

Prevention and Response Plan for Water Soldier (*Stratiotes aloides*) in Ontario

**A plan to set out practices to manage water soldier, including to
authorize certain persons to undertake specified control and
eradication activities, under the *Invasive Species Act, 2015***

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Ontario Ministry of Natural Resources and Forestry**

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This Prevention and Response Plan is prepared under subsection 13(1) of the [Invasive Species Act, 2015](#).

Purpose and Rationale

Water soldier (*Stratiotes aloides*) is classified as a prohibited invasive species as laid out in [Ontario Regulation 354/16](#) made under the [Invasive Species Act, 2015](#), and the prohibitions set out in section 7 of the Act apply to water soldier. These prohibited activities include bringing a member of the species into Ontario, as well as depositing, releasing, possessing, transporting, propagating, and buying/selling/leasing/trading members of the species.

This prevention and response plan for water soldier includes provisions to authorize certain activities otherwise prohibited by the Act. Individuals acting in accordance with this plan when carrying out activities to monitor, manage, control or eradicate water soldier in Ontario, and to prevent its further spread are not required to obtain additional individual authorizations under the Act.

This prevention and response plan identifies the persons or groups of persons who are authorized to implement the plan, sets out the types of activities that the plan applies to and describes conditions that these persons must follow to lawfully possess, transport, and deposit water soldier in Ontario.

Background

Water soldier is an invasive perennial aquatic plant that is native to Europe and northwest Asia. It has long, thin, serrated leaves that grow in a rosette formation and is similar in appearance to the top of a pineapple (Figure 1). Water soldier is submergent (i.e., grows below the water surface) for most of the year (Figure 2). It may rise to the surface of the water as new leaves mature during the summer months (Figure 3). Water soldier typically grows in shallow waters (0.5-1.5 metres) but may be able to grow in depths of up to 6 metres depending on the conditions.



Figure 1: Water soldier (Photo credit: Ontario Federation of Anglers and Hunters)

Water soldier forms dense mats of vegetation (Figure 4), aggressively outcompetes native aquatic plants, and impedes recreational activities such as boating, swimming and angling. It can also interfere with infrastructure, including water intake structures, navigation canals and locks, and hydroelectric facilities, where periodic removal of entrained water soldier plants or plant parts may be required as part of ongoing facility maintenance.



Figure 2: Submergent growth form of water soldier (Photo credit: F. MacDonald)

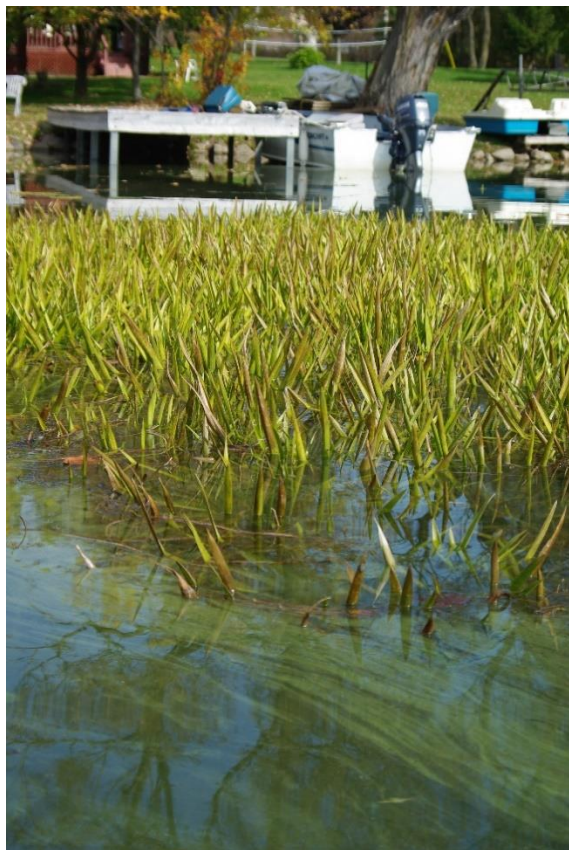


Figure 3: Emergent growth form of water soldier (Photo credit: F. MacDonald)

Water soldier has the potential to invade lake and river ecosystems throughout Ontario and the Great Lakes basin ecosystem. This could cause significant harm to biodiversity, and affect recreation, tourism and navigation in aquatic systems.

The first known wild population in North America was found in the Trent River in 2008, near the Hamlet of Trent River, Ontario. Since that time, it has spread downstream of the original infestation within the Trent-Severn Waterway and has also been documented in both natural waters and offline ponds in a few other locations in southern Ontario.

Prior to its regulation in 2016, water soldier was used as an ornamental plant in water gardens and private ponds, which is the likely source of its introductions to Ontario.

As it is now illegal to possess or propagate water soldier in the province, pond or water garden owners are encouraged to follow the provisions in this plan to control or remove water soldier to reduce the potential for this species to spread.



