



Giant Hogweed Management Strategy for the French Creek Watershed

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PART 1. INTRODUCTION

1.1 Project Purpose

The purpose of this strategy is to guide the management of giant hogweed in the French Creek watershed, a small watershed near Parksville, B.C. Giant hogweed is an invasive alien plant that is considered both a public health and environmental hazard. It is common in streamside areas of French Creek from Coombs to the stream mouth at the Strait of Georgia. It was introduced into the French Creek watershed before the early 1960s¹. French Creek likely has the oldest population of giant hogweed in western Canada and is considered the epicenter of hogweed invasion on southeastern Vancouver Island.

The strategy is divided into three parts: [Part 1](#) provides background on giant hogweed and [Part 2](#) describes seven strategies for managing hogweed in French Creek including engaging landowners and the community in hogweed management, as well as more specific recommendations on effective control methods and monitoring. References and resources are provided in [Part 3](#), but the reader should consult the new webpage (www.frenchcreekhogweed.ca) for more complete information.

This strategy was developed by Nick Page and Patrick Lilley of Raincoast Applied Ecology, with assistance and project management by Jeff Hallworth of the Ministry of Forests and Range. Ron Wall provided technical advice.

1.2 Biology and Identification of Giant Hogweed



Figure 1. General characteristics of giant hogweed

Giant hogweed (*Heracleum mantegazzianum*) is a member of the Carrot Family which originated in the Caucasus Mountains in west central Asia. In its native habitat, it is found in subalpine meadows and forest edges. It is related to and sometimes confused with native cow-parsnip (*Heracleum maximum*), which occurs in streamside areas, moist forests, and subalpine meadows throughout BC. It is also occasionally confused with the following other native plants: seacoast angelica (*Angelica lucida*) and palmate coltsfoot (*Petasites frigidus* var. *palmatus*) although the similarities are superficial.

Giant hogweed is identified by its large size (3–5 m tall when flowering), large sharply serrated, and deeply incised leaves, dark reddish purple spots on the stem, and its seed morphology. More information on identification is provided on the website.

Some key aspects of giant hogweed that influence management are:

- Giant hogweed disperses and establishes by seed. Pieces of roots, leaves, and stems do not re-sprout like Japanese knotweed or English ivy. Seeds are moved by wind (1–4 m) or longer distances

¹ French Creek is considered the first documented location for giant hogweed in B.C. (see Dawe and White, 1979 or Merilees, 1978); the first herbarium record is from 1964 but it may have been introduced in the 1920s or 1930s.

by water along streams, ditches, or storm pipes. Each plant produces thousands of seeds (up to 120,000 (!) but more typically several thousand).

- The establishment of new populations over longer distances usually occurs as a result of human activities. Gardeners sometimes grow giant hogweed as a specimen plant and it is suspected that giant hogweed was introduced to French Creek as a garden introduction. As well, soil or plant material contaminated with seed is sometimes used for roadfill or other construction activities resulting in the establishment of new populations. Some small roadside populations have established from seeds blowing from trucks during transport of cut plants or seed heads.
- Giant hogweed grows in a variety of soil types and vegetation communities (forests, beaches, wetland margins) but prefers moist areas with high-light levels such as streamside areas, forest edges, and roadsides. It can grow and flower in open-canopy forested areas, and forest edges but it is typically smaller and produces fewer seeds.
- Giant hogweed grows for 3–5 years before flowering and dying in the last year. During the first years of growth, it stores increasing amounts of energy in its roots to put into development of the flower stalk, flowers, and seeds. Many established populations consist of plants of varying ages: small first year plants, larger older plants, and fourth or fifth year plants in flower.
- Repeatedly cutting the flower stalk at ground level can be used to kill giant hogweed. However, it often it develops a secondary flower stalk and inflorescence and there is also more chance of being exposed to plant sap when working with larger plants. Removing the seed head in the summer (June 30–July 15) can prevent the production and dispersal of new seeds which is sometimes a useful short-term control technique.
- Giant hogweed seeds may remain in the ground more than five years, although most seeds germinate in the first two years. Control efforts must include site monitoring to prevent hogweed re-establishment from seeds in the soil.

