



Cariboo Chilcotin Coast
Invasive Plant Committee

CARIBOO CHILCOTIN COAST INVASIVE PLANT COMMITTEE

2017

Regional Strategic Plan

FOR INVASIVE PLANT MANAGEMENT

Version 3.1

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SUMMARY

The Regional Strategic Plan for Invasive Plant Management, coordinated and updated by the Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC), has been developed to foster cooperation among management agencies by providing direction on invasive plant management in the Cariboo and Central Coast Regional Districts. This is an area of 10.8 million hectares ranging from arid grasslands to lush coastal rain forests. These diverse ecosystems are home to numerous rare ecosystems and plants, and provide important forestry, mining, agricultural, cultural, and recreational opportunities. Unfortunately, this region also hosts a number of invasive alien plant species that threaten the health of ecological and economic values in the area.

In **Quesnel**, marsh plume thistle negatively impacts free growing status of plantations and grazing of forested rangeland. Toadflax, introduced decades ago as a garden ornamental, threatens the ecological health of the **Tatlayoko Valley**. Pastures in **Horsefly**, dominated by hawkweeds, oxeye daisy, and Canada thistle, offer no benefit to the producer. **Fraser River** grasslands continue to be threatened by well-established knapweed and leafy spurge infestations. Baby's breath has escaped from the **Toosey** cemetery to **Beecher's Prairie** and mountain bluet dominates the graveyard in **Barkerville**. Japanese knotweed, in the **Bella Coola** valley, threatens the estuary, public safety, and utility infrastructure.

Of the 187 introduced plant species found in the Cariboo Chilcotin Coast, 35 are identified as priority species requiring control and/or monitoring to ensure their impacts are minimized. We have 10,027 mapped 'infestations' of these priority invasive plants covering an area of over 5000 ha. These species are widespread, difficult to control, and are found across all land jurisdictions. These priority species fall into one of four general categories based on risks from not managing the species, current and potential distribution, effectiveness of available management practices, and, the effectiveness and availability of biocontrol agents.

Priority 1 Ranking is for **NEW INVADERS**, newly established species with a limited distribution but expected to become established if not managed. The management objective is **elimination**.

Priority 2 Ranking is **CONTAINMENT**. These are well established species that have not infested all potential habitats. Only new sites will be managed to **contain and prevent further spread**.

Priority 3 Ranking is **ESTABLISHED** species that occupy most or all potential habitats and widespread **control is not currently possible**.

Priority 4 Ranking species are **well established species** for which effective **BIOLOGICAL CONTROL** agents exist.

Approximately \$1,600,000 is needed to treat all sites. At present levels of funding only 13% of these sites can be treated.

To get the best possible 'bang for our buck' a coordinated, planned approach is necessary, and, this document hopes to assist in that regard. Improved education of residents and resource users is needed. An accurate invasive plant inventory is required. Treatments need continued monitoring for effectiveness. Integrated Pest Management principles must be used for the greatest chance of success.

To be successful we need your comments, questions, and concerns regarding invasive plant management.

Executive summaries are also produced - one for the Central Coast Region, the other for the Cariboo-Chilcotin Region.

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1 Introduction

The Cariboo Chilcotin Coast is an area of 10.8 million hectares of diverse and spectacular ecosystems, from the interior rain forests of the Quesnel Highland, through the dry grasslands along the Fraser River, and out to coastal rain forests of the Central Coast of British Columbia. These diverse ecosystems provide critical habitats for a range of wildlife species, including a large number of red- and blue-listed species. Unfortunately they also host a number of invasive alien plant species that threaten ecosystem function and health.

With this diverse landscape, the Cariboo Chilcotin Coast is home to numerous industries. Agriculture is important with a large diversity of crops grown, and cattle ranches are found throughout. Forestry, mining, transportation, energy, and recreation are significant and all can also contribute to the spread of invasives.

Successful management of invasive plants across diverse ecosystems and in a variety of jurisdictions requires a cooperative approach. This **Regional Strategic Plan** is a working document designed to be an up to date guide for invasive plant managers and the public, working and recreating throughout the Cariboo and Central Coast. This document houses the input of a wide variety of land managers and residents, and, provides a common vision for invasive plant management in the area.

The Plan, originally prepared after numerous public meetings in the winter of 2007-08, is reviewed and revised annually as populations change and new control methods are developed. The Plan is coordinated and maintained by the Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC), a non-profit organization representing the diverse stakeholder groups impacted by invasive plants in the Cariboo Chilcotin Coast (see Section 5.3 Board of Directors and Membership).

If you would like to be involved in the development of future regional strategic plans, please contact the CCCIPC (See Appendix 6).

1.1 Definition of Invasive Plants

The Invasive Species Council of BC defines 'invasive plant' as, "any invasive plant species that has the potential to pose undesirable or detrimental impacts on people, animals or ecosystems. Invasive plants can establish quickly and easily on both disturbed and undisturbed sites, and cause widespread negative economic, social, and environmental impacts. Many invasive plants have been introduced to BC without their natural predators and pathogens that would keep them in check as in their countries of origin. For this reason, invasive plants are commonly referred to as 'alien', 'non-native', 'exotic' or 'introduced' plant species."

Invasive plants have evolved strategies to establish quickly and out-compete other plants. Many invasive plants have short lifecycles enabling them to germinate, grow and set seed while environmental conditions are favourable. This makes a wide range of habitats suitable for these species and gives the invasive plants a growth advantage over native species. Some further increase their competitive advantage over native plants by producing toxins that inhibit the growth or establishment of other plants.

Many invasive plants produce abundant seed throughout the growing season allowing their rapid spread into suitable habitat. Many are seed bankers with seeds remaining viable in the soil for years or decades until conditions are right for germination. Some are self-pollinating allowing many viable seeds to be produced even when the infestation is only a single plant. The wide range of seed dispersal mechanisms and the ability to reproduce vegetatively can also favour the spread of invasive plants.

Invasive plants cause ecological problems by competing with native vegetation for light, moisture, and

nutrients. This causes a decline in biodiversity by altering nutrient and hydrological cycles, negatively affecting the habitats of rare and endangered species, reducing the quantity and quality of forage for grazing and browsing wildlife and livestock, reducing food supplies for many plant eating insects, decreasing water quality and fish habitat and increasing wildfire hazard. Invasive plants may dominate a site for prolonged periods once established making restoration efforts difficult and costly.

1.2 Purpose of Regional Strategic Plan

Invasive alien plants can pose a number of risks wherever they are present. Economic opportunity can be compromised if crop yields are reduced or management costs increase. Ecological values, such as wildlife habitat, water quality, and biodiversity can be impacted. Once established, invasive plants are often difficult to control with many of them virtually impossible to eradicate.

Invasive plants must be collaboratively managed, so jurisdictions are focused on similar outcomes and are working together to achieve invasive plant control and management. This document provides a common approach to managing invasive plants, based on the direction of local stakeholders.

For the Cariboo Chilcotin Coast, the Regional Strategic Plan gives direction on invasive plant species of highest management priority for control, inventory, and monitoring. It also describes the range of control options available for each priority invasive plant species and the appropriate control methods to use based on the invasive plant species, size of infestation, and the sub-region. Detailed information on the identification and management of invasive species is beyond the scope of this plan, but references and websites giving this information are provided in Appendix 8.

Of the 185 introduced plant species found in the Cariboo Chilcotin Coast, 35 have been selected as priority species during 2014 strategic planning meetings. Residents and resource users recognize these priority species to have the greatest potential impact on ecological or economic values in the region. Each species requires control or monitoring to ensure its impacts are minimized. Specific ranking for each priority species has been done for each of the listed sub-regions (see section 1.3).

In Appendix 1, the Plan includes a short description of each of the 35 priority species, with control measures and the management objectives. Other species of management concern that have not yet been found in the Cariboo Chilcotin Coast region are not discussed in the Plan, but any new occurrences will be aggressively controlled if and when they arrive in the CCCIPC area. Appendix 2 lists all the non-native plants in the region. This list includes species that are ecologically suited to conditions in the region or are found in adjacent jurisdictions and therefore pose a risk of invasion. An overview of Integrated Pest Management Principles is given and should be considered in all invasive plant control programs to provide the greatest chance of success.

1.3 Geographic Scope of the Plan

The Plan covers the areas of the Cariboo Regional District and Central Coast Regional District. Due to the large area and wide range of ecological conditions this encompasses, the area is divided into sub-regions for the purposes of invasive plant priorities and management planning. These units reflect differing ecological conditions, social preferences, and invasive plant presence. Electoral districts were used to divide the Central Coast into 3 sub-regions and the Cariboo Regional District (CRD) into 5 sub-regions. Refer to Figure 1.

1.3.1 Central Coast Region

The Central Coast has very different ecological conditions, invasive plant priorities, and preferred control

methods compared to the Cariboo Chilcotin. Many invasive plants are confined to disturbed areas in the Central Coast, and are often associated with road right-of-ways or construction sites. High value fisheries, well developed wildcraft, and non-timber forest product use limits the use herbicides. Invasive alien plant inventory, planning and educational initiatives are relatively new in this sub-region. Priority species are expected to change as planning and community involvement increases.

The **Bella Coola sub-region** contains the CCRD Electoral Areas D and E. This includes the Bella Coola town site to the Augsburg Church in Hagensborg. This area has been historically opposed to herbicide treatments on public lands. After much consultation with stakeholders, limited herbicide treatments on Japanese knotweed were undertaken in 2012 and 2013. The Nuxalk Nation supports invasive plant management and has applied herbicide on their lands to control knotweed. A Band Council Resolution was passed (September 2011) to support the use of herbicides for the control of invasive plants on a species by species basis. In spite of this resolution, the use of herbicide on Reserve and Crown lands continues to be questioned.

The **Hagensborg East sub-region** is the eastern portion of the Bella Coola Valley to the Cariboo Regional District boundary, CCRD Electoral Area C, and includes Tweedsmuir Provincial Park. Hagensborg East has traditionally been opposed to the use of herbicides on public lands.

The **Outer Coast sub-region** includes the communities of Ocean Falls, Denny Island, Oweekeno, Bella Bella, comprising CCRD Electoral Areas A and B. The boundary commences west of the Bella Coola town site and follows the regional district boundaries north almost to Klemtu, and south past Rivers Inlet and Oweekeno. Invasive plant inventories have not been completed for the Outer Coast.

1.3.2 Cariboo Region

The **Chilcotin sub-region** includes the CRD Electoral Areas J and K. The boundary is the Fraser River in the east to the Coast Mountains in the west. The communities of Alexis Creek, Anahim Lake/Ulkatcho, Big Creek, Kleena Kleene, Nimpo Lake, Redstone/Tsi Del Del, Stone/Yunesit'in, Xeni Gwet'in/Nemiah, Anaham/Tl'etinqox, Toosey/Tl'esqox and Tatla Lake are located in this sub-region. Ranching, forestry, and recreation are important economic pursuits. Invasive plants occur along main road systems but overall abundance and distribution of invasive plants is less here than in other parts of the Cariboo region.

The **Nazko sub-region** is west of Quesnel and is the CRD Electoral Area I. The communities of Nazko, Alexandria/Esdilagh and Kluskus/Lhoosk'uz are within this sub-region. The area is dominated by lodgepole pine forests, with spruce and aspen scattered throughout. Wetlands are common. Invasive plants are mostly limited to roadways, however, a better inventory of all invasive species is needed in the Nazko subregion.

The **South Cariboo sub-region** lies east of the Fraser River from Williams Lake south to the Regional District boundary and encompasses the CRD Electoral Areas E, G, H, and L. The communities of 100 Mile House, Canim Lake/ Tsq'escen', Canoe Creek/Stwecem'c, Dog Creek/ Xgat'tem, Eagle Creek, Esketemc/Alkali Lake, Hendrix Lake, Lac la Hache, and Lone Butte/Interlakes are located in this sub-region. Ecosystems are varied, ranging from dry grasslands along the Fraser River to the wet cedar forests in the Cariboo Mountains.

The **Central Cariboo sub-region** is comprised of the CRD Electoral Areas D and F. The boundaries are east of the Fraser River, with Williams Lake in the south and the McLeese Lake area in the north. Ecosystems range from dry grasslands along the Fraser River to wet forests in the east. Communities

include Horsefly, Likely, McLeese Lake, Soda Creek/Xat'sull, Deep Creek/Cmetem', Sugarcane/T'exelc, and Williams Lake.

The **North Cariboo sub-region** includes the CRD Electoral Areas A, B and C and also includes the community of Alexandria/Esdilagh, as well as Quesnel, Red Bluff, Barkerville, and Wells. The Fraser River forms the eastern boundary. Douglas-fir forests are common and paper birch, lodgepole pine, aspen, and spruce are all present. Many of the invasive plants in this sub-region are adapted to the moister ecosystems that are found here.