Figure 4: Water soldier infestation (Photo credit: V. McCulloch)

The Ministry of Natural Resources and Forestry (MNRF) and partners have been monitoring water soldier within Ontario waterbodies and have taken measures to control populations and prevent spread to new locations.

Many groups and individuals also play an important role in monitoring, controlling and preventing the further introduction and spread of this invasive species in Ontario waters. These include First Nation and Métis communities and organizations, municipalities, volunteer groups, shoreline residents, and members of the public. Similarly, operators and staff of infrastructure facilities in areas of water soldier infestations can also prevent spread by undertaking precautionary measures to avoid incidental dispersal or downstream transport of water soldier plants or plant parts during operation or facility maintenance.

All sightings of water soldier in new locations should be reported to the Invading Species Hotline at 1-800-563-7711, or online at www.eddmaps.org/ontario.

Legislative Context

Under the *Invasive Species Act, 2015*, the Minister may cause a prevention and response plan to be prepared with respect to an invasive species. A prevention and response plan may include measures, practices or courses of action to deal with invasive species and may authorize persons identified in the plan to carry out activities to assist in the implementation of the plan.

Pursuant to subsection 13(4) of the Act, this prevention and response plan authorizes the persons identified in this plan to carry out the measures and practices set out under this plan. Under subsection 9(3) of the Act, the persons identified in this plan will be permitted to possess, transport, deposit and release water soldier in the course of implementing the activities specified in this plan and in accordance with the conditions and provisions of this plan.

Note: As of the date of preparation of this plan, there is also an exemption in [Ontario Regulation 354/16](#) for the incidental possession and transport of water soldier plants that attach to a boat as a result of operating it in infested waters. This exemption is subject to conditions including incidental possession or transport of water soldier solely as a result of the operation of the boat, taking reasonable precautions to avoid moving plants to other areas of the water body, removal of water soldier from the boat before transporting the boat overland and disposal of water soldier away from any water body. Please refer to the regulation for the complete requirements and for any updates. This plan does not affect activities taken pursuant to the exemption set out in the regulation.

If you are considering activities related to water soldier that are not within the scope of this plan, authorization under the [Invasive Species Act, 2015](#) will be needed, if the activity involves actions that are otherwise prohibited under the Act (e.g., possession or transport of this plant). For information about obtaining an authorization under the Act, such as for research or education, contact the MNRF's Natural Resources Information and Support Centre at 1-800-667-1940, or visit the [website](#) at www.ontario.ca/page/ministry-natural-resources-and-forestry.

Note: Control of aquatic vegetation, including water soldier, may require permits, approval or authorizations from other agencies and/or levels of government. The "Other Considerations" section of this Plan provides some examples of other authorities that may be relevant.

Scope of the Plan

This prevention and response plan:

- (a) applies only to water soldier (*Stratiotes aloides*); and
- (b) applies to all areas in Ontario where the species is present.

For greater certainty, any reference to water soldier in this plan includes any part of water soldier, including leaves, offsets (i.e., clones of a mother plant that have been asexually produced), turions (i.e., overwintering buds that are detached from a mother plant), and flowers.

Authorized Persons

The following persons are authorized to carry out the following measures and practices to help control, eradicate and prevent the spread of water soldier in Ontario:

- 1) The following entities, and any individuals, including volunteers, acting under the supervision or control of any of the following entities, engaged in prevention, monitoring, control or removal of water soldier:
 - (a) a band, a tribal council, or an organization that represents a territorially based aboriginal community;

- (b) a not-for-profit corporation;
 - (c) a municipality; or,
 - (d) a conservation authority
- 2) Waterfront property owners engaged in the control and removal of water soldier, if the waterfront property is a parcel of property that;
- (a) has a boundary on a lake, river, stream or pond, where the control and removal of water soldier is to be carried out, or
 - (b) is separated from a lake, river, stream or pond where the control and removal of water soldier is to be carried out only by,
 - (i) a road allowance, or
 - (ii) a strip of public lands that is not more than 30 metres in perpendicular width from the lake, river, stream or pond.
- 3) Property owners engaged in control and removal of water soldier from a pond or water garden that lies wholly within the boundaries of their property.
- 4) Owners and operators of hydroelectric facilities or other in-water structures engaged in activities to control or manage water soldier as part of the facility maintenance or construction activities.
- 5) Agents or employees acting on behalf of an entity or person identified in (1) – (4) above.

Authorized Activities

For the purpose of carrying out the measures and practices set out above, and if all the conditions set out in this plan are met, Authorized Persons are permitted to undertake the following activities:

- (a) Possession and transportation of water soldier in the course of prevention, monitoring, control and removal of water soldier and for the purpose of disposal or destruction of water soldier.
- (b) Deposit of water soldier away from any body of water as required to dispose of plants or plant parts that were removed from a body of water.