1.3 Distribution of Giant Hogweed in French Creek

Recent mapping (Invasive Alien Plant Program Application, October 2007) identified 53 sites in the French Creek watershed with giant hogweed (see map in Appendix 1). All mapped sites are within 50 m of the mainstem of French Creek. The giant hogweed population is found along approximately 14.4 km of stream channel. Four sites occurred in the lowermost developed portion of the watershed (stream mouth to the E&N rail corridor), ten sites between the E&N rail corridor and Highway 19, 17 sites between Highway 19 and Pacific Rim Highway, and 22 sites upstream of the Pacific Rim Highway in the Coombs area.

While the overall number of sites increase the further one travels upstream from the stream mouth, the mean density of sites declines from 6–10 plants per square meter in the few sites near the mouth, to 2–5 plants per square meter in the Coombs area. It is not known if these patterns reflect invasion dynamics or how the survey was undertaken. It is also important to note that the existing survey may underestimate the distribution of giant hogweed in the watershed as point visual estimates were taken,

as opposed to more accurate traversed polygons. Smaller patches were likely missed by visual surveys and we also suspect more sites may occur away from the stream corridor.

1.4 Past Efforts and Existing Management

There have been a variety of small-scale projects to control giant hogweed in the French Creek watershed. Most have been undertaken the direction of Michael Jessen (French Creek Residents Association and Friends of French Creek Conservation Society) and Ron Wall (formerly of the Parksville Streamkeepers Society) and included test projects using mechanical controls (digging, cutting, etc), as well as steam (Waipuna foam). Local residents have also undertaken control activities in the Coombs area.

In 2007 and 2008, the Ministry of Agriculture and Lands, in partnership with the Ministry of Transportation, funded a minimum security eight person inmate crew to control giant hogweed at French Creek. Control efforts occurred on immature and mature plants from June to October each year. Control methods consisted of cutting of stems to within 0.3 metres of ground, every two weeks to prevent flowering and to deplete the seed bank in soil. In cases where umbels were present, the umbels were cut directly into industrial-strength garbage bags and the remainder of the plants were removed as indicated above. The remaining stem and root was dug out to a depth of 15 cm and bagged as well. In most cases all bagged plant waste was deep-landfilled. In a few isolated areas, plant waste was wrapped in large tarps and left to solarize and decompose on site.

1.5 Health and Safety Issues

Giant hogweed sap contains chemicals which can cause severe dermatitis (welts, rashes, and blistering, followed by pigmented scarring) when they contact skin in the presence of sunlight (light-activated phyto dermatitis²). Scarring may persist for as long as six years. The chemicals, furanocoumarins, are activated by sunlight to become irritants. They are found in the leaves, stems, flowers, and roots of giant hogweed, as well as in other plants in the Carrot Family, but not to nearly the same extent as with hogweed. Contact with plant sap can occur by brushing against broken plant parts, handling plant material, or even by touching tools or mowing equipment that was used for giant hogweed control. Children playing with the large plants, or maintenance workers or gardeners involved in vegetation control are most likely to acquire dermatitis from giant hogweed.

There are four main recommendations for minimizing the risk of being adversely affected by giant hogweed dermatitis when undertaking control activities:

1. Wear protective clothing that covers all exposed skin and eyes when handling giant hogweed. This includes gloves that are impermeable to plant juices (thick latex gloves), rubberized raingear, and a facemask or safety goggles. More information is provided by Worksafe BC (see website).

²Dermatitis from giant hogweed is sometimes referred to as “phytophotodermatitis” because of the combination of plant sap (phyto) and sunlight (photo) that is required. The reaction is caused by furanocoumarin chemicals (psoralens) present in plant sap in combination with ultraviolet-A light. Most common plants for causing this reaction are members of the Carrot Family including celery, carrots, Queen Anne’s lace, cow-parsnip, and giant hogweed. Furanocoumarins are also present in grapefruit and limes.

2. Use control techniques that minimize generation, dispersal, and contact with plant sap. Use a long-handled shovel to cut plant roots, or a long-handled sickle to cut flower heads. Do not use a brushcutter or mower unless you have proper training and safety equipment because they can readily spray plant sap onto exposed skin surfaces.
3. If you are exposed to giant hogweed sap, wash affected skin as soon as possible with warm, soapy water or use streamwater if you are in a remote area. Rinse eyes immediately, if they are potentially affected. Similarly, if you are unsure if all plant sap has been removed, keep the area of skin covered (no sunlight) until you are able to wash thoroughly. Consult a doctor if you have had extensive exposure to giant hogweed sap or if you develop blisters or other signs of dermatitis; make sure you tell health care providers about your exposure to giant hogweed sap.
4. Thoroughly wash/rinse raingear and other safety equipment off *prior* to removing clothing, using soap if possible. Be careful not to redistribute plant sap when washing clothing or equipment.

