

# Invasive Dog-strangling Vine

(*Cynanchum rossicum*)

Best Management Practices in Ontario



[ontario.ca/invasivespecies](http://ontario.ca/invasivespecies)

# Foreword

These Best Management Practices (BMPs) are designed to provide guidance for managing invasive Dog-strangling Vine (*Cynanchum rossicum* [= *Vincetoxicum rossicum*]) in Ontario. Funding and leadership in the development of this document was provided by the Canada/Ontario Invasive Species Centre. They were developed by the Ontario Invasive Plant Council (OIPC), its partners and the Ontario Ministry of Natural Resources (OMNR). These guidelines were created to complement the invasive plant control initiatives of organizations and individuals concerned with the protection of biodiversity, agricultural lands, crops and natural lands.

These BMPs are based on the most effective and environmentally safe control practices known from research and experience. They reflect current provincial and federal legislation regarding pesticide usage, habitat disturbance and species at risk protection. These BMPs are subject to change as legislation is updated or new research findings emerge. They are not intended to provide legal advice, and 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](http://www.ontarioinvasiveplants.ca)) or Ontario Ministry of Natural Resources ([www.ontario.ca/invasivespecies](http://www.ontario.ca/invasivespecies)) for updates.

---

Anderson, Hayley. 2012. Invasive Dog-strangling Vine (*Cynanchum rossicum*) Best Management Practices in Ontario. Ontario Invasive Plant Council, Peterborough, ON.

Printed April 2012

Peterborough, Ontario

ISBN: (to be confirmed)

This document was prepared for the Canada/Ontario Invasive Species Centre and the Ontario Ministry of Natural Resources by the Ontario Invasive Plant Council.

Support for the production and publication of this document has been provided by the:

Canada/Ontario Invasive Species Centre

Ontario Ministry of Natural Resources

Inquiries regarding this document can be directed to the

**Ontario Invasive Plant Council**

c/o Ontario Federation of Anglers and Hunters

PO Box 2800, 4601 Guthrie Drive

Peterborough, ON

K9J 8L5

Phone: (705) 748-6324 | Email: [info@ontarioinvasiveplants.ca](mailto:info@ontarioinvasiveplants.ca)

For more information on invasive plants in Ontario, visit [www.ontario.ca/invasivespecies](http://www.ontario.ca/invasivespecies), [www.ontarioinvasiveplants.ca](http://www.ontarioinvasiveplants.ca), [www.invadingspecies.com](http://www.invadingspecies.com) or [www.invasivespeciescentre.ca](http://www.invasivespeciescentre.ca)

Cover photo courtesy of Andrea Hicks.

# Table of Contents

Foreword .....	i
Introduction .....	1
Description .....	2
Lookalikes: the strangling vines (swallowworts).....	4
Additional Lookalikes: Native Species .....	5
Habitat .....	6
Impacts .....	8
Impacts to Biodiversity .....	8
<i>Vegetation Communities</i> .....	8
<i>Wildlife</i> .....	8
Impacts to Forestry .....	9
Impacts to Agriculture .....	10
Impacts to Recreation .....	10
Regulatory Tools .....	11
Best Management Practices.....	11
Natural Resource Considerations .....	11
Control Measures .....	12
<i>Mechanical Control</i> .....	14
<i>Chemical Control</i> .....	16
<i>Biological Control</i> .....	19
Preventing the Spread .....	20
Help track the Spread of Dog-strangling Vine .....	21
Literature and Other Resources .....	22
References/Additional Resources .....	22
Acknowledgements .....	25
Dog-strangling vine BMP Sub-committee.....	25
Additional Review/Information provided by.....	25



Photo courtesy of Andrea Hicks.



Dog-strangling Vine in a pine plantation

Photo courtesy of Stephen Smith.

## Introduction

Dog-strangling Vine is an invasive perennial herbaceous plant in the milkweed family (*Asclepiadaceae*). It is spreading rapidly and causing damage to ecosystems in southern Ontario.

Dog-strangling Vine invasions can harm biodiversity and the economy in a number of ways. It forms thick mats of vegetation which hinder recreational activities, choke out native species, and negatively impact managed woodlots.

Dog-strangling Vine grows in a wide range of habitats and spreads quickly along roadsides,

ditches and fence lines. Its seeds are spread short distances by wind or long distances by moving machinery or equipment with seeds attached. Seeds may also spread by falling in to moving water and floating downstream.

The Ontario Ministry of Natural Resources, the Ontario Invasive Plant Council and partners have developed this document to help guide the effective and consistent management of this invasive plant across Ontario. These BMPs emphasize targeting control efforts to areas where small populations of Dog-strangling Vine are present but haven't yet become established.

# Description

In the United States, Dog-strangling Vine is more commonly referred to as pale swallowwort, and some taxonomists have assigned it to the genus *Vincetoxicum*. In this document, the genus *Cynanchum* is referenced, and the widely accepted Canadian common name Dog-strangling Vine is used.

**Dog-strangling Vine (*C. rossicum*)** distribution in Ontario is not fully documented. The main known infestations have been found along the southern edge of the province (adjacent to Lakes Erie and Ontario). Another well-established population exists in the Ottawa area.



A Dog-strangling Vine infestation

Photo courtesy of Stephen Smith.

## Height:

Dog-strangling Vine is a perennial herbaceous plant with a woody rootstalk that can grow to heights of 60-200 cm (24-80") or more.

## Stems:

The stems can be somewhat downy (fine hairs) and they can twine or climb (dependent on available structures such as trees). The stems will also twine around themselves, forming dense mats of vegetation.



Dog-strangling Vine grows up to 2 m tall

Photo courtesy of Andrea Hicks.



Dog-strangling Vine stems twine around each other

Photo courtesy of Mia Frankl.

## Leaves:

Leaves are opposite, smooth and green with entire to wavy margins (leaf edges). The leaves can be quite variable in colour from dark green to medium-light green; darker green leaves often have lustre. They can range in size from 7-12 cm (3-5") long and 5-7 cm (2-3") wide and are oval to oblong, rounded at the base and pointed at the tip. The leaves are rounder and smaller near the base of the plant, largest at the mid-section and smaller and narrower towards the top of the plant.



Dog-strangling Vine leaves are opposite, and pointed at the tip

Photo courtesy of Diana Shermet.