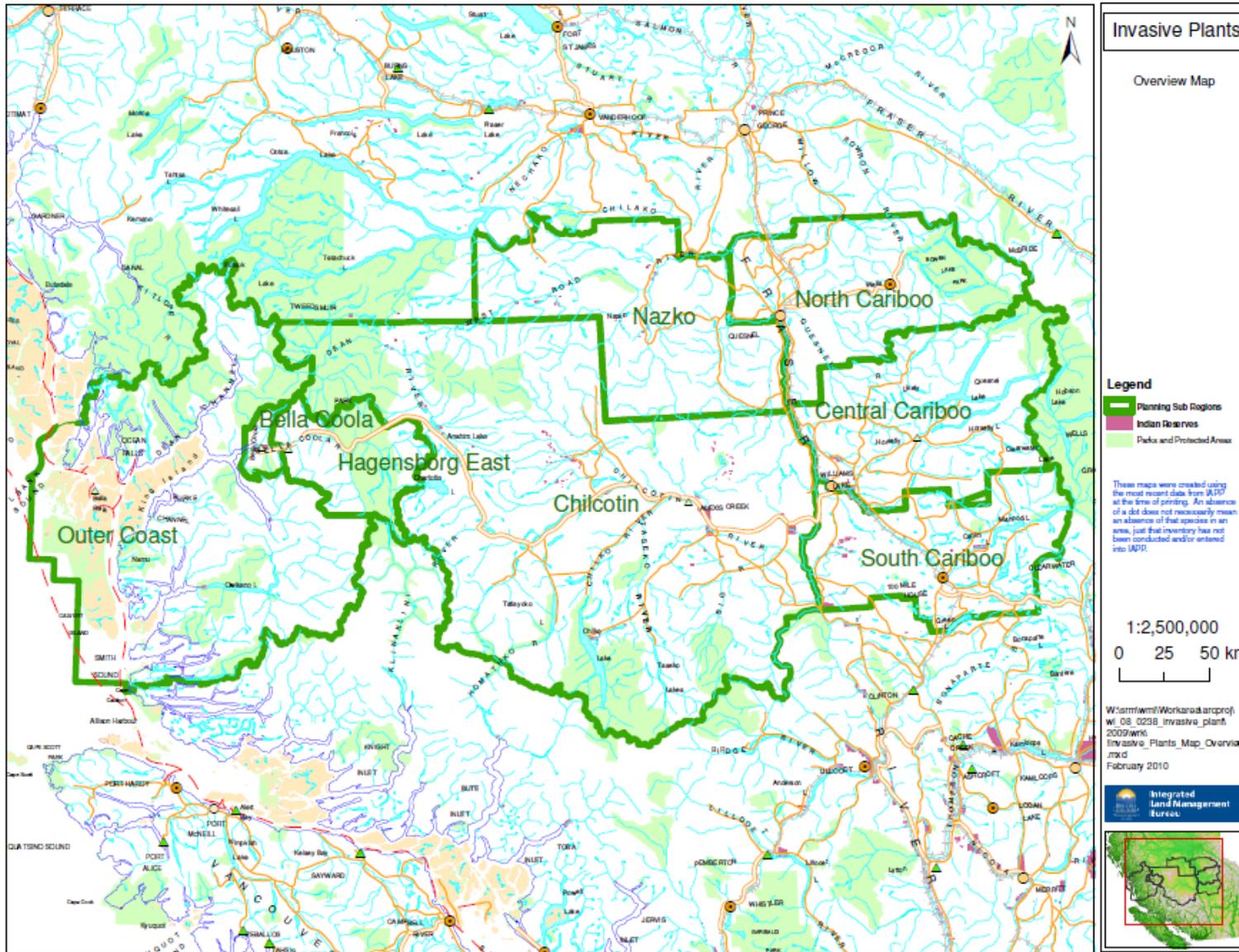


Figure 1: Sub-regions in the Regional Strategic Plan

2 Cariboo Chilcotin Coast Invasive Plant Priorities

There are at least 185 alien plant species that have become established in the Cariboo Chilcotin Coast region (Appendix 2). However, not all introduced plant species can or should be addressed in this strategic plan. Many of these introduced species are beneficial, and were introduced for livestock forage, erosion control, aesthetics, or other reasons. But, some species that were introduced accidentally or have unintentionally spread from cultivation are causing ecological or agricultural problems. The impacts attributed to introduced species depend to some extent on the perspective from which they are viewed. For example, important agricultural species may be perceived as posing risks to native vegetation communities. And, valuable ornamental species can invade native vegetation and reduce ecosystem health or range opportunities.

The Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC) has held many meetings in the region to develop a list of invasive alien plant species that pose the greatest risk across the Cariboo Chilcotin Coast. The species that were determined to have the greatest negative impact have been listed as the priority invasive plant species in the Regional Strategic Plan. A number of introduced grass-like plant species are known problems in the Cariboo Chilcotin Coast and other parts of British Columbia. However, there are no effective control methods for most of these species and they are not included in the plan at this time. As management methods become available, problem introduced grass-like plants will be included in the plan as warranted. There are also aquatic invasive species in British Columbia, but these are not covered as part of this plan, with the exception of yellow flag iris and flowering rush.

Thirty-five invasive alien plant species were determined to be serious problems in various parts of the region and were designated as priority species in some sub-regions in the Cariboo Chilcotin Coast. This list of priority species will be updated as circumstances warrant, adding or removing species, or, changing priority classifications. Some species are required to be controlled by legislation and are also included in this plan (see Appendix 2).

The invasive plants included in this plan fall into one of four general categories based upon the following factors:

- risks from not managing the species;
- current and potential distribution in the Region;
- effectiveness of available management practises; and,
- effectiveness and availability of bio-control agents.

The four categories of priority invasive plants are new invaders, containment, established, and biological control. The descriptions for each category are listed in Figure 2. The priorities for each invasive alien plant species, by sub-region, are listed in Table 1 and Table 2.

Yellow highlighted plants indicate new additions to the priority or watch lists.

Figure 2: Invasive Plant Priority Ranking Descriptions

Priority Ranking	Description
1 – New Invaders	<p>Newly established species, currently of limited distribution, or at our borders. Expected to flourish if they become established, or if not managed.</p> <p>The management objective for 1A species is elimination. Awareness of the presence and threats posed by these species is less developed than for other invasive plants in the region, as none are currently causing substantial problems on a large scale. Increasing awareness of these species in particular is critical to successful management of these species.</p> <p>The management objective for 1B species is to monitor invasive plants that have not become well-established in the region but have been present for a relatively long period of time and are of limited distribution. These species are assessed regularly for whether they are spreading (and thus moved into a 1A priority) or are maintaining their current distribution.</p>
2 – Containment	<p>Well established species in our region that have not yet infested all potential habitats. New sites will be managed to prevent further spread. These species either have containment areas outside of which infestations will be eliminated or have few enough sites that all known and new sites will be managed to prevent further spread.</p>
3 – Established	<p>Common and widespread species that occupy most or all potential habitats. Widespread control of these species is not currently possible unless efforts are intensified or biocontrol agents are introduced. The management objective for these species is to monitor the impact and activity of the species, promoting awareness, prevention, and proper land management, and continued inventory. Control may be a priority in local areas where unacceptable impacts have occurred, and intensive, cooperative efforts exist.</p>
4 – Biological Control	<p>Well established species in our region for which effective biocontrol agents exist. These biocontrol managed species will be monitored to ensure the continuing effectiveness of the biocontrol agents. Further releases of the biocontrol agents may be required for new isolated infestation sites and chemical or mechanical control may be warranted for new or small infestations. Control has been achieved for both by the release of effective biocontrol agents combined with chemical or mechanical treatment of small new infestations where warranted.</p>

Table 1: Priority Invasive Alien Plants by Plan Sub-region in the Cariboo Chilcotin.

Sub-Region Name CRD Electoral Areas	North Cariboo A, B, C	Central Cariboo D, F	South Cariboo E, G, H, L	Nazko I	Chilcotin J, K
baby's breath	1	1	1	1	1
black henbane ¹	1	1	1	1	1
blueweed	1	1	1	1	1
burdock	3	3	3	3	2
Canada thistle	3	3	3	3	3
common tansy	2	2	2	2 ⁸	1
Dalmatian toadflax	4	4	4	1	2 ³
diffuse knapweed	2	2	2	1	2
field scabious	2	1	1	1	1
flowering rush ¹	1	1	1	1	1
Himalayan balsam	1	1	1	1	1
hoary alyssum	1	1 ⁶	1	1	1
hoary cress	1	1	1	1	1
hound's-tongue	1	1	4 ⁵	1	1
knotweed spp.	1	1	1	1	1
leafy spurge ²	2	1	1	2 ⁷	1
marsh plume thistle	1	1	1	1	1
meadow knapweed	1	1	1	1	1
mountain bluet	1	1	1	1	1
nodding thistle	4	4	4	4	4
orange hawkweed	3	3	3	3	1
oxeye daisy	3	3	3	3	3
perennial pepperweed ¹	1	1	1	1	1
plumeless thistle	1	1	1	1	1
purple loosestrife	1 ³	1	1 ³	1	1
Russian knapweed	1	1	1	1	1
scentless chamomile	2	3	3	2	3 ³
spotted knapweed	2	2 ⁴	2	1	2 ⁸
St. John's-wort ⁶	2	2	2	1	1
sulphur cinquefoil	1	2	2	1	1
yellow flag iris	1	1	1	1	1
yellow hawkweeds, invasive	3	3	2	3	2
wild chervil	1	1	1	1	1
wild parsnip	1	1	1	1	1

Species ranks that are in **white** indicate the species is **NOT known to exist** in that sub-region (i.e. if black, the species is present). An **N/A** indicates that this species is not ecologically suited to that given sub-region and is not expected to occur there.

Footnotes: 1. Provincial EDRR species. 2. Biocontrol agent is present on dry sites, but not yet effective; it is effective in the TNRD near Canoe Creek. 3. Biocontrol agent is the primary means of control. 4. Biocontrol agent is present, but not yet effective. 5. In the Canoe/Dog and Churn Creek areas, the species is mainly controlled by biocontrol agents. 6. Biocontrol appears to be affected by a parasite. 7. Classified as a New Invader (1) in the Western Nazko. 8. Grassland are at highest threat. 9. Outside the established containment area.

Table 2: Priority Invasive Alien Plants by Plan Sub-region in the Central Coast.

Sub-Region Name CCRD Electoral Areas	Outer Coast ¹ A, B	Hagensborg East C	Bella Coola D, E
black henbane ²	1	1	1
blueweed	1	1	1
burdock	1	3	3
Canada thistle	1	3	3
common tansy	1	1	2
Dalmatian toadflax	1	1	1
diffuse knapweed	1	1	1
English ivy	1	1	1
field scabious	1	1	1
flowering rush ²	1	1	1
Himalayan balsam	1	1	1
hoary alyssum	1	1	1
knotweed spp.	1	1	1
large yellow loosestrife	1	1	1
leafy spurge	1	1	1
marsh plume thistle	1	1	1
meadow knapweed	1	1	1
nodding thistle	1	1 ³	1
orange hawkweed	1	1	1
oxeye daisy	1	3	3
plumeless thistle	1	1	1
Russian knapweed	1	1	1
scentless chamomile	1	2	1
scotch broom	1	1	1
spotted knapweed	1	1	1
St. John's-wort ⁴	1	3	3
tansy ragwort	1	1	1
yellow flag iris	1	1	1
yellow hawkweeds, invasive	1	2	1

Species ranks that are in **white** indicate the species is **NOT known to exist** in that sub-region (i.e. if black, the species is present). An **N/A** indicates that this species is not ecologically suited to that given sub-region and is not expected to occur there.

Footnotes: 1.The Outer Coast has been minimally inventoried for invasive plants. 2. Provincial EDRR species. 3. Identification is unconfirmed. 4. Biocontrol appears to be affected by a parasite. Most sites are treatable.

3 Provincial and Municipal Legislation related to invasive plants in the plan area

Other invasive plants of concern are found in British Columbia or western North America but have not yet been found in the Cariboo Chilcotin Coast and are not included in this plan. Residents and resource users must be aware of the potential for these invasive plants to reach the Cariboo Chilcotin Coast and be able to identify them. Invasive plants of concern recently noted or not yet known in the Cariboo Chilcotin Coast are on a “watch list” (Table 3).

Table 3: Invasive plant species on the "Watch List" for the Cariboo Chilcotin Coast.

Cariboo Chilcotin	teasel, Dame’s rocket, Scotch thistle, comfrey, wormwood, evening primrose, tansy ragwort, velvet leaf, <i>Phragmites</i> , common bugloss, butterfly bush, wild caray, cypress spurge, Queen Anne’s lace
Central Coast	giant hogweed, Himalayan & cutleaf (evergreen) blackberry, English holly, butterfly bush, Daphne, Herb Robert, Scotch thistle, caraway, English ivy, tansy ragwort, common bugloss, Queen Anne’s lace, hairy cats ear

3.1 British Columbia Weed Control Act

The British Columbia Weed Control Act contains a list of introduced alien plants that are considered noxious weeds which land managers are required to control. The Act, currently administered by the B.C. Ministry of Forests, Lands and Natural Resource Operations, imposes a duty on land occupiers to control designated noxious weeds and allows for the appointment of inspectors for the purpose of enforcing control. Only management of those species listed as Provincially Noxious, or that have been designated as Regionally Noxious within a Regional District, may be enforced. The purpose of this law is to protect farmland and farmers' livelihoods against the spread of noxious weeds which may out-compete crops and reduce yields. A number of these noxious weeds were selected as priority invasive plants by the CCCIPC and are bolded in Table 4.

3.2 Invasive Plant Regulation of the Forest and Range Practices Act

Under the Invasive Plant Regulation (section 47) of the British Columbia Forest and Range Practices Act, any persons undertaking range or forest management practices must put measures in place to prevent the establishment or spread of invasive plants listed under the regulations.

3.3 Regional District Bylaws

Regional Districts may also establish bylaws to control designated invasive plants. There are two regional districts within the CCCIPC area. The Central Coast Regional District has not established any bylaws on invasive plants for their region. The Cariboo Regional District (CRD) has established a bylaw to enforce the treatment of invasive plants on private property within the CRD area. The priority invasive plant species that are listed under this bylaw are listed in Table 4.

Table 4: Priority invasive plant species in the CCCIPC area and associated legislation.