PART 2. MANAGEMENT STRATEGIES

We recommend seven strategies for managing giant hogweed in the French Creek watershed. For each strategy, we describe an objective or objectives as well as specific actions. The strategy does not focus on eradication of giant hogweed from the watershed, but on management actions to reduce the size and extent of existing populations, thereby reducing risk to the local ecology and human health.

- Strategy 1.** Engage and Educate Landowners
- Strategy 2.** Improve Inventory and Mapping
- Strategy 3.** Set Management Priorities
- Strategy 4.** Use Effective Control Methods
- Strategy 5.** Provide Resources to Supplement Landowner Activities
- Strategy 6.** Restore Native Vegetation
- Strategy 7.** Monitor Giant Hogweed Populations in the Watershed

Strategy 1. Engage and Educate Landowners

Objectives. The objectives of this strategy are to encourage landowners to control giant hogweed on private lands, to participate in monitoring programs, and to work with their neighbours to promote giant hogweed management.

Giant hogweed is widespread in riparian areas along French Creek and most plants are found on private land. The June 2007 inventory recorded giant hogweed on 27 properties in the French Creek watershed, of which approximately 22 were privately-owned. Additional sites likely exist.

Actions. The following actions are proposed:

1. Develop and distribute education and stewardship materials to 25 landowners that have giant hogweed on their property. The package should include the following information: (i) cover letter requesting their participation in the project (entitled French Creek Giant Hogweed Project); (2) copy

of the strategy; (3) identification information; (4) maps; (5) health and safety information; and (4) copy of the “Giant Hogweed Best Practice Manual”. All information should be distributed directly by a person knowledgeable about giant hogweed; personal contact increases participation program and provides an opportunity to engage the landowner and answer any initial questions.

2. Education materials should also be made available to stewardship groups, and placed at the Parksville Public Library, and, if possible, local stores or coffee shops.
3. Create and launch website with relevant information on giant hogweed management including biology, identification, and management. The launch of the website should be accompanied by posters in the French Creek area making people aware of its presence. Note, Raincoast Applied Ecology has developed a website (www.frenchcreekhogweed.ca).
4. Encourage landowners to monitor the location and abundance of giant hogweed on their properties, or allow access for monitoring and mapping programs (see Strategy 2). This should include hard-copy orthophotos that can be marked and returned by mail.
5. If funds are available, minor financial incentives or other forms of recognition could be provided to landowners that manage hogweed on their properties. This could include gift certificates for local nurseries or restaurants. The suggested value is \$50 (\$1350 in total if 27 properties participated). Eligible activities would be controlling giant hogweed plants through cutting or root pruning, monitoring or mapping of locations, or removing flower-heads to prevent seed dispersal.

Strategy 2. Improve Inventory and Mapping

Objective. The objective of this strategy is to map the location of giant hogweed in the French Creek watershed to better direct landowner contact information, and to measure the long-term success of control efforts.

It is unusual that all the current records of giant hogweed in the French Creek watershed are in riparian areas along the mainstem of French Creek. In other areas where giant hogweed occurs in BC, such as North Vancouver, it typically is found in both riparian areas and suitable sites in the surrounding landscape such as forest edges, road sides, and gardens. It is unclear if the distribution of giant hogweed in French Creek is confined to riparian areas, or more surveys are needed to understand its full distribution in the watershed. Unmapped sites may provide a source of new seeds even if control activities are successful in downstream areas. Inventory and mapping is also essential for monitoring both the invasion process, and the success of control methods.

Actions. The following actions are proposed:

1. Inventory should be part of the effort to engage and educate landowners. Each landowner should be provided with an orthophoto of their property and requested to mark the location of giant hogweed plants. Maps should be returned to Jeff Hallworth – Coastal Invasive Plant Specialist, Ministry of Forest and Range for input into the IAPP Application or database. Conversely, if the landowner has a GPS unit, then coordinates (an easting and northing) could be sent, as well as the approximate area of the infestation (m²).

