Giant Hogweed

(Heracleum mantegazzianum)

Best Management Practices in Ontario

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Invasive Species Centre

Ontario Invasive Plant Council

Ontario

Foreword

These Best Management Practices (BMPs) are designed to provide guidance for managing invasive giant hogweed (*Heracleum mantegazzianum*) in Ontario. They were developed by the Ontario Invasive Plant Council (OIPC), its partners and the Ontario Ministry of Natural Resources and Forestry (OMNRF and Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). 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 municipal, 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) or Ontario Ministry of Natural Resources and Forestry (www.ontario.ca/invasivespecies) for updates.

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For more information on invasive plants in Ontario, visit www.ontario.ca/invasivespecies, www.ontarioinvasiveplants.ca, www.invadingspecies.com or www.invasivespeciescentre.ca

Front and back cover photo courtesy of Credit Valley Conservation.

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Giant Hogweed.
Photo courtesy of Central Lake Ontario Conservation Authority.

Giant Hogweed escaped from gardens.

Photo courtesy of Ontario Ministry of Natural Resources (OMNRF).

Introduction

Giant hogweed (*Heracleum mantegazzianum*) is an invasive perennial herb from the carrot family (Apiaceae). It has spread throughout much of Europe and is a concern in many parts of southern and central Ontario. Native to the Caucasus Mountains in Southwest Asia, the plant grows to an enormous size and produces large umbels (umbrella–shaped clusters) of white flowers. It was most likely introduced to North America in the early 1900s as a garden plant. Ontario's first confirmed record of this plant was in 1949. Today, giant hogweed has a scattered distribution across southern and central Ontario and has been found as far north as Kapuskasing. Hogweed populations in these locations range in size from individual to thousands of plants.

Giant hogweed invasions can have a range of negative impacts on society and the environment. It poses a significant threat to human health. Giant hogweed sap can cause a condition called phytophotodermatitis, which makes skin extremely sensitive to sunlight, and can result in severe burns and blisters. It also outcompetes native plants, reduces biodiversity and degrades the quality of riparian habitats (the zone of land along or around a body of water). Giant hogweed can negatively impact agriculture and is listed as a noxious weed under the *Weed Control Act.*

Giant hogweed grows in a wide range of habitats, spreading rapidly along roadsides, ditches, and riparian areas. Giant hogweed seeds can be dispersed short distances by wind and long distances by moving water. These BMPs emphasize control efforts in those areas where it can spread easily via waterways or human intervention.

The OMNRF, the OMAFRA, and the OIPC and its partners have developed this document as a tool to help guide the effective control and management of this invasive plant across Ontario.

Ontario's Management Priorities for Giant Hogweed

Giant hogweed is recognized as a threat to Ontario's biodiversity, agriculture, and human health. Ontario has taken several steps to prevent its introduction and spread and to manage and control it where established, consistent with the *Ontario Biodiversity Strategy* and *Ontario Invasive Species Strategic Plan* (OISSP).

In 2010, Ontario listed giant hogweed as a provincially noxious weed under the *Weed Control Act.* This has provided a regulatory tool for weed managers to control giant hogweed where it could affect agricultural or horticultural operations. In addition to regulation, greater public awareness of the problems caused by giant hogweed is necessary to stop gardeners from sharing this invasive plant.

Outreach materials and provincial tracking tools have been produced in partnership with organizations such as the OIPC and the Ontario Federation of Anglers and Hunters. These tools, such as the Invading Species Hotline (**1-800-563-7711**) and EDDMapS Ontario (www.eddmaps.org/ontario/), help the public report sightings of giant hogweed, track the scope of the invasion and allow for early detection and management.

The extensive distribution of giant hogweed in southern Ontario requires a coordinated and focused response to control and management. To facilitate this, the province has committed to develop and share these BMPs.

Giant Hogweed is found in many locations across Ontario.
Photo courtesy of David Staples.

Description

The Giant Hogweeds

Giant hogweed is actually the common name of four species of large hogweeds that are invasive outside of their native range.

Heracleum mantegazzianum is the most common invasive large hogweed (growing up to 5.5 m) found in both Europe and North America. It is generally the species that is thought of when referring to invasive hogweeds. Unless otherwise specified, this is the species referred to in these BMPs.

H. persicum is slightly smaller (growing up to 3 m) and is capable of producing seeds over several growing seasons (it does not die after the first seed set is produced). It is found throughout Europe.

H. sosnowski is also smaller than *H. mantegazzianum* (growing up to 3 m) and is more commonly found in northern areas of Europe. It is more resilient to harsh conditions than the other two species.

H. sphondylium (common hogweed) is very similar to the native *H. maximum* (cow parsnip). It may be that rather than being two species, the North American plant is a sub-species of the European plant. *H. sphondylium* is recorded as introduced to Ontario by the Database of Vascular Plants of Canada.

