



STOCO LAKE, *Tweed, Ontario*

Aquatic Vegetation Report, 2021



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Introduction

Quinte Conservation completed an aquatic vegetation survey on Stoco Lake on September 9, 2021. The objective of the survey was to observe and document the aquatic plant community within Stoco Lake and identify invasive vegetation, a threat to the natural ecology of the lake.

The lake supports a wealth of tourism and recreation opportunities including cottaging, fishing, boating, and nature appreciation. The amount of human activity surrounding the lake has made it vulnerable to invasive species.

Community Lake Surveys completed with lake residents in 2016 have shown both aquatic vegetation and invasive species to be of increasing concern for their lake (Quinte Conservation, 2017). Management of invasive species was outlined as an action item in the most recent Stoco Lake Stewardship Plan (Quinte Conservation, 2017).

This report will discuss the results of plant inventories as well as management strategies for the invasive species documented. Furthermore, this report will provide recommendations on managing invasive species currently found within the Lake as well as recommendations for reducing the spread of new invasive species.





ABOUT STOCO LAKE

Stoco Lake is a relatively shallow, mesotrophic (moderately high levels of nutrients), lake in Hastings County, in the town of Tweed, Ontario. The lake is bordered by significant areas of urban, agricultural and rural-residential land uses, with approximately 70% of the shoreline developed (Quinte Conservation, 2017).

The lake supports a large amount of tourism and recreation including cottaging, fishing, boating, and nature appreciation. The amount of human activity surrounding the lake has made it vulnerable to invasion by invasive species.

Invasive species were previously identified to be on the lake, are affecting the lake's ecology and are impacting recreation (Quinte Conservation, 2017). As such, management of invasive species on the lake is imperative to preserve the quality of the environment and the economic benefits that come from it.

In September of 2021, vegetation surveys were conducted to inventory the plant species in Stoco lake, identify invasive species present, and determine their prevalence in surveyed areas. This report will discuss some of the results of these inventories, and management strategies for the invasive species.

STOCO LAKE is a Mesotrophic Lake (*Moderately High Levels of Nutrients*)

Nutrients lead to excessive aquatic vegetation growth.

- ⇒ urban runoff
- ⇒ farm runoff
- ⇒ lawn fertilizer
- ⇒ septic systems
- ⇒ sewage discharge
- ⇒ nutrient rich lake bottom



Stoco Lake, A Mesotrophic Lake

Historically, Stoco Lake was considered eutrophic (very high levels of nutrients). Through numerous improvements, including upstream reforestation and improved sewage treatment nutrient levels have been reduced. The Lake is now considered to be mesotrophic (moderately high levels of nutrients). Stoco Lake water quality and nutrient levels are greatly affected by the lake's small size, shallow depth, surface area, volume, shoreline length, and hydrological characteristics. The Lake has a high drainage ratio, with over 2000 square kilometre watershed, contributing to increased nutrients entering the lake. Increased nutrient levels contribute to excessive aquatic weed growth and algal blooms (Quinte Conservation, 2017).

The shallow depth of the Lake allows for wind-induced mixing of the lake bottom (determined to be nutrient rich), releasing further nutrients into the water column promoting aquatic plant growth and algae growth. Caution should be taken to avoid any additional amounts of phosphorus from entering the Lake to maintain nutrient levels within a healthy range (Quinte Conservation, 2017).

Total phosphorus is the primary nutrient of concern. Phosphorus can also build up on the bottom of lakes from decaying plant and animal matter. This phosphorus can then be released with the turnover of the lake water. Stoco Lake is particularly susceptible to turnover due to its high flows and relatively shallow depth (Quinte Conservation, 2017) The 1972 MOE study indicated phosphorus concentrations in surface waters of 30-50 $\mu\text{g}/\text{L}$ while the 1984 MOE study indicated concentrations of 26-58 $\mu\text{g}/\text{L}$. Since then, concentrations have been consistently lower, with concentrations in the late 2000's averaging 14.51 $\mu\text{g}/\text{L}$ (MOE, 2012). Lake partner data indicated that between 2008 and 2020 concentrations typically ranged between 10 $\mu\text{g}/\text{L}$ -20 $\mu\text{g}/\text{L}$ with average concentrations as high as 23 $\mu\text{g}/\text{L}$ and as low as 3.5 $\mu\text{g}/\text{L}$ (MOE, 2014a).



AQUATIC VEGETATION, THE KEY TO A HEALTHY AND VIBRANT LAKE

Aquatic plants, often dismissed as “weeds”, are an essential part of a lake ecosystem.

Aquatic plants:

- ⇒ Support rich and diverse fish and wildlife populations.
- ⇒ Produce oxygen that supports aquatic life.
- ⇒ Provide food, shelter, and nesting areas for fish, wildlife, and invertebrates.
- ⇒ Absorb excess nutrients which can prevent algal blooms from occurring.
- ⇒ Hold the lake-bottom sediment in place. When plants are removed, wave action can disturb and move sediment damaging fish habitat and clouding the water.

Nutrients promote plant growth. High levels of nutrients promote excess plant growth and can lead to algal blooms.

Caution should be taken to avoid any additional amounts of phosphorus from entering the water in order to maintain nutrient levels within a healthy range.

To help maintain healthy nutrient levels, efforts should be taken to:

- ⇒ Naturalize shores to remove excess nutrients from entering the water.
- ⇒ Ensure septic tanks are pumped regularly and maintained.
- ⇒ Minimize fertilizer applications to lawns.
- ⇒ Work alongside the agricultural community to implement best management strategies for reducing excess phosphorus loading into the water systems, such as retaining a natural buffer along the shore, fencing livestock out of water systems, and optimizing fertilizer use on agricultural fields through soil testing programs.