2. Regular surveys and mapping using IAPP (Invasive Alien Plant Program) Application field and data management methods described in *Module 1.5: Inventory & Monitoring* should be undertaken. Previous inventory of the French Creek mainstem was undertaken in October 2007 (see Appendix 1). Future inventories should be undertaken from July 15–August 15 to assist in identifying small populations and to allow for seed heads to be collected. All data should be inputted into the IAPP Application in order to keep mapping current.
3. More surveys are needed of non-riparian areas in the French Creek watershed. Potential new populations should be identified using landowner submissions, local knowledge, and road-based surveys late in the growing season when flower heads are visible.
4. Record the presence of other significant invasive alien plant threats to French Creek as such as any of the knotweeds – Japanese knotweed (*Fallopia japonica*), Giant knotweed (*Fallopia sachalensis*), Bohemian knotweed (*Fallopia x bohemica*) and Himalyan knotweed (*Polygonum polystachum*).

Strategy 3. Set Management Priorities

Objective. The objective of this strategy is to focus control efforts on priority sites where limited resources can have the largest benefit. Research has shown that directed control programs are more successful than informal control programs. The identification of management priorities should incorporate three important aspects of giant hogweed biology: (1) seeds are often distributed by water; (2) the largest and oldest patches produce the most seeds; and (3) new populations are usually started by a single “mother” plant moved by some form of long distance dispersal (often by humans).

It is important to note that the actions listed below are primarily directed at activities undertaken by stewardship groups or government contractors. Private landowners, the primary group who will be undertaking giant hogweed control in the French Creek watershed, should focus on giant hogweed populations on their own properties or assisting their immediate neighbours.

Actions. The following actions are proposed:

1. Undertake control efforts in upstream sites around Coombs first. Because of the dispersal of giant hogweed seeds through flowing water, overall management activities should proceed from upstream to downstream in the watershed.
2. Large, established patches anywhere in the watershed should also be a priority because they produce the largest number of seeds for establishing new plants. Landowners with large patches of giant hogweed should seek the assistance of volunteers, naturalists groups and/or contractors and government staff for strategic and/or technical direction.
3. Smaller, outlying giant hogweed populations exist beyond the immediate French Creek watershed and should also be targeted to limit population spread. Small populations in adjacent watersheds should also be a high priority for control.

Strategy 4. Use Effective Control Methods

Objective. The objective of this strategy is to recommend effective and appropriate methods for controlling giant hogweed in the French Creek watershed.

There are variety of methods that have been used to control giant hogweed including manual cutting, mowing, tilling, livestock grazing, and herbicide application. However, many of these methods are inappropriate for the environmental conditions in French Creek, where many of the sites are small and located in inaccessible streamside areas. As well, because landowners will be the primary group undertaking giant hogweed control, control methods must require relatively little training or specialized equipment, and be safe to undertake with only written or verbal direction.

Actions. The following actions are proposed:

We recommend the following three control methods for giant hogweed in French Creek: (1) manual cutting of the taproot in spring or early summer; (2) repeated mowing; and, (3) application of diluted glyphosate (a herbicide) in early spring by trained personnel. Root cutting is the preferred method in most sites because of its effectiveness. We also recommend the removal of flowering heads in early to late summer (June 30–September 15) as a short-term method for preventing further seed dispersal. However, removal of flowering heads does not kill the plant. Cut flowerheads need to be entirely contained (from spilling seeds) and bagged for disposal at the landfill.

1. Taproot Cutting: Like many members of the Carrot Family, giant hogweed has a deep taproot that stores energy for annual growth or flowering. The root can be 12 cm thick and 45 cm long. The large root also provides a buffer against damage to the above-ground parts of the plant from mowing or browsing. Giant hogweed can rapidly re-sprout new leaves or a flower stalk after cutting.