All species are very similar in appearance with only minor differences in size, leaf and umbel shapes.

Although all four species have been found throughout Europe, a comprehensive study of the identity of giant hogweeds in Canada has not been done. There are no confirmed sightings of *H. persicum* or *H. sosnowski* in Canada and reports of *H. sphondylium* are rare, but that may be simply because it's difficult to distinguish between these species. For simplicity, this document will assume that all giant hogweeds occurring within the province are *H. mantegazzianum*.

It is important to get to know this plant – and its "look-alikes".

Photo courtesy of Doug Thain, Lakeside Forestry.

Identification

Height:

Giant hogweed is a perennial herb which can grow to 5.5 m under ideal conditions, though such sizes are rarely seen. Typically the plant reaches heights of 3-4.5 m across Ontario although that varies based on soil and habitat type.

Giant Hogweed can grow to over 5 metres tall in ideal conditions.

Photo courtesy of Joe Ferreira, City of Brampton.

Stems:

Typically 10-15 cm in diameter with coarse hairs, and can either be covered in purple blotches or be completely purple.

The bristles and purple blotches on the stem are a distinctive identification feature.

Photo courtesy of Owen Williams.

Leaves:

Leaves are prominently spiked with a pronounced jagged appearance. On mature plants, leaves are divided into three equal or almost equal parts which are then divided into a further 3 parts (ternate). Smaller plants may just be deeply lobed. Leaves can grow up to 1 m wide.

Seedling leaf.
Photo courtesy of the OMNRF.

Mature leaf – this one a metre wide.
Photo courtesy of Ontario Ministry of Natural Resources OMNR.

Mature leaf.
Photo courtesy of Rick Bull.

Flowers:

Whitish flowers appear in mid-June and are clustered in umbel shaped heads which can measure up to 1 m across. Umbels are an umbrella-shaped cluster of short-stalked flowers, typical of plants of the carrot family. Each compound umbel can have 50-150 rays (seperate stem) which can lead to a single plant producing well over 50,000 flowers. The green fruit (seeds) produced by each flower dry out and turn brown in the late summer. They need to undergo 2-3 months of cold in order to break their dormancy and begin to sprout. Giant Hogweed is a monocarpic plant which means that it flowers once and then dies.

Tiny flowers in umbels.
Photo courtesy of Karen Rimmer.

Flower.
Photo courtesy of Peter Gardiner.

Health Concern:

Giant hogweed contains a phototoxic sap which reacts with ultra-violet (UV) light once it has come in contact with the skin. It can cause second degree burns. The organic chemicals called furanocoumarins that cause the burns also deter predators from eating the plant. Other plants with similar phototoxic properties include wild parsnip (*Pastinaca sativa*) and cow parsnip (*Heracleum maximum*).

Burn to leg caused by giant hogweed sap - 5 days to 5 months after initial exposure.

Photo courtesy of Bob Kleinberg.
Used with permission from New York State Department of Environmental Conservation.

Giant Hogweed frequently grows near water.

Photo courtesy of Peter Gardiner.

Giant Hogweed - Look-alikes

Giant hogweed can be confused with several native and non-native plant species found in Ontario including wild parsnip (*Pastinaca sativa*), cow parsnip (*Heracleum maximum*), purplestem angelica (*Angelica atropurpurea*), woodland angelica (*Angelica sylvestris*), valerian (*Valerian officinalis*), lovage (*Levisticum officinale*) and queen anne's lace (*Daucus carota*) (also known as wild carrot). None of these plants are as large as a mature giant hogweed plant, which can grow up to 5.5 m.

Cow Parsnip:

Giant hogweed looks very similar to the native and widespread cow parsnip (*H. maximum*). **The sap of cow parsnip contains the same toxic properties as giant hogweed and contact with this plant should also be avoided. Note:** *Cow parsnip is native to Ontario and in some cases is regionally rare and is not considered invasive. Control of cow parsnip should only be undertaken where it poses a health and safety hazard.*

Wild Parsnip:

Wild parsnip (*Pastinaca sativa*), an introduced species native to Europe, can also be confused with giant hogweed. The plant grows up to approximately 1.5 metres in size, and its flowers are yellow. **The sap of wild parsnip has the same toxic properties as giant hogweed. Contact with this plant should be avoided.**

Angelica Species:

Giant hogweed is superficially similar to *Angelica* species including the common, native purplestem angelica (*Angelica atropurpurea*) and the introduced woodland angelica (*A. sylvestris*). It might also be mistaken for other *Angelica* species (*A. lucida, A. venenosa*), valerian (*Valeriana officinalis*), and lovage (*Levisticum officinale*), The key differences for the most similar species, the native purplestem angelica, are that it has more rounded flower umbels (almost like globes) and the stem is smooth and purple.

