

Erect Hedge-Parsley

(Torilis japonica)

Best Management Practices in Ontario



Foreword

This Best Management Practices (BMP) document provides guidance for managing invasive erect hedge-parsley (*Torilis japonica*) in Ontario. Funding and leadership to produce this document was provided by the City of Toronto. BMPs are developed by the Ontario Invasive Plant Council (OIPC) and its partners to facilitate invasive plant control initiatives by individuals and organizations concerned with the protection of biodiversity, agricultural lands, infrastructure, crops and species at risk in Ontario. This document also supports and advances the management of invasive species identified as a priority by the City of Toronto's Ravine Strategy and Biodiversity Strategy.

The intent of this document is to relay specific information relating to invasive plant control practices that have been recommended by leading professionals across Ontario. This document contains the most up-to-date, effective, and environmentally safe control practices known from research, experience, and literature available at this time. It complies with current provincial and federal legislation regarding pesticide usage, habitat disturbance, and species at risk protection. It is subject to change as legislation is updated or new research findings emerge. The information provided in this BMP is not to be considered legal advice. The timing windows suggested will differ throughout Ontario and should be tailored to your region. Interested parties are advised to refer to the applicable legislation to address specific circumstances.

Check the website of the Ontario Invasive Plant Council (www.ontarioinvasiveplants.ca) for updates.

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For more information on invasive plants in Ontario, please visit the following websites:

www.ontarioinvasiveplants.ca, www.ontario.ca/page/invasive-species-ontario, www.invadingspecies.com,
or www.invasivespeciescentre.ca.

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Erect Hedge-Parsley

Photo courtesy of: Stephen
James McWilliam, [inaturalist.org/
observations/48963475](https://inaturalist.org/observations/48963475)



Erect hedge-parsley is highly adaptable and can grow in almost any habitat.

Photo courtesy of: Katherine Baird.

Introduction

Erect hedge-parsley (*Torilis japonica*) is a herbaceous plant in the carrot/parsley family (Apiaceae). There are several common names associated with this species including Japanese hedge-parsley and upright hedge-parsley. In French, it is known as torilis du Japon. Native to Eurasia, erect hedge-parsley was introduced to North America in 1917. The exact reason for its introduction is unknown but it is assumed to be for medicinal purposes since it is not considered to be an ornamental.

Its native range spans from western Europe to central Asia, northern Japan, the Mediterranean, and parts of northern Africa. Erect hedge-parsley is considered to be both an annual and biennial plant depending on its biogeographical location. In North America, it is a summer biennial.

Erect hedge-parsley is highly adaptive and can grow in almost any habitat. It primarily spreads via seeds that are covered in hooked hairs which allow the seeds to stick to clothing and fur easily. In most cases, erect hedge-parsley invades and becomes established along hiking and biking trails, campgrounds, and other recreational areas where people unintentionally spread the seeds.

Erect hedge-parsley is regularly misidentified as spreading hedge-parsley (*Torilis arvensis*) which has limited knowledge of its range and overall threat to biodiversity. Its primary threat is due to its vigorous growth habit, its ability to create dense patches of vegetation, and its high dispersal ability. Like erect hedge-parsley, spreading hedge-parsley is native to Eurasia and invasive in North America.

For the purpose of this document, the focus will be on erect hedge-parsley (*Torilis japonica*). However, due to the similar appearance, biology and pathways of spread, the control methods detailed in this document can also be applied to the management of spreading hedge-parsley (*Torilis arvensis*).

Description

Size and Stem:

Erect hedge-parsley is a herbaceous, annual and biennial plant. The flowering stems are erect, ridged, and slender. The stems are green and covered with stiff, white, downward-pointed, appressed hairs that give the stem a rough texture. Each stem is branched and can grow between 0.6 – 1.2 m tall when flowering.



Stems are covered in stiff, white, appressed hairs.

Photo courtesy of Katherine Baird.

Leaves:

The leaves are covered with stiff appressed white hairs that give it a rough texture. Leaves have sharply toothed margins, giving it a feathery or fern-like appearance similar to parsley. In the first year of growth, the leaves are parsley-like, low rosettes

that remain green into the fall. In its second year of growth, it develops stem leaves that are triangular, and alternately attached to the stem with a small sheath. Leaves are compound in groups of 3 or 5 leaflets. Each leaflet is up to 6 cm long and divided into 3 or 5 lobes, with the center leaflet being the largest. Upper leaves are smaller and less deeply divided than lower leaves.



Leaves have sharply toothed margins that give it a fern-like appearance. Leaves are also covered in stiff, appressed, white hairs.

Photo courtesy of: Katherine Baird.

Flowers:

The flowers are white and small (5 mm wide) with five petals. The petals differ in length and are notched on its rounded tip. Flowers have a creamy white centre with five white to pink stamens, which give the flower a slight pinkish colour when unopened. Flowers are arranged in small, flat-topped umbels which are 3.5 – 5 cm across. Umbels are umbrella-shaped clusters of short-stalked flowers, typical of plants of the carrot family. Each umbel is made up of approximately 8 umbellets, and each umbellet can have 10 – 20 rays (individual flowers). Most, if not all, peduncles (flower stalks) are 2 – 9 cm. The flowers bloom in the plant's second year of growth from June to September.

At the base of each umbel, there are two or more pointed bracts (modified leaves). Bracts are unequal in size and covered with hairs. At the base of each umbellet, there may be up to 8 bracts that are very small and often are hard to see.



Small white flowers are arranged in umbels.
Photo courtesy of: [inaturalist.org/observations/14712280](https://www.inaturalist.org/observations/14712280)

Fruit and Seeds:

Erect hedge-parsley fruits are schizocarps or dry fruits. The schizocarps are small, oval, and covered with hooked hairs that act like Velcro and attach to clothing or fur. They are rosy or white/green in colour and turn brown upon maturity. At maturity, the schizocarp splits into two mericarps. Each mericarp is ribbed and contains one seed.



Each flower produces a tiny schizocarp (fruit).
Photo courtesy of: Robert H. Wardell, [inaturalist.org/observations/53825549](https://www.inaturalist.org/observations/53825549)

Roots:

Erect hedge-parsley has a thick taproot that develops during the plant's first year of growth.








Erect hedge-parsley is a herbaceous, annual and biennial plant.

Photo courtesy of: <https://www.inaturalist.org/observations/88576791>

Lookalikes

Erect hedge-parsley resembles several native and non-native species in the carrot family (Apiaceae) including spreading hedge-parsley (*Torilis arvensis*), wild carrot (*Daucus carota*), poison-hemlock (*Conium maculatum*), and wild chervil (*Anthriscus sylvestris*). Erect hedge-parsley differs from these other species by the presence of two or more narrow bracts, the stiff appressed hairs on the leaves and stem, and the dense hooked hairs (bristles) on the fruits. These characteristics are a unique combination that is not seen in any similar species. Some similar-looking species in the carrot family are toxic or can cause severe skin reactions. Take care when handling unknown plants.

Table 1. The main identification features of erect hedge-parsley in comparison to four species that may appear similar (lookalikes). Key I.D. features that separate the lookalikes from erect hedge-parsley are in bold.