## Fruit:

In late July and August, long slender pod-like fruit (follicles) form. There are often two smooth pods at each leaf axil. The pods are 4-7 cm (1.5-3") long and 0.5 cm (0.2") wide. The pods contain a milky sap and turn from green to light brown as they grow. The pods split open to release the seeds. Similar to other members of the milkweed family, the seeds are attached to feathery tufts of hair (called coma) that aid in their distribution via wind.



Dog-strangling Vine seeds are attached to feathery tufts of hair

Photo courtesy of Greg Bales.

## Flowers:

Dog-strangling Vine flowers in late June and July. The flowers emerge at the axils<sup>1</sup> of the leaves in clusters of 5-20 flowers. The flowers have five petals and are red-brown or maroon to pinkish in colour.



Dog-strangling Vine flowers can range in colour from red-brown to pinkish

Photo courtesy of Diana Shernet.

## Lookalikes: the strangling vines (swallowworts)

Dog-strangling Vine is closely related to two other strangling vines (also known as swallowworts in the US), which are invasive outside of their native range.

**Black Dog-strangling Vine (syn. Black Swallowwort)** (*Cynanchum louiseae* [=*C. nigrum* & *V. nigrum*]) is more commonly found in the North-eastern United States, where it is also considered invasive. Black Dog-strangling Vine can be distinguished from Dog-strangling Vine by the difference in the flowers. Black Dog-strangling Vine has much darker flowers (purple to almost black), and hairs on the inner surface of the petals. It is found in isolated locations within the Greater Toronto Area, Ottawa and Southern Quebec.

Black Dog-strangling Vine is native to Ukraine and surrounding areas of Europe and Asia, and was probably introduced as a garden plant.



Black Dog-strangling Vine

Photo courtesy of Jennifer Gibb.



Dog-strangling Vine (top) and Black Dog-strangling Vine (bottom) comparison

Photo courtesy of Jennifer Gibb.

**White Swallowwort** (*Cynanchum vincetoxicum* [=*V. hirundinaria*]) has cream-coloured flowers and has not yet become well-established within North America. It occurs sparsely in the north-eastern United States. There are some records of this plant escaping cultivation in Ontario, but no records of established populations. It is native to Africa, parts of Asia, and Europe, and is used as a horticultural species in some countries.

<sup>1</sup> The plant axil is the area where the petiole (stem) of the leaf meets the plant stem

## Additional Lookalikes: Native Species

### Milkweed Species (*Asclepias* spp.)

Dog-strangling Vine seedlings can closely resemble seedlings of native milkweed species. Common Milkweed (*Asclepias syriaca*) has warty protuberances on the seed pods. Its pods are much larger than the *Cynanchum* species, and flowers in a variety of colours (green, purple, or white). Butterfly Milkweed (*A. tuberosa*) has showy orange flowers, and alternate leaves. Another milkweed species that is common in Ontario, Swamp Milkweed (*A. incarnata*) has seed pods that are more similar to those of *Cynanchum* species in size and shape, and do not have the protuberances. All milkweed species grow upright and erect, and do not twine (coil around something) like Dog-strangling Vine.



Milkweed species

Photo courtesy of Ken Towle.

### Sunflower (*Helianthus* spp.)

Seedlings in the sunflower family can resemble Dog-strangling Vine; however sunflower seedlings grow as erect or spreading plants and do not twine. For most *Helianthus* species in Ontario, only the lowermost leaves are opposite, however some of them do have entirely opposite leaves. Secondary characteristics can be used to differentiate them, such as fine downy hairs all over the stem of the *Helianthus* species or a distinct tri-nerved leaf (three ridges extending from petiole on the back of the leaf, instead of one down the centre like most species).



Sunflower species

Photo courtesy of W.D. Bakowsky.

## Dogbane (*Apocynum* spp.)

Seedlings of this species also resemble Dog-strangling Vine; however, as they mature the stems turn a purplish to reddish colour and the stems are always erect or inclined, never twining like Dog-strangling Vine. The leaves of most *Apocynum* species are usually drooping and often longer and narrower than Dog-strangling Vine leaves.



Spreading Dogbane

Photo courtesy of W.D. Bakowsky.

## Other Vines

Wild Grape (*Vitis riparia*), Wild Cucumber (*Echinocystis lobata*) and Virginia Creeper (*Parthenocissus quinquefolia*) are all native vines that may be confused with Dog-strangling Vine. None of these vines twine, but rather climb by tendrils.



Wild Cucumber

Photo courtesy of Ken Towle.

## Habitat

Dog-strangling Vine is native to Eastern Europe, more specifically, eastern Ukraine and south-western Russia. In Europe, populations of Dog-strangling Vine are sporadic outside of its native range, and it is rarely recorded elsewhere. It is considered potentially invasive in Norway.

Dog-strangling Vine first arrived in Ontario through a horticultural or accidental introduction and was further introduced multiple times in different regions. The province's first recorded specimen is believed to have been collected in Toronto in 1899.

Dog-strangling Vine thrives in calcareous (limestone-based) soils. In Ontario, it can be found in a wide range of habitats, including old fields, shrub thickets, Great Lakes coasts, stream banks, plantations, forests, tallgrass prairies and alvars. While Dog-strangling Vine generally has reduced vigour and reproductive potential in forests, it can invade closed-canopy forests and it may dominate groundcover, particularly where there are gaps in the canopy.

**Dog-strangling Vine has been found to invade the following habitats:**



Alvar

Photo courtesy of W.D. Bakowsky.



Tallgrass Prairie

Photo courtesy of Gary Allen.



Deciduous Forest

Photo courtesy of W.D. Bakowsky.



Dog-strangling Vine Invading Old Field

Photo courtesy of W.D. Bakowsky.



Dog-strangling Vine invading Lake Ontario Bluffs

Photo courtesy of Ken Towle.



Dog-strangling Vine invading Deep Shade Forest

Photo courtesy of Ken Towle.

# Impacts

## Impacts to Biodiversity

### *Vegetation Communities*

Dog-strangling Vine can form extensive, mono-specific stands that out-compete native plants for space, water and nutrients. It creates heavy shade and produces chemicals through allelopathy<sup>2</sup> that alter ecosystem structure and function.

Dog-strangling Vine threatens rare vegetation communities such as alvars, tallgrass prairies, oak savannah and oak woodlands and their associated species. It can also displace rare and sensitive plant species.