Other Species:

Queen anne's lace (*Daucus carota*) and a number of elderberry species including American elderberry (*Sambucas canadensis*) can be confused with giant hogweed. These species are not known to present a health hazard, however queen anne's lace is also listed as a noxious weed under the *Weed Control Act.*

Giant Hogweed and its look-alikes

	Giant Hogweed	Cow Parsnip	Wild Parsnip	Queen Anne's Lace	Angelica
Height	• 2.5-5 m (8-14 ft)	• 1-2.5 m (3-8 ft)	• 0.5-1.5 m (2-5 ft)	• 0.3 -1.5 m (1-5 ft)	• 1.2-2.1 m (4-7 ft)
Flowers	• White flowers in large umbels (umbrella-shaped clusters) 12-36 inches across • Umbel composed of many smaller umbels • 50-150 rays per main umbel	• White umbel 4-12 inches across • 15-30 rays per umbel	• Yellow umbels 4-8 inches across	• Pale pink before fully opening • White, 2-4 inch wide umbel when mature • Often with single purple flower in center of umbel	• Greenish-white • Rounded (globe-like) flower umbels 3-10 inches wide
Leaves	• Compound with 3 large, deeply cut leaflets • Each leaflet has prominently spiked edges • Up to 1.5 m across • Lateral leaflets have blade touching main stem with no petioles (leaf stalk)	• Palmately lobed (leaves have lobes shaped like a hand with fingers) with fuzzy underside • Up to 0.5 m long and wide • Leaf blade separated from main stem by petiole	• Pinnately compound (leaves have leaflets that grow across from each other along the stem) with 2-5 pairs of opposite leaflets and one diamond-shaped terminal leaflet • Leaflets toothed and often shaped like a mitten	• Alternately arranged (leaves are staggered along the stem) • A mix of bi-pinnate and tri-pinnate compound leaves with lobed segments	• Alternate leaves, divided into 2-3 leaflets

Giant Hogweed and its look-alikes (continued)

	Giant Hogweed	Cow Parsnip	Wild Parsnip	Queen Anne's Lace	Angelica
Stem	• Hollow except at the nodes (area of stem that holds leaves), up to 10 cm in diameter • Prominent purple blotches , sometimes nearly solid purple near base • Distinct, coarse and bristly hairs	• Hollow, up to 5 cm in diameter • Green, few to no purple spots • Soft and fuzzy hairs	• 2.5-5 cm in diameter • Green, smooth with few hairs	• 1-3.5 cm in diameter • Green, covered with fine bristly hairs	• Purple or purple blotched • Smooth (no hairs)
Lifecycle	• Biennial (lives for 2 years) or perennial (lives longer than 2 years)	• Perennial	• Biennial/Perennial	• Biennial	• Perennial
Origin	• Invasive	• Native	• Invasive	• Introduced	• Native

Photo Comparison of Features of Ontario's Most Common Hogweed "look-alikes"

