

# Invasive Dog-strangling Vine

*(Vincetoxicum 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 (*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 and Forestry (OMNRF). 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 and Forestry ([www.ontario.ca/invasivespecies](http://www.ontario.ca/invasivespecies)) for updates.

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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)

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Dog-strangling vine will grow up available structures, such as trees.

Photo courtesy of Andrea Hicks.



Dog-strangling vine infestation 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 into moving water and floating downstream.

The OMNRF, the OIPC 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 *Cynanchum*. In this document, the genus *Vincetoxicum* is referenced, and the widely accepted Canadian common name dog-strangling vine is used.



Dog-strangling vine forms thick mats of vegetation that can hinder recreational activities.

Photo courtesy of Stephen Smith.

## Height:

Dog-strangling vine is a perennial herbaceous plant with a woody rootstalk that can grow to heights of 0.6 to 2 metres (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 (angle between the upper side of a leaf or stem and the supporting stem or branch). 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 and 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 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 Shermet.

## Lookalikes: the strangling vines (swallowworts)

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

### **Black Dog-strangling Vine (syn. Black Swallowwort)**

(*Vincetoxicum 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**

(*Vincetoxicum 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.

## 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 (bumps) on the seed pods. Its pods are much larger than the *Vincetoxicum* 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 *Vincetoxicum* 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 (specialized stem or leaf with a threadlike shape that is used by climbing plants for support).



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.