Dog-strangling Vine monoculture  
Photo courtesy of Stephen Smith.

### *Wildlife*

Dog-strangling Vine can negatively affect wildlife by altering habitat. Dense stands have reduced habitat for grassland birds such as Savannah Sparrow (*Passerculus sandwichensis*), Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*) in New York. Deer and other browsers avoid Dog-strangling Vine which could increase the pressure on native plants that are more palatable.

<sup>2</sup> Allelopathy is the release of chemicals from the root of a plant in to the soil to discourage other plants from growing nearby

Dog-strangling Vine can also affect insects, such as the Monarch Butterfly (*Danaus plexippus*), that rely on native milkweed when laying eggs. Butterflies can mistakenly lay eggs on Dog-strangling Vine, which cannot sustain the feeding Monarch larvae. This could lead to further declines in the population of the Monarch, listed as a species of Special Concern in Ontario and Canada. Other insect species can also be affected by the presence of this plant as it doesn't support many insect groups. It has been observed that both pollinators and plant-eating insects tend to avoid Dog-strangling Vine, which may also affect populations of birds and small mammals that depend on these insects as a source of food.



Monarch Butterfly on native Milkweed  
Photo courtesy of Ken Towle.

Contrary to its name, there are no reports of this plant actually strangling dogs. It was likely named Dog-strangling Vine because of the way it grows in thick tangled masses of vegetation. Alternately, the name may have come from European species of the same family that were supposedly used to poison dogs.

## Impacts to Forestry

Dense patches of Dog-strangling Vine suppress native tree seedlings, young saplings and woodland groundcover plants due to heavy shading and can negatively affect forest regeneration. Dog-strangling Vine can invade and dominate the understory of mature forests and is of particular concern to woodlot owners.

One of the most pronounced impacts of Dog-strangling Vine on forests can be found in conifer plantations in southern Ontario. These areas were planted in the early to mid 1900s to control blowing sands and desertification and reduce flooding and erosion. Dog-strangling Vine thrives in the filtered light and open soils of some of these mature plantations, suppressing seedling establishment of native hardwoods. If this invasion continues, very few juvenile trees will survive to fill in the shrinking canopy of over-mature pines.

Reforestation sites can also be affected, since Dog-strangling Vine out-competes planted tree seedlings for sunlight, water, and nutrients. Dog-strangling Vine makes reforestation more expensive. Land managers need to spend more on site preparation, weed control and often need to buy larger plant material to out-compete Dog-strangling Vine. It can also reduce plantable space in highly infested regions, decreasing the potential tree canopy. Dog-strangling Vine has also been reported as problematic on Christmas tree farms and nursery operations.

Forestry operations can also be affected by the dense mats formed by Dog-strangling Vine. These tangles of vegetation can slow down tree marking and walking access which could increase tree marking costs. They would also slow down anyone using a chainsaw in an affected area. However, the biggest challenge for forest managers is the regeneration of the understory (trees and other natural vegetation) on sites with Dog-strangling Vine.



Dog-strangling Vine in Orono forest  
Photo courtesy of Ken Towle.

## Impacts to Agriculture

Dog-strangling Vine is increasingly abundant in agricultural fields and pasture lands across Ontario. Recent observations show that it is moving into corn and soybean fields. There are reports of livestock avoiding this plant and some literature suggests it may be toxic to mammals (e.g. cattle) after mammals. Heavy growth of Dog-strangling Vine can short-circuit electric fences around pastures. Livestock can have difficulty moving through dense mats of Dog-strangling Vine.



Dog-strangling Vine in an old agricultural field

Photo courtesy of Ken Towle.

## Impacts to Recreation

Dog-strangling Vine can inhibit recreational activities in areas where it has become established. The dense tangled mats of vegetation are difficult to walk or bike through, and pets can get tangled in the vines. In the winter, the dead Dog-strangling Vine stems remain and can hinder skiing and snowshoeing along trails. Dog-strangling Vine also reduces the aesthetic value of favourite nature areas by reducing the number and variety of native species.



Dog-strangling Vine invading a natural area

Photo courtesy of Stephen Smith.

# Regulatory Tools

## **Dog-strangling Vine is not currently a regulated species**

There are no laws that address Dog-strangling Vine in Ontario or Canada.

# Best Management Practices

Controlling Dog-strangling Vine when the infestation is small or not yet well established (e.g. isolated plants) will reduce its impacts on biodiversity, the economy and society.

Once Dog-strangling Vine has been confirmed at a location, a control plan should be developed based on infestation size, accessibility, potential for spread and the risk of environmental, economic or social impacts. When action is taken early it can significantly reduce the cost of control. The following BMPs can be used as a guide to develop a control plan. A number of natural resource considerations, such as species at risk and habitat disruption, should be assessed before creating a control plan.

