



Anthriscus sylvestris

BEST MANAGEMENT PRACTICES FOR
Wild Chervil
in the Metro Vancouver Region

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Introduction

The impacts of invasive species on ecological, human, and economic health are of concern in the Metro Vancouver region. Successful control of invasive species requires concerted and targeted efforts by many players. This document - **“Best Management Practices for Wild Chervil in the Metro Vancouver Region”** - is one of a series of species-specific guides developed for use by practitioners (e.g., local government staff, crews, project managers, contractors, consultants, developers, stewardship groups, and others who have a role in invasive species management) in the region. Together, these best practices provide a compendium of guidance that has been tested locally by many researchers and operational experts.

Wild chervil¹ was introduced from Europe, possibly in wildflower seed mixes (Province of BC, 2002). It is widespread from Newfoundland to Ontario (Shantz, 2018) but has likely only been in the Pacific Northwest since the 1980s (King County Noxious Weed Control Program, 2018). In British Columbia, wild chervil is most common in the Fraser Valley but it is becoming established in Metro Vancouver in a variety of habitats.

Wild chervil can be mistaken for many other plants, although it is one of the first to emerge and flower in the early spring in Metro Vancouver. Like other species in the carrot plant family (Apiaceae, formerly Umbelliferae), wild chervil has deep taproots that spread aggressively and are difficult to remove. Its ability to spread vegetatively by budding and its resistance to some herbicides further complicates management (Province of BC, 2002). The lack of effective management options for wild chervil has resulted in local and international research trials; however, much of the research is based on only a few seasons of management. At this stage many gaps remain in our knowledge and recommendations for the treatment of this species are limited.

Academic institutions, government, and non-government organizations continue to study this species in British Columbia. As researchers and practitioners learn more about the biology and control of wild chervil, it is anticipated that the recommended best management practices will change. This document will be updated to reflect these changes as the information becomes available. Please check metrovancover.org regularly to obtain the most recent version of these best management practices.

1 Also known as the common names wild parsley or cow-parsley (Darbyshire, Hoeg, & Havenkort, 1999).

REGULATORY STATUS

Wild chervil is classed as a noxious weed within the Fraser Valley under the [BC Weed Control Act, Weed Control Regulation, Schedule A, Part II – Regional Weeds](#). Under this Act, “an occupier must control noxious weeds growing or located on land and premises, and on any other property located on land and premises, occupied by that person”. It is not listed as a noxious weed within Metro Vancouver.

Section 2 (1) (b) (iii) of the [Community Charter, Spheres of Concurrent Jurisdiction](#), states that “municipalities may regulate, prohibit and impose requirements in relation to control and eradication of alien invasive species”, which includes wild chervil.

IMPACTS

Wild chervil outcompetes native plants in a variety of ecosystems. It can grow in wet areas and is particularly damaging in riparian habitats. Wild chervil spreads rapidly along transportation and utility corridors, forming linear monocultures. The plant can also compete with pasture and hay crops, reducing forage and production (Invasive Species Council of BC, 2019). Although livestock will graze it when it is immature, once mature it is unpalatable and livestock will avoid it (Province of BC, 2002).

A number of species of the *Apiaceae* plant family, including wild chervil, are hosts to parsnip yellow fleck virus (PYFV) (Darbyshire, Hoeg, & Havenkort, 1999). The virus is spread by aphids and can infect edible crops such as carrots and celery (Invasive Species Council of BC, 2019). One study in the Netherlands attributed death of cultivated carrot crops from the PYFV strain carried by wild chervil (Darbyshire, Hoeg, & Havenkort, 1999).

Wild chervil may cause skin irritation; it is recommended to wear gloves when handling the plant (King County, 2019).



CREDIT: ISCMV

REPRODUCTION AND SPREAD

Wild chervil spreads rapidly both by seed and plant fragments. Researchers in the Netherlands found only 21% of new plants originated from seeds in dense stands, while the remaining 79% formed vegetatively. This study concluded that vegetative reproduction is the most important growth mechanism for maintaining and increasing established wild chervil populations, whereas sexual reproduction is more important for establishing new populations (although results are dependent on environmental conditions) (van Mierlo & Groenendael, 1991).

After cutting or mowing, wild chervil plants can flower again in 1-2 weeks (Province of BC, 2016). A mature plant can produce 800-10,000 seeds (Darbyshire, Hoeg, & Havenkort, 1999). Seeds are short-lived, with most germinating in the spring after being formed the previous year, and thus do not form a persistent seedbank (van Mierlo & Groenendael, 1991). Seeds have no special dispersal mechanism.

Experiments in fresh and saltwater indicate that wild chervil seeds quickly sink and are unlikely to be dispersed by water (Darbyshire, Hoeg, & Havenkort, 1999); however, birds and humans aid in seed transport (Province of BC, 2002). Seeds spread easily through contaminated equipment and soil; it is likely that human activities are the main cause of spread along transportation corridors (King County Noxious Weed Control Program, 2018).

Buds (also called side rosettes) can form at the top of the root crown allowing the plant to spread vegetatively (Darbyshire, Hoeg, & Havenkort, 1999). Buds develop taproots and form new plants the following year.

Although it is not known to be sold as a potted plant, wild chervil has been found in UK wildflower seed mixes (Province of BC, 2002).

HABITAT AND DISTRIBUTION

Wild chervil can be found in a variety of conditions but prefers wet to moist disturbed sites. It can tolerate part-shade but prefers open sites (King County Noxious Weed Control Program, 2018). It grows along ditches, roadsides, rail corridors, fence lines, stream banks, fields, wood margins (Klinkenberg, 2019) and utility right of ways (Crosby, 2018). Fertilizers or other forms of nutrient enrichment enhance wild chervil growth (Darbyshire, Hoeg, & Havenkort, 1999).