INVASIVE SPECIES, A THREAT TO OUR NATURAL ECOSYSTEMS

An **INVASIVE SPECIES** is a plant, animal, or microorganism introduced to an area outside of its normal range and it lacks natural controls such as predators and disease, allowing it to spread and displace native plants and animals. These non-native species can negatively impact native biodiversity, the economy, and society. (Environment Canada, 2004).

Invasive species pose a serious threat to Ontario's economy and natural environment. Invasive species provide little benefit to our local ecosystem and are recognized as one of the greatest threats to biodiversity, second only to habitat loss.

The healthiest of ecosystems contain a rich and diverse population of native species.

AQUATIC, NON-NATIVE AND INVASIVE PLANTS

Invasive species are most often brought in through human activity. A large contributor of Invasive aquatic plants is through the movement of boats between water bodies. Invasive plants can also escape from backyard ponds and gardens into our natural environment.

Invasive aquatic plants can be free floating, floating and rooted in sediment, rooted and submergent (underwater), or emergent (partly under and partly above the water's surface). Invasive aquatic plants can affect recreational activities (e.g., boating, fishing, swimming), displace native vegetation, slow down water flow, and alter oxygen levels, all the while impacting populations of native plants and animals.



AQUATIC VEGETATION SURVEY (2021)

Submerged Aquatic Vegetation (SAV) surveys took place in early September of 2021. Three separate zones were surveyed across Stoco Lake. Within each zone, 20 small sampling locations were randomly selected from a larger pool. Randomized sampling locations were surveyed for vegetation species and percent coverage. Sampling zones were the same zones surveyed in a previous lake study completed by Quinte Conservation in 2016 to ensure consistency. The surveyed sites included the sulphide creek inlet, and the two outlets from Stoco into the Moira River. *See Map 1 for survey locations.* Observations were also noted for the public beach area.

Complementary to the SAV surveys, Quinte Conservation staff sampled for turbidity/clarity, water depth, sediment depth and type. Turbidity is the measurement of the amount of light that is scattered by material in the water. Particles suspended or dissolved in water scatter the light making the water appear cloudy. Varied factors cause turbidity in water such as sediments, algae, organic material, or microorganisms. Sometimes turbid waters are temporary like after a heavy rain event which causes particles to re-suspend in the waters. Higher turbidity, or reduced clarity, of the water can decrease light penetration through the water column and impair the plant community and other aquatic species. Water with low turbidity supports increased plant growth as light can penetrate deeper through the water column. Continued monitoring over-time would provide a better picture of changing water health conditions. Aquatic plants provide food and/or habitat for birds, fish, macroinvertebrates, and amphibians. A healthy aquatic plant community can help improve water quality and stabilize the sediment at the bottom of the Bay.

This aquatic vegetation survey is useful in determining a “snapshot” of the aquatic plant community. This information can be used to determine health, observe changes over time, and identify potential areas for restoration and the need for education and outreach.



The surveys of submerged aquatic vegetation (SAV) used a random point method, within predetermined areas with SAV (i.e. Wetlands). Random points were generated before sampling. Sites were then surveyed for an inventory of SAV and their aerial coverages within 1x1 meter quadrats.

Plants were recorded from the surface to substrate (a 3-dimensional space) while being ranked according to the area bounded by the quadrat. This method captures the species occurrences and percent cover.

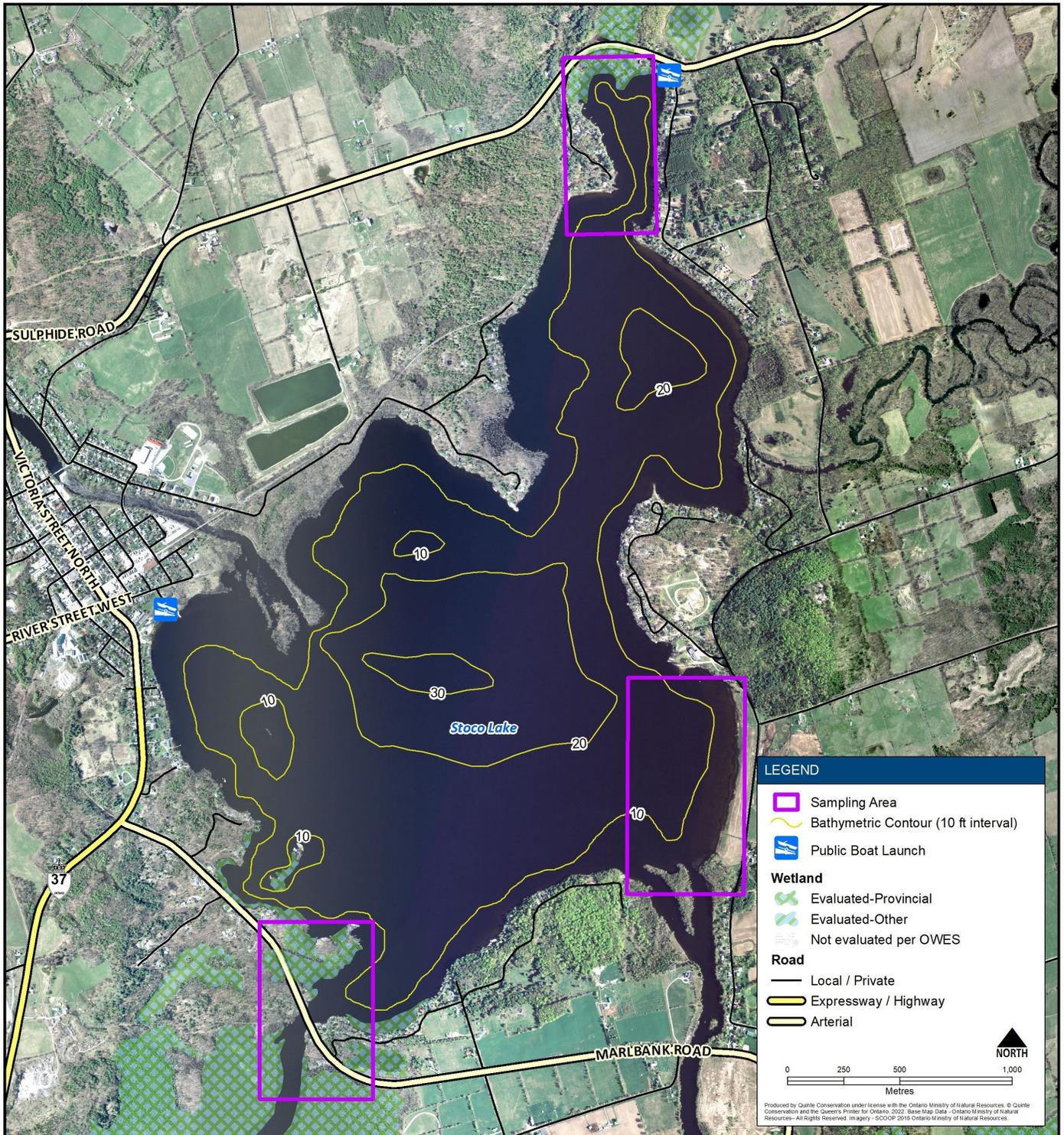
HELP US TO LONGTERM MONITOR WATER HEALTH ON STOCO LAKE