Conditions

The following conditions apply to all persons carrying out activities authorized under this prevention and response plan:

1. No person acting under the authority of this prevention and response plan shall remove water soldier from the water by means other than by hand pulling or human-powered hand-held devices (e.g., rake). For greater clarity, this plan does not apply to the use of other physical removal activities such as mechanical harvesters, dredging or diver-assisted or boat-based suction harvesting. Persons seeking to

remove water soldier through other physical removal activities must obtain a separate authorization under the ISA.

2. Reasonable precautions must be taken to ensure that water soldier is not deposited downstream or outside of the control or removal area during the course of prevention, monitoring, control or removal activities, in-water structure or facility maintenance, or construction activities.
3. All equipment and/or watercraft used in infested waters during water soldier prevention, monitoring, or control or removal activities must be inspected and cleaned of any water soldier prior to movement overland.
4. If transported overland for disposal, any water soldier must be contained or secured in a manner that ensures that no plants or plant parts are lost during transport.
5. Water soldier that is removed from the water must be disposed of on dry land in a manner that ensures that no part of the plant will re-enter the body of water or enter into any other body of water.
6. Entities listed under paragraph (1) and persons listed under paragraphs (2)-(4) under the heading “Authorized Persons” shall notify the Ministry prior to initiating activities to prevent, monitor, control or remove water soldier. Notification shall be made by email to invasive.species@ontario.ca, providing the location, approximate size of water soldier population, and the approximate time and duration of the activities. This information will assist the Ministry to document new locations and assess the status of prevention and control efforts for this invasive plant in the province.

Best Management Practices for Control of Water Soldier

The following information provides a summary of control techniques for water soldier. It is provided for information purposes only and does not provide legal authority to engage in activities that may otherwise require authorization under other applicable laws.

Consult with Ontario’s [In-water Work Timing Window Guidelines](#) prior to carrying out work in water. These Guidelines restrict in-water work during certain periods to protect fish during spawning migrations and other critical life stages.

TIPS FOR CONTROLLING WATER SOLDIER

1) Use an integrated management approach

- Management approaches that include both hand pulling and herbicide applications will be the most effective (Figures 5 and 6)

2) Target control based on size of population, and time of year

- Follow [Ontario's In-Water Work Timing Window Guidelines](#).
- Hand pulling (June-August)* for individual plants and small groups of plants (<25 m²).
- Herbicide application (August-October) for larger populations (>25 m²).
- Individual plants or floating unattached plants should be removed as soon as practicable.*

3) Prevent spread during control

- Water current, wave and wind action can dislodge plants and seeds and carry them to new areas.
- Take precautions to prevent the release of plants downstream during control. Dependent on the location and situation, the use of temporary floating barriers may assist with preventing dispersal.

4) Clean equipment and watercraft

- All equipment and or watercraft used in infested waters during control must be inspected and cleaned prior to movement overland. [Guidance on best practices for cleaning watercraft can be found online](#).

5) Dispose of water soldier carefully

- Dispose of water soldier on dry land, ensuring no part of the plant will re-enter the body of water or into any other body of water.
- If transporting water soldier for disposal, it must be secured to ensure that no plants or plant parts are lost during transport.

6) Handle with care

- The leaves have serrated edges that can cut the skin. Use proper safety gear (e.g., gloves) when handling.

Hand Pulling or the Use of Human-powered Hand-held Devices

Individual water soldier plants, and small populations (<25 m²) can be controlled by pulling by hand, or with the use of human-powered hand-held devices (e.g. rake).

Hand pulling is advised only for plants that are easily accessible and if the entire patch can be removed. Pulling the plants will disturb the sediment and reduce visibility in the water, so repeated removal attempts after the water clears are required to ensure that all water soldier plants are removed. Gloves should always be worn when handling water soldier plants to prevent injury from the serrated edges on the leaves.

The best time of year for hand pulling or using human-powered devices is in the early summer* before water soldier produces turions (dormant winter buds) which can be released from the plant during these activities. Avoid hand pulling or using human-powered devices in late summer and fall to prevent dispersal of turions and offsets in the water to new areas.

***Note:** If work is planned to occur when in-water work is restricted as per [Ontario's In-water Work Timing Guidelines](#), you must contact either the [Ministry of Natural Resources and Forestry](#) or the federal agency (Parks Canada Agency or Fisheries and Oceans Canada) responsible for management of the waters at your site to apply for an authorization.

Aquatic Herbicides**

Within Canada, diquat (trade name Reward® Aquatic Herbicide) is the only herbicide currently registered by Health Canada's Pest Management Regulatory Agency (PMRA) for control of water soldier in aquatic systems. Consult PMRA's Pesticide Label Search [online](#) for more information about pesticide products that are registered for use in Canada.