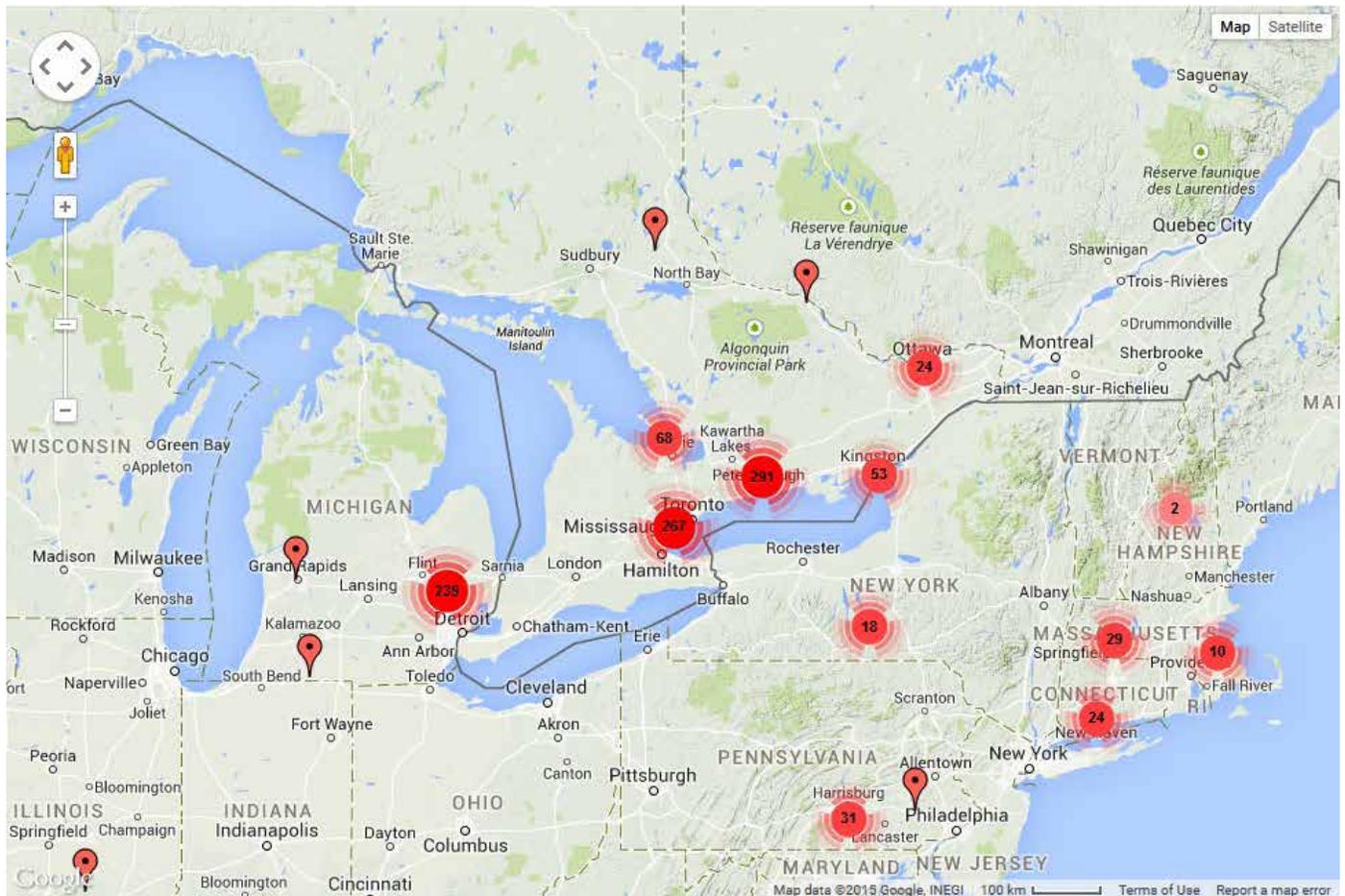


Dog-strangling vine invading deep shade forest.

Photo courtesy of Ken Towle.

# Distribution

Dog-strangling vine is very abundant in urban settings throughout Southern Ontario. 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. More recently, it has spread into rural and natural environments. It has also been reported as far north as Temagami.



Dog-strangling vine distribution in Ontario.

Photo courtesy of EddMapS Ontario.

Dog-strangling vine distribution map courtesy of EDDMapS ([www.eddmaps.org/ontario](http://www.eddmaps.org/ontario)). The map point data is based on records contained in the Invasive Species Database, compiled from various sources as of April 14, 2015. This map is illustrative only. Do not rely on this map as a definitive distribution as it is subject to change based on additional confirmed invasive species sites. This map may contain cartographic errors or omissions.

# 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 (the release of chemicals from the root of a plant into the soil to discourage other plants from growing nearby) 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.



Monarch butterfly on native milkweed.  
Photo courtesy of Ken Towle.

### *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.

Dog-strangling vine can also affect insects, such as the monarch butterfly (*Danaus plexippus*), that rely on native milkweed when laying eggs. Butterflies mistakenly lay eggs on dog-strangling vine, instead of their true host plants (native milkweeds), and the monarch larvae then starve because dog-strangling vine does not provide the necessary food source. 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.

Contrary to its name, there are no reports of this plant actually strangling dogs. The common name 'dog-strangling vine' actually comes from the initial 'Cynanchum' genus, which in Greek, is translated to "kynos" and "anchein" kynos meaning "dog" and anchein, meaning "to choke".

## 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 the 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). Heavy growth of dog-strangling vine can short-circuit electric fences around pastures. Livestock can also have difficulty moving through dense mats of the vine.



Dog-strangling vine infestation 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

### Federal

Dog-strangling vine is not a federally regulated species.

### Provincial - Weed Control Act

In 2014 dog-strangling vine was added to the list of noxious weeds under the *Weed Control Act*. The objective of the *Weed Control Act* is to minimize the impact of noxious weeds and weed seeds on agricultural or horticulture land. Landowners whose property contains noxious weeds and weed seeds that negatively affect agricultural and horticulture lands are responsible for weed control and associated costs.

# Best Management Practices

Controlling dog-strangling vine 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 pest species and its surrounding environment to prevent and fight infestations and may require more than one type of control measure to be successful.

Once dog-strangling vine has been confirmed at a location, a control plan can 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 diversity, wildlife usage and water table fluctuations should also be considered when developing control plans. A detailed inventory of each site is strongly recommended before starting control efforts to help ensure proper methods and timing are used to minimize negative impacts.

Land managers should first focus their efforts on preventing spread by removing isolated plants and small populations (satellite infestations) outside the main infested area. When action is taken early it can significantly reduce the cost of control.