In BC it is found predominately in the Fraser Valley. It is not yet widespread in Metro Vancouver, although it is abundant along railway and road corridors and ditches in South Vancouver, Richmond and Delta, and along highways in Richmond, Surrey and the Township of Langley. It is also scattered throughout the region in smaller populations. It is currently rare on the North Shore.

CLIMATE ADAPTATION

Climate modellers predict that the Metro Vancouver region will experience warmer temperatures; a decrease in snowpack; longer dry spells in summer months; more precipitation in autumn, winter and spring; more intense extreme events; and an extended growing season. In the past, our region had an average of 252 days in the growing season. In lower elevations 45 days will be added to the growing season by the 2050s, and 56 days by the 2080s, resulting in nearly a year-round growing season of 357 days on average. In higher elevation ecosystems the growing season length will increase by 50% to 325 days by the 2080s (Metro Vancouver, 2016). These changes will stress many sensitive ecosystems, increasing their vulnerability to invasive species.

The life history of wild chervil is dependent on the local soil moisture, nutrient regime, and climatic conditions (Darbyshire, Hoeg, & Havenkort, 1999). It can grow as an annual, biennial, or short-lived perennial herb. This variability will likely influence its ability to adapt to future climate changes. No specific information on how wild chervil will

adapt to climate change was found in the literature, but it is speculated that this plant species may benefit from our future climate in several ways:

- **Extended growing season:** Wild chervil emerges and flowers in the early spring in Metro Vancouver. Green, mushroom-shaped rosettes can overwinter or appear as early as February (Province of BC, 2016). As an early emergent species, wild chervil may be able to capitalize on phenological gap opportunities earlier in the growing season.
- **Longer summer drought periods:** The taproot allows wild chervil to be drought-tolerant (Lilley & Page, 2010).
- **Increased precipitation and flooding:** Wild chervil seeds sink quickly, so spread by seeds in stormwater runoff should be limited. Increased flooding events may encourage the spread of wild chervil fragments, which can propagate new plants.

With these kinds of competitive advantages, this species is more adaptable than native species in a variety of ecosystems. Its ability to reproduce in multiple ways and ability to spread quickly suggest that it will be able to withstand, and possibly thrive, with changing climate conditions.

Identification

Unless otherwise noted, the following identification information was collected from the Province of BC, 2002.

Lifecycle: Annual, biennial, or short-lived perennial herb. It usually forms a rosette in the first year and flowers in the second to fourth year (Darbyshire, Hoeg, & Havenkort, 1999). Green, mushroom-shaped rosettes can overwinter or appear as early as February in the region (Province of BC, 2016). Plant death occurs after seeds are produced (King County Noxious Weed Control Program, 2018), starting in late spring (June) in Metro Vancouver.

Stem: Entirely green, hollow, ridged, and branching; commonly 0.3-1.2 metres tall although can reach heights of 1.8 metres. Upper portions of the stem are smooth, lower portions can be hairy (King County Noxious Weed Control Program, 2018). A fringe of hairs is visible at stem nodes.

Leaves: Both basal and alternate stem leaves are present, shiny green, fern-like and triangular in shape and finely divided into smaller leaflets. The bases of the leaves clasp the stem. Basal leaves are most prominent; stem leaves tend to be reduced in size higher up the stem (King County Noxious Weed Control Program, 2018). Foliage has a slightly sweet, musty odor.

Flowers: Small white flowers in umbrella-like clusters (umbels), on 2 centimetre stalks opposite the upper leaves. Five notched petals. Flowers in the outer part of the umbel have larger petals (Darbyshire, Hoeg, & Havenkort, 1999). Flowers appear as early as March in Metro Vancouver and may continue throughout the growing season (Province of BC, 2016).

Fruits: Each flower produces two jointed, slender 6-7 millimetre long seeds with a pronounced beak (point) about 1/3 the length of the seed. Seeds can appear joined in pairs at the beak, green at first then shiny brown at maturity. Seeds ripen June through July. Can set seed one or more times per year (Darbyshire, Hoeg, & Havenkort, 1999). Seed viability is thought to be 1-2 years (King County Noxious Weed Control Program, 2018) with most seeds germinating the year after production (van Mierlo & Groenendaal, 1991).

Roots: Thick, tuberous taproots up to 2 metres long. Local expansion of existing populations is largely due to vegetative growth from root buds.

The following photos show wild chervil plant parts.



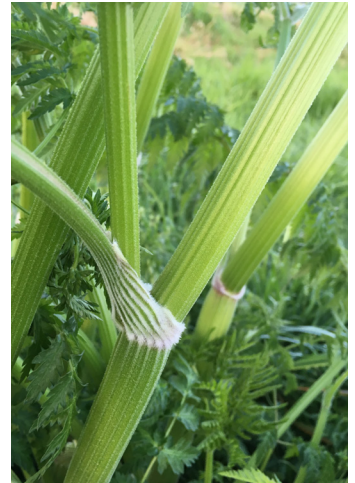
Leaf emergence
"mushrooms" in late
winter/early spring
CREDIT: ISCMV



Full bloom in spring
CREDIT: ISCMV



Fall/winter with dead stems
CREDIT: ISCMV



Stem, branches, and node
CREDIT: ISCMV



Leaves
CREDIT: ISCMV



Wild chervil plant with
taproot (this plant had
been mowed repeatedly
for several years, which
encourages taproot growth)
CREDIT: BOB DRINKWATER



Inflorescence
CREDIT: ISCMV



Seeds
CREDIT: ISCMV

SIMILAR SPECIES

There are many members of the Apiaceae (carrot) plant family in BC, some native and many non-native, including other high priority invasive species. While the stems and foliage of wild chervil are not considered poisonous, other members of this plant family are acutely poisonous.

The most common look-alike plants are described below, with the features that distinguish them from wild chervil underscored. Wild chervil is one of the first plants to emerge and flower in the spring in Metro Vancouver. Its stems are entirely green, furrowed and with a fringe of hair at the stem nodes, and it is rarely seen in gardens (Darbyshire, Hoeg, & Havenkort, 1999).