Species	Legislation	WCA Designation
1 baby's breath	FRPA, CRD	
2 black henbane	CRD	Provincial EDRR
3 blueweed	FRPA, WCA, CRD	Regional
4 Canada thistle	FRPA, WCA, CRD	Provincial
5 common burdock	FRPA, WCA, CRD	Regional
6 common tansy	FRPA, WCA, CRD	Regional (not including CCCIPC area)
7 Dalmatian toadflax	FRPA, WCA, CRD	Provincial
8 diffuse knapweed	FRPA, WCA, CRD	Provincial
9 English Ivy		
10 field scabious	FRPA, WCA, CRD	Regional (not including CCCIPC area)
11 flowering rush	WCA	Provincial EDRR
12 Himalayan balsam	CRD	
13 hoary alyssum	FRPA, WCA, CRD	Regional (not including CCCIPC area)
14 hoary cress	FRPA, WCA, CRD	Regional (not including CCCIPC area)
15 hound's-tongue	FRPA, WCA, CRD	Provincial
16 invasive knotweeds	FRPA, WCA, CRD	Provincial
17 large yellow loosestrife		
18 leafy spurge	FRPA, WCA, CRD	Provincial
19 marsh plume thistle	FRPA, WCA, CRD	Regional (not including CCCIPC area)
20 meadow knapweed	FRPA, WCA, CRD	Regional (not including CCCIPC area)
21 mountain bluet	CRD	
22 nodding thistle	FRPA, CRD	
23 orange hawkweed	FRPA, WCA, CRD	Regional
24 oxeye daisy	FRPA, WCA, CRD	Regional
25 perennial pepperweed	FRPA, WCA, CRD	Regional (not including CCCIPC area) Provincial EDRR
26 plumeless thistle	FRPA, WCA, CRD	Regional (not including CCCIPC area)
27 purple loosestrife	FRPA, WCA, CRD	Provincial
28 Russian knapweed	FRPA, WCA, CRD	Regional (not including CCCIPC area)
29 scentless chamomile	FRPA, WCA, CRD	Provincial
30 Scotch broom		
31 spotted knapweed	FRPA, WCA, CRD	Provincial
32 St. John's wort	FRPA, CRD	
33 sulphur cinquefoil	FRPA, WCA, CRD	Regional (not including CCCIPC area)
34 tansy ragwort	FRPA, WCA, CRD	Provincial
35 yellow flag iris	FRPA, CRD	Provincial
36 yellow hawkweeds, invasive	FRPA	Meadow hawkweed only
37 wild chervil	WCA	Regional (not including CCCIPC area)
38 wild parsnip		

FRPA = Forest and Range Practice Act Invasive Plant Regulation

WCA = BC Weed Control Act Regulation

CRD = Cariboo Regional District bylaws.

4 Invasive Plant Management

Historically, invasive plant management was largely reactive and focussed primarily on removing unwanted plants once an infestation had occurred. A more effective invasive plant management strategy relies upon a proactive framework that prioritizes species and considers the environmental factors, as well as the socio-economic factors of invasive plant management to effectively mitigate spread and achieve desired vegetation conditions. Some of the factors considered include understanding the underlying causes of invasive plant infestations, the ecology and biology of invasive plants present, current policies and laws, and site specific control methods that are effective in preventing or eliminating invasive plant establishment. Invasive plant management is an ongoing process that is refined by assessing new information until invasive plant management objectives are achieved, and ultimately, desired vegetation conditions are realized. This environmentally sensitive approach to pest management is often referred to as Integrated Pest Management.

4.1 Management Objectives

Prescribing a particular treatment could ultimately depend on the long and short term plans for the species or site. For invasive plant species with effective biological control agents available, the objective tends to be long term. For other species the approach tends to be more short term, and multiple options exist depending on the species, the size of the infestation, and land use objectives for a particular site. Finally, the two approaches are often integrated, as per Integrated Pest Management principles, whereby biological control is used in the centre of an infestation and other control means are used at perimeter and satellite sites. Sites outside the containment line or borders can be treated using other methods.

Long Term Objective:

1. To bring a species into equilibrium with native vegetation using available biological control agents. Ongoing monitoring of plant health and bioagent populations will determine when biological control is successful and no other control measures are warranted.

Short Term Objectives and Options:

1. To stop the spread and establishment of new sites outside larger established sites by eradicating all new sites. Plants on roadsides can be treated to reduce seed production and shed on road surfaces with the intention to reduce seed pickup from sites. Larger sites can be used for biological control agent propagation and establishment.
2. To stop the spread from a major infestation core by drawing a containment polygon delineating extent of establishment boundary. Plants on roadside sites can be treated to reduce seed production and shed on immediate road surfaces; intention is to reduce seed pickup probability from sites.
3. To reduce the economic impact on agricultural operations by reducing treatment costs incurred by producers. This includes stopping lateral spread from adjacent jurisdiction(s) by buffering property boundaries, eliminating new sites, and suppressing existing sites. Plants on roadside sites can be treated to reduce seed production and shed on immediate road surfaces; intention is to reduce seed pickup probability from sites.
4. To reduce the impact that a species could have on native and agricultural vegetation by spraying plants using herbicide. Plants on roadside sites can be treated to reduce seed production and shed on immediate road surfaces; the intention is to reduce seed pickup probability from sites.

4.2 Integrated Pest Management

Integrated Pest Management (IPM), in the context of this strategy, is a sustainable approach to managing invasive plants by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. IPM principles focus on managing resource values (critical habitat, ecosystem diversity, agricultural or wildlife values, pristine landscapes, etc.) that are threatened by invasive plants. IPM aims to maintain or enhance the competitive ability of desired vegetation to inhibit invasive plant establishment and growth. To achieve the desired outcomes of an integrated invasive plant management strategy, it should include the following processes:

- Identification and prioritization of invasive plants of concern and acquiring knowledge about them;
- Monitoring invasive plant populations and treatment prescription effects;
- Managing resources to prevent establishment of invasive plants;
- Implementing control decisions based on knowledge of potential damage, cost of control method and environmental impact of the invasive plant(s) and control decision; and,
- Applying control strategies that may include a combination of methods to reduce the invasive plant populations to an acceptable level.

By using the Regional Strategic Plan as a guideline for invasive plant management, invasive plant managers in the region can work together to effectively treat invasive plants, and maintain a thorough and updated inventory of invasive plant site, survey, monitoring and treatment records.

4.3 Monitoring

The definition of monitoring is broadly applied to include both surveys and measurements of species and/or sites followed by a review of species, treatment and monitoring data over time, or over a sequence of management practices. Monitoring of current control activities is currently undertaken by those agencies conducting operations to ensure that treatment prescriptions are compliant, effective and safe. The outputs of monitoring provide the feedback loop into species priority designations and provide for effectiveness evaluations of programs in the region to ensure that resources are directed to the highest priorities.

Species monitoring as used in this strategic plan consist of surveys repeated through time to determine changes in the status and demographics of invasive plants. It seeks to determine the trend over time of invasive plants and their habitat in relation to predetermined management objectives.

Monitoring plays an essential role in managing invasive plants by providing information to make well-informed management decisions. Monitoring is a key component in assessing the trends in invasive plant populations. Monitoring is also essential for evaluating management actions, and adjusting them if necessary, to achieve invasive plant management objectives and goals more effectively and efficiently.

Monitoring can also be used to:

- detect new invasive plant species as they first appear in a management area,
- determine the status and temporal trends in population sizes and distributions over time,
- determine effects of invasive plant species on other biota and ecosystem processes,
- assess the effectiveness of specific invasive plant control measures in suppressing, containing or eradicating target invasive species and the effect of management actions on non-target species and the environment, and
- measure success of best management practices that are meant to prevent the introduction and spread of invasive plants into and throughout a management area.

4.4 Invasive Plant Control Methods

The CCCIPC has a role in providing information from within and outside of the region on the various control methods that are available for use in invasive plant management. Often several methods are effective but the objectives of a prescribed treatment should dictate the most effective control method as a result of the desire for long or short term control.

4.4.1 Prevention

Although prevention is the most effective, economical and ecologically sound approach to managing invasive plants, it is the least practiced control strategy. Maintaining healthy native or desired plant communities is one of the best ways of reducing invasive plant establishment. Most invasive plants favour establishment on disturbed sites with exposed soil where there is reduced competition from other plants. Limiting the amount and duration of exposed soil by seeding disturbed sites with desired plant species can reduce the potential for invasive plant establishment. Where mechanical, biological or chemical control of invasive plant infestations is likely to result in a lack of desired vegetation quickly occupying the site; these sites should be rehabilitated to accelerate the re-establishment of the desired vegetation. This most commonly involves seeding these sites with either a vigorous cover species that will occupy the site until the desired vegetation re-establishes or to directly seed the desired species and thereby inhibiting the re-establishment of invasive species. Fertilization treatments that promote enhanced growth and establishment of desired vegetation also will aid in continued exclusion of many invasive plant species.

Invasive plants are most commonly spread by seed via wind, water, wildlife, livestock and humans. Natural factors are very difficult if not impossible to control; however, human causes of spread are often the main source of new infestations. Often this is caused by a lack of understanding and awareness of invasive plants, the threats posed by invasive plants and the factors that lead to the spread of these plants.

Further preventative strategies include:

- Limiting the further spread and establishment of invasive plant infestations through mechanical, cultural, biological and/or chemical treatments in seed source areas
- Sowing certified weed-free seed
- Cleaning machinery, vehicles, livestock and personal belongings (clothes, boots, etc.) prior to leaving any infested site

4.4.2 Early Detection and Rapid Response

Early Detection and Rapid Response (EDRR) is the integration of two important aspects of invasive species management in order to reduce the risk of a new incursion going unrecognized and potentially untreated. When a new invasive plant is initially establishing there is a brief period when it is relatively easily eradicated or contained. The key to this process is the timely detection and control of new infestations before they become extensive and well established.

The Inter-Ministry Invasive Species Working Group has developed the provincial EDRR framework to make decisions on treatment of new invasive plants to the Province. It is shown and described on the following page.

What is Early Detection Rapid Response?

Early Detection Rapid Response (EDRR) is a proactive approach to managing invasive species that prevents establishment in the first place.

Early detection of newly arrived invasive species, followed by a well-coordinated rapid response, will increase the likelihood of eradication or containment of new invasions. EDRR has proven to be the most cost-effective means of controlling the expansion of invasive species in North America.

BC EDRR activities are guided by the BC Invasive Plant EDRR Plan, which provides detailed direction on the decisions and actions required to identify, assess, and respond to new plant species incursions anywhere in British Columbia.

The Plan establishes a province-wide structured response protocol that includes screening, risk assessment and decision-making processes to determine the appropriate rapid response to new incursions. It also provides a structure for effective communication of early detection rapid response activities and clarifies roles and responsibilities for stakeholders involved in each step of the BC EDRR Plan.



The Plan consists of six key steps:

- Early Detection,
- Identification,
- Alert Screening,
- Risk Assessment,
- Rapid Response, and
- Monitoring & Reassessment.

Communication, information sharing and data management are key elements in each step of the EDRR process.

The provincial government, through the Inter-Ministry Invasive Species Working Group, leads implementation of the BC EDRR Plan. It is recognized, however, that successful eradication of plant species identified for early detection and rapid response can only be achieved with the cooperation and participation of key land managers and stakeholders throughout BC and adjacent jurisdictions.

4.4.3 Mechanical Control

Mechanical control is an effective and environmentally safe method for controlling many invasive plants if timed right with precautions taken to minimize soil disturbance and native vegetation loss. Mechanical treatment may not be practical for large sites and/or for some species. Table 5 lists the various methods of mechanical control for invasive plants. For more information about Targeted Grazing, refer to Appendix 3.

Table 5: Mechanical control methods for invasive plants

Method	Effective Time	Efficiency	Equipment Required
Collecting and Bagging	Before plants flower or shed seed	Removes seeds, effective for annual and biennial invasive plants, requires treatment over multiple years.	Bags, gloves
Hand cutting or mowing	Early season before plants flower or set seeds	Effective on annual or biennials, kills individuals and prevents seed production	Sickle, weed-whacker,
Hand pulling or digging	After the plants have bolted in the spring and prior to flowering and production of seed	Less effective on perennials or species with extensive root systems.	Gloves, shovels
Re-vegetation and seeding	Late fall is best, otherwise early spring	Does not control plants, rather reduces their spread and densities	Appropriate seed, sowing method
Targeted Grazing	Any time during the growing season, but preferably before the plants set seed.	May effectively suppress certain invasive plants and provide control over time. Animals can access invasive plant on the range when people may not be able to.	Livestock, sheep, goats (training may be required)

4.4.4 Biological Control

Biological control uses the invasive plant's natural enemies (primarily insects and pathogens) to reduce invasive plant populations to a desired level. Effective biological control releases provide self-perpetuating, self-dispersing, continual control of invasive plants and can be a very cost-effective and environmentally compatible control method. Biological control may be the only option for the control of invasive plants when infestations are very large or in riparian areas where chemical or other control methods cannot be used.

Treatment impacts include:

- decreased invasive plant reproduction and competitive abilities,
- decreased invasive plant densities, and
- native vegetation re-establishment.

Biological control establishes a long-term balance between the biological control organism and the invasive plant; however, this treatment method is most effective when combined with good land management practices. It is important to note that biological control organisms are thoroughly tested prior to introduction to insure that they will not harm native vegetation and ecosystem integrity. Good information exists online at <http://www.for.gov.bc.ca/hra/Plants/biocontrol/index.htm>

4.4.5 Chemical Control

A wide range of chemical herbicides are available for the control of invasive plants. A few species are however poorly controlled by chemicals. Additionally, herbicide use is prohibited in some areas.

Herbicides should only be used according to the manufacturer's label specifications and in accordance with the Integrated Pest Management Act. Application on Crown land requires the preparation of a Pest

Management Plan (PMP).

4.4.6 Other Control Measures

There are other control measures available for managing invasive plant infestations. Some of these include the use of fire, manipulation of water levels and the use of multi-species grazing. As with all control measures, each requires an assessment as to its applicability to the species being controlled and to the environmental and socio-economic conditions.

4.5 Containment Areas

Containment areas are used for invasive plant species that show heavy infestations beyond control in some areas, and sparse presence in other areas. The infested areas are delineated on a map, by either a polygon or line and are identified as containment areas. Infestations found outside the containment polygon or line will be aggressively treated, attempting to prevent the plant species from spreading beyond the identified area. In special cases, the plant species may be treated within the containment area: if a specific location has an identified high value that warrants protection, or where the site is considered a main source of spread to areas outside the line.

Containment areas are a practical compromise that maximizes resources to limit potential damage. Refer online to the [Inter-Ministry Invasive Species Working Group \(IMISWG\) protocol for establishing containment areas](#) and Appendix 10 for the containment areas established in this area.

4.6 Local Area Agreements

If at the community level, there is a collective desire to control a locally problematic invasive plant species, intensive, cooperative efforts among landowners and agencies can be applied. Appendix 5 contains the details of the local area agreement currently in place in the Cariboo Chilcotin Coast.