We recommend taproot cutting as the most effective method of killing small groups (<100) giant hogweed plants. The suggested method is:

- Wear protective rubberized clothing that covers exposed skin and glasses or a face-shield to cover the face and eyes. Rubber gloves are essential.
 - Using a sharp long-handled shovel or spade, sever the root about 10–15 cm below the soil surface. All plants should be treated, not just large plants.
 - Leave the above-ground part of the on-site to decompose unless there is risk that people will touch them. If possible, do not touch the plant(s).
 - Undertake one round of root cutting in early spring (April 1–May 15) and a second round in early-summer (June 15–July 15) to treat any plants that were missed or have re-sprouted.
 - Wash any tools that have been in contact with plant sap.
 - Monitor the site annually for 3–5 years around June 15 to ensure that new seedlings are identified and removed (root cut).
2. Mowing: Repeated mowing is an effective control method for large, flat sites. Mowing should only be undertaken with tractor-based mowers (not brush cutters) to reduce the possibility of contact with plant sap. Mowing should consist of repeated cutting of all above ground plants during the growing season. Mowing should start April 1st each year and continuing every three weeks

throughout the summer and fall, until mid-November or until the first frost. Multiple years of mowing may be required depending on the seed bank and other factors.

3. **Diluted Herbicide:** There are a few federally approved herbicides that have been used successfully for giant hogweed control, but sometimes there is concern regarding potential impacts to non-target plants, animals, and humans, if used inappropriately. Diluted glyphosate³ should be considered a suitable control method, if applied by professionals or landowners with appropriate training. The goal is to use as little herbicide as possible. Diluted glyphosate (e.g., Roundup) can be applied directly (1) onto leaf surfaces with a paint brush, (2) inserted into stems of giant hogweed using an injection tool⁴, or (3) into a cut stem.

Stem injection

- Inject only one stem per plant, 30 cm (1 foot) above ground with 5 ml (or cc's) of a 5% glyphosate solution. For example, if you purchase a formulation of glyphosate that contains 10% active ingredient (i.e., glyphosate), dilute the formulation by half with water and then inject the herbicide into a single stem of the plant.

Painting Leaf Surfaces

- Dilute a glyphosate formulation to 2% active ingredient and then carefully paint onto all leaf surfaces but avoid dripping it on the ground or onto adjacent native plants.

Cut Stem

- Dilute glyphosate with water down to 5% active ingredient. Cut one stem per plant and using a large plastic syringe (with the needle removed) or turkey baster inject the hollow stem with 5 ml (or cc's) of a 5% solution.

Please note the following:

- Wear protective clothing that includes rubber raingear, waterproof gloves, rubber boots, and protective eyewear.
- Herbicide application is most effective in early spring (March 15–May 15) when plants have reached a height of 20–50 cm.
- Read and follow all label directions and restrictions, and obey all label precautions and safety measures.
- It is legal to treat giant hogweed with glyphosate using the above application methods down to within 1 meter of the high water mark of the stream channel. Manually treat the remainder.

³ Glyphosate refers to the active ingredient of many herbicide formulations commonly sold as under the trade name “Roundup” (and others). There are over one hundred different formulations of glyphosate registered for use in Canada, including concentrated formulations: Vantage Plus Max (see product information [here](#)), and Roundup Super Concentrate (see product information [here](#)).

⁴ See JK Injection System [here](#) as one example of a herbicide injection tool.

For large scale foliar projects, contractors sometimes mix a surfactant such as Sygard 309 (see [here](#)) with glyphosate in order to improve adherence and absorption of the herbicide, and thereby minimizing the total amount of herbicide used and introduced into the environment. As little as 1% surfactant is required to achieve this.

Note, the use of brand names does not connote endorsement and is for reference only.

- A follow-up application is usually required during the first growing season (June) and sites should be visited at least twice during the first treatment season.
- Glyphosate is a “non-selective” herbicide, meaning it kill both target (i.e., giant hogweed) and non-target plants, therefore foliar spraying is not recommended, unless by a trained, certified applicator.

Strategy 5. Provide Resources to Supplement Landowner Activities

Objectives. The focus of this strategy is to support voluntary control activities undertaken by landowners with professional assistance from vegetation management contractors, local stewards with giant hogweed experience, or other trained staff. A strictly voluntary control program is likely to fail because of lack of participation from some landowners, and the failure of control projects on large or difficult sites.

Actions. The following actions are proposed:

1. Provide resources in terms of trained staff or work crews to assist landowners with training or on-the-ground control activities. This could be completed through funding to existing stewardship organizations such as the French Creek Residents Association or streamkeeper groups.
2. Identify local vegetation management contractors that can assist landowners with control activities on large sites on a contract basis. Contractors could be vetted by provincial government staff for inclusion on a resource list. This would allow concentrated glyphosate herbicide formulations to be used more appropriately on large patches of giant hogweed.
3. Hire contractors to undertake control activities on public lands such as the Highway 19 and 19a corridors. As noted above, funding to stewardship groups with experience with giant hogweed control may be effective for these types of projects.