NATIVE SPECIES

- Cow parsnip (*Heracleum maximum*) is 1-3 metre tall with green stems with few purple spots. Leaves are long compound, palmate-shaped, and divided into 3 segments (Klinkenberg, 2019).
- Water parsley (*Oenanthe sarmentosa*) appears less upright and tends to grow in wetter areas (Klinkenberg, 2019).



Cow parsnip

CREDIT: ISCMV



Water parsley

CREDIT: DSCN0470 BY
GERTJANVANNOORD (FLICKR)

NON NATIVE SPECIES

- Bur chervil (*Anthriscus caucalis*) is an annual herb with hairy leaves and seeds covered in short, hooked burs (Province of BC, 2002). It is smaller than wild chervil (King County Noxious Weed Control Program, 2018) with less conspicuous umbels. It is found in sunnier and drier habitats compared to wild chervil (Darbyshire, Hoeg, & Havenkort, 1999) and has been found in several places on Vancouver Island including Comox, Cowichan Valley, and Nanaimo (ISCBC, 2019). Bur chervil is classed as a noxious weed within all regions of the province under the *BC Weed Control Act*, Weed Control Regulation, Schedule A, Part I.
- Poison hemlock (*Conium maculatum*) is taller (0.5-3 metres in height) than wild chervil (Klinkenberg, 2019), has hairless, slightly wavy stems with distinct purple spots (King County Noxious Weed Control Program, 2018). Leaves are large with a similar shape as wild chervil but lighter green (King County, 2019). All parts of the plant are poisonous, especially if ingested. Found in isolated populations in Metro Vancouver.
- Queen Anne's lace/wild carrot (*Daucus carota*) has larger flowers that are densely arranged in flat umbels often with a red/pink central flower (King County Noxious Weed Control Program, 2018). Umbels have a distinct ring of long thin bracts around the base (King County, 2019). Mostly basal leaves. Toxic if large quantities eaten, also causes skin irritation. It is a common weed in Metro Vancouver, flowering in late spring and summer.
- Giant hogweed (*Heracleum mantegazzianum*) is a high priority invasive species in Metro Vancouver due to its toxicity. It is the largest member of the Apiaceae family reaching heights of 2-5 metres (Klinkenberg, 2019). The leaves and flowers are much larger than wild chervil. Stems usually have many purple spots.

- Wild parsnip/common parsnip (*Pastinaca sativa* L.) has yellow flowers and pinnately compound leaves that are not fern-like (Klinkenberg, 2019). It is rare in southwest BC.

- Sweet cicely (*Myrrhis odorata*) is fragrant when crushed and has longer seeds (Darbyshire, Hoeg, & Havenkort, 1999). It is rare in BC. (Klinkenberg, 2019).



Bur chervil

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Poison hemlock

CREDIT: OHIO STATE WEED LAB, THE OHIO STATE UNIVERSITY, BUGWOOD.ORG



Queen Anne's lace / wild carrot

CREDIT: CHRIS EVANS, UNIVERSITY OF ILLINOIS, BUGWOOD.ORG



Giant hogweed

CREDIT: ISCMV



Wild parsnip

CREDIT: LESLIE J MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG



Sweet cicely

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Tracking

The provincial government maintains the [Invasive Alien Plant Program \(IAPP\) application](#) (BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development 2017), which houses information pertaining to invasive plant surveys, treatments, and monitoring. Many agencies, including local governments, have their own internal invasive species inventory and mapping protocols that are used by staff, contractors, and, in some cases, the public. For example, the City of North Vancouver has its own system called AlienMap. Agencies in British Columbia that do not enter data into IAPP are encouraged to check it regularly because it contains public reports and data from other agencies and it is important to consider as much data as possible when making management decisions. The Map Display module of IAPP is publicly accessible.

Since wild chervil can be mistaken for many other species, it is important to ensure proper identification. It is most effective to conduct a targeted inventory in late winter or early spring when the plant first emerges or when it begins to flower. There is a small window of time during which wild chervil is more conspicuous before other plants emerge and flower.

When carrying out a wild chervil inventory it is useful to record the following information as it will later inform treatment plans:

- Size and density of infestation;
- Location in relation to the 10 metre Pesticide Free Zone adjacent to water courses;
- Location in relation to other water sources, such as wells;
- Type of habitat; and
- Growth stage (can help identify urgency and effective treatment options).

Reporting

Please report wild chervil occurrences to:

- The Provincial Report Invasive Species program (via smart phone app www.gov.bc.ca/invasive-species).
- The Invasive Species Council of Metro Vancouver: 1-604-880-8358 or www.iscmv.ca.
- The municipality where the wild chervil was found.
- The landowner directly – If the landowner is unknown, the [Invasive Species Council of Metro Vancouver](#) can provide support to identify the appropriate authority.

Reports submitted through these channels are reviewed by invasive species specialists who coordinate follow-up activities when necessary with the appropriate local authorities.

Prevention and Control Strategies

Effective invasive plant management may include a variety of control techniques ranging from prevention, chemical, manual, mechanical, biological, and/or cultural methods.