4.7 Disposal

If control requires the clipping of seed heads or hand pulling or digging when flowers or seed heads are present, disposal must be in a manner to prevent spread. Collected material must not be transported in open situations (pickup boxes). This material must be bagged in heavy plastic bags or double-bagged then brought to the Transfer Stations in Williams Lake, Quesnel, or 100 Mile House and disposed of in the garbage bins.

Invasive plant material should **not** be disposed of by:

- composting in a backyard composter – if temperatures are not high enough invasive plants can remain viable by either seed or vegetative means.
- burning in back yard burning piles – if temperatures are not high enough invasive plants can remain viable by either seed or vegetative means.

4.8 Best Practices

Many agencies and industries have worked together to develop invasive plant best management practices. Best practices are generally non-legislated steps to prevent the spread of invasive plants. Best practices are usually 'recommended', and expected to be low cost mitigation measures.

Industry best practices generally include the following principles:

- Keep machinery clean; remove all invasive plant parts
- Do not park in invasive plant infestations
- Where possible, minimize disturbance of vegetated areas, and restore disturbed sites promptly
- Dispose of invasive plant infested materials properly
- Report invasive plants promptly
- Work with local invasive plant groups to help plan activities and understand local threats
- Attempt to remove invasive plants from work areas prior to beginning any activities
- Recognize locally problematic invasive plants
- Follow all invasive plant regulations and legislation

The Invasive Species Council of BC (ISCBC) has developed several resources for sectors like transportation, forestry, horticulture, parks and more. Please visit the ISCBC website for best practices resources www.bcinvases.ca.

Refer to the following agency websites to learn more about their specific best practices.

4.8.1 Ministry of Transportation and Infrastructure (MoTI)

MoTI has developed many resources to help maintenance contractors learn best practices for invasive plant prevention. Videos, comprehensive booklets, tailgate sessions and more are available on-line.

<http://www2.gov.bc.ca/gov/content/transportation/transportation-environment/invasive-species-roadside>
<http://bcinvases.ca/resources/tips/adopt-a-highway>

4.8.2 BC Parks

In 2011 BC Parks worked with the Invasive Species Council of BC to develop a Best Practices booklet, and delivered invasive plant best practices training to BC Parks staff and contractors. To view a detailed list of best practices, see the BC Parks Guide on the ISCBC website.

www.bcinvases.ca/resources/outreachmaterials

4.8.3 Utility Corridors

Right-of-way corridors associated with utilities are a known vector for the spread of invasive plants. Maintenance activities and public recreational use on these corridors contributes to invasive plant spread.

The utilities industry operates under a number of best management practices developed both internally and externally to reduce the potential for the spread of invasive plants along RoW corridors. Common aspects of these BMP's across the utilities industry include keeping equipment clean and clear of debris, limiting (where possible) levels of ground disturbance, preserving native topsoil and seed banks and follow up of ground disturbance activities with monitoring and treatment programs.

Educating the public about recreational vehicle use and invasive plants is also important to maintaining invasive plant free utility corridors.

4.8.4 Forestry

The Forest Industry in cooperation with ISCBC has developed best management practices. Refer to <http://bcinvasives.ca/resources/tips/forestry-operations> for more information.

4.8.5 Oil and Gas

The Oil and Gas industry, in cooperation with the ISCBC, has developed oil and gas best practices. Refer to www.bcinvasives.ca for more information.

4.8.6 Horticulture

Several initiatives are underway within the horticulture industry. Best practices are recommended in ISCBC's Grow Me Instead brochures, with certification available for horticulture sectors. Refer to <http://bcinvasives.ca/resources/programs/plant-wise/> for more information.

5 Cariboo Chilcotin Coast Invasive Plant Committee

The Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC) was formed in 2006 in response to the need for a collaborative approach to managing invasive plants within the Cariboo-Chilcotin and Central Coast regions. The CCCIPC is guided by a diverse [board of directors](#), which has representation from federal, provincial, local and aboriginal governments, non-government organizations, industry groups, residents and resource users. The CCCIPC is an inclusive organization that operates by consensus with a membership open to all individuals.

5.1 Purposes and Goals

The CCCIPC's [purposes](#) are listed under its constitution. Our group works to educate the public, government agencies and other land managers about invasive plants in order to prevent invasive plant introduction and spread. CCCIPC also encourages collaborative management of invasive plants between agencies and land occupiers.

Listed below are goals of CCCIPC:

- To educate all residents and resource users, and increase their awareness about invasive plants, their impacts and regionally coordinated activities.
- Across all jurisdictions, to achieve coordinated multi-stakeholder involvement that is inclusive and offers comprehensive representation of the entire region.
- To increase resources available to fulfill both the CCCIPC purpose and invasive plant management.
- To maintain a regional invasive plant strategic plan through a formalized, shared approach to invasive plant management that considers environmental, economic and social values.

5.2 Roles and Responsibilities

The CCCIPC works throughout the Cariboo and Central Coast Regional Districts. The committee's roles and responsibilities can vary between the two regions, and are summarized in the table below.

CCCIPC's Role	Education	Resource Development	Coordination	Fund Development	Research
Cariboo Region	-minor role -focus on industry, Aboriginal groups partners: CRD, ISC	-moderate role -dependent on target audience and message partners: CRD, ISC	-major role -regional strategic planning -encourage collaboration between parties -consult with ISC partners: CRD, ISC	-major role -solicit funding to support activities (partners: none)	-major role -work with stakeholders to determine needs and help establish/manage projects partners: BC government, ISC, other stakeholders
Central Coast Region	-major role -provide education to all parties partners: CCRD, ISC	-major role -provide resources to all parties partners: CCRD, ISC	-major role -regional strategic planning -encourage collaboration between parties -consult with ISC partners: CCRD, ISC	-major role -solicit funding to support activities	-major role -work with stakeholders to determine needs and help establish/manage projects partners: BC government, ISC, other stakeholders

5.3 Board of Directors and Membership

Board seats are available to individuals in a specific set of stakeholder groups. This organization ensures CCCIPC is guided by a variety of interest groups in the region. The Board holds monthly conference calls to keep up to date on committee business, and meets face-to-face on a quarterly basis.

CCCIPC membership is open to all interested individuals that support the objectives of the society.

Members have the opportunity to provide direction to the Board, to participate on sub-committees, to attend the annual general meeting, workshops and field trips. To become a member please contact CCCIPC - info@cccipc.ca . See Appendix 6 for detailed CCCIPC contact information.

5.4 2014 CCCIPC Priorities

CCCIPC plans to continue working on these initiatives in 2014, which are consistent with our goals. These include:

- Exploring the transition to all invasive taxa
- Continuing efforts to raise awareness and treat invasive plants in the Central Coast region

5.5 Invasive Species and CCCIPC

Worldwide, invasive plant groups are realizing their prevention efforts can easily and affordably be adapted to include non-plant invasive species. A large number of weed committees in British Columbia are becoming invasive species groups. The CCCIPC continues to explore this option.

6 Other Invasive Plant Managers

Several partner groups run or support invasive plant programs in the Cariboo Chilcotin Coast. The [Cariboo Regional District \(CRD\)](#) manages a robust invasive plant program in the region, including education, management, landowner assistance, bylaw enforcement and more. The CRD has contracts with some provincial government ministries, local governments, First Nations and agencies to conduct invasive plant management activities on their behalf.

The [Invasive Species Council of BC \(ISC\)](#) provides province-wide leadership, and promotes policy, partnerships and resources. ISC partners with and supports regional committees like CCCIPC through province wide resources and programs.

Some BC government ministries participate in invasive plant management. In 2013, [Ministry of Transportation and Infrastructure \(MOTI\)](#) and the [Ministry of Forests, Range and Natural Resource Operations \(MFLNRO\)](#) both partnered with CCCIPC and the CRD to fund invasive plant management. The CCCIPC and the CRD conducted invasive plant management in the Central Coast Regional District and Cariboo Regional District, respectively, on behalf of these ministries. **BC Parks** also participates in invasive plant management programs.

Several smaller organizations participate in invasive plant management activities. Some **First Nations** have collaborated with CCCIPC and local governments to manage invasive plants on their lands. **Cattlemen's Associations** throughout BC work to manage invasive plants, and partner with other organizations to help minimize invasive plant spread. **Industry** groups support invasive plant management with funding, in kind support and more.

Please refer to Appendix 7 to learn more about jurisdictional responsibilities for invasive plant management.

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Appendix 1: Invasive Plant Profiles

Baby's breath (*Gypsophila paniculata*)

Description: Baby's breath was introduced to North America in the late 1800s (Royer and Dickinson 1999). Baby's breath has an extensive fibrous root system and is found in a wide range of habitats across its range.

Type: perennial

Habitat & Impacts: In the Cariboo Chilcotin Coast region, baby's breath appears to be found exclusively on disturbed sites on warm aspects at low elevations; however it can invade pastures and rangelands.



Method of Spread: Seed is spread by wind or by plant tumbling. A single baby's breath plant can produce up to 13,000 seeds but the seeds do not seed bank well. The use of baby's breath as an ornamental in flower arrangements may lead to infestations in graveyards, roadside memorials or other locations where flowers may be placed. Public education efforts should explain this potential method of invasive plant spread.

Management Options:

Mechanical: Baby's breath can be controlled by hand pulling small infestations, provided the upper portion of the root is removed. Baby's breath does not tolerate frequent disturbance well and is seldom a problem in cultivated fields. Mowing or grazing early in the season limits the production of seed but does not control existing plants.

Chemical: Glyphosate is being used within the region. Dicamba has been recommended for control of baby's breath in Saskatchewan rangelands. Use of chemicals to control baby's breath in British Columbia suppresses the plant, but does not necessarily kill it. (Percy Folkard, pers com.).

Biological: There is no biocontrol agent currently available.

Treatment Options: Local Level - Hand pulling small infestations

Landscape Level - Combination of chemical control and hand pulling for larger sites

Baby's breath (*Gypsophila paniculata*)

CCCIPC Priority, Treatment Strategy and Location: Baby's breath has been designated a priority weed for most of the Cariboo Chilcotin Coast. The number of infestation sites is low and there is a reasonable expectation of being able to control existing sites. Although the species has not been aggressive in the Cariboo Chilcotin Coast region to date, in other areas it has become a very serious invader of grasslands, pastures and other open areas. The extensive grasslands of the Cariboo Chilcotin must be protected from baby's breath infestation.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Baby's breath is currently not managed in the CCCIPC area. It is recommended that all known and new sites be treated and monitored. Suggested treatment is hand pulling. It is currently found at a number of sites along Highway 97 (within the City of Williams Lake, Sugarcane Reserve, north of Lac La Hache) and along Highway 20 around Alexis Creek							
2009	1	1	1	1	1	N/A	N/A	N/A
Notes:	All sites are being treated							
2010	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2011	1	1	1	1	1	N/A	N/A	N/A
Notes:	No major changes. There are still very few sites in the CCCIPC area and they are being treated.							
2012	1	1	1	1	1	N/A	N/A	N/A
Notes:	Hasn't moved much. Most sites are associated with urban areas and roadsides.							
2013	1	1	1	1	1	N/A	N/A	N/A
Notes:	Baby's breath is being managed as 1A priority.							
2014	1	1	1	1	1	N/A	N/A	N/A
Notes:	Baby's breath is found mostly along transportation corridors, on hillsides in Williams Lake and at Lee's Corner.							
2015	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2016	1	1	1	1	1	N/A	N/A	N/A
Notes:								

Species ranks that are in **white** indicate the species is **NOT known to exist** in that sub-region (i.e. if black, the species is present). An **N/A** indicates that this species is not ecologically suited to that given sub-region and is not expected to occur there.

Black henbane (*Hyoscyamus niger*)

PROVINCIAL EDRR

Description: Black henbane was introduced into North America from the Mediterranean as an ornamental and medicinal plant in the 17th century. It grows over a metre and is covered in small hairs (much like tomato plants). It has tubular green-yellow flowers with purple veins and a purple center.

Type: annual or biennial forb

Habitat & Impacts: It grows well in a wide range of conditions, but does require well-drained soil and is not tolerant of shade. Black henbane is narcotic and poisonous to humans. Livestock avoid grazing it unless other forage is not available.

Method of Spread: Black henbane reproduces exclusively by seed. A single plant can produce up to half a million seeds in one season. Seeds can remain viable in the soil for about 4 years.

Management Options:

Mechanical: Mowing is effective, but difficult due to its thick, tough stem. Hand-pulling is effective; however, protective clothing and gloves should be worn to prevent rashes. Mature plants can be burned after pulling to kill the seeds.

Chemical: Picloram, Dicamba, Metsulfuron, 2,4-D, and Glyphosate can be used pre-bloom.

Biological: There is no biocontrol currently available for black henbane.

Treatment Options: Local Level - hand pulling small infestations

Landscape Level - chemical control for larger sites.



Black henbane (*Hyoscyamus niger*)

PROVINCIAL EDRR

CCCIPC Priority, Treatment Strategy and Location: Very few sites in the Chilcotin and the City of Williams Lake; not found in any other areas in the province. Eradication is the management objective. All sites are treated and monitored.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2010	1	1	1	1	1	1	1	1
Notes: Sites are found near Alexis Creek in conjunctions with Scentsless chamomile sites that have 1st stage biological control agents released on them. Please be aware when treating in these areas. One site found in Williams Lake.								
2011	1	1	1	1	1	1	1	1
Notes: A few new sites found in the Chilcotin, but some other sites did not re-grow. It is now listed as a Provincial EDRR species. Other sites noted in SIWMC and SOSIPS areas.								
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes: Black henbane is being managed as a 1A priority.								
2014	1	1	1	1	1	1	1	1
Notes: It is found in and around Alexis Creek and at the Williams Lake dumpsite. Black Henbane is being actively treated as it is a Provincial EDRR species.								
2015	1	1	1	1	1	1	1	1
Notes:								
2016	1	1	1	1	1	1	1	1
Notes: New site located across the street from the Alexis Creek Forest Service building.								