	Erect Hedge-Parsley <i>(Torilis japonica)</i>  <small>Photo courtesy of: Patrick Hacker, inaturalist.org/observations/69835556 licensed under CC</small>	Spreading Hedge-Parsley <i>(Torilis arvensis)</i>  <small>Photo courtesy of: inaturalist.org/observations/44318963</small>	Wild Carrot <i>(Daucus carota)</i>  <small>Photo courtesy of: Vincent, inaturalist.org/observations/54262462</small>	Poison-Hemlock <i>(Conium maculatum)</i>  <small>Photo courtesy of: Scott Loarie, inaturalist.org/observations/572387</small>	Wild Chervil <i>(Anthriscus sylvestris)</i>  <small>Photo courtesy of: inaturalist.org/observations/50417553</small>
Alternative Common Names	<ul style="list-style-type: none"> Japanese hedge-parsley, upright hedge-parsley 	<ul style="list-style-type: none"> field hedge-parsley 	<ul style="list-style-type: none"> Queen Anne’s lace 	<ul style="list-style-type: none"> common poison-hemlock, deadly hemlock, fool’s parsley, spotted parsley, spotted-hemlock 	<ul style="list-style-type: none"> cow parsley, woodland chervil
Accepted French Name	<ul style="list-style-type: none"> torilis du Japon 	<ul style="list-style-type: none"> torilis des champs 	<ul style="list-style-type: none"> carotte sauvage 	<ul style="list-style-type: none"> ciguë maculée 	<ul style="list-style-type: none"> anthrisque des bois
Native Range	<ul style="list-style-type: none"> Europe and Asia 	<ul style="list-style-type: none"> Europe and Asia 	<ul style="list-style-type: none"> Europe and Asia 	<ul style="list-style-type: none"> Europe and Asia 	<ul style="list-style-type: none"> Europe

Erect Hedge-Parsley
(*Torilis japonica*)



Photo courtesy of: Patrick Hacker, inaturalist.org/observations/69835556 licensed under CC

Spreading Hedge-Parsley
(*Torilis arvensis*)



Photo courtesy of: inaturalist.org/observations/44318963

Wild Carrot
(*Daucus carota*)



Photo courtesy of: Vincent, inaturalist.org/observations/54262462

Poison-Hemlock
(*Conium maculatum*)



Photo courtesy of: Scott Loarie, inaturalist.org/observations/572387

Wild Chervil
(*Anthriscus sylvestris*)



Photo courtesy of: inaturalist.org/observations/50417553

Habitat	<ul style="list-style-type: none"> Disturbed areas, roadsides, forest edges, woodlands, fields, prairies 	<ul style="list-style-type: none"> Disturbed areas, upland ecosystems 	<ul style="list-style-type: none"> Pastures, old fields, roadsides, meadows 	<ul style="list-style-type: none"> Along shores, fields, roadsides, woodlots, disturbed soil 	<ul style="list-style-type: none"> Woodlands, thickets, rocky glades, roadsides, railroads
Size & Stem	<ul style="list-style-type: none"> Up to 1.2 m Stems are covered with stiff, white, appressed hairs 	<ul style="list-style-type: none"> Up to 1 m Stems are covered with fine, stiff, white, appressed hairs 	<ul style="list-style-type: none"> Up to 1.5 m Stems are covered with fine, bristly, white hairs 	<ul style="list-style-type: none"> Up to 2.5 m Stems are hairless and have purple spots Often have a slightly glaucous stem 	<ul style="list-style-type: none"> Up to 1 m Stems are covered in tiny white hairs (hairs are dense at branch nodes)
Leaves	<ul style="list-style-type: none"> Leaves are alternate and covered with stiff, white, appressed hairs Fern-like 	<ul style="list-style-type: none"> Leaves are alternate and sparsely covered with stiff, white, appressed hairs Fern-like 	<ul style="list-style-type: none"> Leaves are alternate and lower surfaces may have spreading hairs Fern-like Smells like carrot 	<ul style="list-style-type: none"> Leaves are alternate and smooth/hairless Fern-like Smells bitter when bruised 	<ul style="list-style-type: none"> Leaves are alternate and lower surface has short spreading hairs Fern-like
Flowers	<ul style="list-style-type: none"> White, 5-petal flowers arranged in umbels Umbel is 3.5 – 5 cm across (sparse) Two or more linear, pointed, inconspicuous bracts are present at the base of each umbel (up to 8) 	<ul style="list-style-type: none"> White, 5-petal flowers arranged in umbels Umbel is 5 – 8 cm across (sparse) No bracts present at the base of each umbel or a single linear bract is present (rare) 	<ul style="list-style-type: none"> White, 5-petal flowers arranged in umbels Umbel is 5 – 10 cm across (large and dense) Large, showy bracts are present at the base of each umbel Solitary purple flower may be visible in the center of the umbel 	<ul style="list-style-type: none"> White, 5-petal flowers arranged in umbels Umbel is 5 – 13 cm across (dense) Pointed, ovate-lanceolate bracts are present at the base of each umbel 	<ul style="list-style-type: none"> White, 5-petal flowers arranged in umbel Umbel is 2.5 – 8 cm across (sparse) Hairy-edged bracts are present at the base of each umbel
Seeds/Fruits	<ul style="list-style-type: none"> Covered with hooked tip bristles 	<ul style="list-style-type: none"> Covered with straight to slightly curved bristles 	<ul style="list-style-type: none"> Covered with bristles 	<ul style="list-style-type: none"> Covered in wavy ribs 	<ul style="list-style-type: none"> Smooth
Roots	<ul style="list-style-type: none"> Taproot 	<ul style="list-style-type: none"> Taproot 	<ul style="list-style-type: none"> Taproot 	<ul style="list-style-type: none"> Taproot 	<ul style="list-style-type: none"> Taproot

Erect Hedge-Parsley (*Torilis japonica*) vs. Spreading Hedge-Parsley (*Torilis arvensis*)

Erect Hedge-Parsley (*Torilis japonica*)

Spreading Hedge-Parsley (*Torilis arvensis*)

Stems



Stems are covered with stiff, white, appressed hairs

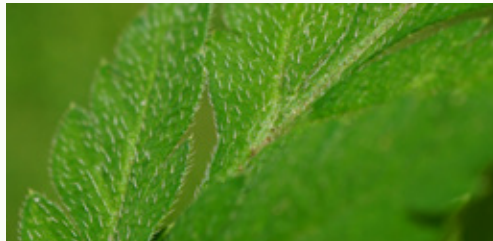
Photo courtesy of: Étienne Lacroix-Carignan, inaturalist.org/observations/57778420



Stems are sparsely covered with hairs.

Photo courtesy of: inaturalist.org/observations/80477512

Leaves



Leaves are covered with hairs.

Photo courtesy of: Patrick Hacker, inaturalist.org/observations/69787109 licenses under CC



Leaves are sparsely covered with hairs.

Photo courtesy of: Diana Foreman, inaturalist.org/observations/5847152

Flowers



Two or more pointed bracts are present at the base of each umbel.

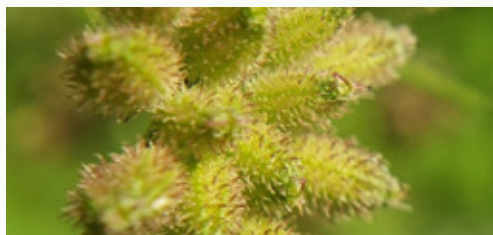
Photo courtesy of: Reuven Martin, inaturalist.org/observations/13956919



No bracts are present at the base of each umbel.

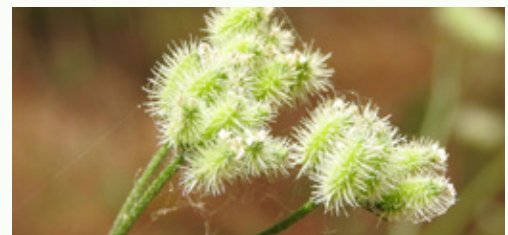
Photo courtesy of: Meghan Cassidy, inaturalist.org/observations/5784650 licensed under CC BY-SA

Seeds



Seeds are covered with hooked tip bristles.

Photo courtesy of: Sharika Elahi, inaturalist.org/observations/55752475



Seeds are covered with straight to slightly curved bristles.