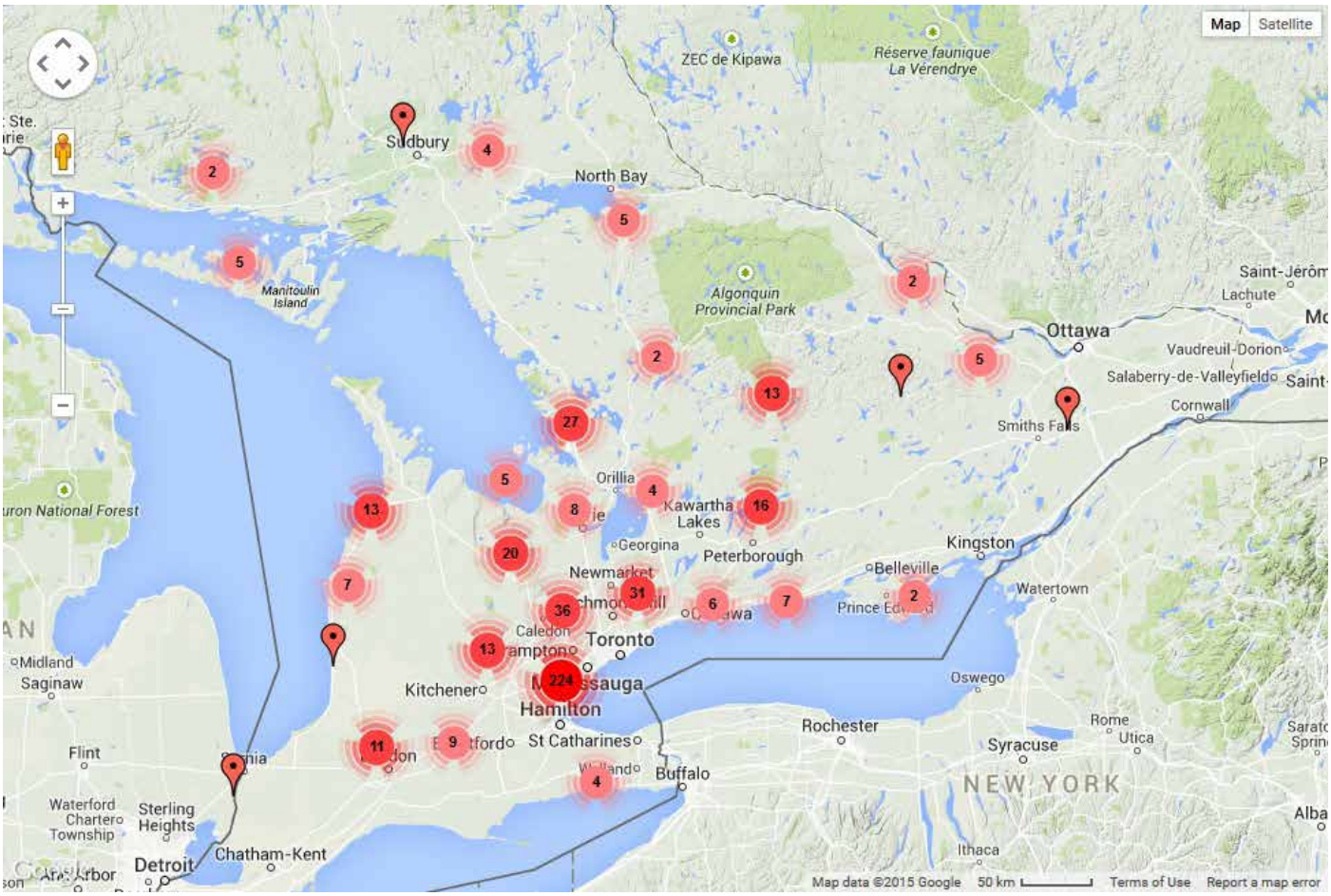
	Height	Stem	Leaf	Flower
Giant Hogweed				
Cow Parsnip				
Wild Parsnip				
Angelica				

Photos courtesy of Jeff Muzzi, Diana Shermet, Owen Williams and Karen Rimmer.

Distribution

Giant hogweed has a scattered distribution across southern and central Ontario, south of the line from Manitoulin Island to Ottawa. Extensive populations have been found within the Greater Toronto Area. Confirmed reports of giant hogweed have been made as far north as Kapuskasing. Many counties and municipalities are taking steps to remove giant hogweed from their lands.

Nationally, limited populations of giant hogweed occur in Quebec, New Brunswick, Nova Scotia, Newfoundland and Labrador, and British Columbia.



Giant Hogweed distribution in the Great Lakes Basin.

Photo courtesy of EddMapS Ontario.

The map point data is based on records contained in the Invasive Species Database, compiled from various sources as of March 19, 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.

Biology and Life Cycle of Giant Hogweed

Giant hogweed is one of the first plants to come up in the spring. During the first year, plants form large rosettes with compound leaves reaching up to 1.5 metres across. It grows rapidly, forming a large taproot which stores energy resources to assist the plant during times of stress. Plants usually take from 3-5 years (sometimes as long as ten years) after they first germinate to produce a flowering stalk. The timing for flower development may depend on environmental conditions and competition with other vegetation, although this is not well understood.

For mature plants, flowering stalks begin to appear in early-mid June in southern Ontario, and they are in full flower from mid-late June to August. Each plant produces compound umbels with tens of thousands of flowers which are wind and insect pollinated. Female flowers typically appear on the central (terminal) umbel around one week before male flowers appear on the satellite umbels. Although capable of reproducing with itself, seed viability is much higher when fertilized by pollen from other plants (~80% compared to ~13% viability). The plants die after seeds are produced.

Each adult plant produces an average of 10,000 winged seeds, though large individuals are capable of producing over 100,000 seeds. Seeds are spread by wind and water, and most fall within 10 m of their parent plant. If seeds fall into water they can float downstream and can remain viable for up to 3 days before dying. New colonies of giant hogweed can start from one single seed. Seeds are also blown around during the winter and can travel great distances on the snow. There is no evidence of birds carrying seeds. Other than being carried by water, the most likely cause of spread is by humans through garden plantings or through contaminated soil being moved or picked up in mud on equipment.

Ninety-five percent of the seeds produced will stay within the top 5 cm of the soil layer, leading to a short-term seed bank. The vast majority of viable seeds are dormant when they first reach the ground and require 2-3 months of cold weather (below 8°C) to break dormancy and germinate. Some seeds remain dormant in the soil but most (>98%) germinate the first spring. After the third year there are less than 0.1% of seeds remaining in the seed bank.