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Blueweed (*Echium vulgare*)

Description: Blueweed was introduced into North America from Africa as an ornamental and is now found across Canada and the United States. It has a large taproot and multiple lateral roots with a large flower spike that may reach to 80 cm.

Type: biennial forb

Habitat & Impacts: This species is found in a wide range of dry sites but prefers areas with dry, coarse soils, particularly those of limestone origin. Blueweed is not palatable and decreases quality of rangelands and pastures.

Method of Spread: Blueweed reproduces exclusively by seed. Seed production is moderate with up to 2,800 seeds produced per plant. Seeds can remain viable in the soil for several years. The seed may stick to clothing, hair or feathers.



Management Options:

Mechanical: Repeated cutting of blueweed plants prior to flowering can reduce seed production, but is less effective at killing older plants. Hand pulling can be effective on small infestations as the long taproot can be removed intact. Blueweed does not usually survive repeated cultivation.

Chemical: Several chemicals are recommended for blueweed, however it has proven to be tough to kill with chemicals:

- 2,4-D can be applied in spring or early autumn for short-term control. Fall treatment is more effective than spring treatment.
- Glyphosate can be used for short-term control in non-vegetated areas. Glyphosate is not recommended for use in areas where desirable perennial vegetation occurs.
- Picloram provides long term, residual control.
- Clopyralid is effective at high rates and is recommended for use under or near conifers.

Biological: There is no biocontrol currently available for blueweed.

Treatment Options: Local Level - hand pulling small infestations.

Landscape Level - chemical control for larger sites.

Blueweed (*Echium vulgare*)

CCCIPC Priority, Treatment Strategy and Location: Blueweed is considered a priority invasive plant in the Cariboo Chilcotin Coast due to the serious implications for rangeland productivity in areas where it is well established. Blueweed occurrence is minimal in the Cariboo Chilcotin Coast, and continued control by management agencies will aid in preventing blueweed from becoming more widespread in the area. It is very prevalent south of the plan area in the Thompson Nicola Regional District.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Blueweed sites are infrequent enough to be treated. Currently the Cariboo Regional District Pest Management Plan specifies that all sites are to be treated in their jurisdiction and MOFR invasive plant crews treat all sites. Found within City of Quesnel, as well as surrounding side roads. Major site at the Hanson gravel pit near Quesnel with scattered sites along highway 97 between Quesnel and Alexandria. Isolated sites exist in Churn Creek, Dog Creek, Gustafson Lake, and one site in the Bella Coola Valley.							
2009	2	1	1	1	1	1	1	1
Notes:								
2010	2	1	1	1	1	1	1	1
Notes:								
2011	1	1	1	1	1	1	1	1
Notes:	Sites are concentrated in the Quesnel and Churn Creek areas. New site found at old pit site in the Chilcotin near River West.							
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes:								
2014	1	1	1	1	1	1	1	1
Notes:	Progress is being made on the 91 sites found the Cariboo Chilcotin Coast. The epicentre for the Quesnel area infestations is the Hanson Pit. Blueweed is also common in the Churn Creek area. The Central Coast has 3 sites that were hand pulled in 2013.							
2015	1	1	1	1	1	1	1	1
Notes:	Mostly associated with gravel type soils and pits. Movement appears most common along the railway.							
2016	1	1	1	1	1	1	1	1
Notes:								

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Burdock (*Arctium* species)

including Common burdock (*A.minus*), great burdock (*A.lappa*)

Description: These biennial invasive plants were introduced into North America from Eurasia and can grow to 3 m tall. They have highly branched stems ending in clusters of rounded purple flowerheads. Burdock has a large fleshy taproot.

Type: biennial

Habitat & Impacts: Burdock is found in forests and grasslands in moist, nutrient rich soils. It is often found in ditch lines and other disturbed sites and it can become a problem in riparian areas once established. Livestock will readily graze burdock, but if ingested in sufficient quantities it can render milk unpalatable. Burdock seeds can become matted in the hair of livestock and can decrease the value of sheep wool. Burdock is also a strong diuretic and has been listed as a poisonous plant in some areas.



Method of Spread: Seed is the only method of spread and each plant may produce up to 16,000 seeds. The seeds develop hooked spines that readily catch on fur, feathers or clothing, thereby potentially transporting them a considerable distance.

Management Options:

Mechanical: Mowing or cutting can be used to reduce seed production. This should be done after the plant has bolted and before it flowers. Burdock does not tolerate repeated cultivation.

Chemical: A range of chemicals can be used to treat burdock including 2,4-D and Glyphosate.

Biocontrol: There is no biocontrol agent to release for burdock, however an adventive agent has been found.

Treatment Options: Local Level - repeated cutting to eliminate seed production or herbicide.

Landscape Level – monitor and treat local infestations in conjunction with other species, such as on private land and within municipal areas.

Burdock (*Arctium* species)

CCCIPC Priority, Treatment Strategy and Location: As a biennial it is easier to treat. Herbicide is used on first year plants and manual control to stop seed production/spread is used on second year plants.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	There are scattered locations throughout the Cariboo Chilcotin Coast. Sites are concentrated in the Bella Coola Valley and the Fraser River valley.							
2009	3	3	3	3	3	1	3	3
Notes:								
2010	3	3	3	3	3	1	3	3
Notes:								
2011	3	3	3	3	3	1	3	3
Notes:	Updated to a priority 1 for the Chilcotin and needs to be re-assessed next year. It is a major problem for agriculture and treatment can happen in priority areas.							
2012	3	3	3	3	1	1	3	3
Notes:								
2013	3	3	3	3	2	1	3	3
Notes:								
2014	3	3	3	3	2	1	3	3
Notes:	There are 475 infested hectares, 135 in the Chilcotin, 63 in the Central Coast. There is an inventory gap in the Chilcotin where 556 sites have been mapped.							
2015	3	3	3	3	2	1	3	3
Notes:								
2016	3	3	3	3	2	1	3	3
Notes:								

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Canada thistle (*Cirsium arvense*)

Description: Canada thistle is a perennial forb introduced into North America from south-eastern Europe or the eastern Mediterranean and is the most widely distributed thistle in North America (Morishita 1999). This plant has an extensive root system spreading laterally and quickly, up to 6 metres in a single growing season, and penetrating to 6.75 metres deep in the soil (Morishita 1999). Canada thistle may grow to 2.0 m tall and can form dense monocultures.

Type: perennial

Habitat & Impacts: Dense infestations of Canada thistle can exclude most or all native species on heavily infested sites. It commonly occurs adjacent to riparian areas and following logging. The spiny leaves and stems make Canada thistle unpalatable to most livestock and reduces forage production and use of pastures. Canada thistle presence also limits recreational pursuits.

Method of Spread: A single plant can produce up to 6400 seeds per flower stalk (Morishita 1999) but the main method of spread is by roots. Seeds are spread by wind and water and in crop seed, hay or livestock manure. Canada thistle seeds may remain viable in the soil for over 20 years.

Management Options:

Mechanical Control: Cattle and possibly other livestock may be trained to eat Canada thistle and other weeds (<http://www.livestockforlandscapes.com/>). Canada thistle can be controlled mechanically if plants are pulled or cut when young. Large or long-established infestations cannot be effectively controlled mechanically. Repeated cutting has been cited as an effective method for controlling Canada thistle, and prevents flower production and perhaps lateral spread of the plant, but is not effective at eliminating the plant. Plants will re-sprout once mowing is ceased. The extensive creeping root system allows Canada thistle to survive cutting and cultivation and to grow on a wide range of sites.

Chemical Control: Chemical control of Canada thistle is possible, but repeated applications are required. A range of chemicals can be used to treat Canada thistle, including 2,4-D and Glyphosate. Chemical control is however limited by riparian limitations.

Biological control: A number of biocontrol agents have been released in British Columbia and some control is apparent. CCC 'colder climate' appears to limit establishment. Potential for *Urophora cardui* control in riparian habitats.

Treatment Options: Local Level – chemical or repeated mowing can prevent spread and seed production; however, this must be diligently repeated before seed production due to intensive root spread.

Landscape Level – there is no viable option until biocontrol agents are established. Localized chemical control for private land.



Canada thistle (*Cirsium arvense*)

CCCIPC Priority & Treatment Strategy: The impacts and distribution of this species must be monitored and local control implemented where warranted. As biocontrol agents become available, they should be released and monitored for effectiveness. Biocontrol agents have been released at Scout Island.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Widespread in the CCCIPC area. The number of sites and the distribution of the species have been increasing steadily in the past several decades.								
2009	3	3	3	3	3	1	3	3
Notes:								
2010	3	3	3	3	3	1	3	3
Notes:								
2011	3	3	3	3	3	1	3	3
Notes: Work towards spreading biocontrol. Mostly confined to riparian areas in the Chilcotin making treatment difficult.								
2012	3	3	3	3	3	1	3	3
Notes:								
2013	3	3	3	3	3	1	3	3
Notes:								
2014	3	3	3	3	3	1	3	3
Notes: Canada thistle is now well established on all roadways.								
2015	3	3	3	3	3	1	3	3
Notes:								
2015	3	3	3	3	3	1	3	3
Notes:								

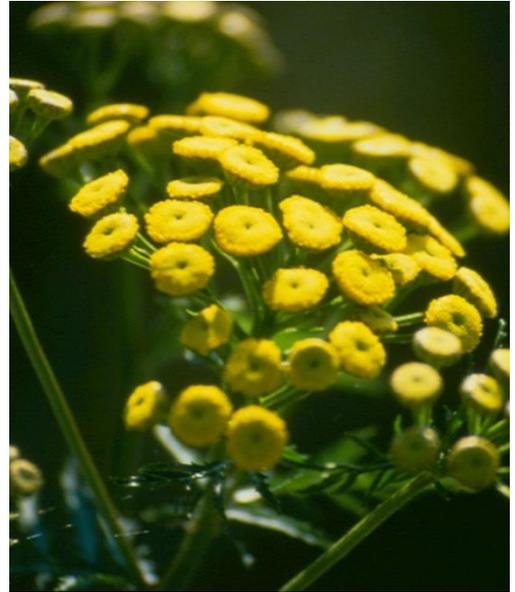
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Common tansy (*Tanacetum vulgare*)

Description: Common tansy was introduced to North America from Europe as a garden herb and is found across the continent as far north as the Northwest Territories (Royer and Dickinson 1999). It is a perennial forb with rhizomatous roots and clusters of bright yellow compound flowers that can grow to 1.5 m in height.

Type: perennial

Habitat & Impacts: Common tansy requires open habitats in fertile soil, usually becoming established on disturbed ground. This species can spread into adjacent undisturbed areas once established. It is especially prone to infesting riparian areas where chemical control is not possible. This species can have significant impacts in riparian areas, by reducing native vegetation, affecting stream bank stability and reducing forage quantity and quality for livestock and wildlife. Common tansy is unpalatable to most livestock and may be mildly toxic in some cases (Royer and Dickinson 1999).



Method of Spread: Seed production is large, with each plant producing up to 50,000 seeds. Seeds may be dispersed by wind and water but are not dispersed far from the parent plant. The seeds of common tansy do not appear to seed bank effectively. Common tansy will also spread by creeping roots.

Management Options:

Mechanical Control: Mowing prior to seed set can eliminate seed production, but must be repeated over a number of years to diminish establishment. Hand pulling with removal of the taproot can be effective.

Chemical Control: Herbicide control of common tansy is very effective and a single treatment may eliminate an infestation. A wide range of herbicides appear to be effective. Common tansy is relatively easy to control chemically.

Biological Control: There are no biocontrol agents available in British Columbia for common tansy. There is potential that the new (still in testing stage) oxeye daisy bio-agent will cross over to common tansy.

Treatment Options: Local Level - repeated mowing and hand pulling, or herbicide.

Landscape Level – herbicide.

Common tansy (*Tanacetum vulgare*)

CCCIPC Priority, Treatment Strategy and Location:

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Currently scattered sites in many areas including Chimney Lake Road, Dog Creek Road, Gang Ranch, Soda Creek, Dragon Lake, Mountain House Road and Quesnel.							
2009	2	2	2	2	1	1	1	1
Notes:								
2010	2	2	2	2	1	1	1	1
Notes:	Inventory is incomplete for this region and needs to be improved. The management strategy may need to be revised once better inventory information is available. Sites in Bella Coola are extensive and mostly on private properties.							
2011	2	2	2	2	1	1	1	2
Notes:	The CRD has been treating all sites that are driven by. Chemical treatments have been very effective. Sites are now being found in riparian areas. Had a really good year. Known sites are expanding. Found in Meldrum area, Charlotte Lake, Knife Creek, and Sheridan Lake. There are many sites in the Cariboo east of Hwy 97.							
2012	2	2	2	2	1	1	1	2
Notes:								
2013	2	2	2	2	1	1	1	2
Notes:	Sites in the north are actively treated as the NWIPC treats their sites. There are large patches at Charlotte Lake, but treatment is working. Riparian sites are getting larger – along the Barkerville Highway and at Dog Creek.							
2014	2	2	2	2	1	1	1	2
Notes:	It would cost \$117,000 to treat all 734 sites found in the region. Sites in the Chilcotin will continue to receive treatment as will those along our northern border. Due to insufficient funding, a rotational schedule will be developed for treatment of roads in 2014.							
2015	2	2	2	2	1	1	1	2
Notes:	Sites in west Nazko should be evaluated for priority. Access is very difficult and there are no other priority sites in the area.							
2016	2	2	2	2	1	1	1	2
Notes:	Consuming a large portion of the North Cariboo treatment budget.							

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Dalmatian toadflax (*Linaria dalmatica*)

Description: Dalmatian toadflax is a perennial forb with a large taproot, waxy, fleshy leaves, and a showy spike of bright yellow flowers.

Type: perennial

Habitat & Impacts: It can grow in a wide range of habitats from gravelly, disturbed roadsides to open forests. Infestations of dalmatian toadflax can reduce forage quality and quantity for livestock and can reduce native vegetation cover in areas of severe infestation. Toadflax can displace sod-forming or bunchgrasses and increase soil erosion, surface runoff and sediment production (Lajeunesse 1999). Cattle may occasionally graze toadflax flower stalks, but this may lead to mild poisoning and usually cattle avoid this species. Sheep will graze toadflax without apparent ill effect.