## Long-term Strategy

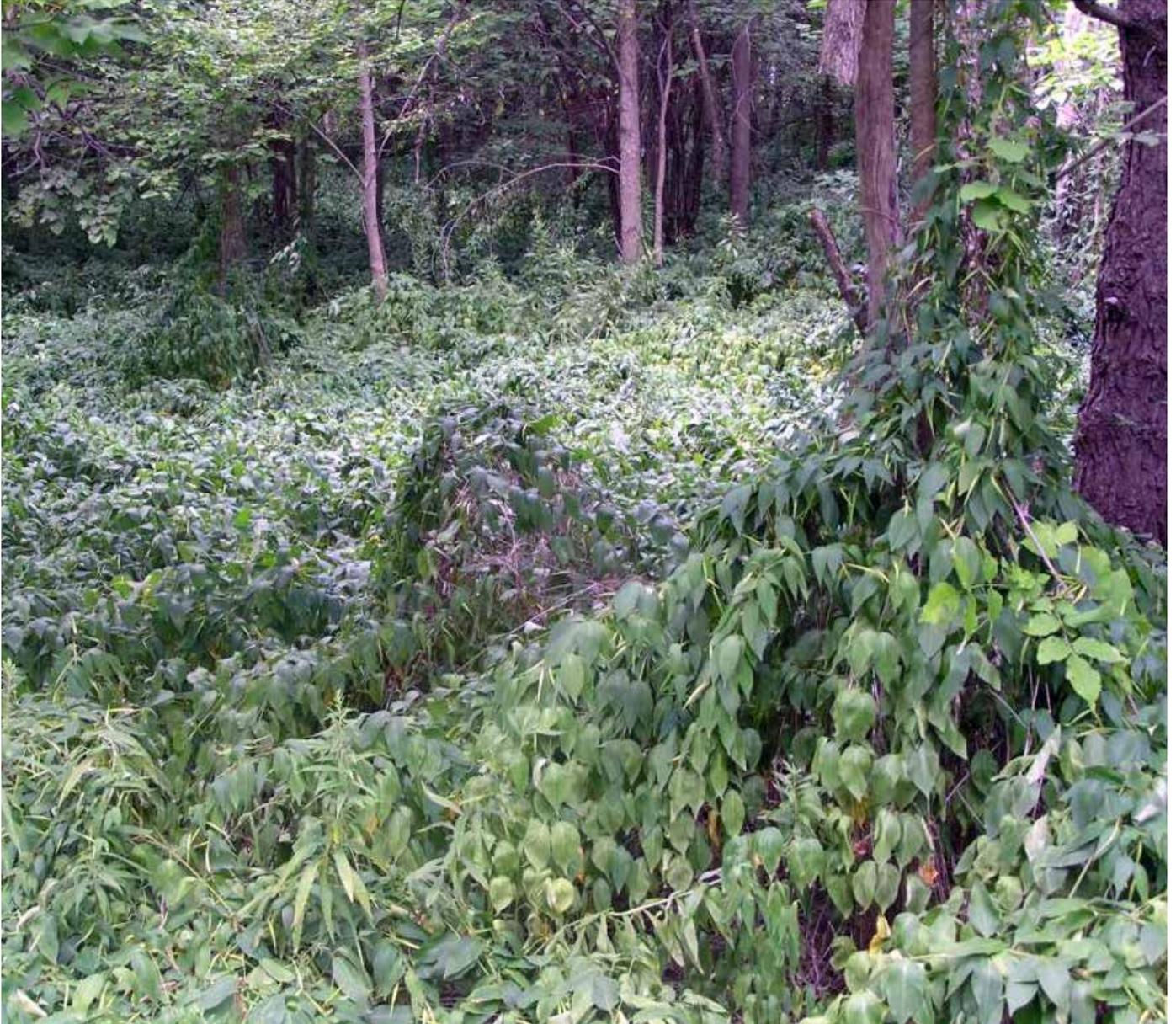
With large infestations and limited time and resources, control work can seem daunting. It is important to develop a feasible, long-term strategy with the following considerations:

1. Try to remove the outlying populations (isolated plants or satellite populations) first, to prevent further spread.
2. Concentrate on high-priority areas such as the most productive or sensitive part of an ecosystem, a favourite natural area, or the side of a trail where people may come into contact with the plants.
3. Consider dedicating a certain time each year to control efforts, and make it a joint effort with neighbouring landowners/land managers.
4. Plan to replant native plant species once the dog-strangling vine population is eradicated or under control. This will help jump-start natural succession and increase biodiversity in the area.
5. Follow-up monitoring is crucial to remove seedlings that may sprout after initial control efforts.