Habitat

Giant hogweed is native to the Caucasus Mountains in Southwest Asia and was introduced to Ontario presumably as an ornamental plant. In its native range giant hogweed occurs in meadows, ravines, and along forest edges and streams. It has been observed in northern regions and is tolerant of cold climates. Within Ontario, giant hogweed has been observed in riparian areas, pastures, open woodlands and wetlands, and along streams, roadsides, ditches and transportation corridors. Giant Hogweed prefers moist soils with adequate nutrient supplies, high sunlight, and limited active land use. It can be found within drier, nutrient poor shaded sites though may take several years for the plant to reach maturity and flower in those locations.

Impacts of Giant Hogweed

Natural Resource Concerns

There is evidence that giant hogweed can harm Ontario's biodiversity by shading out native plants, although scientists have not done extensive research on this topic in Ontario or Canada. Established populations of giant hogweed can out-compete native vegetation through rapid growth in the early spring, producing large leaves which shade out other plants before they have an opportunity to grow. This creates stands of low species diversity typically inhabited by only the hardiest of native grasses and other invasive species such as garlic mustard (*Alliara petiolata*).

Giant hogweed can form dense stands in riparian areas. When the plants die back in the fall, soil is exposed resulting in increased erosion and siltation of stream banks which can impact fish spawning areas. In Ireland, dense giant hogweed stands have caused a significant loss of plant and animal diversity along rivers and streams.

Health Concerns

The clear watery sap of giant hogweed contains toxins that can cause severe dermatitis (inflammation of the skin). Ultraviolet radiation activates compounds in the sap resulting in severe burns when exposed to the sun. Symptoms occur within 48 hours and consist of painful blisters. Purplish scars may form that last for many years. Eye contact with the sap has been reported (in the media and by various web sites) to cause temporary or permanent blindness, though this has not been confirmed. Similar effects result from exposure to the other two cow parsnip species found in Ontario (*H. maximum* and *H. sphondylium*) and from the widely introduced wild parsnip (*Pastinaca sativa*).

Agriculture Concerns

The impact of giant hogweed to agriculture is rare however populations have been documented as creeping into agricultural fields requiring additional management practices for growers in order to minimize its impact on crop yield. Giant hogweed in pasture and forage fields reduces feed quality and increases health risks to more susceptible grazing animals.

Regulatory tools

Provincial - Weed Control Act

In 2010 giant hogweed 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 lands are responsible for weed control and associated costs.

Municipal - Community Standards Bylaw

A municipality might wish to pass a bylaw to address the presence of giant hogweed in areas other than agricultural or horticultural land. Municipalities such as Durham Region and the Town of Halton Hills have enacted bylaws under the *Municipal Act* to control plants in areas where there is a potential for negative impact to human safety.

Federal – Weed Seeds Order

The *Weed Seeds Order* is a ministerial order made under the *Seeds Act.* The *Weed Seeds Order* (WSO) classifies weed species for the purposes of establishing purity standards for seed in Canada. Giant hogweed is proposed to be listed as a primary noxious species on the revised *Weed Seeds Order* (WSO). A primary noxious listing of this species would prevent the spread of giant hogweed by restricting its presence in seed and seed mixtures imported into or sold in Canada.

In addition, *H. sosnowski* and wild parsnip (*Pastinaca sativa*) are proposed for addition to the WSO, as a Class 2- Primary Noxious weed and Class 3-Secondary Noxious weed respectively.

Giant hogweed plants after removal.

Photo courtesy of Doug Thain, Lakeside Forestry.

Best Management Practices

Controlling Giant Hogweed before it becomes locally established will reduce its impacts on human health, 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 giant hogweed 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 giant hogweed 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 health and safety and natural resource considerations to take into account prior to implementing control plans.

Given the health concerns associated with giant hogweed and similar plants with phototoxic properties, it is highly recommended that private landowners hire a licensed professional to remove the plant to ensure safe procedures are followed. A list of giant hogweed abatement professionals prepared by the Ontario Invasive Plant Council can be viewed at www.ontarioinvasiveplants.ca for information purposes only.

Health and Safety Considerations

Protective clothing:

- All persons employed in the removal or management of giant hogweed MUST wear protective clothing. The clear watery sap of giant hogweed and similar plants with phototoxic properties contains toxins that can cause severe dermatitis (inflammation of the skin). Severe burns can occur if the sap contacts the skin and is then exposed to sunlight. Symptoms occur within 48 hours and consist of painful blisters.
- Protective clothing includes waterproof gloves, long sleeve shirts, pants, and eye protection (face shield). It is ideal to wear disposable "spray suit" coveralls over your normal clothing (spray suits are commercial grade waterproof coveralls). Tape coveralls at the wrists to minimize potential exposure of skin to sap.
- Remove protective clothing carefully to reduce the risk of skin coming into contact with any sap that may be on your clothing. Wash rubber gloves first with soap and water prior to removing the protective disposable spray suit. Wash rubber gloves again before taking them off and then lastly remove the protective eye wear. Put non-disposable clothing in the laundry and wash yourself immediately with soap and water.
- Keep pets and animals clear of giant hogweed, as the sap can also be transferred on their fur.