The BC Ministries of Transportation and Infrastructure, and Forests, Lands, Natural Resource Operations and Rural Development (2016) recommend prioritizing treatment to:

- Small, isolated sites (<300 metres²)
- Large sites and clusters of sites at greatest risk of spread (e.g. gravel pits, heavily travelled roads), and/or
- Sites threatening sensitive habitats

Most experts and wild chervil researchers agree a consistently applied integrated pest management approach should involve a wide array of treatments techniques applied within the same season. For example, in Washington State, trials were conducted using pre-bloom mowing, herbicide application, and tillage, followed by seeding with well-adapted perennial grasses (Miller & D’Auria, 2011). Metro Vancouver researcher Shantz (2018) recommends the following uninterrupted, annual prescription for wild chervil in large old field habitats for several years:

1. Pre-bloom mowing – preparation for tilling (June); vegetation does not need to be removed from site
2. Tilling – early-season (June) & drought-season (late July or early August)
3. Post-treatment re-vegetation or grass seeding – early fall
4. Herbicide – for subsequent spot treatments or inaccessible areas
5. Commitment and monitoring – treatment regime must be applied consistently, annually and uninterrupted for several years to obtain meaningful results

Of course, all of these methods are not appropriate for all sites; however, multiple treatment methods should be considered for this species. Each method is described below by effectiveness on their own and how efficacy can be improved in combination with other methods. Practitioners are encouraged to experiment with methods and timing in order to achieve desired results. Follow-up monitoring and treatment will be required for several years regardless of the treatment technique(s).

STRATEGY COLOUR LEGEND

GREEN: RECOMMENDED

ORANGE: CAUTION

RED: NOT RECOMMENDED OR NOT AVAILABLE



CREDIT: CITY OF SURREY

PREVENTION: IMPERATIVE

Prevention is the most economical and effective way to reduce the spread of wild chervil over the long term.

It is imperative to manage new infestations immediately to prevent establishment of extensive root systems (Province of BC, 2002).

When working in or adjacent to wild chervil, it is best to inspect and remove plants, plant parts, and seeds from personal gear, clothing, pets, vehicles, and equipment and ensure soil, gravel, and other fill materials are not contaminated with wild chervil before leaving an infested area. Plants, plant parts, and seeds should be tarped or bagged before transport to an appropriate disposal site (see Disposal section).

Review seed mixes carefully as wild chervil has been found in some wildflower seed mixes (Province of BC, 2002). The Invasive Species Council of BC's ['Grow Me Instead'](#) Program or [Metro Vancouver's Grow Green website](#) provide recommendations for non-invasive, drought-tolerant plants, and garden design ideas. All materials (e.g., topsoil, gravel, mulch, compost) should be weed-free. Healthy green spaces are more resistant to invasion by invasive plants, so it is also important to maintain or establish healthy plant communities.

MANUAL/MECHANICAL: RECOMMENDED

Timing and life stage of wild chervil must be carefully considered as “early removal of the flowering stem promotes sexual reproduction, whereas late removal or no removal allows the formation of vigorous clonal offspring” (van Mierlo & Groenendael, 1991). At established sites, vegetative reproduction is more common, but cutting early in the flowering season may stimulate extra flowering and diminish the risk of strong vegetation spread that season. Careful consideration should be given to scheduling while using the following manual/mechanical methods for wild chervil management.

- **Pulling or digging** can be effective for individual rosettes and immature plants, although care must be taken to remove the entire taproot to prevent regrowth (Province of BC, 2002). If soils are heavy and fine, pulling may result in breakage of the tap root, which should be avoided (Province of BC, 2016). If plants have mature seeds, the seed heads should be cut first and bagged (King County Noxious Weed Control Program, 2018).

This method may be used for follow-up treatment after herbicide application (Province of BC, 2016). After mowing, plants may have developed extensive tap roots and pulling or digging may be ineffective (Province of BC, 2016).

- **Tilling** is the use of machinery to turn over and break up soil (also called disking). Tillage works to control wild chervil by bringing the taproots to the surface so they will dry out. This method can be used before or after herbicide treatment. During tilling trials at Campbell Valley Regional Park in the Township of Langley, Shantz (2018) saw a significant decrease in wild chervil productivity 12 months after tilling. There was no difference detected in plots treated exclusively with tilling and those that were tilled and re-seeded.

Pre-treatment mowing or cutting may increase the effectiveness of tilling (Miller & D’Auria, 2011). Removing the cuttings after treatment (raking or hay baling) may further increase effectiveness (Shantz, 2018).

Typically tilling is only feasible in field settings where it is appropriate to use large machinery. Tilling is often done with large, expensive equipment that may be difficult to source. Since tilling is not a selective method, it can only be used at sites with little to no desirable species. It should only be considered for medium to large infestations at relatively flat sites where machine access is possible.

- **Mowing** delays flowering, reduces seedling propagation, depletes taproot reserves but also extends plant life and stimulates root bud production (Darbyshire, Hoeg, & Havenkort, 1999). This method may deplete the plants reserves and minimize spread but will not reduce populations even when repeated several times over many years (Province of BC, 2016). Mowing is best used at sites >25 m² where herbicide application is not permitted (Province of BC, 2016) and must be completed prior to seed set, around mid-June (Province of BC, 2002).

A mowing experiment conducted on four different wild chervil growth stages yielded no significant difference in root budding and therefore timing of mowing is not likely a factor (Darbyshire, Hoeg, & Havenkort, 1999) except to mow before flowering to avoid seed spread. Furthermore, mowing either once or twice per season makes no difference in wild chervil biomass (Beaton, 2014).

Mowing can be used prior to tilling to remove biomass and is beneficial when used prior to herbicide treatment (Miller & D’Auria, 2011).

- **Seed head clipping** by hand can be used as a containment measure to prevent the release of seeds but it is not an effective control method on its own (King County Noxious Weed Control Program, 2018). Cutting of flowering plants early in the season, while the flowering stems are still immature, results in the production of a secondary

inflorescence originating from buds in the axis of the old leaves (van Mierlo & Groenendael, 1991). Therefore, this method is best employed when the flowering stem is close to maximum height and growth so no secondary flowering stems grow (Darbyshire, Hoeg, & Havenkort, 1999).

This method will also be more effective on small, newly established populations where budding may not yet be the main form of spread (on established populations, vegetative propagation is more important for population growth than sexual reproduction) (van Mierlo & Groenendael, 1991). If seeds are already mature, it is still possible to clip and use garbage bags to collect the seeds heads, taking care not to disperse the seeds (King County Noxious Weed Control Program, 2018).

