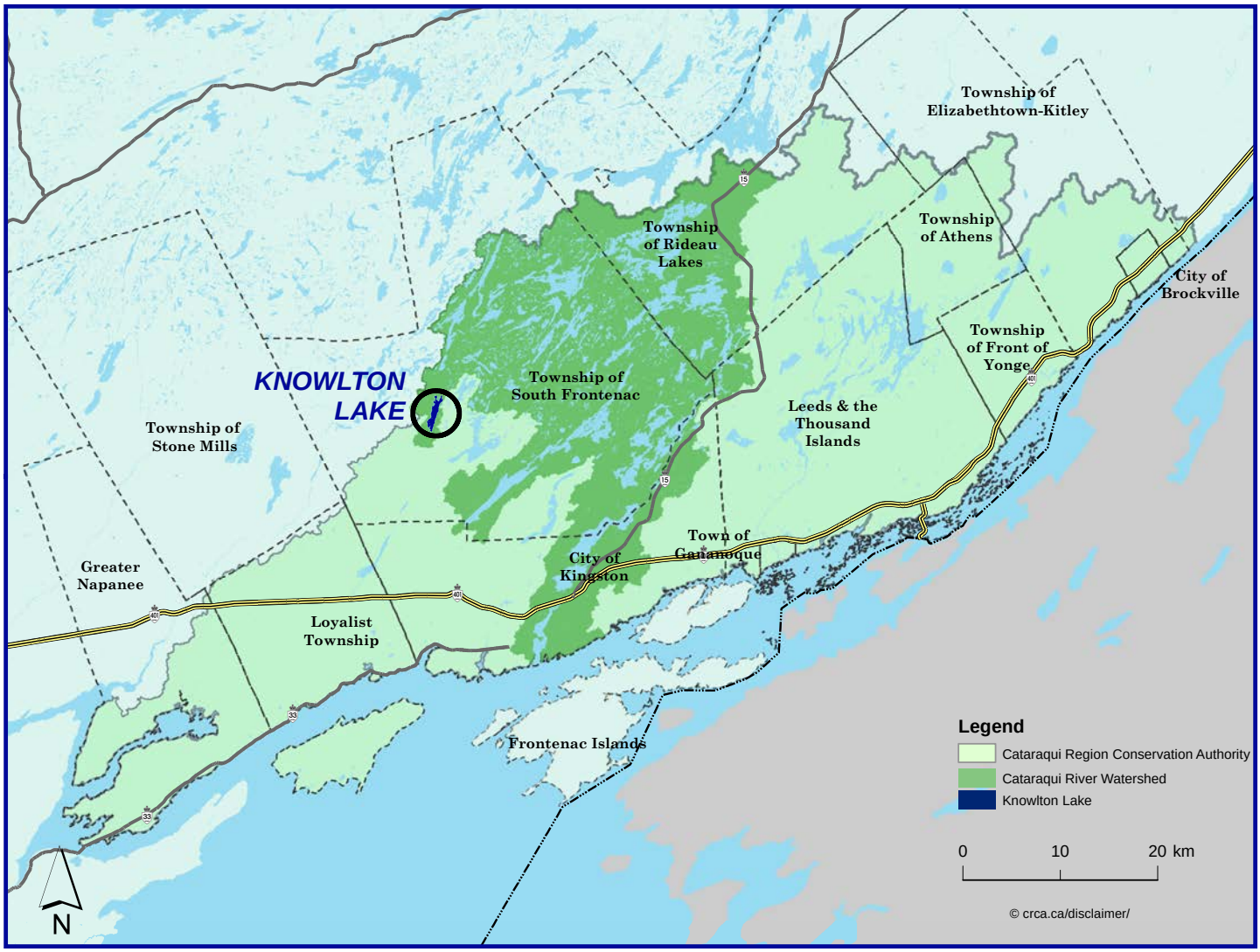
KNOWLTON LAKE

CATARAQUI REGION
CONSERVATION AUTHORITY

LAKE FACT SHEETS

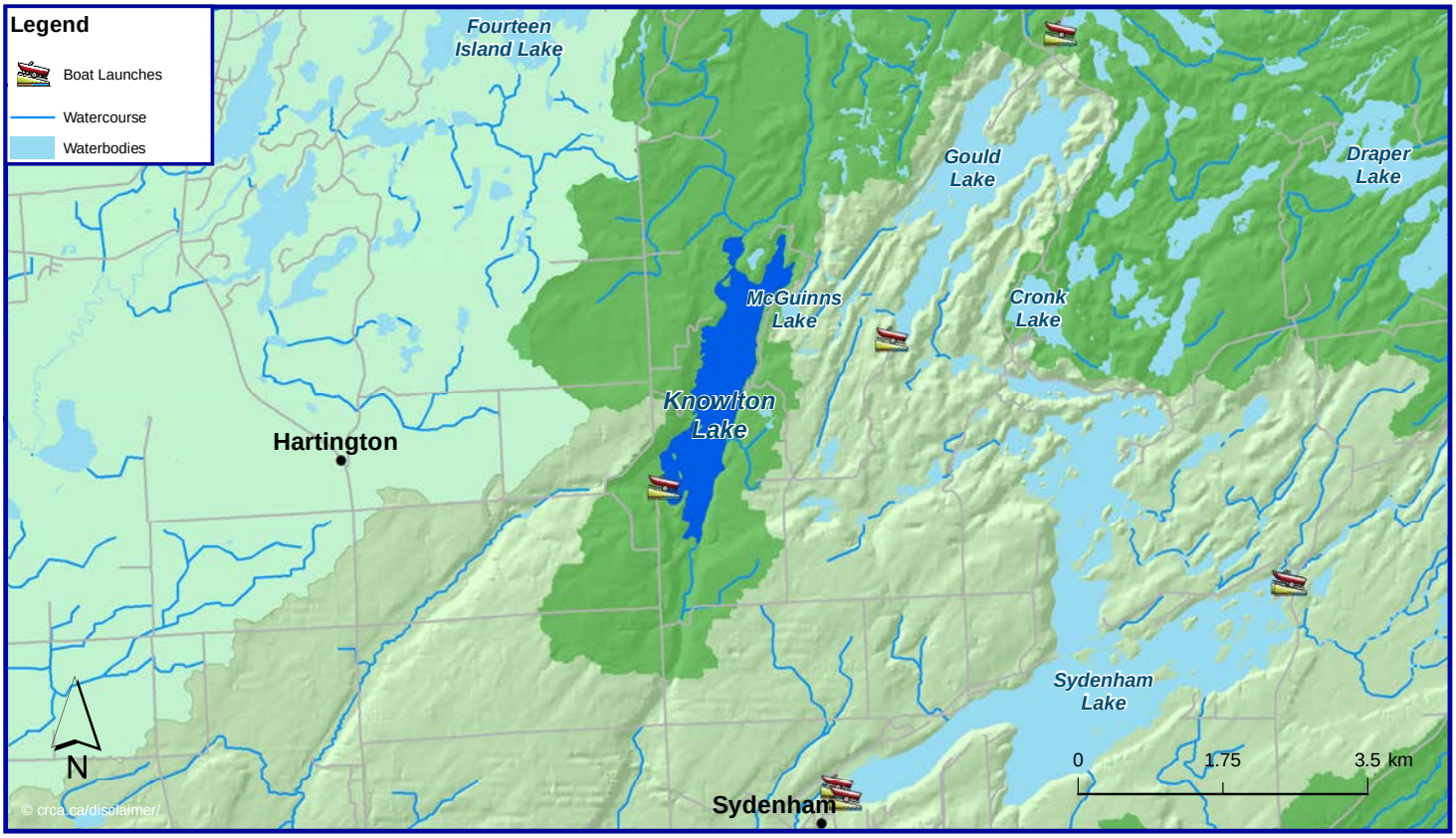
The Cataraqui Region Conservation Authority (CRCA) has provided environmental leadership and service to local communities since 1964. It is one of 36 watershed-based agencies within Ontario dedicated to the conservation and protection of the natural environment through a variety of management tools including 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 Knowlton Lake with respect to nutrient loading, invasive species colonization and acidification.



KNOWLTON LAKE

Knowlton Lake is located in the Cataraqui River watershed south of the community of Holleford. Nearby lakes include Fourteen Island Lake, Gould Lake, Cronk Lake, Sydenham Lake, and Draper Lake.



County: County of Frontenac

Municipality: Township of South Frontenac

Watershed: Cataraqui River

Coordinates: 44.457 Lat., -76.053 Long.