If you are exposed to giant hogweed sap:

- If skin comes into contact with the sap, wash it thoroughly with soap and water.
- Avoid further exposure of the affected skin to UV/Sunlight.
- If photodermatitis occurs, seek medical consultation.
- If there has been direct exposure to the eye (cornea), immediately flush the eye with water and seek medical evaluation and treatment on an urgent basis.

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 (www.ontario.ca/government/ministry-natural-resources-and-forestry-regional-and-district-offices) early in your control plans for advice or visit http://www.ontario.ca/environment-and-energy/how-get-endangered-species-act-permit-or-authorization to learn more about specific permitting requirements.. If controlling giant hogweed in riparian areas impacts to shoreline health must also be considered.

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 control of giant hogweed.

Site Prioritization

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

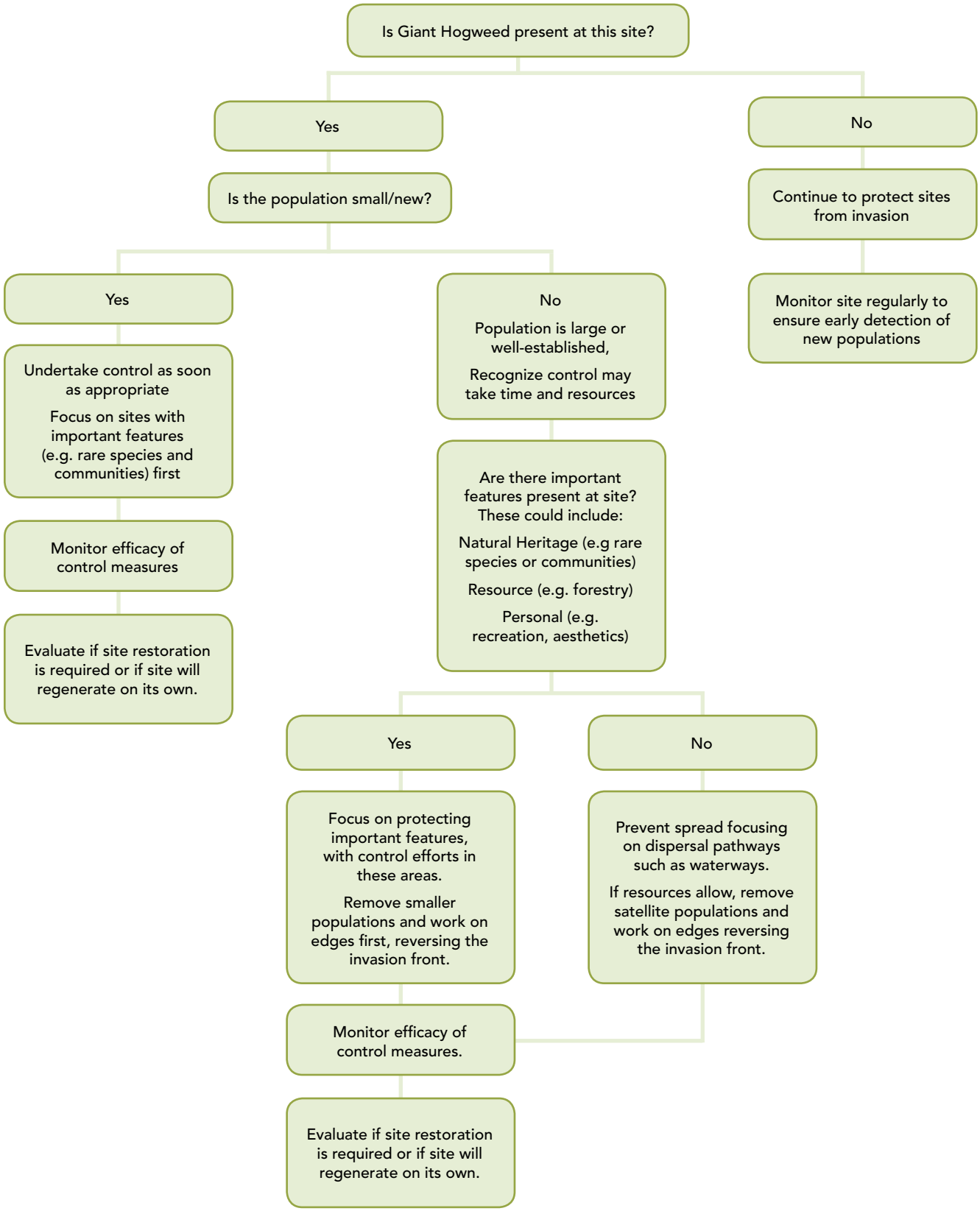
1. Protect areas where giant hogweed is absent or just appearing.
2. Protect rare species and communities. These include federal, provincial and regionally listed rare species.
3. Protect important habitats and land values (i.e. agriculture, wildlife appreciation, forestry).
4. Cost and effort: Will 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 assist land managers in determining which site to focus control efforts first:



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 reduce the risk of re-invasion. See page 24 for restoration methods.

Control Measures

Most control of giant hogweed should take place in early spring, as plants are typically less than 30 cm in height and more susceptible to control measures. As the growing season progresses, giant hogweed becomes more difficult to control due to its large size, and health and safety concerns for workers are increased.

Giant hogweed should be controlled before seeds are produced.

Photo courtesy of Owen Williams.

Manual Control

Manual control is most effective if done in early spring (i.e. late April to early May). The overall success of manual control options depends on the size of the Giant Hogweed population. Manual control works best when dealing with a limited number of plants in relatively accessible locations. Due to the close contact with the plant required for these options, extreme care must be taken to ensure workers' health and safety. **Note:** *Motorized tools such as "whipper snippers" should never be used for control of giant hogweed or other plants with phototoxic properties as the sap can be splashed on to the operator.*

Hand Pulling/Digging:

Hand pulling with gloves can be effective on young seedlings, but not on larger plants. Digging works best for giant hogweed plants in their first or second year of growth, as the taproot can exceed 1 m in depth in older plants. Digging is most effective in the spring (early May).

Use a spade to remove as much of the taproot as possible. Unless the entire root is removed, it is possible that the plant will re-grow and repeated digging or covering the dug area with black plastic to smother new growth will be necessary.

Digging to remove hogweed.
Photo courtesy of Doug Thain, Lakeside Forestry.

Mowing:

NOT RECOMMENDED. Mowing or above ground cutting takes a great deal of effort and care as it is an ongoing process throughout the year. Mowing may be useful if the sole objective is to prevent seed production. Extreme caution should be exercised by operators of mowing equipment due to the potential for sap to splash.

If the terrain allows the use of machinery, mow top growth every two weeks throughout the growing season to exhaust the plant's root reserves. Take precautions to prevent people from coming in contact with the cut stem bases. Even a single spring cutting can reduce the number and size of seeds. When mowing, care must be taken to avoid the spread of seeds in tire treads and sap on the machinery.

Tilling:

Tilling is problematic in many landscapes because giant hogweed tends to grow in unsuitable areas. This control method is most effective on agricultural land and near residential areas where conditions may be more favourable.

Flower removal:

NOT RECOMMENDED. Removing flowering umbels in summer before seed production will stop the plant from reproducing and the seed bank from increasing, however, this control tactic is extremely challenging. The sheer size of the plant at this time of year prevents easy access to the flower head, and in dense populations workers are at increased risk of coming in contact with the sap. While the removal of umbels during early flowering stages can result in a reduction in seed production, new umbels can form on lower branches. Control work must be repeated over the summer to regularly remove new flower heads. Timing is crucial because if the treatment is applied too early in the season (before full inflorescence), regeneration is very vigorous and an even larger number of seeds can be produced. If treatment is carried out too late (at the beginning of seed-setting), there is a risk that seeds will ripen even on cut umbels.

The cut umbels must be collected and destroyed. Carefully remove flower heads from stems and place them in black plastic bags. Make sure not to drop any seeds (see information on disposal techniques below). The removal of umbels is most effective if done when terminal umbels just start to flower. Even then, there is some regeneration and treated stands must be checked at the time of seed ripening to stop release of seeds produced by regeneration.

This method should only be considered as an improvised solution for control of stands where no other attempts of control have taken place earlier in the season.

Umbels turn green as seed develops.

Photo courtesy of Ken Towle.

Note: *If the flower heads have changed from white to green, seeds are being produced and there is less opportunity for successful management as it is challenging to remove the seed heads and/or cut the plant without dispersing the seeds.*

Disposal:

DO NOT BURN. DO NOT COMPOST. Dispose of plant material in black plastic bags. Seal the bags tightly and leave them in direct sunlight for about a week. Allow stems and roots to dry out thoroughly before disposing of them. Contact your municipality to determine if the bagged plants can be sent to your local landfill site.