Photo courtesy of: inaturalist.org/observations/3210047

Biology and Life Cycle

Erect hedge-parsley reproduces via seed. It is considered both an annual and biennial depending on its biogeographical location. In Europe it is considered a summer annual or biennial, and in Japan it is considered a winter annual. In North America, it is considered a summer biennial where it flowers during the summer of its second year (Kirk *et al.* 2011).

In its first year of growth, erect hedge-parsley grows as a rosette of basal leaves which rise from the thick taproot. The leaves remain green until the late fall. In its second year, it grows a flowering stem that blooms from June to September. The flowers on the outer edge of the umbel open first and the plant looks more open and airier, filling in with more flowers and branches as it matures. Each flower produces a schizocarp (fruit) that remains closed until maturity. At maturity (August to September), the schizocarp turns brown and splits into two mericarps which contain one seed each. Each plant can produce 2,000 – 7,000 seeds (Graeve 2015). At the moment of dispersal, the seeds are dormant and require a period of cold stratification (around 5°C) to germinate. Seed viability information is not available for erect hedge-parsley because it is often confused with closely related spreading hedge-parsley.

Erect hedge-parsley matures quickly and re-seeds. Plants can produce seeds that do not germinate until the following year, allowing it to build up a seed bank. The exact duration of the seed bank is unknown, but it is believed that seeds can remain viable in the soil for up to five years (DiTommaso *et al.* 2014). It is unspecialized and self-fertile, meaning it contains both male and female parts, which is attractive to generalist pollinators.



Erect hedge-parsley seeds turn brown at maturity.

Photo courtesy of: City of Toronto

Habitat

Erect hedge-parsley prefers well-drained moist soils and partial shade, but it is highly adaptable and will grow almost anywhere. It is tolerant of a wide range of light intensities ranging from full sun to full shade. It can grow in most soil types including sand, loam, and clay, and in soils with varying pH and nutrient levels. It prefers areas with a moderate slope and more calcareous soils.

It is commonly found in disturbed, uplands and communities, waste sites, railroads, roadsides, trails, hedgerows, and forest edges. Although disturbed habitats are preferred, it has also been known to invade open woodlands, grasslands, savannas, thickets, and pastures. It has been reported in oak forests, rich maple woods, wet ditches and on rock outcrops (Sheehan 2007). Most often, it establishes itself along trails, campgrounds, and other recreational areas where people and animals have unintentionally introduced it. Erect hedge-parsley occurs at lower densities in species-rich, sunny habitats and does not grow well in wetlands or grazed habitats.



Erect hedge-parsley is tolerant of a wide range of light intensities, including partial shade.

Photo courtesy of: Corinne Helmer, <https://www.inaturalist.org/observations/25527209>

Pathways of Spread and Distribution in Ontario

The native range of erect hedge-parsley extends throughout Europe, Asia, the Mediterranean, and part of northern Africa.

In the United States, it has been introduced in the east and Pacific northwest, and is currently observed throughout the Midwest including Missouri, Iowa, Wisconsin, Illinois, Indiana, Ohio and Michigan. It is listed as prohibited/restricted in Wisconsin. Erect hedge-parsley occurs sporadically throughout Canada, being reported in British Columbia, Quebec, and Ontario. It is primarily found in southern Ontario and throughout the Greater Toronto Area including Toronto and Mississauga. Reports of its occurrence have been made as far east as Peterborough and Ottawa.

Erect hedge-parsley is primarily dispersed by seed. The seeds are covered with Velcro-like hooked hairs which attach to clothing and the fur of animals. It tends to spread very quickly into areas with high human or animal traffic. Typically, it establishes itself along hiking and bike trails, campgrounds, and other recreational areas where it is spread by people on clothing, vehicles, equipment, and pets.

For up-to-date distribution information, visit:

www.eddmaps.org/ontario or <http://inaturalist.ca>.



Erect hedge-parsley tends to establish quickly in areas of high disturbance such as trails.

Photo courtesy of <https://www.inaturalist.org/observations/57177589>

Impacts

Ecological:

Erect hedge-parsley is commonly confused with spreading hedge-parsley (*Torilis arvensis*) for which there is limited knowledge of its range and overall threat to biodiversity. The primary threat of erect hedge-parsley is due to its vigorous growth habit, its ability to create dense patches of vegetation, and its high dispersal ability. In North America it is considered an aggressive invasive species because of its adaptability and tolerance of a wide range of habitats. Erect hedge-parsley can establish in natural areas independent of any known natural or anthropogenic disturbances.

It has been shown to invade forests, woodlands, grasslands, and roadsides where it forms dense colonies that out-compete native vegetation. Once it is established, it quickly spreads and shades out other plants, reducing the ground vegetation diversity and eliminating the dependent wildlife in the area. It may also prevent tree regeneration in some areas (Jacquart 2011).

Large dense stands of erect hedge-parsley are typically present in areas that have few other invasive species present (Jacquart 2011). This suggests that it has an ability to invade relatively pristine natural areas and areas that may be unsuitable habitats for other invasive species.

A study on erect hedge-parsley found that the seeds have a high ability to survive in harsh and disturbed soils, indicating its overall resilience and threatening ability to invade natural areas (Roberts 1979). Another study found that the seeds resulted in high germination rates when subjected to a chilling treatment, but even more seeds germinated when the chilling treatment was followed by a short period of high temperatures (Vandelook *et al.* 2008). This suggests that erect hedge-parsley can become more aggressive at higher temperatures, which explains why it grows quickly on bare, disturbed soils, alluding to possible effects because of climate change.

Erect hedge-parsley is unspecialized and self-fertile (both male and female flowers on the same plant), making it attractive to many insects, bees, flies, wasps, and beetles. It is suspected but not proven that the presence of erect hedge-parsley may alter the native plant-pollinator interactions.

Erect hedge-parsley has no clearly defined benefits that outweigh the associated negative impacts (Graeve 2015).

Economic:

Erect hedge-parsley has high potential costs to land managers, foresters, woodland owners, and homeowners (Sheehan 2007). Once established, the dense colonies are very costly and difficult to control.



Erect hedge-parsley creates dense patches of vegetation.

Photo courtesy of: Sharika Elahi, inaturalist.org/observations/55752475

Societal:

Erect hedge-parsley is commonly used in traditional medicine to treat a variety of conditions, although there is little research to support the human health benefits. Torilin in the fruit can be extracted and has been shown to inhibit the growth of blood vessels in tumor development, suggesting its ability to combat several cancers (Kim *et al.* 2000). The juice of the roots is used to treat indigestion.

Applicable Legislation



Erect hedge-parsley.

Photo courtesy of: [inaturalist.org/observations/14712280](https://www.inaturalist.org/observations/14712280)

Most of the control methods for plant species are regulated under federal and/or provincial legislation.

Current regulations regarding chemical, manual and mechanical control of erect hedge-parsley at the time of writing are summarized in this document. Please note that this is only for general guidance and is not intended as legal advice.

Land managers are responsible for ensuring that the management or control project complies with all relevant legislation. If protected species or habitats are present, an assessment of the potential effects of the control project could be required. Permits may be required for activities that may affect species listed in the Endangered Species Act (2007) (ESA), species listed on Schedule 1 of the Species at Risk Act (2002) (SARA), and for activities which contravene SARA's general or critical habitat prohibitions. Depending on the species and its location, applications should be directed to the appropriate authorities (see details below).

To learn which species are at risk in Ontario and for information on permit requirements consult: <https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization>.



Erect hedge-parsley forms dense vegetation that displaces native plants.