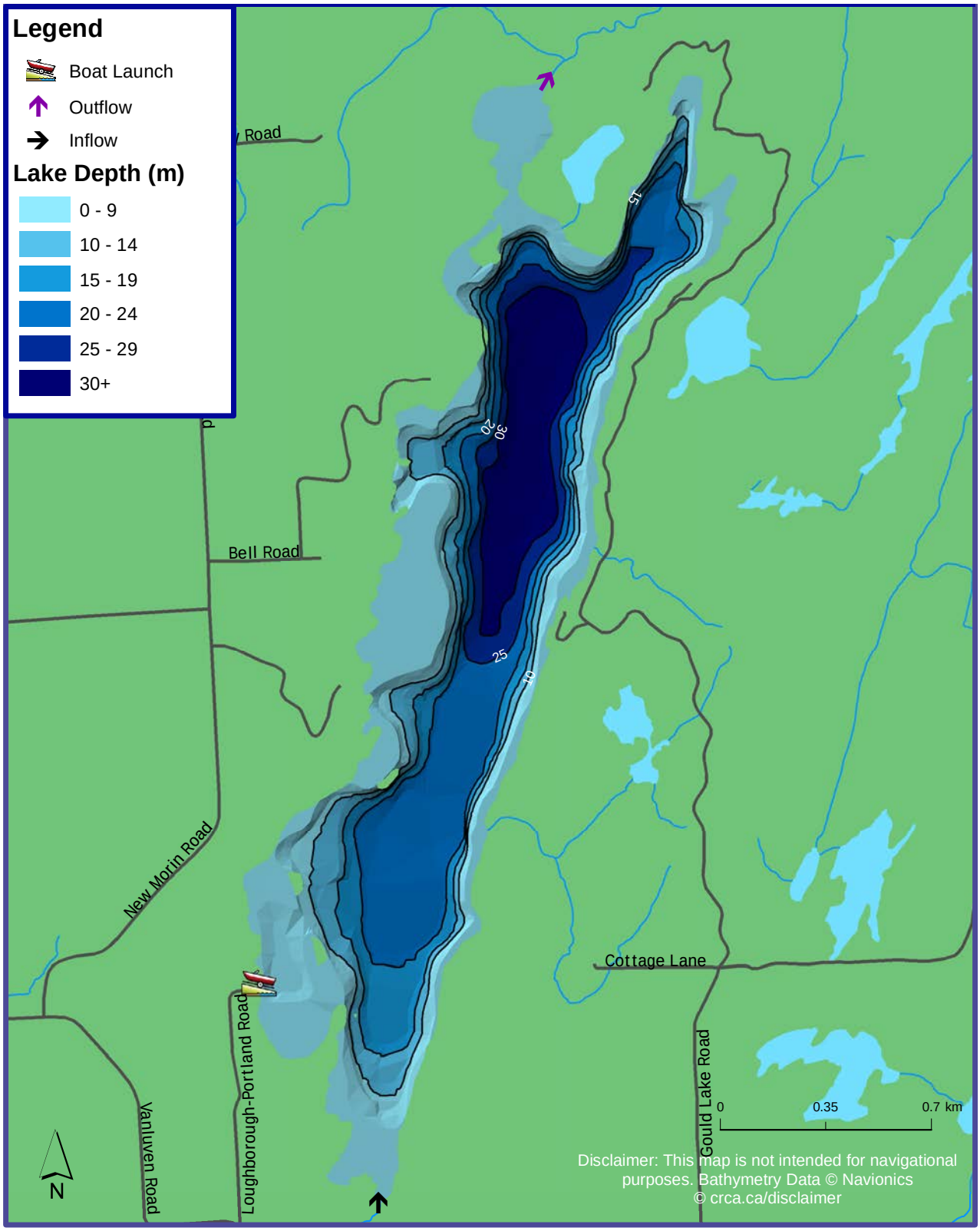
Average Depth (m): 9.8

Volume (m^3 x10^6): 17.8

SURFACE AREA (HA)	MAX. DEPTH (M)	SHORE LENGTH (KM)
182	33.9	10.3

LOCATION & BATHYMETRY

The map below shows water depths and the topography of the lake bottom (bathymetry). Knowlton Lake is a headwater lake that flows out into Crooked Creek towards Holleford Lake.



LAKE CHARACTERISTICS

Knowlton Lake is a natural, deep, coldwater lake located on limestone and granite bedrock. As with most lakes within the Cataraqui Region, Knowlton 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.

Knowlton Lake undergoes natural water level fluctuations due to changes in climate, evaporation rates, flooding, and drowning conditions.