Strategy 6. Restore Sites with Native Vegetation

Objectives. The focus of this strategy is to restore native vegetation following giant hogweed control activities. The introduction of ecologically-suited native vegetation increases competition, reducing the risk of hogweed recolonization. Giant hogweed seedlings need adequate light to establish and dense native plant cover can reduce establishment success.

Actions. The following actions are proposed:

1. In many cases, site restoration will not be needed and natural recolonization or regrowth of native plants can occur. We recommend that only sites more than 25 square meters of dense giant hogweed should be considered for restoration planting. Smaller sites or sites with sparse giant hogweed cover should be left to naturally revegetate.

2. Planting should only be undertaken once control methods are complete to reduce the potential conflict between protecting planted stock and controlling emerging giant hogweed plants.
3. Native shrubs and trees should be used for revegetation. In shaded sites (stream ravine), salmonberry (1 gallon), sword fern (1 or 2 gallon), western red cedar (2 gallon), and grand fir (2 gallon) should be planted. Trees should be spaced approximately 2.5 m apart and shrubs should be 1.0 m apart. In sunny sites (forest edges), thimbleberry (1 gallon), snowberry (1 gallon), Nootka rose (1 gallon), Douglas-fir (1 or 2 gallon), western red cedar (1 or 1 gallon), and red alder (1 gallon) should be planted.
4. Planting should be undertaken in spring (April 1–May 15) or early fall (October 15–November 15) when soil moisture levels are higher.
5. Some sites may be located in inaccessible stream areas and the transport of container-grown stock may be difficult. For these sites, the transplanting of native understory species such as sword fern and young shrubs should be considered or the use of smaller plant stock such as tree plugs (western red cedar primarily).
6. Exposed soil may occur following root cutting in dense patches. We recommend a general coastal revegetation (grass seed) mixture without fall rye, preferably that is a grade of Common #1 Forage Mixture or better to minimize the further introduction of weed seeds. Grass seed can be hand applied onto small disturbed areas or a cyclone or rotary hand seeder can be used for larger areas. Seeding should be undertaken from March 1–May 1 or from September 1–15.

Strategy 7. Monitor Giant Hogweed Populations in the Watershed

Objectives. The focus of this strategy is to measure the success of the strategy in reducing the distribution (number of sites) and abundance (number of plants) of giant hogweed in the French Creek watershed.

Monitoring is the repeated collection of measurements to assess changes over time. In the context of invasive plant management it encompasses: (1) measurements to track changes in invasive plant density and distribution on a city-wide, watershed, or habitat basis; and (2) activities to measure the success of control and restoration activities at a specific site. Site-scale monitoring is critical for measuring the success of invasive plant management projects. Most invasive plants, including giant hogweed, are persistent and difficult to control and monitoring for several years may be required to ensure control methods are appropriate, restoration plantings are successful, and to guide maintenance activities.

Actions. The following actions are proposed:

1. Use regular surveys (see Strategy 2 – Improve Inventory and Mapping) to measure the density and distribution of giant hogweed in the French Creek watershed. Use IAPP methods for data collection, management, and mapping. See [here](#) for the Invasive Alien Plant Program (IAPP) Application.

2. Monitor the number of flowering stalks each August as an indicator of total population size. Flower stalks are easily seen even from roadside surveys and are suitable for volunteer-based monitoring projects.
3. Continue the informal monitoring of control method effectiveness by visiting managed sites on a regular basis. Improve quantitative monitoring of control methods by including some fixed-plot monitoring (mortality, regeneration, seedling establishment, etc. in 5 m square plots).

PART 3. RESOURCES AND APPENDICES

Resources

The Giant Hogweed Best Practice Manual: Guidelines for the management and control of an invasive weed in Europe. Published by Forest & Landscape Denmark (C. Nielsen, H.P. Ravn, W. Nentwig, and M. Wade (eds.), 2005). [Download manual](#).

Toxic Plant Warning for Giant Hogweed. WorkSafe BC. [Download warning](#). [View video](#).