Photo courtesy of <https://www.inaturalist.org/observations/89318129>

Federal

Plant Protection Act and Plant Protection Regulations

Under the *Plant Protection Act* (1990) and *Plant Protection Regulations*, the Canadian Food Inspection Agency (CFIA) is responsible for protecting plant resources in Canada by preventing the importation of new plant pests and limiting the movement and spread of pests within Canada. Invasive plants that are regulated under the *Plant Protection Act* (1990) are included in the list of Pests Regulated by Canada.

At the time of publication, erect hedge-parsley is not listed under the Pests Regulated by Canada. For the full list, visit <https://inspection.canada.ca/plant-health/invasive-species/regulated-pests/eng/1363317115207/1363317187811>.

Weed Seeds Order

The Weed Seeds Order (2016) (WSO) is a ministerial order made under the *Seeds Act* (1985), which lists regulated invasive plants under the *Seeds Act* (1985). Under this order, the CFIA restricts the presence of weed species in commercially sold seeds to prevent the introduction and spread of new weeds.

At the time of publication, erect hedge-parsley is not listed under the WSO. For the full list, visit <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-93/page-2.html#h-838559>.

Pest Control Products Act

The management of pesticides is the joint responsibility of the federal and provincial governments. Under the *Pest Control Products Act* (PCPA) (2002), Health Canada's Pest Management Regulatory Agency (PMRA) registers pesticides for use in Canada with an approved label after conducting a stringent, science-based evaluation that ensures any risks are acceptable. The pesticide label is a legal document that prescribes how the pesticide can be used; pesticides must be applied in accordance with all label directions. Ensure you

have the most current label and are aware of any re-evaluation decision.

Visit the Pest Management Regulatory Agency's product label search site at <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>.

Fisheries Act

The *Fisheries Act* (1985), administered by Fisheries and Oceans Canada (DFO) and Environment and Climate Change Canada (ECCC), applies to both the plant and pesticide use. It specifies that it is an offence to:

- Harmfully alter, disrupt, or destroy fish habitat, including streamside vegetation;
- Move or introduce aquatic organisms (including plants) to new habitats;
- Damage fish habitat or put harmful substances such as pesticides into water frequented by fish, including by pesticide drift.

To determine if you need a permit under the *Fisheries Act*, consult <http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>.

Species at Risk Act

ECCC also enforces the *Species at Risk Act* (2002) (SARA), whose purpose is "to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species that are extirpated (no longer exist in the wild in Canada), endangered, or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened." Permits are required by those persons conducting activities that may affect species at risk, such as invasive plant management.

To learn which species are at risk, for more information about critical habitat, or information on obtaining a permit, consult the SARA Public Registry at <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>.

Migratory Birds Convention Act

The *Migratory Birds Convention Act* (1994) (MBCA) administered by ECCC, provides for the protection of some bird species through the Migratory Birds Regulations and the Migratory Birds Sanctuary Regulations. For birds protected under the MBCA, it is an offence to kill, capture, injure, take or disturb a protected migratory bird as well as damage, destroy, remove, or disturb its nest without authorization under a permit issued under the Migratory Birds Regulations. To minimize the risk to breeding birds, consider operating outside nesting periods. Operating outside nesting periods is not a guarantee that birds will not be killed or disturbed; therefore, it is the individual's responsibility to ensure they do not contravene the Act.

For more information or to determine if you require a permit under the *Migratory Birds Convention Act*, visit: <https://www.canada.ca/en/environment-climate-change/services/migratory-bird-permits.html>.

To find out which birds are protected under the MBCA, visit: <https://www.canada.ca/en/environment-climate-change/services/migratory-birds-legal-protection/convention-act.html>

For information on general nesting periods, visit: <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html>

Provincial

Weed Control Act

The *Weed Control Act* (1990) (WCA) is administered and enforced by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). The intent of the WCA is to reduce negative impacts of noxious weeds on agriculture and horticulture; to reduce plant diseases by eliminating their host plants; and to reduce health hazards to livestock caused by poisonous plants.

A noxious weed includes a plant that has been listed in the schedule of noxious weeds found in Regulation 1096 made under the WCA. This list is commonly referred to as the "Noxious Weed List".

In general, a species designated as a noxious weed under the WCA has one or more of the following characteristics:

- Difficult to manage on agricultural land once established and will reduce the yield and quality of the crop being grown;
- Negatively affects the health and well-being of livestock;
- Poses a risk to the health and well-being of agricultural workers.

In Ontario, 25 weeds are currently designated as noxious under the WCA. Municipalities are responsible for appointing one or more weed inspectors at their discretion. The weed inspector is responsible for responding to calls made to the municipal clerk regarding a noxious weed that has been reported on someone's property. The weed inspector can order the landowner to destroy the weed within seven days.

At the time of publication erect hedge-parsley is not regulated under the WCA's Noxious Weeds List. For the full list, visit: http://www.omafra.gov.on.ca/english/crops/facts/noxious_weeds.htm.

Invasive Species Act

Under the *Invasive Species Act* (2015) (ISA) there are rules to prevent and control the spread of invasive species.

At the time of publication erect hedge-parsley is not listed as Prohibited or Restricted under the *Invasive Species Act*. For more information on which species are listed, visit: <https://www.ontario.ca/page/stop-spread-invasive-species>.

Pesticides Act

Before a pesticide can be sold, stored, or used in Ontario, it must be registered under the federal *Pest Control Products Act* (2002) (PCPA) by Health Canada's Pest Management Regulatory Agency (PMRA) and be classified under the provincial *Pesticides Act* (1990) by the Ministry of the Environment, Conservation and Parks (MECP).

The provincial classification of federally registered pesticides can be found at <https://www.ontario.ca/page/pesticide-classification-guideline-ontario>.

For Commercial (Class C) and Restricted (Class B) herbicides, only appropriately licensed pesticide exterminators can legally purchase, store, and apply these herbicides. The most effective herbicides used for treating erect hedge-parsley are both in the Commercial (Class C), and therefore not available for homeowner use. However, homeowners may be able to hire a contractor who has the appropriate licence and access to herbicides for controlling erect hedge-parsley. To undertake the project, a Letter of Opinion must be obtained by the licensed technician from the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) Regional or Branch Director.

To obtain a written Letter of Opinion, the licensed technician should contact your local Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) office <https://www.ontario.ca/page/ministry-northern-development-mines-natural-resources-and-forestry-regional-and-district-offices>

It is important that pesticides be applied in accordance with all label directions. The pesticide label is a legal document and prescribes how the pesticide can be legally and safely used. Ensure you have the most current label and are aware of any re-evaluation decisions.

For an up-to-date list of pesticides labelled for erect hedge-parsley control and to access the most current label, visit the Pest Management Regulatory Agency's product label search site at <http://pr-rp.hc-sc.gc.ca/ls-re/index-eng.php>.

In addition to being used in accordance with label directions, pesticides may only be used for purposes allowed under Ontario's Cosmetic Pesticides Ban. The allowed uses are for pesticides in, on, or over land if the active ingredient in the pesticide is included on the Allowable List, or if its use is permitted under an exception to the Ban. Examples of exceptions include, uses for:

Agriculture

- The agriculture exception allows farmers to use Commercial (Class C) and Restricted (Class B) pesticides for the purposes of the agricultural operation that they own or operate. This exception may apply to the control of invasive plants if it impacts their agricultural or horticultural operation. Agricultural operations include agriculture, aquaculture, and horticulture activities.

Examples include:

- › Growing, producing, or raising farm animals;
- › Production of crops, including greenhouse crops, maple syrup, mushrooms, nursery stock, tobacco, trees, turf grass, and any additional agricultural crops prescribed under the *Nutrient Management Act* (2002);
- › Activities that are part of an agricultural operation such as maintenance of a shelterbelt for the purposes of the agricultural operation;
- › The production of wood from a farm woodlot, if at least one of the activities described above is carried out on the property where the farm woodlot is located.
- › Some activities such as a household vegetable garden and lawn are not included in the definition of an "agricultural operation".