REMOVAL TIMING

When possible, control should be done before the plants flower to prevent seed production (King County Noxious Weed Control Program, 2018). Due to the early emergence and flowering of this species, management planning will require early planning and coordination.

APPLYING MANUAL/MECHANICAL CONTROL METHODS IN RIPARIAN AREAS

Wild chervil often grows in large contiguous patches right up to the edge of water courses. Consider the impact of control techniques and the resulting bare soil on the adjacent aquatic environment. Schedule removal works during a period of least risk to fish species, outside of the [fish window](#). Adhere to provincial and federal riparian regulations. It is recommended to consult with a qualified environmental professional when working around water bodies.



CREDIT: ISCMV

CHEMICAL: RECOMMENDED

When alternative methods to prevent or control invasive plants are unsuccessful, professionals often turn to herbicides. Chemical control may be required to control large wild chervil infestations that are not feasible to only control manually/mechanically, but this method should be used with caution for the following reasons (Crosby, 2018):

1. Weather conditions greatly influence treatment efficacy.
2. Wild chervil often grows in riparian areas where pesticide use is restricted; and
3. Native vegetation is often integrated with wild chervil infestations. Mortality of non-target plants is possible.

Researchers have found that wild chervil is resistant to many herbicides (Darbyshire, Hoeg, & Havenkort, 1999). This presents a challenge when other management methods don't work and chemical control is desired. Tilling, mowing, and other manual and mechanical methods may be impossible or impractical at some sites and herbicide application is often recommended in these cases (Shantz, 2018).

With the exception of substances listed on Schedule 2 of the [BC Integrated Pest Management Regulation](#), the use of herbicides is highly regulated in British Columbia. Site characteristics must be considered with herbicide prescribed, based on site goals and objectives and in accordance with legal requirements. [This summary of BC's Integrated Pest Management Act](#) provides an overview of the provincial legislation.

PESTICIDE LICENCE AND CERTIFICATION

A valid pesticide licence is required to:

- offer a service to apply most pesticides;
- apply most pesticides on public land including local government lands²; and
- apply pesticides to landscaped areas on private land, including outside office buildings and other facilities.

Pesticides (e.g., herbicides, insecticides, fungicides) are regulated by the federal and provincial government, and municipal governments often have pesticide bylaws.

- Health Canada evaluates and approves chemical pest control products as per the [Pest Control Products Act](#).
- The [BC Integrated Pest Management Act](#) sets out the requirements for the use and sale of pesticides in British Columbia. This Act is administered by the Ministry of Environment and Climate Change Strategy.
- Several municipalities have adopted bylaws that prohibit the use of certain pesticides.

Everyone who uses pesticides must be familiar with all relevant laws.

² on up to 50 ha/year by a single organization. Organizations looking to treat over 50 hectares of land per year are also required to submit a Pest Management Plan and obtain a Pesticide Use Notice confirmation.

ONLY companies or practitioners with a valid Pesticide Licence and staff who are certified applicators (or working under a certified applicator) may apply herbicide on invasive plants located on public lands in British Columbia. Applicators must be either the land manager/owner or have permission from the land manager/owner prior to herbicide application.

On private property the owner may obtain a Residential Applicators Certificate (for Domestic class products only) or use a qualified company. Residents do not require a Residential Applicator Certificate for certain uses of domestic class glyphosate including treatment of plants that are poisonous for people to touch, invasive plants and noxious weeds listed in legislation, and weeds growing through cracks in hard surfaces such as asphalt or concrete. Refer to the 'Pesticides & Pest Management' and 'Home Pesticide Use' webpages listed in the Additional Resources Section for more information.

Questions? Contact the BC Integrated Pest Management Program: Telephone: (250) 387-9537

Email: bc.ipm@gov.bc.ca

Pesticide applicator certificates can be obtained under the category 'Industrial Vegetation Management' to manage weeds on industrial land, roads, power lines, railways, and pipeline rights-of-way for control of noxious weeds on private or public land. However, since wild chervil is not a regulated noxious weed in the Metro Vancouver region, the 'Landscape' certification category is needed for herbicide use on public and private lands. Assistant applicator training is also available and the [online course and exam](#) are free.

It is best practice for personnel supervising or monitoring pesticide contracts to also maintain a pesticide applicator licence so they are familiar with certification requirements.

For more information on how to obtain a licence and the requirements when working under the provincial [Integrated Pest Management Act and Regulation](#), please review the Noxious Weed & Vegetation Management section on this webpage: gov.bc.ca/PestManagement.

HERBICIDE LABELS

Individual herbicide labels must always be reviewed thoroughly prior to use to ensure precautions, application rates, and all use directions, specific site and application directions are strictly followed. Under the federal Pest Control Products Act and the BC Integrated Pest Management Regulation, **persons are legally required to use pesticides (including herbicides) only for the use described on the label and in accordance with the instructions on that label.** Failure to follow label directions could cause damage to the environment, create poor control results, or pose a danger to health. Contravention of laws and regulations may lead to cancellation or suspension of a licence or certification, requirement to obtain a qualified monitor to assess work, additional reporting requirements, a stop work order, or prohibition from acquiring authorization in the future. A conviction of an offence under legislation may also carry a fine or imprisonment.

Herbicide labels include information on both the front and back. The front typically includes trade or product name, formulation, class, purpose, registration number, and precautionary symbols. Instructions on how to use the pesticide and what to do in order to protect the health and safety of both the applicator and public are provided on the back (BC Ministry of Environment, 2011).

Labels are also available from the Pest Management Regulatory Agency's [online pesticide label search](#) or [mobile application](#) as a separate document. These label documents may include booklets or material safety data sheets (MSDS) that provide additional information about a pesticide

product. Restrictions on site conditions, soil types, and proximity to water may be listed. If the herbicide label is more restrictive than provincial legislation, the label must be followed.

