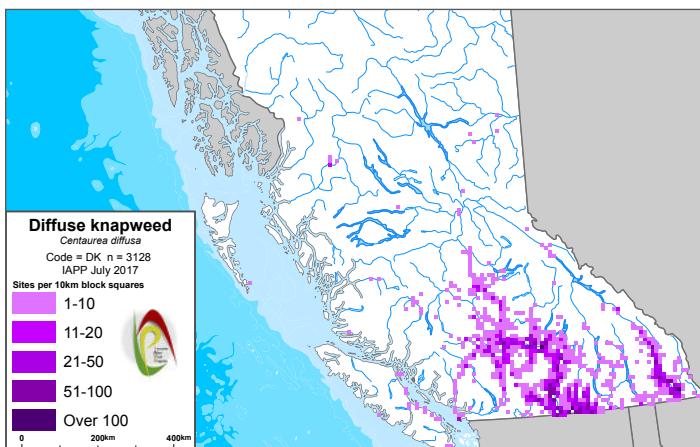
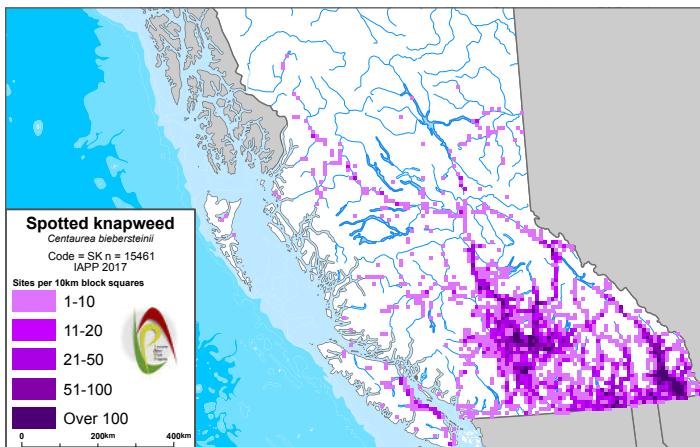


# Knapweeds

*Spotted - Centaurea biebersteinii*  
*Diffuse - Centaurea diffusa*

## Legal Status

Invasive Plants Regulation, Forest and Range Practices Act;  
 Noxious Weed (Provincial), BC Weed Control Act



## Distribution

Currently distributed throughout Southern BC and are of major concern in the Omineca, Peace River, Kootenay, Okanagan, Thompson, and Cariboo regions. Coordinated efforts in Southern BC are attempting to prevent or minimize the spread of spotted knapweed. Concerted efforts in Northern BC have resulted in the eradication or containment of spotted knapweed infestations, thus minimizing and preventing the threat of wide-scale spread.

## Identification

**Flowers:** **Spotted:** Purple, sometimes white, found individually, non-clustered, at the ends of branches. Black-tipped flower head bracts give plants a spotted appearance. **Diffuse:** White, sometimes rose-purple or lavender, broadly urn-shaped, found in clusters or solitary at the end of branches. Bracts are yellowish with a brownish margin, sometimes spotted, fringed on the sides, and terminating in a slender bristle or spine.



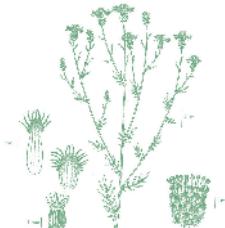
Spotted Knapweed; J. Leekie



Diffuse Knapweed; R. Mueller

**Stems:** **Spotted:** Height to 1.5 m. **Diffuse:** Height 0.1 to 0.6 m.

**Leaves:** **Spotted:** Stem leaves are multi-divided and decrease in size closer to the shoot. **Diffuse:** Stem leaves are smaller, alternate, less divided, stalkless, and become bract-like near the flower clusters. Basal leaves are stalked and divided into narrow, hairy segments.



Spotted Knapweed  
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**Fruits:** **Spotted:** Seeds are bristled. **Diffuse:** Seeds are light brown to black in colour; non-bristled.



Diffuse Knapweed  
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**Similar Species:** (i) Meadow knapweed has undivided leaves and larger flowerhead bracts with comb-like fringes at the tips; (ii) Russian knapweed has smaller flowers and no black marks on the bracts; (iii) Black knapweed has undivided leaves and loral bracts with long, black fringes from a black or dark brown triangular center; and (iv) Brown knapweed has a few egg-shaped or lance-shaped basal leaves on long stalks and solitary heads at the ends of branches with somewhat hairy bracts that have a torn appearance. Spotted and diffuse knapweeds are capable of hybridizing and it is expected to be occurring in BC; therefore, identification can be somewhat difficult.