Forestry

- A forest is defined as a treed area of land that is one hectare in size or larger.

Commercial (Class C) and Restricted (Class B) pesticides may be used in a forest for the purposes of harvesting, renewing, maintaining, or establishing a forest, protecting forest resources derived from a forest, and accessing a forest for these purposes under the forestry exception. The control of invasive plants may fall under the forestry exception; a Forestry Class Land Exterminator license is required to use commercial pesticides in a forest.

Natural Resources

- The “natural resources” exception exists for the use of prohibited pesticides to manage, protect, establish, or restore a natural resource. To qualify for this exception, your project must meet the criteria specific in Section 28 of Ontario Regulation 63/09, including the use of pesticides in accordance with Integrated Pest Management principles outlined in this BMP guide. As noted above, the licensed technician will need to obtain a written Letter of Opinion.

Public Works

- The public works exception includes things such as roads, buildings, and structures, provided certain conditions are met. For example, an exemption for a Commercial (Class C) active ingredient may apply if a plant interferes with the essential maintenance of public works.

To determine if a permit is required for your invasive species management project, contact your local Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) office <https://www.ontario.ca/page/ministry-northern-development-mines-natural-resources-and-forestry-regional-and-district-offices>.

Endangered Species Act

The Ministry of the Environment, Conservation and Parks (MECP) enforces the Endangered Species Act (2007) (ESA), whose purpose is to provide protection for species and habitat classified by the province of Ontario as endangered or threatened. Permits are required by those persons conducting

activities that may affect species at risk, such as invasive plant management.

To learn which species are at risk in Ontario or for information on obtaining a permit, consult www.ontario.ca/environment-and-energy/species-risk-ontario-list.

Conservation Authorities Act

Conservation Authorities (CAs), formed under the *Conservation Authorities Act* (1990), are watershed-based resource management agencies with a mandate that includes a number of roles and responsibilities in the land use planning and development processes. CA responsibilities include ensuring development is not at risk from natural hazards including flooding or erosion, with an aim to protect and restore the ecological health and function of natural systems. Under the Act, CAs regulate development and other activities in or adjacent to river or stream valleys, watercourses, wetlands, Great Lakes and large inland lakes' shorelines, and hazardous lands. CAs also regulate the straightening, changing, diverting, or interfering in any way with the existing channel of a river, creek, stream, or wetland.

To find out if you need a permit to undertake your control project, consult your local conservation authority at <http://conservationontario.ca/>.

Municipal

Under the *Building Code Act* (1992), municipalities may pass bylaws to address the presence of invasive plants. Municipalities may enact bylaws to control plants when there is a risk of negative impact to human health and safety.

Municipalities are also responsible for enforcing the *Weed Control Act* (1990) to reduce the infestation of noxious weeds that negatively impact agricultural and horticultural land. Subject to the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) approval, municipalities can designate additional plants not listed on the Ontario Noxious Weed list in their own jurisdictions.

Invasive Plant Management Planning

Management Considerations

Avoiding the planting of erect hedge-parsley and preventing its spread before it becomes locally established will reduce its impacts on biodiversity, the economy, and society.

It is important to use a control plan that incorporates Integrated Pest Management (IPM) principles. This means using existing knowledge about the invasive species and its surrounding environment to prevent and fight infestations and may require more than one type of control measure to be successful.

Once erect hedge-parsley has been confirmed at a location, a control plan should be developed based on infestation size, site accessibility, potential for spread, and the risk of environmental, economic, or social impacts. Site specific conditions such as native plant richness and diversity, wildlife usage, and water table fluctuations should also be considered when developing control plans. A detailed inventory of each site, including known trails and footpaths, is strongly recommended before starting control efforts to help ensure proper methods and timing are used to minimize spread and negative impacts on wildlife and native plant species.

Mapping

If you think erect hedge-parsley is nearby or on your property, you may wish to conduct an ecological survey. While managers of large land areas, such as conservation authorities or municipalities, may hire or recruit appropriately qualified staff or volunteers, private landowners with smaller properties may be able to conduct their own surveys, or contact an expert. If you know you have erect hedge-parsley in one area of the property, survey the rest of the property to identify other infestations and to document current and future distribution.

For detailed information on mapping techniques, consult the Landowners Guide for Managing and Controlling Invasive Plants in Ontario at <http://www.ontarioinvasiveplants.ca/resources/technical-documents>.



Erect hedge-parsley basal rosettes.

Photo courtesy of: Reuven Martin, [inaturalist.org/observations/13956919](https://www.inaturalist.org/observations/13956919)

Landscape Level Management

If erect hedge-parsley has become widely established, a more detailed management strategy should be developed and implemented. A strategic and integrated landscape-level approach to management, conservation, and planning serves to bring partners, landowners, and land managers together to work toward common and shared goals that consider both site-level needs and wider landscape considerations. Focusing only on individual, local challenges without also examining the site within a broader landscape context may increase management costs, be more labour intensive, and may not result in strategic impacts across larger areas. Effective management and control of erect hedge-parsley requires several interventions and a combination of control measures. It is not always realistic, especially for large infestations, to try and eliminate the infestation all at once. Determine the desired plant community and the land use objective and then develop an appropriate IPM strategy.

Setting Priorities

Establishing your highest priority locations for control prior to management will help to determine your best course of action. Therefore, when developing a management strategy, it is important to consider the following considerations to help inform control decisions:

1. If you have limited resources, first try to remove the outlying populations (isolated plants or satellite populations) or plants along trail edges, to prevent further spread.
2. If you have more resources, working into larger, "core" populations of erect hedge-parsley can prevent spread into uninfested areas. In many cases, resource limitations may prohibit immediate removal of entire core populations. Under these circumstances, core areas should be prioritized and addressed strategically.
3. Concentrate on preventive strategies in high-priority areas or areas where the plant is going to cause the most problems in terms of spread, such as the most productive or sensitive part of an ecosystem, along a creek, along a trail, near species at risk, or a favourite natural area.
4. Protect federally, provincially, and regionally rare species and communities by removing invasive plants and ensuring rare species are not negatively impacted by control efforts.
5. Review the different control options and costs with considerations to surrounding water, habitat, time of year, and type of land use (i.e., high-traffic recreational areas, agriculture, etc.).
6. Ensure all landowners have been identified and consulted before control takes place.
7. Consider dedicating a certain time each year to control efforts and make it a joint effort with neighbouring landowners and/or land managers.
8. Begin to assess whether regeneration or restoration is appropriate, and if seeding or planting of native plants is needed to help jump-start natural succession and increase biodiversity in the area.
9. Follow-up monitoring is crucial to remove new plants that may emerge after initial control efforts.



Removal of erect-hedge parsley.

Photo courtesy of: <https://www.inaturalist.org/observations/92917194>

Prioritizing within a Control Area

(This section is modified from *The Landowners Guide to Managing and Controlling Invasive Plants*, published by Credit Valley Conservation).

1. Focus on large blocks of un-invaded areas and keep them free of invaders.
2. Control small, younger, outlier (satellite) populations first.
3. Reverse the invasion, expand the cleared area outward and ensure that un-invaded areas are kept free of invasive plants (with regular monitoring).