HERBICIDE OPTIONS

The following herbicides can be used on wild chervil. Unless otherwise noted, information is from Drinkwater (2015) and BC Ministries of Transportation and Infrastructure, and Forests, Lands, Natural Resource Operations and Rural Development (2016).

ACTIVE INGREDIENT (EXAMPLE BRAND NAMES)+	APPLICATION	PERSISTENCE	GROWTH STAGE	TYPE++	COMMENT
Aminopyralid + metsulfuron-methyl (e.g. Clearview™)*	foliar application	residual	before bud stage or early flowering	selective	Use with a surfactant, season-long residual effect will control new seedlings, can only be used once per season
Aminocyclopyrachlor + Chlorsulfuron (e.g. Truvist™)*	foliar application	residual	young, actively growing plants	selective	Use with a surfactant, can be used more than once a year, but consider using a different herbicide + surfactant for second treatment
Diflufenzopyr (example: Overdrive™)*	foliar application	short residual	actively growing	selective	
Dicamba, 2,4-D + Mecoprop-P (e.g. Dyvel DSp™)	foliar application	short residual (will not control germinates)	actively growing, before flowering	selective	Maximum two treatments per season, 2,4-D products not currently permitted on BC Ministry of Transportation and Infrastructure jurisdiction
Imazapyr (e.g. Arsenal™)	foliar application	residual	young, actively growing	non-selective	Only use in non-crop and non-grazed sites

ACTIVE INGREDIENT (EXAMPLE BRAND NAMES)+	APPLICATION	PERSISTENCE	GROWTH STAGE	TYPE++	COMMENT
Glyphosate (many products)	foliar application	non-residual	young, actively growing (effectiveness will decrease once plants bolt)	non-selective	Limited efficacy on wild chervil compared to other herbicides, preferred herbicide to use in gravel pits due to reduced risk of movement and leaching, can impact trees with roots within or adjacent to the treatment area
Metsulfuron (e.g. Escort™)	foliar application	residual	actively growing	selective, no effect on grasses	Surfactant required
Aminopyralid (e.g. Milestone™)	foliar application	residual	actively growing	selective, no effect on grasses	Should avoid using under the dripline of trees
2-4 D Amine	foliar application	short residual	actively growing	selective	Most effective when applied early in the spring (Darbyshire, Hoeg, & Havenkort, 1999), 2,4-D products not currently permitted on BC Ministry of Transportation and Infrastructure jurisdiction
Dicamba (e.g. Banvel™)	foliar application	short residual	actively growing	selective	Provides poor control (Darbyshire, Hoeg, & Havenkort, 1999)

+ The mention of a specific product or brand name of pesticide in this document is not, and should not be construed as, an endorsement or recommendation for the use of that product.

++ Herbicides that control all vegetation are non-selective, while those that control certain types of vegetation (e.g., only grasses or only broadleaf plants) are termed selective.

* Most recommended herbicides based on Drinkwater (2015) and Beaton (2014).

HERBICIDE MIXES

As suggested in the herbicide table above, chemical control of wild chervil may be best accomplished with an herbicide that has multiple active ingredients or with herbicide mixes.

Drinkwater and partners (2015) conducted a number of trials on herbicides and herbicide combinations at pasture sites in the Fraser Valley. Results varied between the same season and following season monitoring. After 10 months, none of the treatments yielded acceptable control (Drinkwater, 2015). The trials did not provide strong recommendations for multi-year control of wild chervil. For seasonal control and some effect the following year, the following herbicides/ combinations showed the best results:

- Aminopyralid + metsulfuron-methyl (example: Clearview™)
- Aminopyralid + metsulfuron-methyl (example: Clearview™) + 2,4-D
- Diflufenzopyr (example: Overdrive™)

Results indicate that further testing of herbicides on wild chervil are warranted.

In fine textured soils, residual herbicides may be more effective (Province of BC, 2016). For eradication of large sites, the Ministries of Transportation and Infrastructure, and Forests, Lands, Natural Resource Operations and Rural Development (2016) recommend treatment with a selective herbicide with some residual activity or a non-selective herbicide followed by seeding (see Restoration section below).

APPLYING PESTICIDE IN RIPARIAN AREAS

Provincial legislation prohibits the use of herbicides within 10 metres of natural water courses and 30 metres of domestic or agricultural water sources on public lands. On private lands herbicide labels need to be followed (which means for glyphosate products treatment can happen up to the water's edge) and other restrictions may apply (e.g. industrial sites, forestry sites, golf courses, etc.). On public lands, glyphosate is the only active ingredient that can be applied within the 10 metre Pesticide-Free Zone (PFZ)³ in British Columbia in accordance with the BC *Integrated Pest Management Act* and Regulation and all public land Pesticide Management Plans (PMPs), but not within 1 meter of the high water mark (HWM)⁴. A plant must be either a listed Noxious Weed (under the [BC Weed Control Act](#)) or appear in the *Forest and Range Practices Act Invasive Plants Regulation* to be treated within the 10 metre PFZ. **Wild chervil is only classed as a noxious weed in the Fraser Valley Regional District and not listed for Metro Vancouver and therefore glyphosate and other herbicides can only be applied on wild chervil up to 10 metres away from the high water mark.** The 30 metre no-treatment zone around a water supply intake or well used for domestic or agricultural purposes may be reduced if the licensee or PMP holder is "reasonably satisfied" that a smaller no-treatment zone is sufficient to ensure that pesticide from the use will not enter the intake or well.

3 The Pesticide-Free Zone (PFZ) is an area of land that must not be treated with pesticide and must be protected from pesticide moving into it, under the *Integrated Pest Management Act* and Regulation.