The following BMPs can be used as a guide in the development of a control plan. There are several natural resource considerations to take into account prior to implementing control plans, including species at risk and habitat disruption.

## Natural Resource Considerations

You are responsible for ensuring that your project follows all relevant laws, including the *Endangered Species Act* (ESA). If protected species or habitats are present, an assessment of the potential effects of the control project could be required. Consult with your local MNRF district office early in your control plans for advice (<http://www.ontario.ca/government/ministry-natural-resources-and-forestry-regional-and-district-offices>) or visit <https://www.ontario.ca/environment-and-energy/how-get-endangered-species-act-permit-or-authorization> to learn more about specific permitting requirements.



An example of an established dog-strangling vine population.

Photo courtesy of Greg Bales.

## Setting Priorities

When creating management plans, it is important to make the most of resources by prioritizing invasive species control. The following will help you to prioritize sites and areas within sites for control of dog-strangling vine.

### Site Prioritization

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

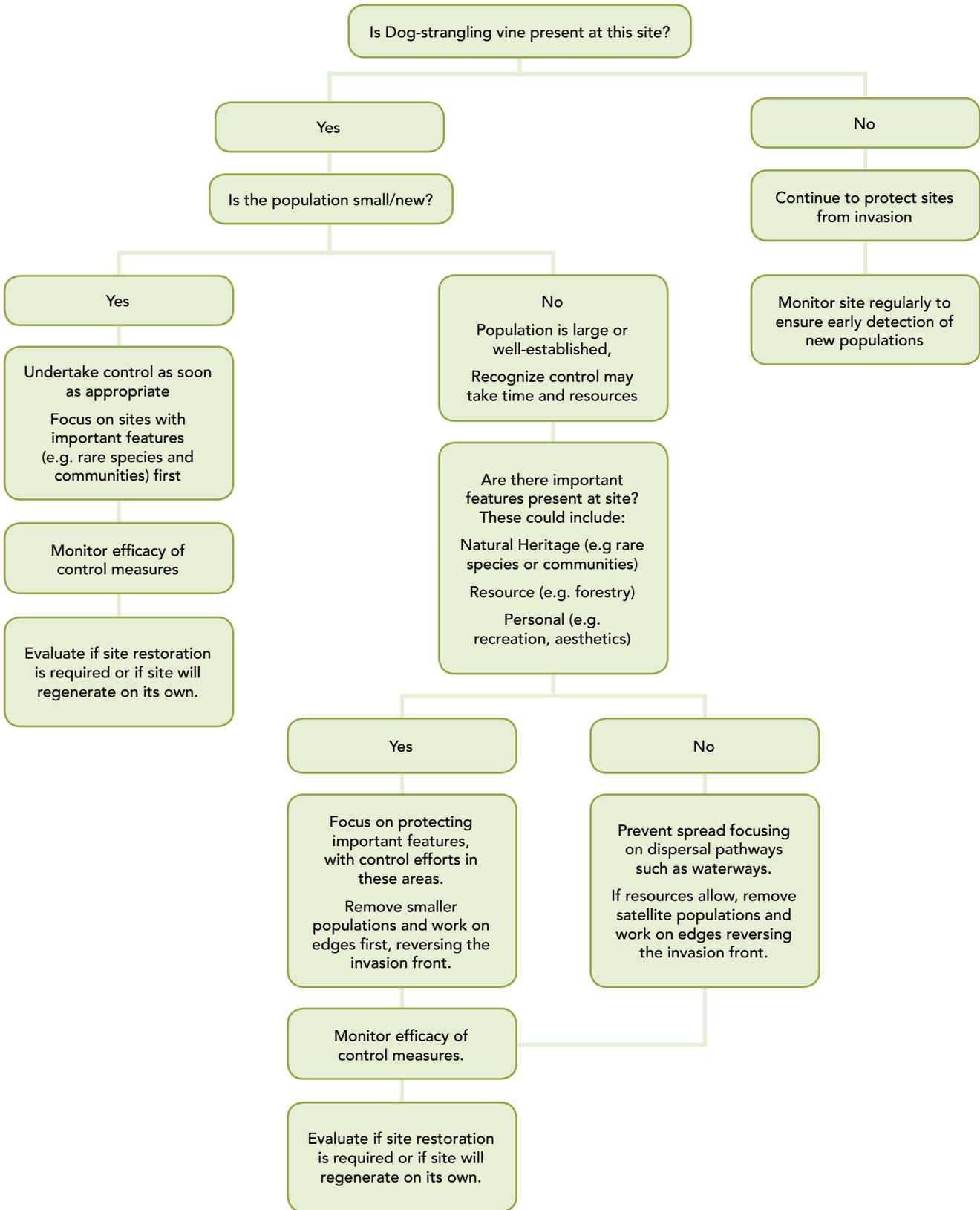
1. Protect areas where dog-strangling vine is absent or just appearing.
2. Protect rare species and communities. These include federal, provincial and regionally listed rare species.
3. Protect important habitats and land values (i.e. agriculture, wildlife appreciation, forestry).
4. Cost and effort: Will the area where dog-strangling vine has invaded require restoration or can it be left to regenerate naturally? (Note – it is usually recommended to restore control areas to make them more resilient to future invasions).