The [Lake Partner Program](#) is a province-wide, volunteer-based, water-quality monitoring program. Volunteers collect total phosphorus samples and make monthly water clarity observations on their lakes.

The [Water Rangers Program](#) offers easy-to-use water quality test kits and participants post their water data to an **open data platform** available for all to view.



Map 1: STOCO LAKE 2021 Vegetation Survey Locations





AQUATIC VEGETATION COMMUNITY

The purpose of this study was to determine invasive species currently present in Stoco Lake, and their abundance relative to native vegetation.

Four invasive aquatic plants of concern were identified in the quadrats surveyed;

- Eurasian water-milfoil (*Myriophyllum spicatum*),
- Curly pondweed (*Potamogeton crispus*),
- Flowering rush (*Butomus umbellatus*),
- and European frogbit (*Hydrocharis morsus-ranae*).

The most prominent invasive species found was Eurasian water-milfoil, found in 82% of the quadrats and found in all three sampling zones.

In addition to those found within the quadrat surveys, staff observed two more invasive plant species of concern on Stoco Lake;

- Invasive phragmites (*Phragmites australis*),
- Purple loosestrife (*Lythrum salicaria*),

The points sampled were random within predetermined sampling locations and the observations do not provide a total picture of invasive species spread in the Stoco Lake, but instead they provide a snapshot of the vegetation profile.

Similar vegetation inventory results were found in previous aquatic vegetation surveys, through different methodologies were followed.

The invasive species noted in Stoco Lake have the potential to spread rapidly. Without any control measures, and with a lack of efficient natural controls, they are likely to increase in abundance and distribution.