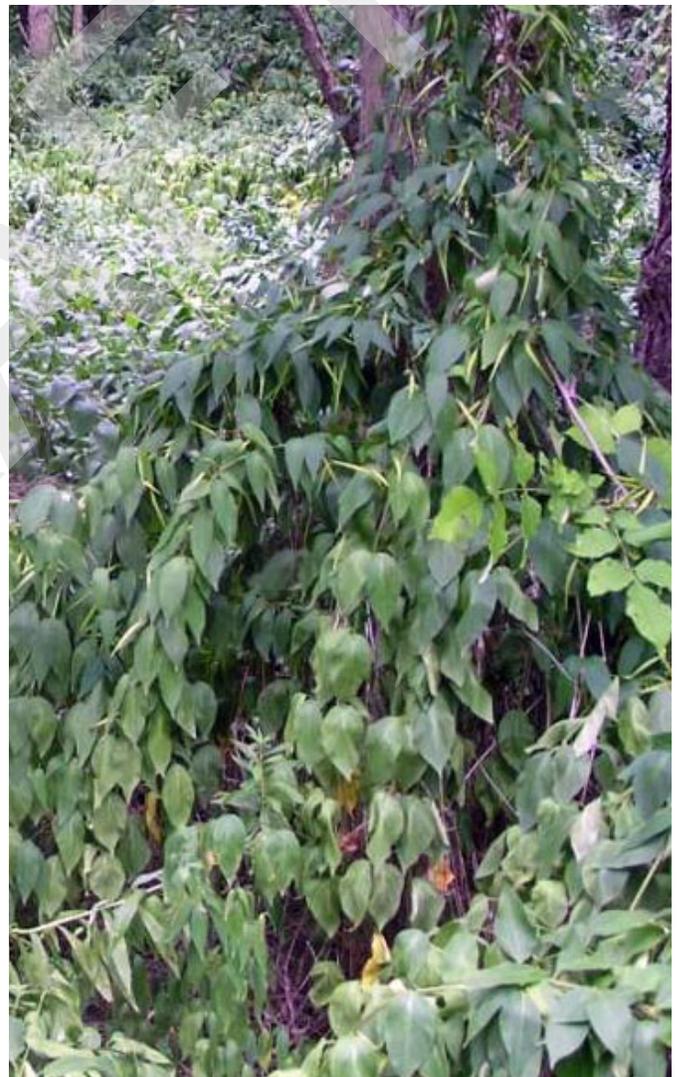
## Natural Resource Considerations

You are responsible for ensuring that your project follows all relevant laws, including the Endangered Species Act (ESA).

Prior to implementing control actions, a site assessment for species or habitat protected under the ESA is required. Your local MNR office can provide existing knowledge of protected species and or their habitat at or near your site, as well as provide existing species at risk survey protocols.

Details on additional sources to consult for this information are available in the ESA Submission Standards for Activity Review.

If protected species or habitats are present, an assessment of the potential effects of the control project is required. Consult with your local MNR district office as early in your control plans as possible for advice on alternatives that may avoid or minimize adverse effects, and to determine if your control activities require authorization under the ESA.



An example of an established Dog-strangling Vine population

Photo courtesy of Greg Bales.

## Control Measures

It is important to use a control plan that incorporates integrated pest management principles. This means using existing knowledge about the pest species and its surrounding environment to prevent and fight infestations and may require more than one type of measure to be successful. It is also important to note that control measures have a much higher success when heavily infested sites are re-planted with native species that are able to out-compete invasive plants.

If confronted with an established infestation of Dog-strangling Vine, land managers should first focus their efforts on preventing spread; by removing isolated plants and small populations outside the main infested area (satellite infestations).

		Size of the Infested Area			
Density of Infested Area		Isolated Plants	Small (.1-.5ha)	Medium (.5-2ha)	Large (more than 2 ha)
	Low Density (1-50 plants)	<ul style="list-style-type: none"> <li>• Digging</li> <li>• Herbicide</li> </ul>	<ul style="list-style-type: none"> <li>• Herbicide</li> </ul>	<ul style="list-style-type: none"> <li>• Herbicide</li> <li>• Seed Pod Removal*</li> </ul>	<ul style="list-style-type: none"> <li>• Herbicide</li> <li>• Seed Pod Removal*</li> </ul>
	Medium Density (50-1000 plants)		<ul style="list-style-type: none"> <li>• Clipping</li> <li>• Herbicide</li> </ul>	<ul style="list-style-type: none"> <li>• Herbicide</li> <li>• Seed Pod Removal*</li> </ul>	<ul style="list-style-type: none"> <li>• Herbicide</li> <li>• Mowing</li> <li>• Seed Pod Removal*</li> </ul>
	High Density (more than 1000 plants)		<ul style="list-style-type: none"> <li>• Herbicide</li> <li>• Clipping</li> <li>• Mowing</li> <li>• Seed Pod Removal*</li> </ul>	<ul style="list-style-type: none"> <li>• Herbicide</li> <li>• Mowing, Seed Pod Removal*</li> <li>• Tarping**</li> </ul>	<ul style="list-style-type: none"> <li>• Herbicide</li> <li>• Mowing</li> <li>• Seed Pod Removal*</li> <li>• Biological</li> </ul>

\* Seed pod removal is often used in the case of a late-season discovery when herbicide or other control methods are no longer an option and the goal should be to remove as many of the seed pods as possible.

\*\* Tarping may not be feasible for .5-2 ha of Dog-strangling Vine, but can be used in target areas

Method	Population Characteristics	Objective of Control	Notes
<b>Digging</b>	Small populations	Eradication	
<b>Mowing</b>	Monoculture (large or dense populations)	Reduce seed production	
<b>Clipping</b>	Small dense populations	Reduce seed production	
<b>Pulling</b>	Small to medium populations	Reduce seed production	
<b>Tarping</b>	Medium, Dense Infestations	Reduce growth and seed production	Need to rehabilitate soil afterwards
<b>Seed Pod Removal</b>	Large/established populations	Reduce seed production	Can be used for populations detected late in the season or for volunteer days, or where other control cannot occur
<b>Chemical</b>	Small to large/established populations	Eradication or control to manageable levels	Generally need multiple applications
<b>Biological</b>	Large/established, dense populations	Once a population is past manageable or treatable levels, often the only viable control option is biological control	Research on Dog-strangling Vine biological control agents is ongoing, and no approvals have been issued yet for widespread release of control agents

## Mechanical Control (Grouped by Objective of Control)

### Eradication

#### Digging:

Digging is a viable eradication measure for small populations. Land managers have reported that digging up the root crown is more effective than hand pulling and, in some cases, pesticide use. If a newly established plant and its roots are removed there is a good chance that it can be eradicated. Follow-up is required to make sure seedlings aren't growing from old seeds and that all plant pieces were removed to prevent re-sprouting.

#### Clipping:

For smaller infestations, selective clipping of plants later in the growing season can provide an effective reduction in seed production; however this method will not eradicate the population. Clipping is considered more ecologically friendly than mowing, as it allows for surrounding native vegetation to remain intact. As with mowing, clipping needs to be timed properly to prevent rapid re-sprouting. Clipping should be done just after the plants flower and before seed pods are produced.

### Reduce Seed Production

#### Mowing:

Dog-strangling Vine plants that have been mowed can re-sprout rapidly and may still produce flowers and seeds. However, properly timed mowing can be an effective way to reduce the amount of seed that is produced, even though it will not eradicate the population. To be most effective mowing should be done just after the Dog-strangling Vine flowers and before it produces seed pods. Some land managers choose to mow regularly throughout the growing season to reduce the risk of Dog-strangling Vine stems tangling their machinery.

#### Pulling:

Pulling removes above-ground vegetation and can prevent seeds from forming, however, the stems break easily when pulled, leaving the root crown in place. If the entire root system is not removed, Dog-strangling Vine can re-sprout from the root, often more aggressively. As with other methods, pulling may need to be repeated throughout the growing season to ensure plants aren't re-sprouting and setting seed.