This flow chart can help land managers choose where to first focus control efforts if controlling satellite populations due to limited resources:

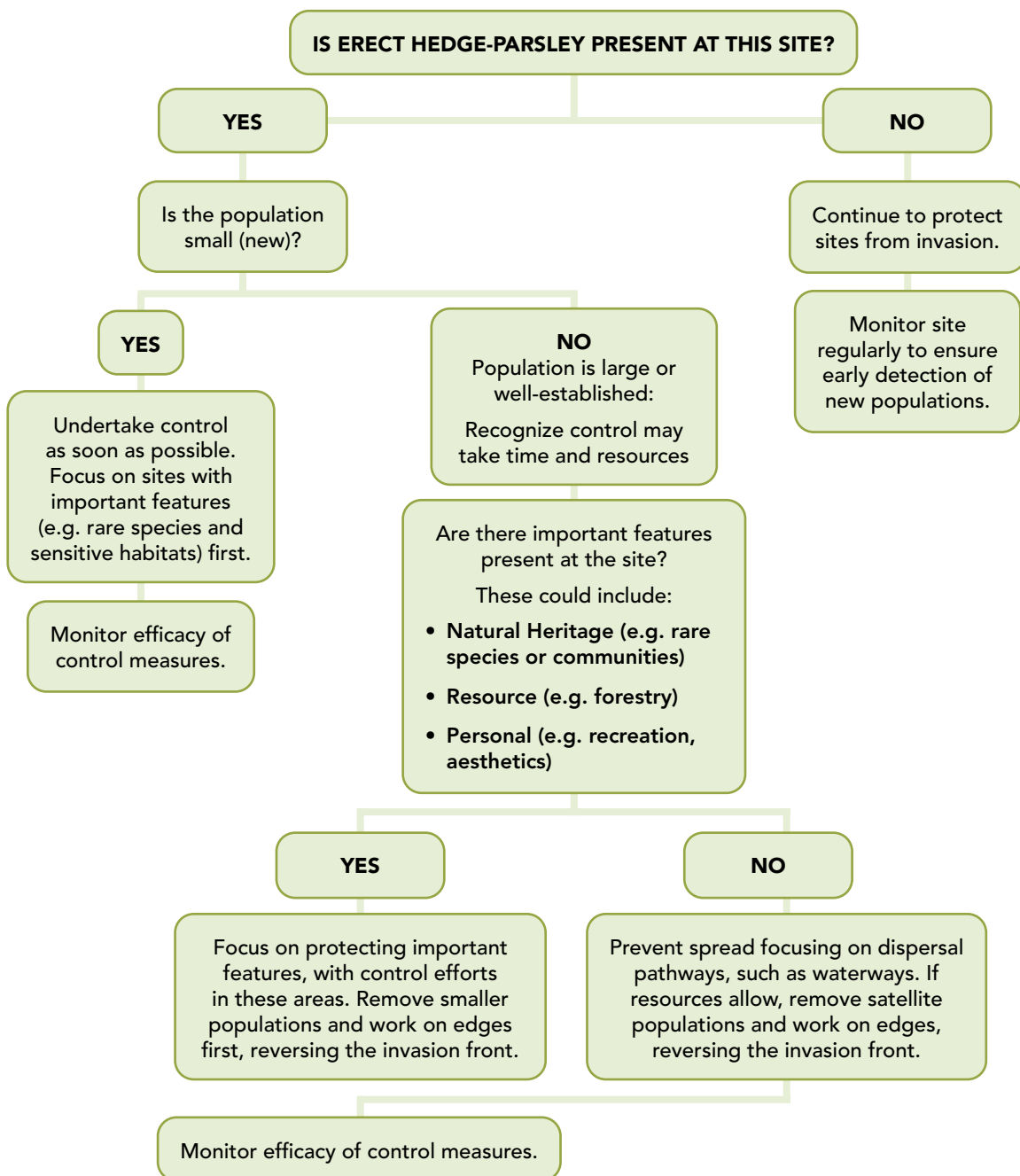


Figure 1: How to prioritize erect hedge-parsley sites for effective control.

Long-term Management and Monitoring

To prevent the re-establishment of erect hedge-parsley, a long-term management and monitoring plan should be created prior to the implementation of control efforts. Monitoring will enable assessment of the initial control measures, including their effectiveness, as well as the types of follow-up treatments that are necessary. Ongoing management is critical to the success of a project; after removal, a site remains at risk of reinvasion by nearby populations or another invasive species.

Monitoring could be as simple as taking photos or performing a visual inspection, or it could be more complex and include extensive vegetation surveys. In general, annual treatment is imperative and should focus on selectively removing isolated populations as they appear. Follow-up spot treatment will help to ensure the invasive population remains under control and allows for the regeneration of native plant species.

For more information on monitoring, consult the Landowners Guide for Managing and Controlling Invasive Plants in Ontario at <http://ontarioinvasiveplants.ca/resources/technical-documents>.

After Management: Assessing Regeneration vs. Restoration

Consider the following factors:

1. **Level of disturbance at the site:**
 - a. Was this a heavily invaded site (e.g., was much disturbance caused during control measures)?
 - b. Will it continue to be disturbed (e.g., through urban management activities or recreational use)?
2. **Biology of the invasive species removed:**
 - a. Is there a seed bank to consider?
 - b. Are there seedbanks from other invasive plants in the area?
3. **Re-invasion risk:**
 - a. Are there invasive species nearby that could re-invade the site from nearby trails, watercourses or other pathways of introduction?
 - b. Are people dumping yard waste that could contain erect hedge-parsley?
4. **Existing native vegetation:**
 - a. Will any native vegetation that still exists on the site regenerate quickly?
 - b. Does the existing native vegetation need help? Species with specific habitat requirements or reproductive strategies resulting in low fecundity, including species at risk, may require re-introduction. The majority of plant species should be able to recover naturally, especially if healthy populations exist adjacent to the controlled area.

If you answered **Yes** to most of the questions under 1 to 3, it is most likely that (a) the site will be re-invaded before it has a chance to regenerate on its own or (b) that erect hedge-parsley will continue to invade and be present among the native species so that annual control of erect hedge-parsley may be required. Restoration will need to reduce the risk of re-invasion. If you answered **Yes** to the questions under 4, your site may have a lower risk of invasion but could still require some restoration measures to help re-establish native vegetation.

Control Measures

Erect hedge-parsley seed dormancy and germination rates have been shown to differ greatly across North America, limiting the scientific understanding on the success of management strategies. Plants can produce seeds that do not germinate until the following year, allowing seeds to build up a seed bank and increasing the difficulty of control. It is believed that seeds can remain viable in the soil for up to five years, so follow-up monitoring and control will be required.

Late fall and winter are good times to survey for erect hedge-parsley as seeds germinate in the fall, producing a basal rosette of leaves that remain green under the snow. Adult plants are short-lived and control efforts should focus on preventing seed production and spread. Control should be timed to occur after the flowers bloom (June) but before the seeds start to develop (August). If brown (mature) fruits are present during control, plants should be bagged and removed from the site. When leaving the site, check your clothing, shoes, and equipment for plant material (i.e., seeds).

Systemic herbicides that are translocated to the roots and kill the entire plant are most effective for erect hedge-parsley control. Herbicide treatment is effective at controlling large populations at the basal rosette stage (October – April) or on re-sprouts after cutting/mowing (Kirk *et al* 2011). Herbicide application may be timed to limit the impacts on native vegetation (early spring before native plants are active or late fall after native plants have gone dormant) but herbicides may not be very effective below a temperature of 10°C.

Care should be taken to limit disturbance to the soil and damage to nearby native plants with any control method. Continue to monitor the sites periodically for at least five years. Remove any new growth by hand-pulling or digging as required.



Erect hedge-parsley.

Photo courtesy of: Corinne Helmer, [inaturalist.org/observations/25527209](https://www.inaturalist.org/observations/25527209)

Manual

Pulling:

Hand-pulling is highly effective and practical however, it is labour-intensive. It can be considered as effective, if not more effective, than herbicide application if the entire root system is removed.