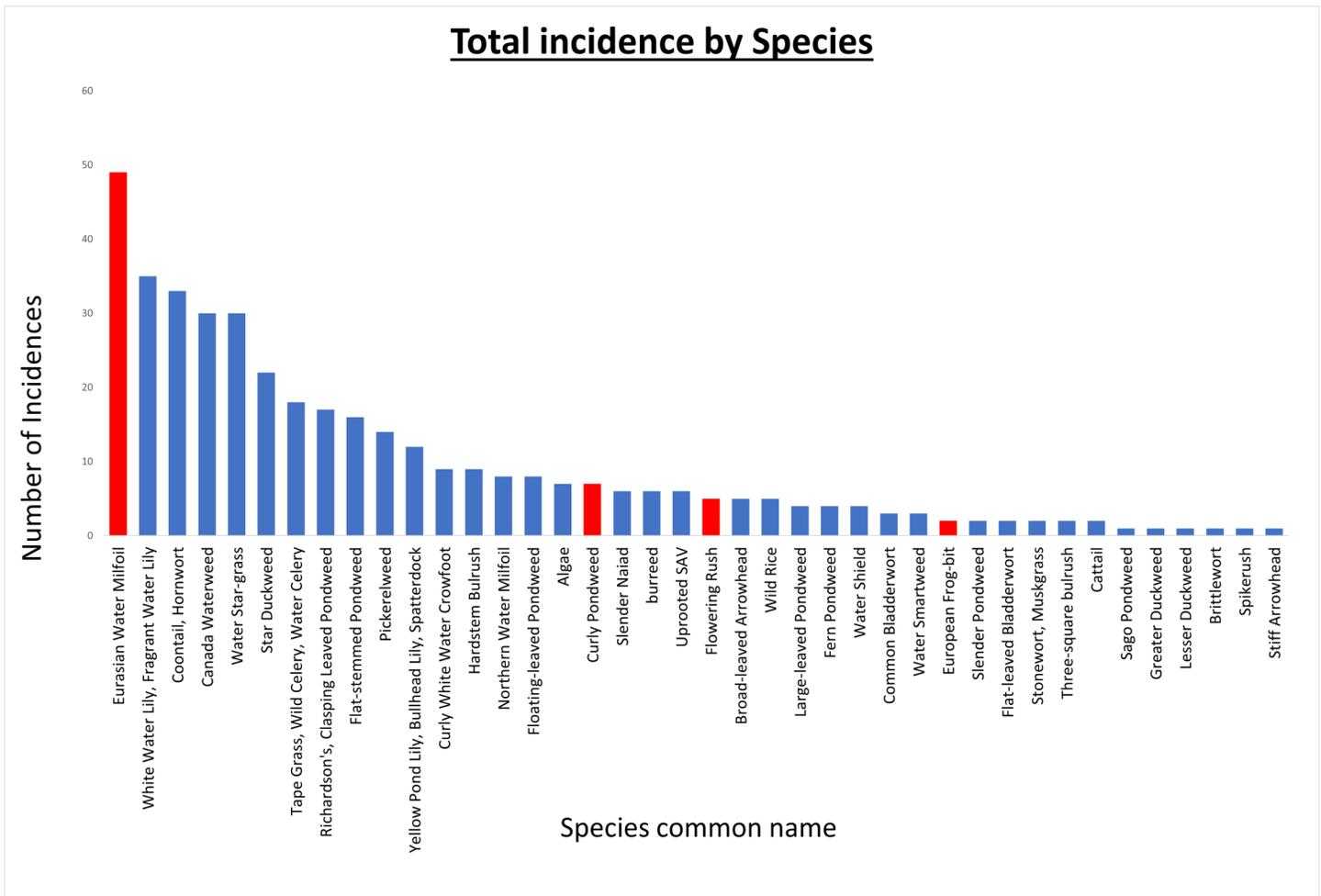


Aquatic Vegetation Community

The figure below displays all aquatic plant species documented during the survey (2021) and the total number of quadrats they were observed in (out of 60). Documented species are ranked from most to least abundant and includes both submergent and emergent plants.

Invasive species are highlighted in red, while native species are blue.

Figure 1: Incidence of all aquatic plant species documented within surveyed quadrats, 2021.





AQUATIC VEGETATION COMMUNITY

The following species of aquatic vegetation were inventoried, with four of the aquatic plants identified as non-native invasive plants (in red).

Submerged Aquatic Vegetation

Algae, *Algae sp. fil. underwater*
Brittlewort, *Nitella sp.*
Canada Waterweed, *Elodea canadensis*
Common Bladderwort, *Utricularia vulgaris*
Curly-leaf Pondweed, *Potamogeton crispus*
Curly White Water Crowfoot, *Ranunculus longirostris*
Eurasian Water Milfoil, *Myriophyllum spicatum*
Fern Pondweed, *Potamogeton robbinsii*
Flat-stemmed Pondweed, *Potamogeton zosteriformis*
Flat-leaved Bladderwort, *Utricularia intermedia*
Large-leaved Pondweed, *Potamogeton amplifolius*
Northern Water Milfoil, *Myriophyllum sibiricum*
Richardson's Pondweed, *Potamogeton richardsonii*
Sago Pondweed, *Potamogeton pectinatus*
Slender Naiad, *Najas flexilis*
Slender Pondweed, *Potamogeton pusillus*
Star Duckweed, *Lemna trisulca*
Stonewort, Muskgrass, *Chara sp.*
Water Star-grass, *Heteranthera dubia*
Wild Celery, *Vallisneria americana*

Emergent Aquatic Vegetation

Burreed, *Sparganium sp.*
Broad Leaved Arrowhead, *Sagittaria latifolia*
Cattail, *Typha sp.*
Flowering Rush, *Butomus umbellatus*
Hardstem Bulrush, *Schoenoplectus acutus*
Pickerelweed, *Pontederia cordata*
Spikerush, *Eleocharis palustris*
Stiff Arrowhead, *Sagittaria rigida*
Three Square Bulrush, *Schoenoplectus pungens*
Water Smartweed, *Polygonum amphibium*
Wild Rice, *Zizania palustris*

Floating Vegetation

European Frog-bit *Hydrocharis morsus-ranae*
Floating-leaved Pondweed, *Potamogeton natans*
Lesser Duckweed, *Lemna minor*
Greater Duckweed, *Spirodela polyrhiza*
Water Shield, *Brasenia schreberi*
White Water Lily, *Nymphaea odorata*
Yellow Pond Lily, *Nuphar lutea ssp. Variegata*



WHAT YOU CAN DO TO SLOW THE SPREAD OF INVASIVE SPECIES

- ⇒ Learn to recognize invasive species and report them.
- ⇒ Do regular checks for invasive species on, and off shore, from your property.
- ⇒ Develop a plan to deal with invasive species on, and off shore, from your property.
- ⇒ Share your knowledge with neighbours.
- ⇒ Identify pathways of introduction and prevent new non-native species from establishing.
- ⇒ Garden and landscape with Ontario native trees, shrubs, wildflowers, ferns, and grasses.
- ⇒ Don't move firewood, you can introduce new forests pests to your region.
- ⇒ Ensure contractor equipment is cleaned between sites, especially mowing equipment.
- ⇒ Don't dump yard waste into natural areas.
- ⇒ Never release aquarium or water plants into nature.
- ⇒ Never release your bait buckets into our lakes and rivers.
- ⇒ When moving your boat, always clean, drain and dry between lakes and rivers.
- ⇒ Avoid driving through weedy areas and moving invasive plants around the lake.