Mowing is the most effective in monocultures; it is not selective and will impact other species if they are growing in the area that is mowed. Mowing (and other mechanical methods) can continue after seed pod production, but pod development must be monitored to prevent the ripened pods from opening and spreading seeds.



Pulling Dog-strangling Vine

Photo courtesy of Nature Conservancy of Canada.

### Seed Pod Removal:

For some established populations, land managers have reported that manual removal of seed pods, though time-consuming and intensive, has prevented populations from spreading further. The best time to remove seed pods is just before they start to dry out and split (early to mid August with follow-up removal until the end of September). This will not eradicate the plant, but will prevent further spread, and can be used in combination with mowing for increased effectiveness. Efforts to control spread of the species should focus on areas in which seed pod growth is prolific, such as areas with high sunlight or areas with the densest growth of plants.



Volunteers after a successful day of pulling

Photo courtesy of Nature Conservancy of Canada.

### Tarping:

Tarping refers to covering an invasive plant population with a dark material to block sunlight and “cook” the root system. Tarping is not recommended in low light areas. Tarping is most effective when started in late spring and continued through the growing season and is a viable control method for medium to larger infestations. This method is best for monocultures. To tarp an area, first cut Dog-strangling Vine stems, taking care not to spread seed to new areas (this is best done in late spring/early summer before the plant has produced seed). Next, cover the infested area with a dark coloured tarp or heavy material. Weed barriers used by landscapers or blue poly tarps are good options. Take care to weigh down the tarp material so it doesn’t blow away, but be sure it is still receiving adequate sun exposure. Tent pegs work well as long as the ground isn’t too rocky. The tarp may need to be left in place for more than one growing season to ensure effective control. Monitor for plants growing out from under the edges of the tarp. As with many of the control measures listed in this document, re-planting the area with native vegetation will help to suppress

re-sprouting and assist in preventing new invaders from establishing. Since tarping essentially “cooks” the soil, mycorrhizae (beneficial soil fungi) may need to be added when re-planting.



Tarping a Dog-strangling Vine patch

Photo courtesy of Parks Canada.



After tarp removal

Photo courtesy of Parks Canada.

### Not Recommended:

Grazing and tilling are not recommended control measures. Tilling Dog-strangling Vine may actually contribute to an infestation by spreading pieces of root which can re-sprout to form new plants. Grazing may reduce competition from native species and Dog-strangling Vine may be toxic to livestock.

### Proper Disposal:

Do not compost. Do not use cut plants as mulch on site. Dog-strangling Vine can leach plant toxins in to the soil which are harmful to other species and may reduce the effectiveness of re-planting efforts. If plants have seed pods, carefully put all plant material in black plastic bags. Seal the bags tightly and leave them to “cook” in direct sunlight for 1-3 weeks, depending on the temperature and amount of sunlight. If flowers/seed pods have not formed, allow stems and roots to dry out thoroughly before disposing of them. Baking at municipal facilities has been recommended by some sources as a method of disposal of biomass from small and medium infestations, however, this may not be practical for large infestations. Dispose of all parts of removed plant material, including roots, stems and leaves to ensure there is no re-sprouting. Seed pods left on site can ripen, open and be spread by wind. Removed plant material can be disposed of at municipal waste facilities or landfills.

### Chemical Control

The Ontario Pesticides Act and Ontario Regulation 63/09 provides natural resources, forestry and agricultural exceptions which may enable chemical control of invasive plants on your property. Other exceptions under the Act include golf courses, and for the promotion of public health and safety.

### Natural Resources Exception:

A ‘natural resources’ exception exists for the use of prohibited pesticides to manage, protect, establish or restore a natural resource. This exception allows the use of prohibited herbicides

for control of invasive plants on your property provided your project meets specific conditions and you obtain the necessary approvals.

If your project meets the natural resources criteria specified in section 33 of Ontario Regulation 63/09 and includes the use of pesticides in accordance with Integrated Pest Management principles outlined in the BMP guide you will need to contact the Ontario Ministry of Natural Resources ([www.ontario.ca](http://www.ontario.ca)) to obtain a written letter of opinion from the MNR Regional or Branch Director.

### Forestry Exception:

If Dog-strangling Vine is within a forest\*, chemical control may fall under the exception for forest management, and a letter of opinion may not be required. Class 9 pesticides can be used under the forestry\* exception to protect trees from pests and to control competing vegetation.

\*O. Reg. 63/09 defines “forestry” and “forest” as:

“Forestry means activities relating to any of the following: harvesting, renewing, maintaining or establishing a forest, protecting forest resources derived from a forest, and accessing a forest for these purposes.”

“Forest means a treed area of land that is one hectare in size or larger and is not used for producing an agricultural crop as part of an agricultural operation.”

Refer also to the Ministry of Environment’s factsheet titled “Pesticides Act and Ontario Regulation 63/09 Private Land and Woodlot Owners April 2011” [http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod\\_085367.pdf](http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_085367.pdf)

### Agriculture Exception:

There is an exception for the use of Class 9 pesticides for uses related to agriculture by a farmer. This exception may apply to the control of Dog-strangling Vine in agricultural fields or near farm operations.

A farmer is an individual who owns or operates an agricultural operation.

An agricultural operation is an agricultural, aquacultural or horticultural operation and includes:

- Growing, producing or raising farm animals
- Production of crops, including greenhouse crops, maple syrup, mushrooms, nursery stock, tobacco, trees and turf grass, and any additional agricultural crops
- 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 earlier is carried out on the property where the farm woodlot is located.

Refer also to the Ministry of the Environment’s factsheet titled “Pesticides Act and Ontario Regulation 63/09 Agriculture May 2011”

[http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod\\_080128.pdf](http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_080128.pdf)

## Herbicide Application:

Herbicides must be applied in accordance with all label directions and only for the control of specified pests. For an up-to-date list of herbicides labelled for Dog-strangling Vine control, visit the Pest Management Regulatory Agency's web site at [www.pmr-arla.gc.ca](http://www.pmr-arla.gc.ca). The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)'s Publication 75, Guide to Weed Control is an excellent reference for all aspects of weed control, and includes a section on invasive plant management. To determine if a federally registered herbicide is also classified for use in Ontario, visit <http://app.ene.gov.on.ca/pepsis/>.