Method of Spread: Dalmatian toadflax reproduces by seed or can spread vegetatively from the roots. Each plant can produce a very large number of seeds, up to 500,000 per plant, but most seeds land close to the parent plant (Robocker 1970). However, birds and mammals may eat dalmatian toadflax seedheads and spread seeds a considerable distance. Dalmatian toadflax seeds may remain viable in the soil for up to ten years. Dalmatian toadflax can also spread by creeping roots.

Management Options:

Mechanical Control: Mechanical treatments consist of: cutting plants prior to seed set to control seed production, repeated disking or tilling over several years to reduce or eliminate infestations in cultivated fields, or hand pulling prior to seed set to control small infestations.

Chemical Control: Chemical treatments in the Cariboo Chilcotin Coast consist of a fall application of Picloram or Picloram/2,4-D to control toadflax infestations in areas that do not have a successful bio-agent catch. Dichlorprop has also been used in this region.

Biological Control: *Mecinus janthinus*, a stem weevil, has been used with great effectiveness in the Cariboo. Many sites have declined or been eliminated due to the successful establishment of the biocontrol agent. There are areas in the region, particularly the Chilcotin, where biocontrol agent releases in the past were not successful. A large biocontrol release in 2007 is being monitored in the Tatlayoko Valley and the management strategy will be re-evaluated if biocontrol proves unsuccessful. Two more cold hardy agents will be coming out soon that could be more successful in the Tatlayoko Valley.

Treatment Options: Local Level – Hand-pull or cut.

Landscape Level – biocontrol releases, and chemical treatment on localized areas such as private land.

Dalmatian toadflax (*Linaria dalmatica*)

CCCIPC Priority, Treatment Strategy and Location: Biological control is the primary means of control for the large infestations. A large release in 2007 in the Tatlayoko Valley is being monitored. The biocontrol agent will likely never eliminate dalmatian toadflax, but it will help to stop extensive spread. The management strategy may need re-evaluation if biocontrol is not successful.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Found sporadically throughout the region with exceptions of the Central Coast. There is a large uncontrolled infestation in the Tatlayoko Valley.								
2009	4	4	4	1	2	1	1	1
Notes: Containment area established in the Tatlayoko Valley. See Local Area Agreement for more information.								
2010	4	4	4	1	2	1	1	1
Notes: Primary means of control in the Chilcotin is biocontrol. One site found in Tweedsmuir Park.								
2011	4	4	4	1	2	1	1	1
Notes: Monitoring needs more effort. Site in Tweedsmuir did not regrow.								
2012	4	4	4	1	2	1	1	1
Notes:								
2013	4	4	4	1	2	1	1	1
Notes: Dalmation toadflax is being actively treated outside of the containment area in the Tatlayoko Valley. The bioagents are not working yet but there is hope for the future. In general, biocontrol seems to have collapsed in the Cariboo, perhaps a down cycle for the bugs.								
2014	4	4	4	1	2	1	1	1
Notes: The Dalmation toadflax is being actively treated outside of the containment area in the Tatlayoko Valley. There is however not enough money to treat the entire road.								
2015	4	4	4	1	2	1	1	1
Notes: Seeing good results with bio-control. NCC collects data most years. North and Central Cariboo needs biocontrol monitoring								
2016	4	4	4	1	2	1	1	1
Notes: New sites on the Gibraltar Mine Rd and Mountain House Road.								

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Diffuse knapweed (*Centaurea diffusa*)

Description: Diffuse knapweed is a biennial or short-lived perennial with a well-developed taproot and highly branched stems. It was introduced to North America from Eurasia near the beginning of the 20th century probably in alfalfa seeds (Roche and Roche 1999). It grows to 60 cm tall and has white, lavender, or purple composite flowers.

Type: biennial or short-lived perennial

Habitat & Impacts: It is found in a variety of dry habitats particularly in disturbed areas and does not tolerate shade. It is generally not found in cultivated or irrigated fields. Diffuse knapweed is unpalatable to livestock, and can cause serious loss of forage production on heavily infested rangelands.

Method of Spread: Diffuse knapweed reproduces exclusively from seeds and a single plant can produce up to 18,000 seeds. Most seeds fall close to the parent plant, but adult plants may break off at the root collar or lower stem and tumble for a considerable distance blown by wind and distribute seeds this way. Seeds can remain viable in the soil for many years.



Management Options:

Mechanical Control: Cutting or mowing prior to seed-set can reduce seed production, but cut plants may survive, re-bolt, and produce additional seed heads. Hand-pulling can be effective on small infestations, but must be repeated depending on the size of the initial population.

Chemical Control: Chemical treatments consist of Picloram, 2, 4-D, Aminopyralid and Glyphosate applied before flower production.

Biological Control: Successful release and establishment of a number of biocontrol agents has reduced the vigour and abundance of diffuse knapweed in other regions of British Columbia. *Larinus obtusus* and *Larinus minutus* are seed weevils, and *Cyphocleonus achates* is a root weevil; both species have been released in the region.

Treatment Options: Local Level - hand-pulling small sites, herbicide for larger sites.

Landscape Level - herbicide, biocontrol where larger infestations occur.

Diffuse knapweed (*Centaurea diffusa*)

CCCIPC Priority, Treatment Strategy and Location: Scattered throughout the region but heaviest along Highway 97. There are large infestations south and east of our region. Sites in the CCCIPC are not large enough to be treated with biological control; however, releases have been done. Continued monitoring and control of sites will ensure that the species does not begin to increase in the CCCIPC area.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Scattered throughout the region but heaviest along Highway 97. Also found at Tatlayoko Valley, Churn Creek, Riske Creek, and Dog Creek. The Cariboo Regional District currently treats all sites chemically.							
2009	2	2	2	1	1	1	1	1
Notes: Green Lake, Konni Lake								
2010	2	2	2	1	1	1	1	1
Notes:								
2011	2	2	2	1	1	1	1	1
Notes: Biological agent monitoring needs to be done.								
2012	2	2	2	1	1	1	1	1
Notes:								
2013	2	2	2	1	1	1	1	1
Notes: The Anahim Lake Millsite remains a problem. 3 sites in the Central Coast seem to be under control.								
2014	2	2	2	1	1	1	1	1
Notes: Alternating treatment schedules to be developed due to funding limitations.								
2015	2	2	2	1	1	1	1	1
Notes: Sites usually mixed with spotted knapweed. It is less invasive and shorter lived than spotted knapweed.								
2016	2	2	2	1	1	1	1	1
Notes:								

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English ivy (*Hedera helix*)

Description: English ivy belongs to the Ginseng family. It is an evergreen climbing vine and grows up to 30 m tall. It has dark green, alternate waxy leaves. Juvenile leaves are 3-5 lobed and mature leaves are often oval and unlobed. English ivy has small greenish-white flowers which become dark blue fruits (Metcalf, 2005). This plant is native to Europe, western Asia and northern Africa and was introduced to North America as an ornamental plant.

Type: perennial vine

Habitat and Impacts: English ivy grows in sunny and shady locations and invades disturbed areas in forests, open areas, stream banks and coastal areas. It will grow in most soil types and is somewhat drought tolerant, although it prefers moist soils. It does not do well in grasslands where the soil is too dry in summer months (Metcalf, 2005). The dense growth of English ivy can block sunlight from low-growing native plants. In its climbing form, it can create a dense cover on the bark of trees, making the tree susceptible to damage. This plant has caused poisoning in animals and humans and can cause dermatitis in humans (Metcalf, 2005).

Method of Spread: English ivy reproduces vegetatively from advancing stems and by seed, although fruits do not develop in areas with cold winters ($>-1.5^{\circ}\text{C}$). Each berry contains 1-5 seeds and seeds germinate within 6-14 days and are primarily spread by birds. There does not appear to be a period of seed dormancy or the formation of a persistent seed bank. Vegetative spread is likely more important in areas where English ivy is already present (Metcalf, 2005).

Management Options:

Mechanical: Cutting or hand pulling. English ivy has a low tolerance to fire when it burns, but it does not burn easily (Metcalf, 2005).

Chemical: Systemic herbicides – Triclopyr and Glyphosate. It is resistant to 2,4-D and mildly resistant to 2,4,5-T in water (Metcalf, 2005).

Biological: There are no known biological controls for English ivy.

Treatment Options: Local Level – continuous cutting or hand pulling (wear protective gear).

Landscape Level - chemical control, fire.



English Ivy (*Hedera helix*)

CCCIPC Priority and Treatment Strategy and Location: English ivy is a very aggressive species in the south coastal area and strong efforts should be made to keep it from establishing in the Central Coast. Ranked as N/A (not ecologically suited and therefore unlikely to establish) in all other areas. It is a 'to watch for' species in our region.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Infestations have been reported in the Bella Coola area.								
2010	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Reported sites are not confirmed								
2011	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Reported sites cannot be confirmed								
2012	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Site has been identified as Virginia Creeper								
2013	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Reported site in Bella Coola was checked in 2012 – not English ivy								
2014	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes:								
2015	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes:								
2016	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes:								

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Field scabious (*Knautia arvensis*)

Description: Field scabious is a large, erect forb with a large branched taproot and a single main stem, branching into multiple flower stalks. It has a creeping root system.

Type: perennial

Habitat and Impacts: Field scabious grows in a wide range of conditions on sites with nutrient-rich, finely textured soils. Infestations of field scabious can reduce the yield and quality of forage in pastures. Native vegetation can be displaced by heavy infestations.

Method of Spread: Field scabious reproduces exclusively by seed. Seed production is moderate, with up to 2000 seeds produced per plant. Most seeds fall close to the parent plant, but some seeds may be spread by animals. Field scabious seeds may remain viable in the soil for many years. This species is generally slow spreading, but is very invasive and can colonize most suitable habitats.



Management Options:

Mechanical: Mowing or hand pulling prior to seed set can control seed production, and cultivation may eliminate an infestation. Cattle can be used to graze young plants.

Chemical: Picloram, 2, 4-D, Glyphosate and Metsulfuron-methyl are effective herbicides for the control of field scabious.

Biological: There is no biocontrol agent available for field scabious in British Columbia.

Treatment: Local Level - chemical, hand-pull, dig or mow. Hand pull or mow in riparian areas.

Landscape Level - chemical spraying or manual control.

Field scabious (*Knautia arvensis*)

CCCIPC Priority and Treatment Strategy and Location: A containment line has been established around the infestation in the Cottonwood area. Only localized treatment for field scabious will be undertaken within this area, but all infestations outside the containment area will be treated. Commonly found in conjunction with old homesteads.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
Notes: Most sites are along the Cottonwood River. Other sites that are scattered and infrequent are found south of Quesnel, Gaspard Creek, and Alexis Creek.								
2009	2	1	1	1	1	1	1	1
Notes:								
2010	2	1	1	1	1	1	1	1
Notes: Sites recorded in the City of Quesnel,								
2011	2	1	1	1	1	1	1	1
Notes: Sites found at Chilko Ranch. It is also expanding in the Quesnel area and along Quesnel Hydraulic Road. The Containment area is still holding; most sites are untreatable (riparian area).								
2012	2	1	1	1	1	1	1	1
Notes:								
2013	2	1	1	1	1	1	1	1
Notes:								
2014	2	1	1	1	1	1	1	1
Notes: 199 sites, 22.6 ha in the containment area, 11 ha outside. Mowers are causing it to spread in the north.								
2015	2	1	1	1	1	1	1	1
Notes: Need to determine efficacy of containment area								
2016	2	1	1	1	1	1	1	1
Notes: CRD completed a report on the status of the containment area. No changes are going to be made yet.								

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Flowering rush (*Butomus umbellatus*)

Description: Flowering rush is a freshwater plant that can grow up to 1.5m tall. It has a single, flat-topped cluster of 20-50 light pink flowers, each with 3 petals and 3 sepals. Leaves are fleshy and 3-sided at the base, with a noticeable slow twist or spiral and flattening out towards the tip. It is native to Northern Africa, Asia and Europe, and was introduced to North America as an ornamental plant about 100 years ago.

Type: perennial

Habitat and Impacts: Flowering rush grows along the shorelines of freshwater bodies, canals and ditches. It can rapidly colonize these areas and spreads by rhizome fragments and buds. Flowering rush reduces the quality of boating, fishing and swimming in shallow, freshwater habitats, as well as negatively impacting native plant and aquatic animal communities.



Method of Spread: Flowering rush reproduces both by seed and by rhizomes through buds or root fragments. Seed production is significant, with between 4,000 and 10,000 seeds produced per plant, and can remain viable for many years. Rhizomatous buds detach easily from the roots and develop into new plants quickly and easily on moist soil. Root fragments also demonstrate this same ability, making Flowering rush a very prolific plant.

Management Options:

Mechanical: Digging or suction dredging by hand may be successful for isolated plants in areas of low density populations. The entire rhizome must be removed without leaving any buds or other root fragments, and the buds detach with even minor disturbance. Cutting has not proven successful. Land disposal of the plant is required.

Chemical: Due to its aquatic habitat, chemical control options are limited, and still being tested.

Biological: There is no bio-control agent available for Flowering rush in British Columbia.

Treatment: Local Level - hand-pull or hand dredge individual plants.