REPORT INVASIVE SPECIES: Invading Species Hotline 1-800-563-7711 or visit [EDDMapS Ontario](#)

CLEAN, DRAIN, AND DRY YOUR BOAT BETWEEN LAKES & RIVERS

Boats transported from one body of water to another often carry seeds, spores, eggs or larvae of aquatic species on their surface, or in any stored water that is released. This can result in the invasion of species into new bodies of water. To minimize the risk of new invasive species entering (or leaving) the lake, boats should be thoroughly cleaned before going between bodies of water. Invasive species can be removed by washing boats with pressurized water (preferably hot), and draining any water from them.

As of January 1st, 2022, Ontario has regulated watercraft (boats, canoes, kayaks) as a carrier of invasive species under the *Invasive Species Act*. Boaters are now required to take steps **before transporting** a boat or boat equipment overland to reduce chance of spread, see page 23. [Learn More](#)



EURASIAN WATER-MILFOIL (*MYRIOPHYLLUM SPICATUM*)

Native to Europe, Asia, and North Africa, it's believed the species was introduced to North America in the late 19th century from ornamental aquatic gardens and/or ships. It has since become one of the most problematic and widespread aquatic invasive species in North America. This species forms dense, underwater mats, that shade out native vegetation. (Simkovic, 2020a)

IDENTIFICATION: Eurasian water-milfoil is a perennial that grows under the water surface. It can be identified by its green leaves that circle the stem, each leaf having 12 or more thread-like segments. It is important to note that the native Northern water-milfoil has 11 or fewer segments. It prefers shallow water 1-3m deep, however, it can root in up to 10m of water (Simkovic, 2020a).



IMPACTS: Eurasian water-milfoil reduces the diversity and density of fish and invertebrates, as well as displaces many species of native aquatic plants. As a result, high densities of Eurasian water-milfoil can result in degraded ecosystems and the loss of biodiversity. Dense patches can impair recreational values, as they may make swimming, boating, and fishing difficult due to entanglement (Simkovic, 2020a).



NATIVE SPECIES LOOK-ALIKES

Northern water-milfoil (right) has a dark green stem, and only up to 11 thread-like segments per leaf. **Coontail** (left) is similar to both milfoils. However, unlike either milfoil, it has segments that fork into two.





WATCH, REPORT, STOP THE SPREAD

HAND REMOVAL & RAKING: This method is low cost, relatively easy, though does take effort. Care should be taken to remove the whole plant, including the root, and any broken fragments. This method is best when focused on a localized area, and will need to be repeated annually (Simkovic, 2020a).

BENTHIC BARRIERS: These are biodegradable mats that cover the benthic layer of the lake bottom, and block plants from growing. This method can be useful in areas where new small patches of the plant appear. This method is costly, labour intensive, and requires routine monitoring and maintenance. In addition, barriers are a nonselective control measure, negatively affecting the growth of native aquatic plants, fish spawning, and nursery habitats (Simkovic, 2020a).

MECHANICAL CONTROL METHODS: Mechanical harvesting is the equivalent to mowing a lawn. It needs to be done repeatedly as the plant regrows. It is designed to remove as much material as possible. It can efficiently cover a large area and works immediately. It does not target specific species, and should only be used for very large, dense areas (Simkovic, 2020a).

BIOLOGICAL CONTROL METHODS: Three species of insects have been found to graze on Eurasian water-milfoil: the Milfoil weevil (*Euhrychiopsis lecontei*), a species of midge (*Cricopopus myriophyllii*), and the introduced but naturalized Water veneer moth (*Acentria ephemerella*). Densities of these species often have to be artificially increased to cause enough damage to control the plant (Simkovic, 2020a).

CHEMICAL CONTROL METHODS: The herbicide “diquat” can be requested to control Eurasian water-milfoil through the MECP. This particular herbicide is fast-acting and highly effective, but is not target-specific, and should be reserved for extreme cases. Application of this herbicide must also take place annually, as it only kills the top part of the plant, leaving the roots unaffected (Simkovic, 2020a).

[Eurasian Water Milfoil - Ontario Invasive Plant Council](#)



EUROPEAN FROG-BIT (*HYDROCHARIS MORSUS-RANAE*)

HISTORY: European frog-bit is a free-floating aquatic plant native to Eurasia. It was introduced to North America for ornamental use in Ottawa in 1932 and escaped into Rideau Canal and has now spread across Ontario, Quebec and into the U.S. (Simkovic, 2020b)

IDENTIFICATION: It can be identified by its leathery and heart-shaped leaves. The underside of the plant is dark purple to red. From June to September, small white flowers with three petals and a yellow center can be seen on the plant. Don't confuse with White water lily, White water lily is rooted while Frog-bit is free floating (Simkovic, 2020b)

IMPACTS: Grows rapidly and creates large, densely tangled floating mats crowding out native vegetation. It favors slow moving waters such as sheltered inlets, slow moving rivers, ditches and ponds (Simkovic, 2020b).

NATIVE SPECIES LOOK-ALIKES



American white water lily is similar in appearance to European frog-bit, but is much larger and has a different flower. The leaves of frog-bit are 2-5 cm wide, while the water lilies are 15-25 cm. The flowers of Frog-bit are smaller and have three slightly triangular petals and a yellow centre. The flowers of White water lily are larger, round, and have many overlapping petals (Simkovic, 2020b).

WATCH, REPORT, STOP THE SPREAD

COLLECTING EUROPEAN FROG-BIT BY HAND is the most practical way to control it. This can be done by collecting the entire growing portion of the plant, including the stems, leaves, buds, and roots. Many parts of the plant are capable of re-growing into an entire plant when broken off, it is imperative to collect as much as possible.

RAKING MAY ALSO BE FEASIBLE, though may lead to fragmentation of the plant and should be done with hand removal.

BENTHIC MATS CAN BE USED to smother patches of Frog-bit. This method is usually very effective, but can be disturbing to habitat, and is most practical for small patches (Simkovic, 2020b).