Anyone using a pesticide is responsible for complying with all federal and provincial legislation. Most non-domestic (i.e. commercial, restricted etc.) herbicides can only be applied by licensed exterminators. For more information, refer to the Ontario Pesticides Act and Ontario Regulation 63/09 (available on <http://www.elaws.gov.on.ca>), or contact the Ontario Ministry of the Environment - (<http://www.ene.gov.on.ca/environment>).



Chemical control of Dog-strangling Vine

Photo courtesy of Ken Towle.

## Biological Control

Biological control is the use of an herbivore, predator, disease or other natural enemy to reduce established populations of invasive species. As introduced species, most invasive species have no natural enemies in their new habitats. Biological control aims to re-establish an ecological balance between the introduced species and its natural enemies by selecting highly host-specific natural enemies from the country of origin, and moving them to the country where the invasive species is a problem. This is only done after extensive host-range testing in the country of origin or quarantine, to ensure that the potential biocontrol agent is host-specific to the targeted invasive. This method has been used successfully for invasive plants in North America, including purple loosestrife (*Lythrum salicaria*), leafy spurge (*Euphorbia esula*), diffuse knapweed (*Centaurea diffusa*) and St John's Wort (*Hypericum perforatum*).

For Dog-strangling vine, there have been host-specificity trials with five different potential biological control agents: two leaf-eating caterpillars (*Lepidoptera*), two beetles (*Coleoptera*) and a seed feeding fly, all present in the native range of Dog-strangling Vine in Europe. The two beetles were eliminated as not being specific enough to Dog-strangling Vine and the fly is still undergoing testing. The two caterpillars are both highly host-specific to Dog-strangling Vine and have been shown to have a significant impact on plant biomass.

A petition for the release of the first caterpillar *Hypena opulenta* was submitted to regulatory authorities in late 2011, with a proposal for release of the agent by 2013. A release petition for the second caterpillar will follow, and screening research on the seed head fly is continuing in Europe.

Ongoing research into manipulating the soil fungus (arbuscular mycorrhizal fungi) that Dog-strangling Vine depends on may also provide future biological controls for it and other invasive species.



Removing cut plant material

Photo courtesy of Parks Canada.

# Preventing the Spread

Everyone can help prevent the spread of Dog-strangling Vine by following these tips:

---

## ✔ Report it.

If you think you see Dog-strangling Vine, take a picture, record the location and contact the Invading Species Hotline to report it. For more information and guidance contact the Invading Species Hotline at 1-800-563-7711 or visit

[www.invadingspecies.com](http://www.invadingspecies.com) or [www.ontarioinvasiveplants.ca](http://www.ontarioinvasiveplants.ca).

## ✔ Watch for it.

Monitor hedges, property boundaries, fence lines and trails. Early detection of invasive plants can increase the success of control and removal efforts.

## ✔ Stay on trails.

Avoid traveling off-trail and in areas known to have Dog-strangling Vine or other invasive species.

## ✔ Stop the spread.

Inspect, clean and remove mud, seeds and plant parts from clothing, pets (and horses), vehicles (including bicycles), and equipment such as mowers and tools. Clean vehicles and equipment in an area where plant seeds or parts aren't 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 disturbed, which makes it more vulnerable to invasive species.

## ✔ Use native species.

Try to use local native species in your garden. Don't buy or transplant invasive species such as Dog-strangling Vine and encourage your local garden centre to sell non-invasive or native plants.

# Help track the Spread of Dog-strangling Vine

The extent of Dog-strangling Vine populations in Ontario is not well known. You can help track the spread of this invasive species by using one of these tools:

1) The Invasives Tracking System, an on-line reporting tool that enables users to view existing sightings of Dog-strangling Vine and other invasive species in Ontario and document their sighting reports utilizing satellite imagery. The website ([www.invasivetrackingsystem.ca](http://www.invasivetrackingsystem.ca)) is free to use for professionals and the public.