## Ecological Characteristics

**Habitat:** Both species prefer open areas and well-drained soils and can become established in grasslands, open forests, and along roadsides and right-of-ways. Spotted knapweed is more intolerant to dense shade and prefers moister habitats than diffuse knapweed; however, spotted knapweed is still a problem in forested areas disturbed by logging, fire, or other factors. Diffuse knapweed cannot tolerate cultivation or excessive moisture and is therefore uncommon on cultivated land.

**Reproduction:** Both are biennial or short-lived perennials that reproduce solely by seed. Dormant seeds may remain viable in the soil for over 8 years, with studies indicating that some seeds may be viable for over 15 years. Both species flower in late spring/early summer (e.g. June-July) and produce mature seed in summer (e.g. July-August).

**Dispersal:** Seeds are usually dispersed in the immediate vicinity of the parent plant. They can be spread greater distances in hay, on and through animals, and on vehicles.

## Impacts

**Ecological:** The physical form of knapweed tends to be sparse compared to most native vegetation. Large infestations of spotted knapweed can increase runoff and erosion, leading to sedimentation of watercourses. Displacement of native vegetation may impact biodiversity. Dead plant material can increase risk of fire. Allelopathic properties can alter soil chemistry, preventing the growth of other plants.

## Integrated Pest Management

*IPM is a decision-making process that includes identification and inventory of invasive plant populations, assessment of the risks that they pose, development of well-informed control options that may include a number of methods, site treatment, and monitoring.*

### Prevention

- » Report infestations:
  - Regional Invasive Species Committees: [www.bcinvasives.ca/about/partners/bc-stakeholders/regional-committee-map](http://www.bcinvasives.ca/about/partners/bc-stakeholders/regional-committee-map)
  - Online: [www.gov.bc.ca/invasive-species](http://www.gov.bc.ca/invasive-species)
  - Toll Free: 1-888-933-3722
- » Avoid unloading, parking or storing equipment and vehicles in infested areas.
- » Remove plant seeds and parts from personal gear, equipment, vehicles and machinery at designated cleaning stations before leaving infested sites.
- » Treat spotted knapweed before seed set, monitor results, and re-treat to prevent seed dispersal.
- » Monitor site annually until it is knapweed-free for several consecutive years.



*Thank you to the BC Ministry of Environment and the BC Ministry of Transportation and Infrastructure for providing project funding, and to those who advised the development of these management recommendations*

## Mechanical Control

- » Pulling, cutting or mowing is most effective when completed prior to seed set. If the plants have not yet flowered, the removed plants can be left onsite, but stems should be twisted, bent or otherwise crimped.
- » If treatment is performed while flowers are present on stems, the plants must be bagged and removed from the site to prevent production of viable seeds.
- » Wherever possible, the root system should be removed to prevent re-sprouting; however, stem removal and prevention of seed set is most important.
- » Follow-up treatments will be required as knapweed has an extensive, long-lived seed bank.

## Biocontrol

- » 12 knapweed biocontrol agents have been released in BC and are most effective when used in combination.
- » Several agents show promise for a variety of habitats.
- » Evidence strongly points to a suite of biocontrol agents (seed feeders and root feeders) as the primary drivers of knapweed decline in British Columbia's Southern Interior.

## Chemical Control

Herbicide recommendations and use must consider site characteristics and be prescribed based on site goals and objectives. Herbicide labels and other sources of information must be reviewed before selecting and applying herbicides.

- » Effective herbicides include: picloram, dicamba, 2,4-D, clopyralid, aminopyralid and glyphosate.
- » Picloram has been determined most effective; however, it has residual effects.
- » Application: The use of a wick or selective spot spraying is recommended to minimize non-target damage.
- » Application of pesticides on Crown land must be carried out following a confirmed Pest Management Plan (Integrated Pest Management Act) and under the supervision of a certified pesticide applicator: [www.env.gov.bc.ca/epd/ipmp/](http://www.env.gov.bc.ca/epd/ipmp/)

## References/Links

- » BC Ministry of Forests, Lands, and Natural Resource Operations, Invasive Alien Plant Program (IAPP). [www.for.gov.bc.ca/hra/Plants/application.htm](http://www.for.gov.bc.ca/hra/Plants/application.htm)
- » Watch Out For Knapweed. Goodwin, K. and D. Burch. Montana State University. <http://www.msuextension.org/publications/agandnaturalresources/eb0179.pdf>
- » Impact of Biological Control on Two Knapweed Species in British Columbia. as explained in the research report by Gayton, D and Miller, V. JEM Vol 13, N. 3 [https://www.for.gov.bc.ca/hra/plants/publications/Gayton\\_Miller\\_knapweed.pdf](https://www.for.gov.bc.ca/hra/plants/publications/Gayton_Miller_knapweed.pdf)