Chemical Control

Herbicides must be applied in accordance with all label directions. For an up-to-date list of herbicides labelled for giant hogweed control, visit Health Canada's Pesticide Label Search web site at http://pr-rp.hc-sc.gc.ca/ls-re/index-eng.php. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)'s Publication 75, Guide to Weed Control (www.omafra.gov.on.ca/english/crops/pub75/pub75toc.htm) is an excellent reference for all aspects of weed control, and includes a section on invasive plant management.

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

Section 22 of Regulation 63/09 contains an exception which allows the use of herbicides to control plants such as giant hogweed that are poisonous to the touch. Under this exception the use of herbicides listed in Class 10 is allowed. Read the product label before using to ensure it can be legally used on giant hogweed.

Herbicide Application:

Systemic herbicides are translocated throughout actively growing plants. They should be applied after leaves are fully expanded in spring or early summer, followed by a subsequent application to control missed plants or those that may have re-grown. New seedlings may germinate from seed and emerge after herbicides have been applied.

Giant Hogweed after chemical control.

Photo courtesy of Greg Bales.

It is recommended that areas treated with herbicide are covered in mulch 10-14 days after application to manage seedling germination. Herbicide treatments need to be repeated annually. If a plant is flowering, herbicides are not effective and control methods should focus on carefully removing the flower heads as per the instructions under 'Flower Removal' (above).

Summary of Control Measures

General:

Take appropriate health and safety precautions to protect workers and others from the toxic sap. Avoid use of mechanical equipment that might spray or splash sap. **Eradication is most efficient in spring** (April and May) when the plants are less than 30 cm tall. Mechanical control is most effective when dealing with small numbers of plants. **Disposal:** Do not burn. Do not compost.

Method	Population Type	Purpose of Control	Notes
Digging	• Small number of plants • Most effective on 1st or 2nd year plants	• Eradication	• Entire root must be removed to prevent regrowth
Mowing	• Small to medium populations in accessible location	• Reduce seed production	• Start early in the growing season, while plants are still small • Repeat every two weeks
Tilling	• Medium populations, located in accessible locations (agricultural)	• Reduce growth and seed production	
Flower removal **(Not recommended)**	• Individual to small populations	• Reduce seed production	• Requires extreme caution to avoid contact with sap • Cutting must be repeated to remove new flower heads
Chemical	• Small to large populations	• Eradication or to control population size	

This table is a summary. See the text of this section for more detail.

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 giant hogweed) 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 giant hogweed 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:

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.

Preventing the Spread

Everyone can help prevent the spread of giant hogweed by following these tips:

☑ Report it.

If you think you see giant hogweed, take a picture, record the location and contact the Invading Species Hotline to report it (for safety reasons do not take a sample of the plant). For more information and guidance call the Invading Species Hotline at **1-800-563-7711** or visit www.ontarioinvasiveplants.ca. Because it is listed as a noxious weed under the *Weed Control Act* you can also contact county and regional weed inspectors regarding giant hogweed infestations.

☑ Watch for it.

Learn what giant hogweed looks like. Monitor hedges, property boundaries, fence lines and trails. Early detection of invasive plants can make it easier and cheaper to remove or control them.

☑ Stay on trails.

Avoid traveling off-trail and in areas known to have giant hogweed or other invasive species. If Giant hogweed is found close to trails, signs should be posted to alert people to the potential health hazards.

☑ 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. It's very important to carefully wash sap from clothing, equipment, and pets.

☑ Keep it natural.

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

☑ Use native species.

Try to use local native species in your garden. Don't plant giant hogweed in your garden and if you have removed it, try to replant with native species. Don't transplant invasive species such as giant hogweed. Encourage your local garden centre to sell non-invasive or native plants. The Grow Me Instead guide lists alternatives to plant instead of invasive plants. www.ontarioinvasiveplants.ca/index.php/gardenersandhorticulturalists

Tracking the Spread of Giant Hogweed

Over 400 locations of giant hogweed have been documented in Ontario, however there are still gaps in our understanding of its provincial distribution and the scale of its invasion in many locations.

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 is free to use.

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

If you think you have giant hogweed 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. **Do not collect parts of the plant for identification.**

Please report giant hogweed in Ontario.

Photo courtesy of David Staples.

Additional Resources

Ontario Weeds: Giant Hogweed
http://www.omafra.gov.on.ca/english/crops/facts/ontweeds/giant_hogweed.htm

Giant Hogweed, *Heracleum mantegazzianum*
http://www.weedinfo.ca/en/weed-index/view/id/HERMZ

The Biology of Invasive Alien Plants in Canada. 4. *Heracleum mantegazzianum* Sommier & Levier
http://www.weedinfo.ca/media/pdf/page_biology_canada_weeds.pdf

Best Management Practices Document Series:

Common Buckthorn Best Management Practices for Ontario
Dog-strangling Vine Best Management Practices for Ontario
Garlic Mustard Best Management Practices for Ontario
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

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