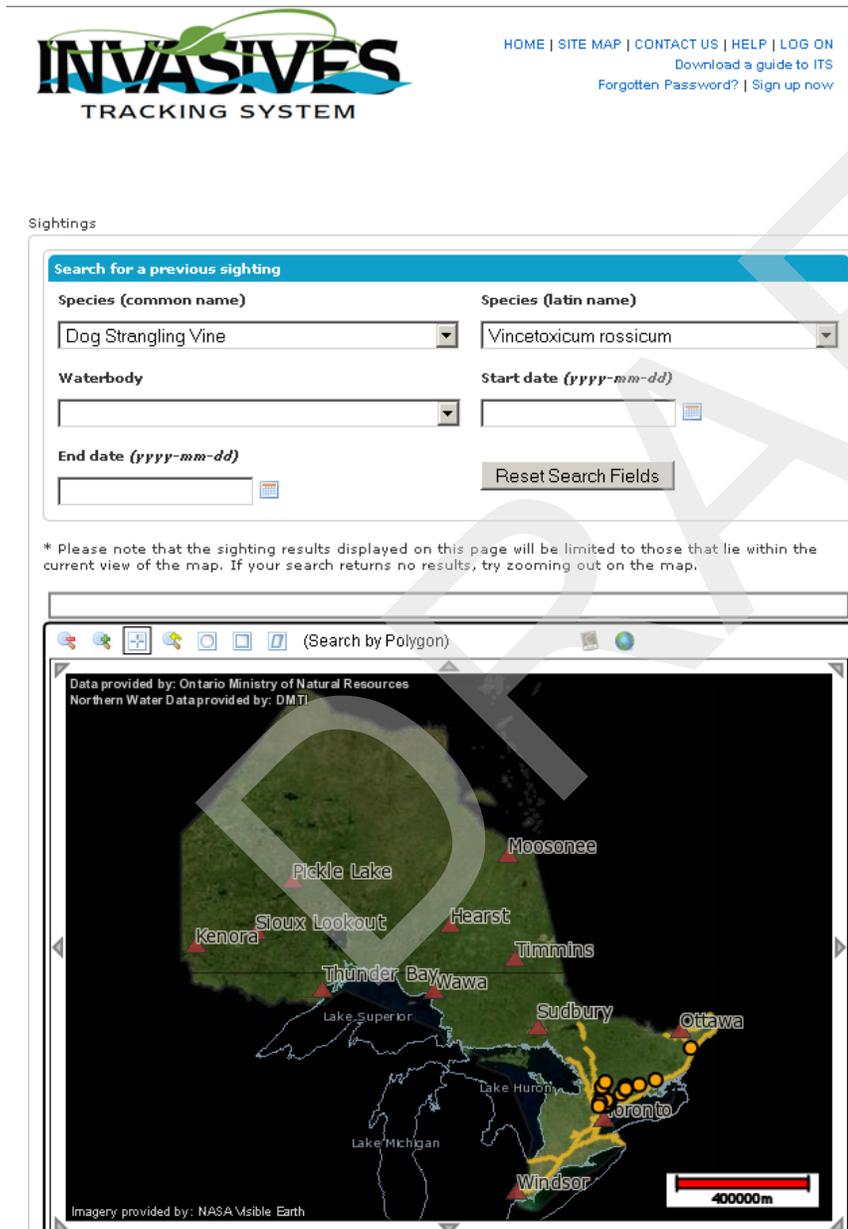


Photo courtesy of OFAH.

2) The toll-free Invading Species Hotline (1-800-563-7711) and website ([www.invadingspecies.com](http://www.invadingspecies.com)) can be used to report sightings verbally or on-line.

# Literature and Other Resources

The Ministry of Natural Resources, the Ontario Invasive Plant Council and their partners have produced outreach materials which can be shared with the public and provide information on the identification, control and management of Dog-strangling Vine. These materials can be accessed on-line at [www.ontario.ca/invasivespecies](http://www.ontario.ca/invasivespecies), [www.invadingspecies.com](http://www.invadingspecies.com) and [www.ontarioinvasiveplants.ca](http://www.ontarioinvasiveplants.ca) or by contacting the Invading Species Hotline at 1-800-563-7711.

## Additional materials and resources can be found at:

Fact Sheet on the Ontario Pesticides Act and Ontario Regulation 63/09 for Private Land and Woodlot Owners -

[http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod\\_085367.pdf](http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_085367.pdf)

[www.ofnc.ca/fletcher/research/swallowwort/index\\_e.php](http://www.ofnc.ca/fletcher/research/swallowwort/index_e.php)

Resources on Dog-strangling Vine from the Ontario Ministry of Food, Agriculture and Rural Affairs

[http://www.omafra.gov.on.ca/english/crops/field/news/croptalk/2006/ct\\_0306a7.htm](http://www.omafra.gov.on.ca/english/crops/field/news/croptalk/2006/ct_0306a7.htm)

<http://www.invasivespecies.gc.ca/english/view.asp?x=1>

Credit Valley Conservation

<http://www.creditvalleyca.ca/watershed-science/plants-animals-communities/invasive-species/>

Canadian Botanical Conservation Network

<http://archive.rbg.ca/cbcn/en/projects/invasives/invade1.html>

# References/Additional Resources

Aldrich B. 2008. Swallow-wort Threatens Native Plants, Animals and Agriculture in the Northeast. Cows & Crops, Part One. Cornell University. [Available on-line at

<http://nebeginningfarmers.org/sfp/2008/07/27/swallow-wort-threatens-native-plants-animals-and-agriculture-in-the-northeast/>. Accessed August 23, 2011].

Anon. Element Stewardship Abstract for *Vincetoxicum nigrum* and *Vincetoxicum rossicum*, Swallowwort. The Nature Conservancy, Arlington, Virginia. 10 pp.

Casagrande R.A, Dacey J.E. 2007. Monarch Butterfly Oviposition on Swallow-Worts (*Vincetoxicum* spp.) Environmental Entomology 36(3): 631-636.

Christensen T. 1998. Swallowworts: The ecology and control of *Vincetoxicum* spp. Wildflower, summer 1998: 21- 25.

- Christensen T. and Leale P. 1997. The Phenology of Pale Swallow-wort (*Cynanchum rossicum*) in Metropolitan Toronto. First Year Study Results. Toronto; Urban Forest Associates. 13 pp.
- DiTommaso A and Losey J.E. 2003. Oviposition preference and larval performance of monarch butterflies (*Danaus plexippus*) on two invasive swallow-wort species. The Netherlands Entomological Society, Entomological Experimentalis et Applicata 108: 205-209.
- DiTommaso A, Lawlor F.M, and Darbyshire, S.J. 2005. The Biology of Invasive Alien Plants in Canada. 2. *Cynanchum rossicum* (Kleopow) Borhidi [= *Vincetoxicum rossicum* (Kleopow) Barbar.] and *Cynanchum louiseae* (L.) Kartesz & Gandhi [= *Vincetoxicum nigrum* (L.) Moench]. Canadian Journal of Plant Science 85: 243–263.
- Doubleday L.A.D and Cappuccino N. 2011. Simulated herbivory reduces seed production in *Vincetoxicum rossicum*. Botany 89(4): 235-242.
- Douglass, C.H, Weston L.A, and Wolfe D. 2011. Phytotoxicity and Potential Allelopathy in Pale (*Cynanchum rossicum*) and Black swallowwort (*C. nigrum*), Invasive Plant Science and Management, 4(1): 133-41
- Ernst C.M and Cappuccino N. 2005. The effect of an invasive alien vine, *Vincetoxicum rossicum* (Asclepiadaceae) on arthropod populations in Ontario old fields. Biological Invasions 7:417–425.
- Kricsfalusy V. and Miller G.C. 2010. Community ecology and invasion of natural vegetation by *Cynanchum rossicum* (Asclepiadaceae) in the Toronto region, Canada. Thaiszia Journal of Botany 20: 53-70.
- Lawlor F.M. 2000. Herbicidal treatment of the invasive plant *Cynanchum rossicum* and experimental post control restoration of infested sites. M. S. thesis, State University of New York, College of Environmental Science and Forestry, Syracuse.
- Lawlor F.M. and Raynal D.J. 2002. Response of 2003. The swallow-worts. N Y Forest Owner 41(4): 14–15.
- Leale P. and Christensen T. 1997. Chemical and Mechanical Control of Pale Swallow-wort (*Cynanchum rossicum*). First Year Trial Results. Toronto; Urban Forest Associates. 15 pp.
- McKague C.I. and Cappuccino N. 2005. Response of pale swallow-wort (*Vincetoxicum rossicum*) following above-ground tissue loss: Implications for the timing of mechanical control. The Canadian Field Naturalist 119(4): 525-531.
- Milbrath L.R. 2008. Growth and reproduction of invasive *Vincetoxicum rossicum* and *V. nigrum* under artificial defoliation and different light environments. Botany 86: 1279-1290.
- Milbrath L.R, Biazzo J, Sforza R, Berner D, and Casagrande R. 2006. Proposed host specificity test plant list for testing potential biological control agents of swallow-worts in North America. USDA Agricultural Research Service Research Proposal, pp 1–31.