Diquat can provide control of medium to large infestations of water soldier. It is a non-selective contact herbicide, and its use is best timed in the fall (September to mid October) when water soldier is still actively growing. This timing will reduce impacts to native aquatic plants which have senesced or gone dormant by the fall. Herbicide treatments in the fall can also impact reproductive propagules (i.e., turions and offsets) that remain on the water soldier plants. Depending on the situation, treatment earlier in the season may be warranted (e.g., prevent expansion of newly detected water soldier populations). The efficacy of diquat can be affected by temperature, turbidity, water flow and depth. Follow the product label for directions on application rate and limitations of use. Additional control efforts in subsequent years may be necessary to address any regrowth and plants that were missed during initial application.

****Note:** If you plan to use herbicides to control water soldier or other aquatic plants, approval is required from the Ontario Ministry of the Environment, Conservation, and Parks (MECP). Information on requirements for aquatic herbicide applications can be obtained by contacting a MECP [regional office](#) to discuss plans and what pesticide permits may be required.



Figure 5: Water soldier infestation in Trent-Severn Waterway in August 2015 prior to control (Photo credit: V. McCulloch)



Figure 6: Trent-Severn Waterway in July 2018 following successful control of water soldier (Photo credit: H. Simpson)

Updates to or Cancellation of the Prevention and Response Plan

Under the [Invasive Species Act, 2015](#), the Minister may cause a prevention and response plan to be updated from time to time as the Minister considers appropriate. The Minister will publish and give notice of any updates to the prevention and response plan as appropriate.

The Minister may also cancel a prevention and response plan by publishing notice of the cancellation on a website maintained by the Government of Ontario and by giving notice of the cancellation of the plan in any other manner that the Minister considers appropriate.

Other Considerations

Permits, approvals or authorizations may be required from other agencies and/or levels of government before an activity related to the control or removal of water soldier can be initiated. It is the responsibility of the individual to ensure that all other permissions, approvals and authorizations are acquired prior to proceeding with any water soldier control or removal activities. For example, the presence of a species at risk may require additional authorizations.

Other permits, approvals and authorizations that could apply to water soldier control activities will depend on the location in Ontario, as well as the timing and type of activity being undertaken. While not

an exhaustive list of permits or rules that may apply to water soldier control or removal activities, several examples for consideration include the following:

Aquatic Plant Removal on Provincial Crown Land and Shore Lands

In Ontario, the beds of most waterbodies are provincial Crown land. The Ministry of Natural Resources and Forestry manages Crown and shore lands under the [Public Lands Act](#) (PLA). The PLA does not apply to federal lands and water bodies (e.g., the Trent-Severn and Rideau Canal waterways), or provincial parks and conservation reserves.

The PLA applies to the removal of invasive aquatic vegetation from provincial Crown land and shore lands. [The rules](#) in Ontario Regulation 239/13, section 9 must be met, in addition to the direction prescribed in this Water Soldier Prevention and Response Plan.

If you cannot meet all the prescribed rules, for example if you are not the waterfront property owner or want to conduct control or removal activities outside of the [in-water work timing window guidelines](#), you will need a work permit. Information on how and when you need a work permit for projects on Crown land and shore lands as well as permit applications can be obtained [online](#) or by contacting your local [MNRF office](#).

Please also refer to e-laws regularly, to check for any updates to the requirements under the [Public Lands Act](#).

Herbicides

If you plan to use herbicides to control water soldier or other aquatic plants, approval is required from the Ontario Ministry of the Environment, Conservation and Parks (MECP). Information on requirements for aquatic herbicide applications can be obtained by contacting a MECP [regional office](#) to discuss plans and determine what pesticide permits may be required.

Aquatic Plant Removal in Federal Lands and Waters

Authorization is required from the Parks Canada Agency for any plant removal activity in federal waters under their jurisdiction including national parks and historic sites. For the Trent-Severn Waterway and the Rideau Canal, permit applications and guidelines for aquatic plant removal can be obtained on-line. Depending on the scope of the project, obtaining a permit for control work might involve one of two pathways. For residential or smaller projects, please see policies for [In-water and Shoreline Works and Related Activities](#) or for larger projects please see policies under the [Research and Collection Permit System](#).

Federal waters that are not regulated by the Parks Canada Agency are generally under the authority of Fisheries and Oceans Canada (e.g. small craft harbours). Information about requirements related to projects for the prevention, control or eradication of an aquatic invasive species near water can be obtained [online](#).

Resources to Support Implementation of the Plan

For more information about the [Invasive Species Act, 2015](#) and [regulations](#) pertaining to water soldier and other regulated invasive species visit <https://www.ontario.ca/page/invasive-species-ontario>.

For more information about how to identify water soldier, report new occurrences, and prevent its further spread in Ontario visit <https://www.ontario.ca/page/water-soldier>.