FLOWERING RUSH (*BUTOMUS UMBELLATUS*)

Native to Eurasia and Africa, Flowering rush was brought to North America as an ornamental plant for ponds and water gardens, which escaped into nearby waterways. It's also suspected that trans-Atlantic ships encouraged spread (Simkovic, 2020c).

IDENTIFICATION: It can be recognized by its sedge-like characteristics. It reaches 1.5-2m in height. The flowers grow in an umbrella shaped structure, are white to deep purple in colour, each growing on a thin stalk. Although flowering rush can grow in a variety of ecosystems, it prefers shallow areas with fluctuating water levels such as riparian zones, lakes, wetlands, and marshes (Simkovic, 2020c).



IMPACTS: It creates large and dense colonies, hindering recreational activity such as boating, fishing, and swimming. The species outcompetes native vegetation and impacts native fish habitat and nesting birds (Simkovic, 2020c).

WATCH, REPORT, STOP THE SPREAD

CUT THE PLANT BELOW THE WATER LINE: This can be effective with small to medium sized populations. This strains rhizome growth, limiting its spread during the growing season. Perform multiple cuts throughout the year for best results.

CUT SEED HEADS: This method can help discourage spread, however it does not address or prevent the main method of spread, vegetative reproduction via spread of rhizomes and bulbils.

HAND REMOVAL: Effective on individual plants or small populations when done annually during the growing season and over several years. The goal is to prevent small, isolated populations from spreading. This method is simple and inexpensive, however it is labor-intensive and difficult to remove all plant material.

MOWING IS NOT RECOMMENDED. Mowing may increase the spread through rhizome fragmentation (Simkovic, 2020c).

[Flowering Rush - Ontario Invasive Plant Council](#)



CURLY PONDWEED (*POTAMOGETON CRISPUS*)

HISTORY: A pondweed native to Eurasia and Africa and introduced to North America in the 1800s. Although it is not clear how it ended up in North America, it is likely due to deliberate cultivation for water gardens (Adirondack Watershed Institute, n.d.).

IDENTIFICATION: This species can be identified by its wavy, alternating leaves with serrated edges, which are dark reddish green in colour. The stems are pale with a slightly reddish hue to them, and can grow up to 5 metres long (Adirondack Watershed Institute, n.d.).

IMPACTS: This species grows rapidly in shallow water, and has few predators to keep it in check. In depths of up to 5 metres, it can spread very quickly and form dense mats. This can have negative impacts by pushing out native species, or rendering an area inaccessible for recreational activities such as swimming, fishing, or boating (Adirondack Watershed Institute, n.d.).



WATCH, REPORT, STOP THE SPREAD

MANUAL CONTROL METHODS - Information on management strategies for this species in Canada are lacking as it has not yet become a significant problem in its Canadian range.

This species may be controlled by hand pulling or mechanical harvesting.



EUROPEAN COMMON REED/INVASIVE PHRAGMITES (*PHRAGMITES AUSTRALIS*)

HISTORY: Native to Eurasia, it is likely that this plant was introduced to North America in the 1800s as both a seed contaminant in soil ballast and intentionally through the horticulture trade. It is common in lakes and coastal habitats, as well as major highways and secondary roads. This introduced species is causing significant damage to Ontario's biodiversity, wetlands, and beaches. (Nichols, 2020).



IDENTIFICATION: This invasive plant can grow up to 5 meters tall. It is easily distinguished later in the growing season during and after flowering. Large, dense seed heads that are purple/brown in colour are produced and as the plant matures, they become fluffier in appearance and white in colour (Nichols, 2020).



IMPACTS: Phragmites is a threat to native plant and wildlife diversity. This invasive plant also negatively affects human health and safety, infrastructure and services. It can impede farming, block drainage ditches, damage asphalt, and cause road safety issues by obstructing roadway sightlines. Dead standing stalks are combustible, which increases the risk of fire (Nichols, 2020).

NATIVE SPECIES LOOK-ALIKES

Distinguishing between the two can sometimes be difficult, since characteristics may overlap, and hybrids complicate it further.

The red stem segments on the native phragmites (right) is a fairly good way for a non-expert to distinguish it from invasive phragmites (above).

[Invasive Phragmites—Ontario Invasive Plant Council](#)





WATCH, REPORT, STOP THE SPREAD

DRY LAND MANAGEMENT:

HERBICIDES: Herbicide applications can be an effective method to manage Phragmites stands when used in accordance with the label, with appropriate authorization and permits, and when an integrated pest management approach is applied.

SELECTIVE CUTTING/SPADING: Manually cutting Phragmites reduces photosynthesis and deprives the belowground structures of energy (Nichols, 2020). A tool commonly used for this are raspberry cane cutters.

WET MANAGEMENT SITES:

*** ANY IN-WATER WORK MAY REQUIRE PERMITS—ALWAYS CHECK BEFORE YOU START**

FLOODING: This control method acts as a stressor to Phragmites by reducing the amount of oxygen that can travel to the root system in high water conditions. Low oxygen levels can decrease the growth of the plant or cause die-off.

SELECTIVE CUTTING/SPADING: Selective cutting of Phragmites beneath the waterline (at the substrate line) can effectively drown the plant by inhibiting the supply of oxygen to lower plant parts. In suitable water depths, after cutting has occurred, new shoots cannot successfully reach the surface to collect oxygen (Nichols, 2020). A tool commonly used for this are raspberry cane cutters.