Small patches of erect hedge-parsley can be hand-pulled prior to flowering. It is easiest to hand-pull plants when the soil is moist. If the soil is dry, a shovel can be used to loosen the soil around the plant. Take care to remove the entire plant since the root can re-sprout if not removed. Hand-pulling should occur prior to seed development. It is best completed on second year plants from April to July (before seeds start to develop).

Working from satellite populations inward, grasp the plant at the base of the stem and pull the entire plant from the soil, ensuring the entire root system is removed. If brown fruits/seeds are present, care should be taken to prevent the spread of seed. All viable plant material (flowers, fruit and seeds) should be bagged and removed from the site. The remaining non-viable material can be left to dry on site. The site should be monitored throughout the growing season and for at least five years. Any new growth should be hand-pulled before it goes to seed (August).

Clipping:

Clipping the flowering stems of erect hedge-parsley before it develops seed may be an effective control strategy. Considering it is an annual to biennial species and relies on seed set to reproduce and spread, clipping should be carefully timed to occur well into the bloom period (June – July) but before the seeds mature. If the flower is cut too early, it will develop new flowering stems. If seeds are present, the cut stems should be bagged and removed from the site. The site should be monitored throughout the growing season to make sure all the flowering plants are removed.

Mechanical

Mowing/Cutting:

If timed correctly, frequent mowing close to the ground may control or slow the spread of erect hedge-parsley. Mowing/cutting the plant as the flowers start to form but before the plant develops seed is crucial for success. Similar to clipping, if the plant is mowed/cut too early, it will reflower, sometimes very close to the ground where it is difficult to see. If it is mowed/cut too late and seeds are present, this could unintentionally spread seeds and result in further spread. Mowing should not be considered if brown (mature) fruits/seed are present.

For large populations, use a weed cutter or mower to cut the stem as close to the ground as possible, ideally about 2.5 – 5 cm. Mow as soon as the white flowers have formed (June – July) and repeat for several years. One study showed that mowing from early July through mid-August (from flowering through to the green fruit stage) was highly effective, with less than 5% of plants resprouting in the fall and none regrew the next season (DiTommaso *et al.* 2014).

Data is lacking on how many years of mowing are required to control a population, but a minimum of five years is likely due to the seed bank. The site should be monitored, and any new growth should be hand-pulled, mowed or re-cut before it goes to seed (August).

Since mowing is non-selective, care should be taken to reduce the impacts on the surrounding native species. Mowing should not be done in environmentally sensitive areas or where species at risk are present. Generally, mowing is only recommended for less sensitive areas, such as roadsides.

Cultural

Tarping:

Inhibiting the photosynthesis of erect hedge-parsley in early spring can control the plant by lowering its carbohydrate reserves. One method to prevent photosynthesis is tarping, which involves covering the invasive plant population with material that is completely opaque, thick and allows no sunlight to penetrate. This can include landscape fabric, black plastic tarps, sheeting or cardboard. Tarping should be done in early spring (April – May) before the plants gain a substantial carbohydrate reserve. The tarp should extend 1 m beyond the infestation area to ensure coverage and prevent light penetration from the edges. The edges should be secured to the ground using sandbags, bricks, landscape staples, or tent pegs as long as the ground is not too rocky. The tarp needs to be left in place for two or more years to deprive the plants of sunlight, as such, it is only recommended for small areas or to control localized populations



Tarping done by the City of Toronto using a black landscape fabric.

Photo courtesy of: Kaylyn Crawford, City of Toronto

to prevent them from spreading. Without sunlight, the plants will be unable to photosynthesize, causing them to weaken and die. The edges of the tarp and rips or tears should be monitored to ensure no plants are growing out from under the edge. Signage explaining the purpose of the tarp should be left at the site to prevent it from being stolen or thrown out.

Since erect hedge-parsley has a large taproot that develops in the first year of growth, the patch should be mowed or cut prior to covering with a tarp for the best results. In addition, in order to make tarping an effective control method, it should be done in an area of full sun; on smooth, flat areas; and in areas where the tarp will not be disturbed. If the tarp is black or dark coloured, the heat generated from solarization will kill the plants under the tarp. Black tarps with silver underneath are suggested to provide ideal solarization. As tarping is a non-selective control measure, one must also take care when using this method to not suppress known populations of native plants. In addition, site selection should also take into consideration that tarping may damage soil microbial activity and potentially alter soil nutrient cycling.

Prescribed Fire:

NOT RECOMMENDED.

Prescribed burning may be an effective control method for erect hedge-parsley when used in conjunction with other control techniques or in fire-adapted habitats. Spring burns can kill germinating seedlings and suppress the above-ground growth, but it is unlikely to kill established plants since they resprout vigorously and reinvade after a burn. One study found that burning was 50 – 70% effective at reducing growth during the control season, and less than 50% effective in the season following control (Panke and Renz 2012). Sites that are burned tend to see an increase in erect hedge-parsley populations as the plants take advantage of the disturbance. Prescribed burns in fire-adapted landscapes (e.g., savannas) may benefit native species that are well-adapted to this type of management and may result in improved competition with erect hedge-parsley. Planning a control strategy to follow a prescribed burn is very important. Prescribed fires are not recommended unless integrated with other techniques.

Biological

Biological control is the use of a herbivore, predator, disease, or other natural control to reduce established populations of invasive species. Many invasive species have no natural controls in their new habitats. Biological control aims to re-establish an ecological balance between the invasive species and its natural controls by selecting highly host-specific natural controls, such as predatory insects or diseases, from the country of origin and moving them to the country where the invasive species is a problem. This is done after extensive host-range testing in the country of origin or under quarantine, to ensure that the potential biocontrol agent is host-specific to the targeted invasive species.

At the time of publication, there are no biological control agents currently available for erect hedge-parsley. For more information on the status of biological control agents in Canada, visit: <https://inspection.canada.ca/plant-health/invasive-species/biological-control-agents/eng/1514956211166/1514956212112>.

Chemical

Foliar Spray:

Chemical application may be done using a foliar spray method. This method is most effective with a product containing the active ingredients glyphosate or triclopyr. Research shows that glyphosate or triclopyr based herbicides are 70 – 90% effective at reducing growth during the control season (Panke and Renz 2012).

Chemical and Concentration:

Glyphosate (1 – 2%* solution)

*Based on a product originally containing 540 g/L of active ingredient.

Triclopyr (2%** solution)

**Based on a product originally containing 755 g/L of active ingredient.

Note: Always consult the pesticide label to ensure you are adhering to the maximum solution for the product.

Herbicide application can be applied to rosettes in the early spring or late fall (when other plants are dormant, but the rosettes are still green) however, herbicides may not be very effective below a temperature of 10°C. Spray until the leaves are just covered and the herbicide is not dripping off the leaves. Repeat annually for several years if there is an existing seed bank. For large, dense infestations, broadcast it across the infested area. Exercise caution if erect hedge-parsley is interspersed with desirable native species. A subsequent application that targets missed or emerging plants may be necessary but may not be permitted for some herbicides. Check the pesticide label for further restrictions regarding treatment frequency.

Herbicides can be applied to cut plants to increase the efficacy and the ability to target individual plants without damaging desirable plants. Mow/cut the plants before the plant develops seed (spring/summer). Wait 1 – 2 weeks for the plants to resprout and spray the new growth with the herbicide.

Systemic herbicides such as glyphosate and triclopyr are non-specific and can damage or kill desirable native plants that may be accidentally sprayed during treatment. These herbicides are not for use near water. Consult pesticide label and carrier agent/surfactant labels for information on how the pesticide can legally and safely be used.