Miller G.C. and Kricsfalusy V. 2008. Dog-strangling vine - *Cynanchum rossicum* (Kleopow) Borhidi: A review of distribution, ecology and control of this invasive exotic plant. Rouge Park and Toronto Region Conservation Authority. [Available on-line at <http://www.rougepark.com/unique/reports.php> Accessed 4 October 2011].

Ontario Ministry of Agriculture, Food and Rural Affairs. Dog-strangling Vine - An Invasive Species Creeping Into Agricultural Fields. [Available on-line at [http://www.omafra.gov.on.ca/english/crops/field/news/croptalk/2006/ct\\_0306a7.htm](http://www.omafra.gov.on.ca/english/crops/field/news/croptalk/2006/ct_0306a7.htm) Accessed February 2, 2012].

Parks Canada. 2010. Detailed Assessment of Invasive Species: Dog-strangling Vine, Pale Swallowwort (*Vincetoxicum rossicum*).

Pringle J. 1973. The spread of *Vincetoxicum* species (Asclepiadaceae) in Ontario. *The Canadian Field Naturalist* 87: 27-32.

Sheeley S.E. 1992. Life History and Distribution of *Vincetoxicum rossicum* (Asclepiadaceae): An Exotic Plant in North America. M.S. Thesis, SUNY-College of Environmental Science and Forestry, Syracuse, NY.

Sheeley S.E. and Raynal D.J. 1996. The distribution and status of species of *Vincetoxicum* in eastern North America. *Bulletin of the Torrey Botanical Club* 123(2): 148-156.

Smith L.L, DiTommaso A, Lehman J, and Greipson S. 2006. Growth and Reproductive Potential of the invasive exotic vine *Vincetoxicum rossicum* in northern New York State. *Canadian Journal of Botany* 84: 1771-1780

Smith S.J. 1998. Control of the Invasive Dog-strangling vine *Cynanchum rossicum*. In *Restoration and Reclamation of Settled Landscapes*, proceedings of the annual conference of the Canadian Land Reclamation Association and Society for Ecological Restoration, Ontario Chapter, September 1998

Tewksbury L, Casagrande R, and Gassmann A. 2002. Swallowworts. In: Van Driesche R et al (eds) *Biological control of pests in forests of Eastern United States*, USDA Forest Service Publication FHTET-2002-04, pp 209-216.

Weed A.S. and Casagrande R.A. 2010. Biology and larval feeding impact of *Hypena opulenta* (Christoph) (Lepidoptera: Noctuidae): A potential biological control agent for *Vincetoxicum nigrum* and *V. rossicum*. *Biological Control* 53: 214-222.

Weed A.S, Gassmann A, and Casagrande R.A. 2010. Effects of leaf and root herbivory by potential insect biological control agents on the performance of invasive *Vincetoxicum* spp. *Biological Control* 56: 50-58.

Weston L.A, Barnet J.N, and DiTommaso A. 2005. Review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (*Polygonum cuspidatum*), Mugwort (*Artemisia vulgaris*) and pale swallow-wort (*Vincetoxicum rossicum*). Invasive Plant Council of New York State. [Available on-line at [www.ipcnys.org](http://www.ipcnys.org). Accessed 12 Oct 2009].

# Acknowledgements

## Dog-strangling vine BMP Sub-committee

Hayley Anderson, Ontario Invasive Plant Council

Pedro Antunes, Algoma University

Bob Bowles, Kids for Turtles Environmental  
Education & North Simcoe Stewardship

Barb Boysen, Forest Gene  
Conservation Association

Bronwen Buck, Carolinian Canada Coalition

Nancy Cain, Cain Vegetation

Carol Dunk, Ontario Horticultural Association

Kristyn Ferguson, Nature Conservancy of Canada

Jennifer Gibb, City of Toronto

Michael Irvine, Ontario Ministry of  
Natural Resources

Dan Kraus, Nature Conservancy of Canada

Patricia Lowe, Central Lake Ontario  
Conservation Authority

Francine MacDonald, Ontario Ministry of  
Natural Resources

Caroline Mach, Dufferin County

Gavin Miller, Toronto and Region  
Conservation Authority

Dave Pridham, Kawartha Conservation

Diana Shermet, Central Lake Ontario  
Conservation Authority

Fraser Smith, Ontario Federation of Anglers  
and Hunters

Tys Theysmeyer, Royal Botanical Garden

Ken Towle, Ganaraska Region  
Conservation Authority

Owen Williams, Ontario Invasive Plant Council

## Additional Review/Information provided by

Hugh Berges, Ontario Ministry of Agriculture, Food  
and Rural Affairs

Jeff Brinsmead, Ontario Ministry of  
Natural Resources

Kristen Callow, Ontario Ministry of Agriculture,  
Food and Rural Affairs

Barry Cottam, Fletcher Wildlife Garden

Mike Cowbrough, Ontario Ministry of Agriculture,  
Food and Rural Affairs

Nicola Day, University of Guelph

Freyja Forsyth, Credit Valley Conservation

Mia Frankl, Northumberland County

Rachel Gagnon, Ontario Invasive Plant Council

Emily Gonzales, Parks Canada

Sean James, Fern Ridge Landscaping and  
Eco-Consulting

Rod Krick, Credit Valley Conservation

Scott Olan, Ontario Ministry of the Environment

Iola Price, Ottawa Invasive Plant Group/Rockcliffe  
Park Residents Association

Paul Ronan, Ontario Parks Association

Stephen Smith, Urban Forest Associates Inc.

Dawn Sucee, Ontario Federation of Anglers  
and Hunters

Donna Wales, Ontario Ministry of  
Natural Resources

Cara Webster, City of Toronto

**Editing services provided by Sarah Higginson**

**Design by Adam Connor, [www.AdamConnor.ca](http://www.AdamConnor.ca)**