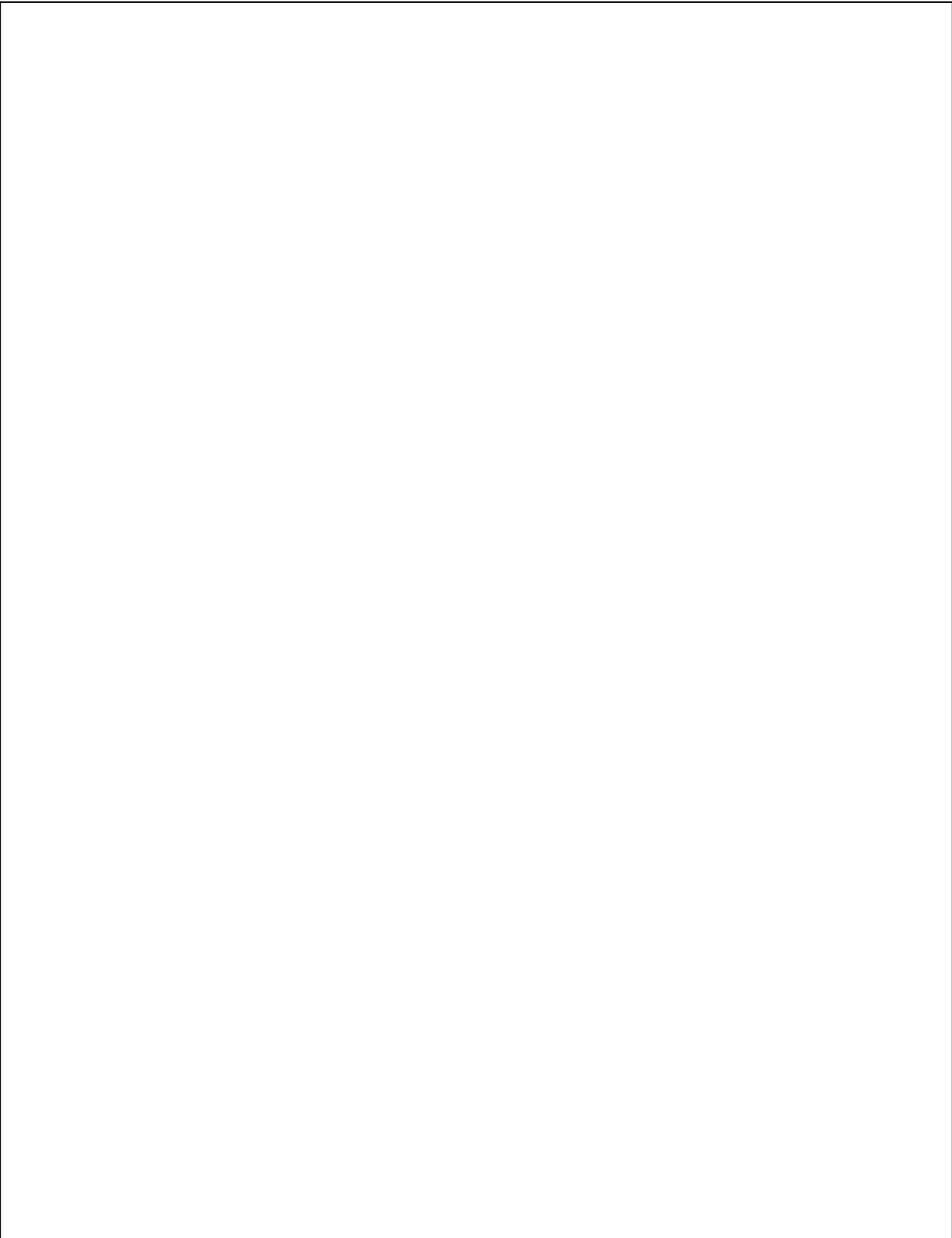
Landscape Level - manual control.

Flowering rush (*Butomus umbellatus*)

CCCIPC Priority and Treatment Strategy and Location: There is a small infestation at Bouchie Lake.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2013	1	1	1	1	1	1	1	1
Notes:								
2014	1	1	1	1	1	1	1	1
Notes: Looking to remove from EDRR and putting into containment as there is no way to treat. 11 sites in Bouchie Lake.								
2015	1	1	1	1	1	1	1	1
Notes:								
2016	1	1	1	1	1	1	1	1
Notes: Dredging in Bouchie Lake is being completed by the province.								

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Himalayan balsam (*Impatiens glandulifera*)

Description: Himalayan balsam, also known as policeman's helmet, was introduced into North America in the early 1900's as an ornamental and is still sold in some nurseries. Himalayan balsam has large showy flowers and bamboo-like stems.

Type: annual

Habitat & Impacts: Prefers moist habitats. This species poses particular risk to fish habitat and water quality. Himalayan balsam may come to dominate native riparian vegetation once established. Once it dies back in the fall, the exposed soil is vulnerable to erosion, as it is not stabilized by any vegetation.

Method of Spread: Seed

Management Options:

Mechanical: The species has relatively shallow roots, so hand pulling is effective at eradicating sites of this species. Cutting can also be effective but must be conducted before seeds are set and done every year until no further plants emerge. Cattle and sheep can also be used to graze infestations but the treatments must again be continued until no new germinants appear. The trampling by livestock in riparian areas and the water-bodies themselves may be an unacceptable consequence of this treatment option and must be considered before a grazing treatment is attempted.

Control measures need to take a top-down approach along watercourses. Since the species spreads mainly by seeds flowing downstream, control should be established on upper sections of the watercourse first to prevent seeds being carried down to already treated sites.

Chemical: As it is found primarily in moist riparian habitats, chemical control methods are not recommended.

Biological: There is no biocontrol currently available.

Treatment: Local Level - hand pulling small infestations, avoid planting in gardens and flowerbeds.

Landscape Level – Hand pull.



Himalayan balsam (*Impatiens glandulifera*)

CCCIPC Priority & Treatment Strategy: Himalayan balsam is a high priority due to the serious implications for riparian and fish habitats. It is a common garden ornamental in wetter areas. A top-down approach is important for treatment since seeds are spread along watercourses.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: All known sites are in the Bella Coola Valley.								
2009	1	1	1	1	1	1	1	1
Notes: Bella Coola Valley sites are expanding. Sites found in the Cariboo.								
2010	1	1	1	1	1	1	1	1
Notes: Sites found in Quesnel area. Particularly, one major garden waste dumping site.								
2011	1	1	1	1	1	1	1	1
Notes: Found in gardens in Williams Lake, but no 'wild' sites yet.								
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes: Himalayan balsam may become a rank 2 in the North Cariboo in 2014.								
2014	1	1	1	1	1	1	1	1
Notes:								
2015	1	1	1	1	1	1	1	1
Notes: Sites are being reduced to due aggressive mechanical control								
2016	1	1	1	1	1	1	1	1
Notes: Sites were not treated								

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Hoary alyssum (*Berteroa incana*)

Description: Hoary alyssum has a slender taproot and small white flowers in short spike inflorescences.

Type: biennial or short-lived perennial forb

Habitat and Impacts: Hoary alyssum is found primarily on disturbed sites and prefers sandy or gravely well-drained sites. Hoary alyssum can be a serious problem for horse owners as ingestion of sufficient quantities can cause a number of diseases in horses. This species can also become a serious problem on heavily used rangelands and may displace native vegetation, reducing forage production for wildlife and livestock.

Method of Spread: This species reproduces exclusively by seed, which is produced in moderate amounts by each plant. Seeds are produced from the first flower in late spring right up until frost and are spread by wind and water.



Management Options:

Mechanical: Hand-pulling can effectively remove small infestations, or cutting prior to seed set can control seed production.

Chemical: 2,4-D amine, Dicamba and Mecoprop are effective at controlling hoary alyssum. This species has been difficult to control chemically in other areas of the province, possibly due to timing of treatments.

Biological: There is no biocontrol agent available for control of hoary alyssum.

Treatment: Local Level – hand-pulling small sites, herbicide for larger sites.

Landscape Level – hand pulling small sites, herbicide for larger sites.

Hoary alyssum (*Berteroa incana*)

CCCIPC Priority & Treatment Strategy and Location: A number of sites are scattered throughout the Cariboo Chilcotin Coast region and all are small and localized. Recent inventory has indicated that this plant is expanding throughout the Cariboo. Hoary alyssum is very prevalent and beyond control in the Barriere area within the Thompson Nicola Regional District to the east of our border.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Sites currently exist at Alexis Creek, within the city of Quesnel and Williams Lake, and along Hwy 97 near Lac la Hache and 100 Mile House, Green Lake, Haggens Point Road, Wiffle Lake Road and 103 Mile House.							
2009	1	1	1	1	1	1	1	1
Notes:								
2010	1	1	1	1	1	1	1	1
Notes:	Site found on Young Road, near Bull Canyon. Hoary alyssum is becoming a growing concern!							
2011	1	1	1	1	1	1	1	1
Notes:	Has become out of control in the TNRD. Many new sites found in CCCIPC area including Tatlayoko, City of Quesnel, Dragon Lake, and Quesnel Hydraulic Road							
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes:								
2014	1	1	1	1	1	1	1	1
Notes:	108 sites, 6.7 ha. Big increase in the South Cariboo in 2013. Population has exploded. Found at Dragon Lake, Quesnel-Hydraulic Rd., Tatlayoko, and Young Rd (west of Alexis Creek)							
2015	1	1	1	1	1	1	1	1
Notes:	Good candidate for weed pulls. Big threats to range and horse owners							
2016	1	1	1	1	1	1	1	1
Notes:								

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Hoary cress (*Cardaria draba*)

Description: Hoary cress belongs to the Mustard family. It was introduced into North America in the 1800's, most likely in contaminated alfalfa seed (Kadrmaz and Johnson, 2002). Hoary cress is also referred to as "white top" because of the numerous white flowers that are produced at the top of the plant. Clasping, arrowhead-shaped leaves are present along the stem and are covered with soft white hairs, giving them a gray-green color. Hoary cress can grow up to 2 feet tall. It has an extensive underground creeping root system.

Type: Perennial forb

Habitat and Impacts: Hoary cress can occur in a variety of soil conditions but favours alkaline soils with moderate amounts of moisture. It tends to do well at low to mid elevations where it occurs in hay fields, rangeland meadows and along roads and roadside right of ways.

Method of Spread: Reproduces by roots and heart-shaped seeds. Each plant can produce 4,800 seeds that can remain viable for up to 3 years in the soil (Kadrmaz and Johnson, 2002).

Management Options:

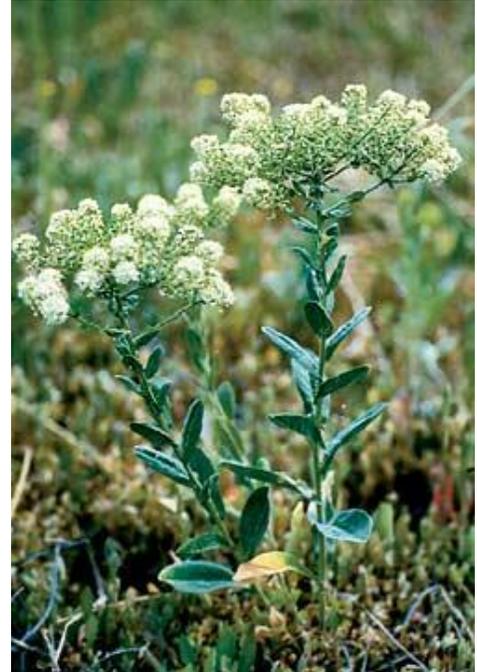
Mechanical: Mechanical treatments, particularly hand-pulling, are less favourable, as the entire root system must be removed. Leaving a single root fragment can result in the emergence of a new plant. Frequent mowing prior to seed production has proven effective in reducing seed production and plant vigour.

Chemical: Dicamba and 2, 4-D are effective herbicides that can be used to chemically control hoary cress during the early pre-bud stage. Glyphosate has shown effective control during the flowering stage.

Biological: There is no biological control agent available for hoary cress in British Columbia.

Treatment: Local Level – frequently mowing small infestations.

Landscape Level – chemical control for larger sites.



Hoary cress (*Cardaria draba*)

CCCIPC Priority and Treatment Strategy and Location: Hoary cress is not well established in the Cariboo Chilcotin Coast region. Where hoary cress has been categorized as a new invader, the current management goal is elimination via chemical treatment.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	1	1	1	1	1	N/A	N/A	N/A
Notes: Currently there is a single infestation located along the east side of Highway 97, just north of 103 Mile. There are no records of plants spreading from this site								
2010	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2011	1	1	1	1	1	N/A	N/A	N/A
Notes: New sites found at Begbie, Summit, and Knife Creek. New site found at Williams Lake dump								
2012	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2013	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2014	1	1	1	1	1	N/A	N/A	N/A
Notes: Has just been found in the south and central Cariboo. Is present at the Williams Lake Dump and Hodgson Rd. It is not treated in the TNRD.								
2015	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2016	1	1	1	1	1	N/A	N/A	N/A
Notes:								

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Hound's tongue (*Cynoglossum officinale*)

Description: Hound's tongue is a biennial or short-lived perennial forb with a woody taproot. This species can grow to 1.2 m tall.

Type: biennial to short-lived perennial

Habitat and Impacts: Hound's tongue prefers dry disturbed sites at low to medium elevations. Hound's tongue can establish in open grasslands to forests, particularly in areas with alkaline soils. The barbed seeds of hound's tongue readily stick to hair and fur, causing stress to animals and reducing hide values. The plant contains alkaloids that are toxic to livestock and can therefore reduce hay and forage quality.

Method of Spread: Hounds tongue reproduces exclusively by seed and plants can produce up to 4000 seeds per plant. Hound's tongue is a poor seed banking species and buried seeds rarely survive one year. Seeds on the soil surface may survive to three years. Seeds can be widely spread by animals, as the hooked spines facilitate attachment to fur, feathers or clothing.



Management Options:

Mechanical: Hand-pulling and mowing hound's tongue prior to seed set can eliminate seed production and often kills the plant.

Chemical: Chemical control of hound's tongue is effective. Picloram, Dicamba, Metsulfuron-methyl, or Glyphosate are all effective for controlling hound's tongue.

Biological: The root-feeding weevil *Mogulones cruciger* has proven extremely effective at controlling hound's tongue in the southern areas of the Province.

Treatment : Local Level – cutting small accessible infestations or chemical treatment.

Landscape Level – biocontrol releases, and chemical treatment on localized areas such as private land.