Presentation on how to identify giant hogweed. Developed by Nick Page (Raincoast Applied Ecology) for Greater Vancouver Invasive Plant Council. [Download presentation](#).

T.I.P.S. on Giant Hogweed. Produced by Invasive Plant Council of B.C. [Download factsheet](#).

Best Management Practices for Giant Hogweed. King Country Noxious Weed Control Program, King County, Washington. [Download BMPs](#).

E-Flora BC - Heracleum mantegazzianum. Electronic Atlas of the Plants of British Columbia (www.eflora.bc.ca). by Brian Klinkenberg (editor), Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. [View atlas page](#).

Invasive Alien Plants Program (IAPP). B.C. Ministry of Forests & Range. [Visit website](#).

Report-A-Weed online invasive plant reporting tool. B.C. Ministry of Forests & Range. [Visit website](#). [Launch tool](#).

Aggressive Ornamentals - Giant Hogweed. B.C. Ministry of Agriculture and Lands. [Visit website](#).

Field Guide to Noxious Weeds and Other Selected Invasive Plants of British Columbia. B.C. Ministry of Agriculture and Lands. [Visit website](#).

The Biology of Invasive Alien Plants in Canada, Giant Hogweed (Heracleum mantegazzianum). Published in the Canadian Journal of Plant Science 86 (by N.A. Page, R.E. Wall, S.J. Darbyshire, and G.A. Mulligan, 2006). [Download paper](#).

Heracleum mantegazzianum Sommier & Levier. From Biological Flora of the British Isles series published in the Journal of Ecology (by G.E.D. Tiley, F.S. Dodd, and P.M. Wade, 1996). [Download paper](#).

Ecology and Management of Giant Hogweed. Edited by P. Pyšek, M.J.W. Cock, W. Nentwig, H.P. Ravn, 2007). [Download book info](#).

References

Caffrey, J. M. 2001. The management of giant hogweed in an Irish river catchment. Journal of Aquatic Plant Management 39: 28–33.

Camm, E., Buck, H. W. L. and Mitchell, J. C. 1976. Phytodermatitis from *Heracleum mantegazzianum*. Contact Dermatitis 2: 68–72.

Dawe, N. K. and White, E. R. 1979. Giant cow parsnip (*Heracleum mantegazzianum*) on Vancouver Island, British Columbia. Canadian Field-Naturalist. 93: 82–83.

Merilees, B. 1978. Giant cow parsnip – French Creek. Federation of British Columbia Naturalists Newsletter 16 (4).

Morton, J. K. 1975. The giant cow parsnip, *Heracleum mantegazzianum*, Umbelliferae, in Canada. Canadian Field-Naturalist 89: 183–184.

Morton, J. K. 1978. Distribution of giant cow parsnip (*Heracleum mantegazzianum*) in Canada. Canadian Field-Naturalist 92: 182–185.

Otte, A. and Franke, R. 1998. The ecology of the Caucasian herbaceous perennial *Heracleum mantegazzianum* Somm. et Lev. (Giant Hogweed) in cultural ecosystems of Central Europe. Phytocoenologia 28: 205–232.

Page, N and Wall, R. 2003. *Heracleum mantegazzianum*: a nasty invasive plant species in British Columbia. Botanical Electronic Newsletter 314. [Online] Available: <http://http://www.ou.edu/cas/botany-micro/ben/> [24 November 2008].

Pyšek, P. 1991. *Heracleum mantegazzianum* in the Czech Republic: dynamics of spreading from the historical perspective. Folia Goebotánica Phytotax. (Praha) 26: 439–454.

Pyšek, P. 1994. Ecological aspects of invasion by *Heracleum mantegazzianum* in the Czech Republic. Pages 45–54. in L.C. de Waal, L.E. Child, P.M. Wade and John Brock, eds. Ecology and Management of Invasive Riverside Plants. John Wiley & Sons, Chichester, UK.

Pyšek, P. and Pyšek, A. 1995. Invasion by *Heracleum mantegazzianum* in different habitats in the Czech Republic. Journal of Vegetation Science 6: 711–718.

Tiley, G. E. D. and Philp, B. 1992. Strategy for the control of giant hogweed (*Heracleum mantegazzianum*) on the River Ayr in Scotland. Vegetation Management in Forestry, Amenity and Conservation Areas. Aspects of Applied Biology 29: 463–466.