4 The High Water Mark (HWM) is defined as the visible high water mark of any lake, stream, wetland or other body of water where the presence and action of the water are so common and usual and so long continued in all ordinary years as to mark upon the soil of the bed of the lake, river stream, or other body of water a character distinct from that of the banks, both in vegetation and in the nature of the soil itself. Typical features may include, a natural line or "mark" impressed on the bank or shore, indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial

When managing wild chervil with herbicide in riparian areas:

- Observe and mark all PFZs while on site.
- The HWM should be determined by careful evaluation by the applicator.
- Distances in PFZs should be measured as horizontal distance.
- Herbicides restricted in a PFZ must not enter these zones by leaching (lateral mobility) through soil or by drift of spray mist or droplets.
- Treatments should be conducted when water levels are low (e.g. summer months) to reduce risk.
- Note that efficacy may be dependent on site conditions, including moisture in the soil.

APPLICATION METHODS

Foliar application can be undertaken by hand, backpack, or boom sprayer. The herbicide table above suggests optimal treatment times depending on the active ingredient. Note that the treatment timing window for wild chervil is short, usually April-June in Metro Vancouver (before the plants go to seed and start breaking down). Application completed at the bloom stage will provide more effective long-term control than the same herbicide applied at other growth stages (Beaton, 2014). If residual control is desired herbicide treatments may be less effective when there is dense upper stem foliage or if there are other plants surrounding the chervil that may prevent basal leaf and ground coverage, and therefore herbicide application should be completed earlier in this case (Drinkwater, 2015).

Fall applications are least effective (King County Noxious Weed Control Program, 2018). When the herbicide label allows, plants should be treated twice per growing season (Shantz, 2018).

Miller and D’Auria (2011) found that tillage following herbicide application resulted in effective control compared to herbicide treatment without tillage. Shantz (2018) found that glyphosate treatment significantly decreased wild chervil productivity, one year after treatment, only when followed by seeding.

Follow-up spot treatment can be conducted by pulling, digging and/or selective herbicide application (Province of BC, 2016).

CULTURAL: CAUTION

- **Smothering** is the use of a cover material installed on top of plants to block them from accessing light and air, thereby preventing photosynthesis and encouraging decomposition. This method is costly, compacts soils, is non-selective, time-consuming and will likely require significant follow-up after treatment and is only recommended for wild chervil at large sites close to a water body or where herbicide treatments are not permitted (Province of BC, 2016). Smothering materials such as landscape fabric, mulch, carpet or recycled conveyor belt rubber must be in place for at least five years (Province of BC, 2016). Care must be taken when selecting cover materials as there is a potential for leaching of toxic chemicals into soils or watercourses. Re-vegetation or re-seeding is required after smothering.

vegetation, or other distinctive physical characteristics. The area below the high water mark includes the active floodplain (BC Ministry of Environment, 2011).

• **Grazing** has long been associated with reduced abundance of wild chervil relative to adjacent non-grazed areas, or when comparing the same pasture between grazed vs. non-grazed years (Darbyshire et al., 1999; DiTomaso & Kyser, 2013; Hansson & Persson, 1994; Hellström et al., 2003; Wagner, 1967). Like other control methods, grazing will not be effective on its own but may be used as a complementary method as part of a larger integrated pest management plan. Miller, Tarasoff & Salmon (2021) recommend annually pulling/digging followed by grazing and/or mowing applied with as much frequency as opportunistically possible within each growing season over 2 years, with ongoing monitoring and consistent follow up treatments as necessary. Miller, Tarasoff & Salmon (2021) also provide information about the legal and logistical considerations associated with

targeted grazing. Grazing opportunities may be limited in urban areas due to municipal bylaws regulating agriculture animals, the high probability of interface with the public, and the damage animals could cause to riparian areas and other sensitive sites with multiple land uses.

• **Burning** is not effective on wild chervil due to the extensive root system.

BIOLOGICAL: NOT AVAILABLE

There are no known biological control agents for wild chervil.



CREDIT: CITY OF SURREY

CONTROL SUMMARY

The following table provides a summary and comparison of control methods for wild chervil.

CONTROL STRATEGY	TECHNIQUES	APPLICABLE SITE TYPE	PROS	CONS
Manual	Pulling, digging	Individual rosettes, immature plants, small sites, follow-up after chemical control	Selective, low risk to environment	Must remove entire taproot, creates disturbance, labour intensive
Mechanical	Tilling	Typically only feasible in fields, medium to large infestations, flat sites where machine access is possible	Kills taproots, less labour intensive	Requires trained staff and specialty equipment, costly, damaging, non-selective, low long-term efficacy unless combined with other methods
Chemical	Foliar application	Large sites (>25 m ²) except in environmentally sensitive areas and/or where herbicide use is restricted	Treatment method for plants that cannot be managed other ways, less labour intensive, treat large areas, less disturbance of surrounding environment	Herbicide resistance, may require herbicide mixtures, unintended environmental/health impacts, high public concern, requires trained staff, specialty equipment and herbicide products, weather dependent, cannot treat within PFZ
Mechanical	Mowing	Sites > 25 m ² where herbicide application is not permitted	Pre- or post-treatment with other control methods, less labour intensive	Requires trained staff and specialty equipment, costly, damaging, non-selective, low long-term efficacy unless combined with other methods
Manual	Seed head clipping	Small sites with flowering plants almost at full height	Prevents release of seeds	Containment measure only and not an effective method on its own, may result in budding from leaf axils
Cultural	Smothering	Large sites, environmentally sensitive areas in places with minimal native vegetation or other obstacles	Low risk to environment	Challenging to implement around existing vegetation, access constraints, costly, requires significant follow-up
	Grazing	Sites where infrastructure and logistics of a grazing herd can be met	Non-chemical treatment method	Non-selective, may create disturbance and unintended environmental impacts, special permits may be required
Burning is not effective on wild chervil due to the extensive root system				
Biological	No biological control agents are currently available for distribution in British Columbia			

CONTROL SUMMARY COLOUR LEGEND

GREEN: RECOMMENDED

ORANGE: CAUTION

RED: NOT RECOMMENDED OR NOT AVAILABLE

Disposal

ON SITE DISPOSAL

After manual or mechanical control, cut material can be buried in situ on site (Shantz, 2018).