Disposal

Do not backyard compost

Home composters do not reach the temperature necessary to kill the seeds. Do not compost viable plant material (e.g., seeds, fruit, or roots).

After control

Following control, plant material should be removed from the site to prevent re-rooting or re-establishment, particularly if the seeds are still present. If seeds are present, remove the seed heads from the site and leave the remaining plant material on site to dry if not in contact with moist soil. Place all reproductive material in a black garbage bag and dispose of it in a landfill.

Municipal compost

Viable plant material (seeds, fruit, and roots) should only be composted if the material is taken to a large-scale municipal composting facility where the compost pile reaches temperatures high enough to kill the living material. Composting operations that demonstrate strict adherence to pathogen kill processes and maintain optimal moisture conditions may provide sufficient conditions to destroy most seeds of invasive plants. Ontario composting facilities are required to routinely monitor the compost process and meet strict, provincially regulated time-temperature parameters for pathogen kill. Consult your local municipality to determine if this is an appropriate course of action.

Solarize

If seeds are present, plant material can be placed in black plastic bags. Seal the bags tightly and leave them in direct sunlight for 2 – 3 weeks to cook or kill the viable plant material. Tarps can also be used if there is a large amount of biomass to solarize. Place the tarp below and above the plant material, ensuring all plant material is in the center of the tarp and is not in contact with the soil. Secure the edges to the ground with sandbags, bricks, or landscape staples, and leave in place for 2 – 3 weeks. The rotten material can then be composted or disposed of in a landfill.



Erect hedge-parsley basal rosettes.

Photo courtesy of: Mary Gartshore.

Restoration

During Control

Mulching:

Covering sites with mulch immediately after invasive species control can reduce further invasive seedling establishment and growth, and prevent colonization by other invaders before restoration planting takes place. Spread approximately 15 – 30 cm of mulch across the site. Ensure the equipment and mulch used does not contain any other invasive plant material. Monitor the site for several weeks and remove any new growth of invasive plants. Leave the mulch on site to biodegrade before beginning restoration.

Note that this technique is not appropriate for nutrient poor soils like savannas, because mulching adds nutrients to the soil and the increase of nutrients would drastically alter the function of these ecosystems. One must also take care when using this method not to suppress known populations of native plants. A floral inventory of the site prior to control would be beneficial if employing this method.

Seeding:

Broadcasting seeds of native plant species immediately after management activities may be useful to prevent the establishment of new invasive species. This can give desirable native species the chance to establish themselves. It is important to wait until all management activities are completed before attempting seeding. This prevents the new plants from being killed by future management activities.



Native plants planted following removal of invasive plants.

Photo courtesy of Jaclyn Scobie, City of Toronto

After Control

Planting:

Once erect hedge-parsley has been removed from a site, consider restoration by planting site-appropriate native species. Wait until all management is completed if doing a large stock (e.g., potted) re-planting to ensure newly planted stock is not damaged or killed by ongoing management. When planting after control, consider space and light availability (have any trees recently been removed that created a canopy gap?). These environmental changes should be considered when choosing plant species for restoration, as they will affect the growing and soil conditions. A diverse mix of plants suited to the growing conditions on site and suited to the project goals should be considered for replanting.

Preventing the Spread

Prevention and early detection are the most effective tool for controlling the spread of erect hedge-parsley and everyone can help. Follow these tips:

Report it.

If you think you see erect hedge-parsley, take a picture, record the location, and report it using the following tools: contact the Invading Species Hotline at **1-800-563-7711** or report online at www.eddmaps.org/ontario or www.inaturalist.ca. For more information, call the Invading Species Hotline at **1-800-563-7711** or visit www.invadingspecies.com or contact the Ontario Invasive Plant Council at info@oninvasives.ca.

Watch for it.

Learn to recognize erect hedge-parsley and then monitor property boundaries, forested areas, fence lines, and trails. Early detection of invasive plants can make it easier and less expensive to remove or control them.

Stay on trails.

Avoid traveling off-trail and in areas known to have erect hedge-parsley or other invasive species.

Stop the spread.

Inspect, clean, and remove mud, seeds and plant parts from clothing, pets (including horses), vehicles (including bicycles, trucks, ATVs, etc.) and equipment such as mowers and tools. Clean vehicles and equipment in an area away from natural areas where plant seeds or parts are not likely to spread (e.g., wash vehicles in a driveway or at a car wash) before travelling to a new area.

Keep it natural.

Try to avoid disturbing soil and never remove native plants from natural areas. This leaves the soil bare and vulnerable to invasive species.

Use native species

Try to use local native species in your garden. Do not plant erect hedge-parsley and if you have removed it, replant with native species. Encourage local garden centres and nurseries to sell non-invasive or native plants. The Grow Me Instead guide lists alternative species to plant instead of invasive species. For more information on alternative species to plant instead of invasive species, consult the Grow Me Instead guide at <https://www.ontarioinvasiveplants.ca/resources/grow-me-instead/>.

Tracking the Spread (Outreach, Monitoring, Mapping)

Several reporting tools have been developed to assist the public and resource professionals to report erect hedge-parsley sightings, track the spread, detect it early and respond to it quickly. These include:

1) **EDDMapS Ontario**: an online reporting tool and FREE mobile application (iPhone and Android) where users can report sightings, review distribution maps, and explore educational resources of invasive plants and other invasive species. This tool is free to use at www.eddmaps.org/ontario, and can be downloaded from your app store.

2) **The Invading Species Hotline**: a toll-free telephone number (**1-800-563-7711**) operated by the Invading Species Awareness Program where individuals can report sightings verbally.

3) **iNaturalist**: an online citizen science reporting tool where users can report sightings and review distribution maps. This tool is free to use at <http://www.iNaturalist.ca/> and can be downloaded from your app store.

If you suspect you have encountered erect hedge-parsley or other invasive species, please take detailed photographs (e.g., entire plant, leaves, stem, flowers, or other identifying features), mark your location, and report it using one of the above methods.

Additional Resources

Japanese Hedge Parsley, identification of the Wisconsin Invasive Species *Torilis japonica* [video].

<https://www.youtube.com/watch?v=YlipKypzEFg>

Japanese Hedge Parsley [video].

https://www.youtube.com/watch?v=WQ3u4ryB_GA

Best Management Practices Documents Series from the OIPC

Autumn Olive
Black Locust
Erect Hedge-parsley
European Black Alder
European frog-bit
Eurasian Water-milfoil
Flowering Rush
Garlic Mustard
Giant Hogweed
Goutweed
Invasive Common (European) Buckthorn
Invasive Dog-strangling Vine
Invasive Honeysuckles
Invasive Reed Canary Grass
Japanese Knotweed
Multiflora Rose
Norway Maple
Oriental Bittersweet
Phragmites (Common Reed)
Phragmites (Common Reed) Best Management Practices for Ontario Roadways
Purple Loosestrife
Scots Pine
Spotted Knapweed
White Mulberry
White Sweet Clover
Wild Parsnip
Winged Euonymus

Additional Publications from the OIPC

A Landowner's Guide to Managing and Controlling Invasive Plants in Ontario
A Quick Reference Guide to Invasive Plant Species
Clean Equipment Protocol for Industry
Creating an Invasive Plant Management Strategy: A Framework for Ontario Municipalities
Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a Guide for Southern Ontario, Edition 3, 2020 (EN)
Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a Guide for Southern Ontario 2017 (EN, FR)
Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a Guide for Northern Ontario
Invasive Aquatic Plant Species: A Quick Reference Guide
Invasive Terrestrial Plant Species: A Quick Reference Guide
Invasive Plant Technical Bulletin Series
The Landowners Guide to Controlling Invasive Woodland Plants

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