[**Invasive Phragmites - Ontario Invasive Plant Council**](#)



STARRY STONEWORT (*NITELLOPSIS OBTUSA*)

HISTORY: Starry stonewort is an invasive macroalgae native to Eurasia. It is believed that the plant was introduced through the St. Lawrence River by a ship ballast. It then spread throughout the Great Lakes basin. This plant forms dense mats in waters 2-10 meters in depth (Invasive Species Centre, n.d.)

IDENTIFICATION: Starry stonewort is a plant-like form of algae. This plant reaches 30cm to 10m in the water column and has white, star shaped bulbils on the main axes. The stem is smooth green, and the branchlets are in whorls of 4 to 6 (Invasive Species Centre, n.d.)

IMPACTS: Starry stonewort reduces biodiversity by producing dense mats and competing with native vegetation. These dense mats of vegetation can also impede the movement of fish, spawning activity, water flow, and recreational activity (Invasive Species Centre, n.d.).



WATCH, REPORT, STOP THE SPREAD

Help Stop the spread of Starry Stonewort:

- Clean, drain and dry your boat between locations
- Report starry stonewort when it is observed—See [EDDS Maps Ontario](#)
- Avoid disturbing areas of starry stonewort with boats or equipment which may increase the risk of fragmentation

[Starry Stonewort - Invasive Species Centre](#)



WATER SOLDIER (*STRATIOTES ALOIDES*)

HISTORY: Water soldier was first detected in Ontario in the Trent river, near the hamlet of Trent River. It is unknown exactly where it arrived from, but likely it escaped from water gardens. Since then, this species has expanded further down the Trent River as well as to a handful of other locations.

IDENTIFICATION: This species is similar in appearance to an aloe plant and has broad, serrated leaves, and floats in open shallow water. There are a few potential native look-alikes in Ontario, but none of them have the sharp serrated leaves of the Water soldier, so this is a good identifying feature. The Water soldier may produce flowers, but in Ontario it seems to only reproduce vegetatively.



IMPACTS: Grows rapidly and creates large, densely tangled floating mats crowding out native vegetation, and potentially alters water chemistry in a way that harms phytoplankton populations. Water soldier can also create dense mats that impact recreational opportunities such as boating, fishing and swimming. The latter is particularly affected because the Water soldier has very sharp leaves that can easily cause painful cuts.



WATCH, REPORT, STOP THE SPREAD

- Learn to recognize water soldier. Do not plant water soldier in your water garden.
- Avoid spreading water soldier: clean and inspect your watercraft between locations and avoid any known patches of water soldier.
- Report your sightings to the EDDS mapping website here [EDDMapS Ontario](#)

[Water Soldier - Invasive Species Centre](#)



EUROPEAN WATER CHESTNUT (*TRAPA NATANS*)

HISTORY: European water chestnut was introduced to the United States in the late 19th century and has since spread to other locations. The main areas in Ontario where it is present are the Voyageur provincial park area, and the St Lawrence near Kingston, although it has spread to a variety of other places.

IDENTIFICATION: This species is distinct amongst wetland plants in Ontario, and does not have any close look-alikes. It floats on the water's surface and have spade shaped serrated leaves. The leaves are on long stems and fan out from a "rosette". The "nuts" are dark, woody and have two hooks.

IMPACTS: Grows rapidly and creates large, densely tangled floating mats crowding out native vegetation, and reduce biodiversity in aquatic habitats. The dense patches also impact recreational activities like boating, fishing, swimming and beach-going. The nuts are sharp and barbed and pose a risk to beach users. They may accumulate in sediment and are hard to clean up.



WATCH, REPORT, STOP THE SPREAD

- Learn to recognize European water chestnut . Do not plant water chestnut in your water garden.
- Avoid spreading European water chestnut. Inspect your water and clean between locations and avoid any known patches of the invasive plant.
- Report your sightings to [EDDMapS Ontario](#)

[European Water Chestnut - Invasive Species Centre](#)



INVASIVE SPECIES WATCH LIST

Included in the list below are invasive species known to be present within the Quinte and surrounding watersheds and may pose a threat to Stoco Lake. Early detection and control measures can slow and stop the spread of new invasive species.

Aquatic Vegetation

- *Common Reed/Phragmites (*Phragmites australis*)
- *Curly-Leaved Pondweed (*Potamogeton crispus*)
- *Eurasian Water Milfoil (*Myriophyllum spicatum*)
- *European Frog-bit (*Hydrocharis morus-ranae*)
- European Lake Sedge (*Carex acutiformis*)
- European Water Chestnut (*Trapa natans*)
- Fanwort (*Cabomba caroliniana*)
- *Flowering Rush (*Butomus umbellatus*)
- Hydrilla (*Hydrilla verticillata*)
- Parrotfeather (*Myriophyllum aquaticum*)
- Reed or Giant Manna Grass (*Glyceria maxima*)
- Starry Stonewort (*Nitellopsis obtuse*)
- Waterweed (*Egeria densa*)
- Water Hyacinth (*Eichhornia crassipes*)
- Water Lettuce (*Pistia stratiotes*)
- Watermoss-Salvinia species (*Salvinia molesta*, *S. auriculata*, *S. minima*, *S. natans*)
- Water Soldier (*Stratiotes aloides*)
- Yellow Iris (*Iris pseudacorus*)

Parasites and Disease

- Asian fish tapeworm parasite
- Koi herpesvirus

Invertebrates

- Bloody Red Shrimp Spiny and Fish Hook Water Flea
- Rusty Crayfish
- Zebra and Quagga Mussels

Terrestrial Vegetation:

- *Common Reed/Phragmites (*Phragmites australis*)
- English Ivy (*Hedera helix*)
- European or Black Alder (*Alnus glutinosa*)
- European Spindletree (*Euonymus europaeus*)
- Garlic Mustard (*Alliaria petiolata*)
- Giant Hogweed (*Heracleum mantegazzianum*)
- Goutweed (*Aegopodium podagraria*)
- Manitoba Maple (*Acer negundo*)
- Norway Maple (*Acer plantanoides*)
- Non-native bush honeysuckles (*Lonicers spp.*)
- Periwinkle (*Vinca minor*)
- Purple Loosestrife (*Lythrum salicaria*)
- Japanese Knotweed (*Polygonum cuspidatum*)
- Reed or Giant Manna Grass (*Glyceria maxima*)

** identified in recent aquatic vegetation survey*

Fish

- Asian Carp
- Goldfish
- Northern Snakehead
- Rainbow Smelt
- Round Goby
- Rudd
- Sea Lamprey
- Tench
- Tube-nose Goby

Forest Pests

- Asian Long-horned Beetle
- Emerald Ash Borer
- LDD Moth
- Invasive Earthworms
- Mountain Pine Beetle

Pathogens

- Beech Bark Disease
- Butternut Canker
- Dutch Elm Disease
- Oak Wilt
- Sudden Oak Death

Memorial Park Beach - Observations

At the request of the Stoco lake Stewardship Committee, the beach at Memorial Park was briefly inventoried after the main aquatic vegetation surveys had been completed. Species were recorded based on whether they were identifiable and visible to observers. Four invasive species were present. The only one in significant numbers was Eurasian watermilfoil, which visually appeared to be >80% of the submerged aquatic vegetation. The emergent vegetation found on shore was primarily common species, with areas outside of the main swimming area covered mainly with cattails and various rushes. Emergent invasives (flowering rush, purple loosestrife), were limited to a small area of the beach.

Table 4: Beach observations

West Side	East Side
Coontail	Burreed sp
Canada Waterweed	White Water Lily
algae- surface	Eurasian water Milfoil
algae-underwater	Floating pondweed
Eurasian Water Milfoil	Flatstem pondweed
White Pond Lily	Water stargrass
Wild Celery/eelgrass	pickerelweed
Water stargrass	Stiffleaf arrowhead
Floating pondweed	Water Plantain
Wild mint	Cattail
Watershield	Purple Loosestrife
Pickerelweed	Nodding beggarticks
Flowering rush	Water Smartweed
Pinkweed	Jewelweed
Soft stemmed bulrush	Sweetflag
	Three squared bulrush



INVASIVE SPECIES ACT 2015

The Invasive Species Act is a piece of provincial legislation with the purpose of regulating the prevention and management of invasive species in Ontario (OMNRF, 2021). Most notably, the act names a number of species that are prohibited and restricted in Ontario. Prohibited species are those that are not allowed to enter the province at all, while restricted species are prohibited from entering provincial parks and conservation areas, or being released into the wild (OMNRF, 2021). Additionally, the act sets out how management plans for invasive species will be authorized and executed. While there are no specific actions listed in the act (as the needs for each species vary widely), plans to manage invasive species may have to be approved before they can be implemented (Smith & Downe, n.d.). This aspect of the act is relevant to any management plans, as authorizations may be required to implement certain management strategies.

CONTROLLING AQUATIC PLANTS MAY REQUIRE PERMITS. ALWAYS CHECK BEFORE YOU BEGIN WORK:

- Ministry of Natural Resources
- Ontario Ministry of the Environment
- Department of Fisheries and Oceans
- Conservation Authorities

As of January 1st, 2022, Ontario has regulated watercraft (boats, canoes, kayaks) as a carrier of invasive species under the *Invasive Species Act*.

Boaters are now required to take the following steps **before transporting** a boat or boat equipment overland:

- remove or open drain plugs to allow water to drain from the boat or boat equipment
- take reasonable precautions to remove all aquatic plants (weeds), animals and algae from any boat, boat equipment, vehicle or trailer

Before reaching a launch site or placing a watercraft in any body of water in Ontario, boaters are required to ensure their boat, boating equipment, vehicles or trailers are free of all:

- aquatic plants
- animals
- algae

It is illegal to place a boat, boating equipment or any vehicle or trailer into any body of water if there are any aquatic plants, animals or algae attached to it. (<https://www.ontario.ca/page/invasive-species-action-plans/#boaters>)



STEWARDSHIP RECOMMENDATIONS

- Consider a lake-wide invasive species watch program and encourage residents to watch and report known invasive species and keep an eye out for those on the “Watch List”
- Organize lake-wide invasive species pulls/mechanical removals
- Install boat cleaning signage at all public boat launches
- Consider installing a boat cleaning station at busy boat launches
- Provide education and outreach materials on [invasive species](#) to lake residents, cottagers, renters, and visitors, and participants of fishing derbies
- Consider leveraging funding to tackle invasive species lake-wide, e.g. a targeted Phragmites control program

LANDOWNER PROGRAMS

- Consider shoreline naturalization to restore sections of your waterfront to a natural state with shrubs and wildflowers and trees. Apply to [Quinte Conservation’s Shoreline Planting Program](#)
- When gardening and landscaping consider planting native Ontario trees, shrubs, wildflowers, vines, ferns, and grasses. Contact [Quinte Conservation](#) for recommendations of native species suitable to your site.
- Check with your local conservation authority ([Quinte Conservation](#)) regarding agricultural landowner grants for soil testing, cover crop funding, waterway buffer planting programs and grants, large-scale tree planting programs, livestock fencing grants, and alternate watering system grants, and erosion/water quality improvement project grants such as barnyard runoff control, stream bank stabilization, wetland construction, storm water management.

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