### Prioritizing within a Control Area

1. Focus on large blocks of un-invaded areas and keep them free of invaders.
2. Control small, younger, outlier (satellite) populations first.
3. “Unfragment” the boundaries of invaded areas by removing outlying plants.
4. Reverse the invasion, expand the un-invaded area outward.

It is crucial to prioritize control by determining where the satellite populations are, and eradicating those before they join up with larger populations.

This flow chart can help land managers choose where to first focus control efforts:



## Assessing Regeneration vs. Restoration

Consider the following factors:

**1. Level of disturbance at the site:**

What is the level of disturbance at the site? Was it a heavily invaded site? (e.g. a lot of disturbance was caused during control measures) Will it continue to be disturbed? (e.g. through beach use or trail use/management)

**2. Invasive species biology:**

What is the biology of the invasive species removed and is there a seed bank to consider?

**3. Re-invasion risk:**

Are there invasive species nearby which could re-invade the site from nearby trails, watercourses or other pathways of introduction?

**4. Existing native vegetation:**

What native vegetation is left? How long before it regenerates by itself? Does it need help?

If you answered yes to most of the questions above, it is most likely that the site will be re-invaded before it has a chance to regenerate on its own. Restoration will be needed to reduce the risk of re-invasion. See **page 23** for restoration methods.

## Control Measures

### *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. **Note:** *It's recommended to re-visit any site where dog-strangling vine has been dug for at least three years following control and multiple times throughout the summer as seedlings can quickly mature in the disturbed soil left from previous digging.*

#### 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.

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.

##### 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.

## 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. **Note:** *It's recommended to re-visit any site where dog-strangling vine has been pulled for at least three years following control and multiple times throughout the summer as seedlings can quickly mature in the disturbed soil left from previous digging.*



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 seeds 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 infestation.

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. 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. For large amounts of plant material you should contact your local municipality to determine if plant material can be disposed of in the landfill or brought to their composting facility.

## Chemical Control

The Ontario Pesticides Act and Ontario Regulation 63/09 provide natural resources, forestry and agricultural exceptions which may allow 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:

The 'natural resources' exception exists for the use of prohibited pesticides to manage, protect, establish or restore a natural resource. In order to qualify for this exception, your project must meet the criteria specified in section 33 of Ontario Regulation 63/09 including the use of pesticides in accordance with Integrated Pest Management (IPM) principles outlined in this BMP guide. You will need to contact the Ontario Ministry of Natural Resources and Forestry ([www.ontario.ca](http://www.ontario.ca)) to obtain a written letter of opinion from the MNRF Regional or Branch Director.

### Forestry Exception:

A forest is defined as a treed area of land that is one hectare in size or larger. Class 9 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 dog-strangling may fall under the forestry exception; a Forestry Class of land exterminator licence would be required to use commercial pesticides in a forest.