OFF SITE DISPOSAL

When disposed off site, all plant parts should be tarped or placed in thick plastic bags before transporting to an appropriate disposal or compost facility. In the Metro Vancouver region, the several facilities accept wild chervil plants and/or infested soil. Please consult [this disposal facility list](#) for current details.

PLEASE CONTACT ALL FACILITIES BEFOREHAND TO CONFIRM THEY CAN PROPERLY HANDLE THE MATERIAL.

CLEANING AND DISINFECTION⁵

Before leaving a site, all visible plant parts and soil from vehicles, equipment, and gear should be removed and rinsed if possible. When back at a works yard or wash station, vehicles should be cleaned and disinfected using the following steps:

- Wash with 180 °F water at 6 gpm, 2000 psi*, with a contact time of ≥ 10 seconds on all surfaces to remove dirt and organic matter such as vegetation parts or seeds. Pay special attention to undercarriages, chassis, wheel-wells, radiators, grills, tracks, buckets, chip-boxes, blades, and flail-mowing chains.
- Use compressed air to remove vegetation from grills and radiators.

- Sweep/vacuum interior of vehicles paying special attention to floor mats, pedals, and seats.
 - Steam clean poor access areas (e.g., inside trailer tubes) – 200 psi @ 300 °F.
 - Fully rinse detergent residue from equipment prior to leaving facility.
- * Appropriate self-serve and mobile hot power-wash companies in the Metro Vancouver area include: Omega Power Washing, Eco Klean Truck Wash, RG Truck Wash, Ravens Mobile Pressure Washing, Hydrotech Powerwashing, Platinum Pressure Washing Inc, and Alblaster Pressure Washing. Wash stations should be monitored regularly for wild chervil growth.

⁵ Adapted from Metro Vancouver 2017 Water Services Equipment Cleaning Procedures and Inspection Protocols.

Follow-up Monitoring

Whatever control method is used, follow-up monitoring and maintenance treatments are components of an integrated management plan or approach. Wild chervil sites should be monitored for up to 5 years post-treatment.

Restoration

Restoration is recommended to create competition, control wild chervil regrowth, and replace lost habitat. Planting should not take place until control of new seedlings has been conducted.

Since wild chervil is often found in pastures and fields, re-seeding may be a suitable restoration method at these sites. Re-seeding provides competition to germinating wild chervil seedlings, reduces invasion by other plants, and promotes growth of the existing grasses (Shantz, 2018). After use of a non-selective herbicide, re-seeding with a short-lived agronomic grass is essential (Province of BC, 2016). At Campbell Valley Regional Park, Shantz (2018) found the following non-native, non-invasive common agricultural grass species all established and provided good temporary cover after one year: orchardgrass (*Dactylis glomerata*), timothy grass (*Phleum pratense*), tall fescue (*Festuca arundinacea*), and an equal mixture of all three. Seeds can be spread by hand or broadcast seeded at larger sites (Shantz, 2018). It should be noted that these non-native grass species are not appropriate for use in sensitive ecosystems.

Mulch can be used to avoid leaving bare soil and reduce colonization from other invasive plant species. The International Society of Arboriculture and relevant municipal Parks or arboriculture departments offer guidelines for mulch application. Specific mulch depths can be used to control invasive weeds and encourage plant growth (International Society of Arboriculture, 2018).



CREDIT: ISCMV

Examples of common competitive native species prescribed in Metro Vancouver sites are summarized in the table below based on site moisture.

WET SITES	MOIST SITES	DRY SITES
SHRUBS		
Salmonberry	Salmonberry	Thimbleberry
Hardhack	Willow	Nootka rose
Willow	Red osier dogwood	Red flowering currant
Red osier dogwood	Red elderberry	Snowberry
Pacific ninebark	Vine maple	Tall Oregon grape
	Indian plum	Oceanspray
TREES		
Western red cedar	Western red cedar	Douglas-fir
Red alder	Red alder	Red alder

Replacement species should be chosen based on the ecology of the site by a qualified environmental professional. Local biologists, environmental professionals, agronomists, agrologists, native and domestic forage specialists, seed companies, and plant nurseries are all good sources for localized recommendations for regional native species and regionally adapted domestic species, based on site usage. Native grass seed mixes are also available. There are several science-based resources available to guide restoration efforts, such as the South Coast Conservation Program’s [Diversity by Design](#) restoration planning toolkit.

Revegetation of the site to a domestic or cultured non-native plant species composition may be considered in some circumstances. Often domestic species establish faster and grow more prolifically, which aids in resisting wild chervil re-invasion.

Wild chervil sites are often found in areas with existing, or potential, wildlife populations that can damage restoration plantings (deer, beaver, muskrat, vole, etc.). Therefore, any revegetation plan must consider impacts from wildlife and utilize appropriate mitigation measures to protect the restoration and existing native plantings (tree wrapping, exclusion caging/fencing, vole guards, etc.).

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Additional Resources

For more information please refer to the following resources.

- BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Invasive Alien Plant Program (IAPP). www.gov.bc.ca/invasive-species
- BC Ministries of Transportation and Infrastructure, and Forests, Lands, Natural Resource Operations (2016). Invasive Plant Management Guidelines on Crown Lands – Wild Chervil https://testwww.for.gov.bc.ca/hra/Plants/publications/Wild_Chervil_Treatment_Prescription_May2016.pdf
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- E-Flora BC, an Electronic Atlas of the Plants of BC. www.eflora.bc.ca/
- Grow Green Guide. www.growgreenguide.ca
- Grow Me Instead. <https://bcinvasives.ca/resources/programs/plant-wise/>
- Invasive Species Council of British Columbia, wild chervil Factsheet: https://bcinvasives.ca/wp-content/uploads/2021/01/Wild-Chervil_Factsheet_04_22_2019.pdf
- Pesticides and Pest Management. Province of British Columbia <https://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management>

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