LAKE FEATURES

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

SURROUNDING LAND USE:
Woodlands, Agriculture

PRIMARY WATER LEVEL CONTROL:
Natural

WATER ACCESS:
Off Knowlton Lake Road

VULNERABILITY

Information about Knowlton 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 Knowlton 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

VULNERABILITY

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

KNOWLTON LAKE VULNERABILITY SCORES

Eutrophication	Invasive Species	Acidification
LOW	NO DATA	NO DATA

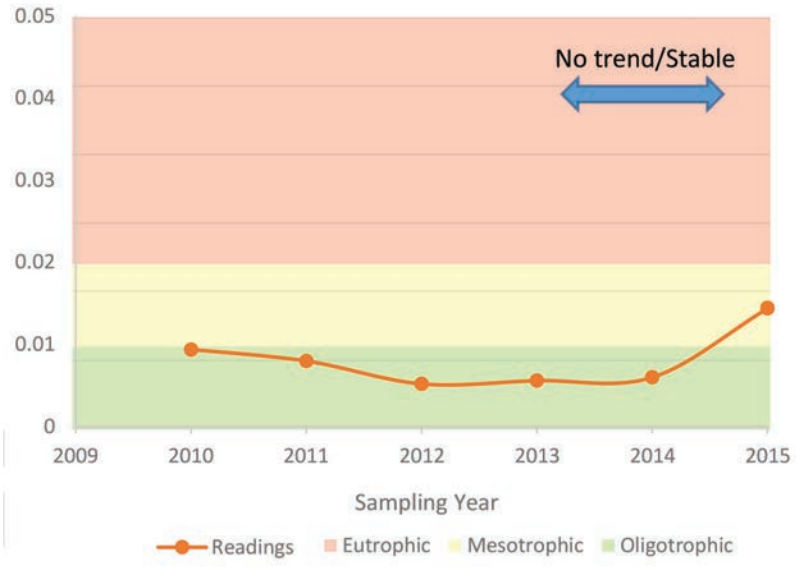
- Based on an average total phosphorus concentration of 0.0081 mg/L, nutrient levels are low with no risk of nuisance algae bloom growth

WATER QUALITY

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

Thermal Regime:	Coldwater
Dissolved Oxygen (mg/l):	No data
Trophic Status:	Oligotrophic[1]
Average Secchi Depth (m):	No daya
Total Phosphorus (mg/l):	0.0081[2]
pH:	No data
Average Calcium(mg/l):	24.9[2]



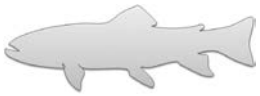
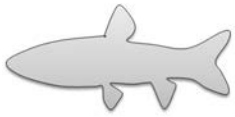
Knowlton Lake hosts populations of lake trout suggesting coldwater habitats in deeper pools and dissolved oxygen concentrations of at least seven mg/L to support young fish growth. Although no Secchi disk depth is available, the average total phosphorus concentration and trophic status suggest the lake has a transparency of at least greater than five metres. This indicates the lake is clear with optimal productivity to support a high diversity of wildlife.

As shown on the total phosphorus graph above, average concentrations are currently stable. Additional measurements in subsequent years will determine if the higher value from 2015 is the beginning of a rising trend.

Although no pH data is available, a high calcium concentration suggests good buffering capacity supporting pH conditions for a strong fisheries community of 6.5-8.5. Calcium readings indicate suitable habitat for invasive zebra or quagga mussel establishment. As of 2016, no reported sightings of aquatic invasive species have been recorded.

AQUATIC DIVERSITY

Knowlton Lake is a highly sensitive lake hosting a high diversity of fish species. As this lake is deep, there are many cold sections providing critical habitat for lake trout. When coldwater species such as trout are present, this is an indication of good water quality since these species are highly sensitive to poor conditions. Fish species previously caught on Knowlton 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.

	COMMON FISH FAMILIES	SPECIES PRESENT
	North American Catfish	Brown Bullhead
	Pikes	Northern Pike
	Trout & Salmon	Lake Trout Cisco
	Sunfishes & Basses	Largemouth Bass Smallmouth Bass Pumpkinseed Bluegill Rock Bass Black Crappie
	Topminnows	Banded Killifish
	Carps & Minnows	Variety
	Perches & Darters	Yellow Perch

AQUATIC DIVERSITY

FISHERIES MANAGEMENT ZONE

18

ACTIVE FISH STOCKING[3]

NO DATA

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[4]:

- Blanding's Turtle
- Eastern Musk 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

HOW TO PROTECT YOUR LAKE

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
Knowlton Lake Association	knowltonlakeca@gmail.com

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[1] Average total phosphorus data provided by the Lake Partner Program and PWQO
[2] Averages provided by the Lake Partner Program (2009-2015)
[3] Ministry of Natural Resources and Forestry Fisheries Data (Fish ON-line and personal communication, 2016)
[4] **Ontario Nature Reptile and Amphibian Atlas**

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