Refer also to the Ministry of Environment and Climate Change's factsheet titled "Pesticides Act and Ontario Regulation 63/09 Forestry."

<https://www.ontario.ca/document/technical-guidance-pesticides-act-and-ontario-regulation-6309-forestry>

### Agriculture Exception:

The agriculture exception allows a farmer to use Class 9 pesticides for the purposes of the agricultural operation that he or she owns or operates. This exception may apply to the control of dog-strangling vine if it impacts their agricultural or horticultural 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 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, and;
- 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.

Some activities are not included in the definition of an "agricultural operation", please refer also to the Ministry of Environment and Climate Change's factsheet titled "Pesticides Act and Ontario Regulation 63/09 Agriculture May 2011"  
<https://www.ontario.ca/document/technical-guidance-pesticides-act-and-ontario-regulation-6309-agriculture>

## Herbicide Application:

Herbicides must be applied in accordance with all label directions. For an up-to-date list of herbicides labelled for dog-strangling vine control, visit the Pest Management Regulatory Agency's web site at <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>. 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 <https://www.lrcsde.lrc.gov.on.ca/PCDWeb/home.action>.

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.ontario.ca/laws>), or contact the Ontario Ministry of the Environment and Climate Change (<http://www.ontario.ca/ministry-environment-and-climate-change>)

All herbicides that are effective for control of established dog-strangling vine move systemically within the plant. Unless otherwise indicated on the product label, plants should be treated after leaves are fully expanded. Once existing plants are under control, re-treating the seedling growth will be needed for a number of subsequent years.



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. Classical 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*).

Agriculture and Agri-Food Canada (AAFC) are leading a dog-strangling vine biocontrol project in collaboration with scientists from the University of Toronto, Carleton University, University of Rhode Island and the forest management company, SilvEcon Inc. A moth, *Hypena opulenta*, which like DSV is native to Ukraine, was identified as a possible defense against dog-strangling vine in 2006. Prior to its approval for release in 2013, the insect underwent extensive testing to confirm that it can only survive on dog-strangling vine and will not feed on native plants. The *Hypena* release program started in the fall of 2013 to test overwintering in the Ottawa area and was scaled up in 2014 with over 12,000 caterpillars released at Ontario field sites to date. Results have been very encouraging with entire plants yellowing in response to insects feeding on just a few leaves. The AAFC team will continue to monitor these initial release locations for additional impact on the dog-strangling vine plants, spread of the insects and successful overwintering. These "nurse" sites will form the basis of a larger release program planned throughout Ontario in 2015.



Removing cut plant material.

Photo courtesy of Parks Canada.

# Restoration

Restoration can be a critical aspect of invasive plant management. Site restoration will result in a healthier ecosystem more resistant to future invasions. Monitor all restoration activities to ensure native species are becoming established, and continue removal of invasive plants that remain onsite.

## Types of Restoration

### *During Control*

#### **Mulching:**

Mulching sites immediately after invasive species control (i.e. manual or chemical control of dog-strangling vine) may aid in the recovery of native species and prevent immediate re-colonization by other invaders. Mulching reduces light availability, allowing more shade-tolerant native plant species to germinate and colonize the gaps left by the dog-strangling vine removal.

#### **Seeding:**

Seeding an area with an annual cover crop or 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.

### *After Control*

#### **Soil Rehabilitation:**

Dog-strangling vine changes soil chemistry by adding nitrogen to the soil. The soil may no longer support native plant species, and may be better suited to other invaders moving in. Replenishing the mycorrhizae in the soil after all dog-strangling vine control has been completed will help to reduce any effects and restore soil conditions to encourage native species to re-grow. Growth of mycorrhizal fungi can be encouraged by using leaf mulch, logs and sticks (to provide food and protective cover for the fungi) and reducing soil compaction. Commercial mycorrhizal products are also available for purchase in Ontario.

#### **Planting:**

If there are invasive plants nearby which may colonize the control area, planting larger native species stock (potted etc.) will help them outcompete invasive seedlings. Wait until all management is complete before doing a large stock re-planting as it may be difficult to distinguish between newly planted native species and invasive seedlings. When completing planting at control sites, consider earthworm impacts (little to no leaf litter) and light availability (have any trees recently been removed which have opened up the forest canopy?). These environmental changes should be taken into account when choosing plant species for restoration, as they will affect the growing and soil conditions. Also, additional management activities may disturb the newly planted materials, so it is best to postpone planting until all invasive plant control is complete.

**Table 1. Choosing the best control measure**

		Size of the Infested Area			
Density of Infested Area		Isolated Plants	Small (.1-.5ha)	Medium (.5-2ha)	Large (more than 2 ha)
	<b>Low Density</b> (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>
	<b>Medium Density</b> (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>
	<b>High Density</b> (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

## Control measures summary

Method	Population Characteristics	Objective of Control	Notes
<b>Digging</b>	<ul style="list-style-type: none"> <li>• Small populations</li> </ul>	<ul style="list-style-type: none"> <li>• Eradication</li> </ul>	
<b>Mowing</b>	<ul style="list-style-type: none"> <li>• Monoculture (large or dense populations)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce seed production</li> </ul>	
<b>Clipping</b>	<ul style="list-style-type: none"> <li>• Small dense populations</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce seed production</li> </ul>	
<b>Pulling</b>	<ul style="list-style-type: none"> <li>• Small to medium populations</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce seed production</li> </ul>	
<b>Tarping</b>	<ul style="list-style-type: none"> <li>• Medium, Dense Infestations</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce growth and seed production</li> </ul>	<ul style="list-style-type: none"> <li>• Need to rehabilitate soil afterwards</li> </ul>
<b>Seed Pod Removal</b>	<ul style="list-style-type: none"> <li>• Large/established populations</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce seed production</li> </ul>	<ul style="list-style-type: none"> <li>• Can be used for populations detected late in the season or for volunteer days, or where other control cannot occur</li> </ul>
<b>Chemical</b>	<ul style="list-style-type: none"> <li>• Small to large/ established populations</li> </ul>	<ul style="list-style-type: none"> <li>• Eradication or control to manageable levels</li> </ul>	<ul style="list-style-type: none"> <li>• Generally need multiple applications</li> </ul>
<b>Biological</b>	<ul style="list-style-type: none"> <li>• Large/established, dense populations</li> </ul>	<ul style="list-style-type: none"> <li>• Once a population is past manageable or treatable levels, often the only viable control option is biological control</li> </ul>	<ul style="list-style-type: none"> <li>• Research on Dog-strangling Vine biological control agents is ongoing, and no approvals have been issued yet for widespread release of control agents</li> </ul>

# Preventing the Spread

Everyone can help prevent the spread of dog-strangling vine by following these tips:

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## 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.

Learn what dog-strangling vine looks like. 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.

# Tracking the Spread of Dog-strangling Vine

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

- 1) EDDMaps Ontario, which is an on-line reporting tool where users can view existing sightings of dog-strangling vine and other invasive species in Ontario, and document their sightings.

This tool, at [www.eddmaps.org/ontario](http://www.eddmaps.org/ontario) is free to use.

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

If you think you have dog-strangling vine on your property or if you see it in your community where it hasn't been intentionally planted, please report it. You will be asked to send in photos of the leaf, bark and flower for identification.

## **Best Management Practices Documents Series:**

Common Buckthorn Best Management Practices for Ontario

Garlic Mustard Best Management Practices for Ontario

Giant Hogweed Best Management Practices for Ontario

Invasive Phragmites (Common Reed) Best Management Practices for Ontario

Japanese Knotweed Best Management Practices for Ontario

Wild Parsnip Best Management Practices for Ontario

Invasive Honeysuckles Best Management Practices for Ontario

White Sweet Clover Best Management Practices for Ontario

European Black Alder Best Management Practices for Ontario

Reed Canary Grass Best Management Practices for Ontario

## **Additional Publications from the Ontario Invasive Plant Council:**

Clean Equipment Protocol for Industry

Compendium of Invasive Plant Management

Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a guide for Southern Ontario

Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a guide for Northern Ontario

Canadian Botanical Conservation Network

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