Hound's tongue (*Cynoglossum officinale*)

CCCIPC Priority and Treatment Strategy and Location: In regions where hound's tongue is ranked as a new invader, all sites will be treated with the goal of elimination. In appropriate climates, the bioagent for hound's tongue has been extremely effective.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Scattered hounds tongue sites are recorded for south-central areas of the region south of 100 Mile House, at Churn Creek, Bridge Lake and 70 Mile House								
2009	1	1	1	1	1	N/A	N/A	N/A
Notes: Dog Creek and Stormy Road								
2010	1	1	4	1	1	N/A	N/A	N/A
Notes: Mostly control with biological control in the Churn Creek area.								
2011	1	1	4	1	1	N/A	N/A	N/A
Notes: Potential hound's tongue site reported in Alexis Creek								
2012	1	1	4	1	1	N/A	N/A	N/A
Notes:								
2013	1	1	4	1	1	N/A	N/A	N/A
Notes:								
2014	1	1	4	1	1	N/A	N/A	N/A
Notes: 'Friends of Churn Creek' really keep their eyes on this species. Treated chemically and handpulled in Quesnel.								
2015	1	1	4	1	1	N/A	N/A	N/A
Notes:								
2016	1	1	4	1	1	N/A	N/A	N/A
Notes:								

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Knotweeds including Himalayan knotweed (*Polygonum polystachyum*), Japanese knotweed (*Fallopia japonicus*), Giant knotweed (*F. sachalinense*), and Bohemian knotweed (*F. x bohemica*)

Description: These perennial forb species were originally from eastern Asia and were introduced to Europe and North America as ornamentals in the early 1800s. They are listed as one of the worst 100 invasive plant species by the World Conservation Union. Bohemian knotweed is an aggressive and adaptable hybrid between Japanese knotweed and giant knotweed and is probably the most common of the invasive knotweeds in British Columbia, although the other three species are also causing problems.

All four species have a similar appearance and are difficult to distinguish in the field. Himalayan knotweed has pinkish white flowers, while the other three species have greenish-white flowers. All four species have hollow, reddish, bamboo-like stems, large broad leaves and rhizomatous roots. Giant knotweed can grow to 6 m, Japanese knotweed to 4 m and Himalayan knotweed to 3 m tall.



Type: perennial forb

Habitat and Impacts: These species grow in a wide range of open sites, but do not tolerate shade. They are most common in moist low-lying sites but can also tolerate extreme heat and drought. The knotweeds form dense stands and may virtually eliminate other vegetation on a site.

Method of Spread: The main form of reproduction is vegetative, with new shoots forming from underground rhizomes or root fragments.

Management Options:

Mechanical: Cutting, mowing or grazing can limit stem size and density but are not effective at eliminating an infestation unless repeated several times per year for several years. Digging or pulling is not effective as the large roots aggressively re-sprout following treatment. Shading the plants by covering with landscape fabric and mulching is also not effective.

Chemical: Glyphosate, Imazapyr and Triclopyr may be required to control large infestations or heavily infested landscapes. Stem injections are effective in late summer or fall. Foliar applications are effective at late bud. Salt water has been proven to be ineffective and creates results similar to mechanical treatments.

Biological: Biocontrol is not currently available. Screening research started in 2007.

Treatment: Local Level – repeated cutting, shading, and herbicide. Avoid using in landscaping.

Landscape Level – herbicide treatments.

Knotweeds including Himalayan knotweed (*Polygonum polystachyum*), Japanese knotweed (*Fallopia japonicus*), Giant knotweed (*F. sachalinense*), and Bohemian knotweed (*F. x bohemica*)

CCCIPC Priority and Treatment Strategy and Location: All sites should be treated with the management goal of elimination.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Central Coast, one site at 150 Mile House along Highway 97 and within residential gardens								
2009	1	1	1	1	1	1	1	1
Notes:								
2010	1	1	1	1	1	1	1	1
Notes: Sites expanding in the Central Coast due to consecutive years of flooding. Salt water/Vinegar/Borax/Lime trials								
2011	1	1	1	1	1	1	1	1
Notes: Sites found in Quesnel and new site in Saloopmt River (Central Coast). Trials ineffective. First year of herbicide treatments in Central Coast. All other sites are treated with herbicide as well.								
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes:								
2014	1	1	1	1	1	1	1	1
Notes: Very labor intensive to treat. More funding is needed for private property treatment. 59 sites in Bella Coola totalling 4.8 ha. Has the potential to damage riparian habitat								
2015	1	1	1	1	1	1	1	1
Notes:								
2016	1	1	1	1	1	1	1	1
Notes: CRD treated Bella Coola sites in collaboration with MOTI								

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Leafy spurge (*Euphorbia esula*)

Description: Leafy spurge is a long-lived perennial that was introduced into north-eastern North America from Eurasia as an ornamental in 1829 and quickly spread across the continent (Lajeunesse *et al.* 1999). By the start of the 20th century, this invasive plant had reached the west coast of North America and its distribution continues to spread.

Leafy spurge has an extensive lateral root system and clusters of small yellowish green flowers growing to 80 cm tall. Leafy spurge has shown to be extremely invasive in many habitats with infestations becoming very dense.

Type: perennial

Habitat and Impacts: Leafy spurge is extremely invasive in many habitats, forming very dense infestations. This species generally increases on heavily grazed lands. The milky latex is toxic to some livestock and a skin irritant to humans. The plant is also an airborne allergen for humans. .

Method of Spread: Leafy spurge reproduces by seed or by lateral roots. Plants are productive, producing up to 130,000 seeds. Seeds remain viable for up to 8 years in soil but most will germinate within 2 years. Most seeds land within 4.5 m of the parent plant, but animals or water can transport seeds further.

Management Options:

Mechanical: The extensive lateral root system makes most mechanical control methods ineffective. Sheep grazing can reduce the abundance of leafy spurge, but must be maintained for the long term, otherwise the abundance quickly returns to pre-grazing levels.

Chemical: Spring applications of Picloram, Picloram with 2,4-D or Dicamba with 2,4-D are effective when high application rates are used.

Biological: Biocontrol agents exist for leafy spurge and have been effective in controlling the plant on many sites; agents have not been proven effective under forest canopies and in areas with fluctuating water tables. Releases in 2008 for *Apthona nigriscutis* (root feeding flea beetle) were completed in the region.

Treatment: Local Level – herbicide.

Landscape Level – biocontrol effectiveness monitoring, chemical control where applicable.



Leafy spurge (*Euphorbia esula*)

CCCIPC Priority and Treatment Strategy and Location: Scattered leafy spurge sites occur throughout the region, primarily along transportation corridors. The inventory of this species is well developed at this time. All new leafy spurge sites will be addressed. The serious impacts to range quality and displacement of native vegetation make it a priority for the region. Management may consist of chemical treatments if the sites are small, or additional biocontrol releases if sites are too large to manage chemically. Biocontrol is currently effectively controlling most sites in drier areas. The Cariboo Regional District and MFLNRO address all sites on their jurisdictions.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Significant infestations exist along Dog Creek, Gaspard Creek, Empire Valley Road, Narcosli Creek and the West Fraser Road.								
2009	2	1	1	2	2	1	1	1
Notes:								
2010	2	1	1	2	2	1	1	1
Notes:								
2011	2	1	1	2	1	1	1	1
Notes: Sites have expanded in the Chilcotin. There is a need to find bio-control agents that work in wetter areas. Current populations of bio-agents prefer dry sites.								
2012	2	1	1	2	1	1	1	1
Notes:								
2013	2	1	1	2	1	1	1	1
Notes:								
2014	2	1	1	2	1	1	1	1
Notes: Biocontrol is not working! 112 sites.								
2015	2	1	1	2	1	1	1	1
Notes: Likes the Fraser Valley areas. Not as much on the plateau.								
2016	2	1	1	2	1	1	1	1
Notes:								

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Marsh plume thistle (*Cirsium palustre*)

Description: Marsh plume thistle is a biennial taprooted forb growing to 2 m tall with a cluster of large purple pink flowers and bracts with large spines. Some plants have been seen to be over 3 meters tall.

Type: biennial

Habitat and Impacts: Marsh plume thistle grows on moist to wet areas on most soil types, provided seepage is present. Typically this species grows on unshaded sites, but can tolerate some shade. Marsh plume thistle can invade undisturbed riparian areas and moist pastures. It reduces or eliminates native vegetation and reduces ecological functioning in these sensitive sites. This species generally does not pose a risk to agricultural crops, as it does not tolerate cultivation, but may pose a risk to forestry plantations by overtopping and then pressing and/or shading seedlings. Seeds do not need light to germinate.



Method of Spread: Marsh plume thistle reproduces exclusively from seed, which are dispersed by wind, water, or birds. Seeds can disperse over long distances, especially in areas with strong, consistent winds. It is unknown how long seeds remain viable in the soil.

Management Options:

Mechanical: Hand-pulling or mowing can prevent seed set, and may be effective at removing infestations if repeated over several years.

Chemical: Clopyralid and Aminopyralid are being used in the region.

Biocontrol: *Rhynocillus conicus*, is being evaluated in the Robson Valley, however, monitoring indicates susceptibility of agent to weather events. A cold hardy strain of this agent is present in Alberta.

Treatment: Local Level – hand-pulling.

Landscape Level – hand-pulling or chemical.

Marsh plume thistle (*Cirsium palustre*)

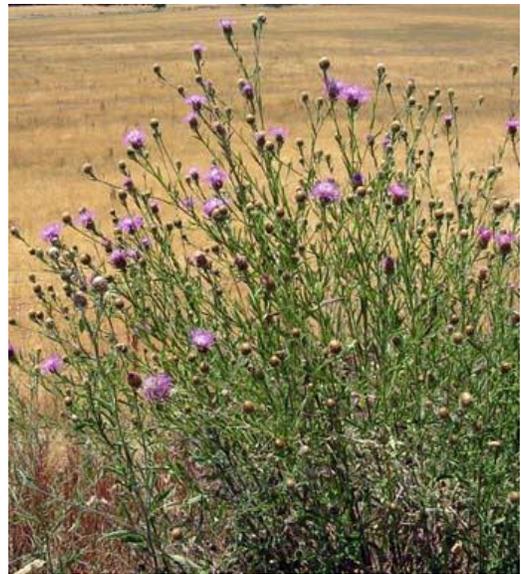
CCCIPC Priority and Treatment Strategy and Location: Marsh plume thistle is ranked as a new invader in most regions, although a containment line was established in 2013. All known and new sites outside the containment area will be managed: the goal is to keep marsh plume thistle from spreading further. The Northwest Invasive Plant Council has drawn a containment line north of this region and is actively attempting to stop the spread of this difficult to manage species.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	There are 6 known sites near Blackwater Road. A significant amount of Marsh plume thistle occurs east of Prince George in the McBride area where it has been extremely invasive.							
2009	1	1	1	1	1	1	1	1
Notes:								
2010	1	1	1	1	1	1	1	1
Notes:	Numerous sites exist near Blackwater Road east of Quesnel and along several Forest Service roads between Quesnel and Wells. Sites in the Dunkley area have expanded exponentially. There is a need for further inventory.							
2011	1	1	1	1	1	1	1	1
Notes:	New sites are showing up closer to Quesnel. Discussion about expanding the NWIPC containment area into the CCCIPC area. Dunkley Forest Products is not noticing an impact on seedlings yet. Potentially changing to a priority 2 next year. There is a need for further inventory.							
2012	1	1	1	1	1	1	1	1
Notes:								
2013	2	1	1	1	1	1	1	1
Notes:	Containment line moved to old Quesnel-Hixon highway, from Quesnel airport to northern boundary of region. Finish inventory between old highway and Fraser River.							
2014	2	1	1	1	1	1	1	1
Notes:	Containment line moved to old Quesnel-Hixon highway, from Quesnel airport to northern boundary of region. Finish inventory between old highway and Fraser River.							
2015	1	1	1	1	1	1	1	1
Notes:	Areas outside of the containment area are now a priority 1							
2016	1	1	1	1	1	1	1	1
Notes:								

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**Meadow knapweed (*Centaurea pratensis*,
Centaurea debauxii, *Centaurea x monctonii*)**

Description: Meadow knapweed belongs to the Sunflower family. This plant is native to Europe and was most likely introduced to North America as a contaminant in alfalfa seed (Ball et al 2006). Meadow knapweed can grow up to 1m tall. It has lance-shaped basal leaves. Several large purple-pink flower heads form at the top of its branched, hairy, erect stems. This species of knapweed is considered to be a hybrid between brown and black knapweed and is often confused with those knapweed species, as well as with spotted knapweed. Meadow knapweed reproduces solely by seed (Ball et al 2006).



Type: Perennial forb

Habitat and Impacts: Meadow knapweed has been known to invade rangelands and pastures, reducing carrying capacities and yields

Method of Spread: Meadow knapweed reproduces primarily through seed; however, it can re-grow from root and crown fragments. Seeds germinate throughout the growing season and plants typically flower from May to July. Seed is spread via humans, wind and animals and can remain viable in the soil for several years.

Management Options:

Mechanical: mowing and hand-pulling plants prior to flowering can reduce seed production.

Chemical: Picloram, Dicamba or a combination of Clopyralid and 2, 4-D are a few of the herbicides that effectively control meadow knapweed.

Biological: several biological control agents are used to control meadow knapweed. These include *Larinus obtusus* (seed feeding weevil), *Metzneria paucipunctella* (seed feeding moth) and *Urophora quadrifasciata* (seed feeding fly)

Treatment Options: Local Level – frequently mowing and hand-pulling small infestations.

Landscape Level – chemical control and possible biological control for larger infestations.

Meadow knapweed (*Centaurea pratensis*, *Centaurea debauxii*, *Centaurea x monctonii*)

CCCIPC Priority and Treatment Strategy and Location:

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	1	1	1	1	1	1	1	1
Notes: occurs in the Bella Coola Valley along the Tote Road (currently unmapped)								
2010	1	1	1	1	1	1	1	1
Notes: occurs outside the CCCIPC area along HWY 97 approximately 0.5km north of Loch Lomond in the TNRD and possibly north of Lac Des Roches (not confirmed). Tote Road site unconfirmed.								
2011	1	1	1	1	1	1	1	1
Notes:								
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes:								
2014	1	1	1	1	1	1	1	1
Notes: Found along Barkerville Rd.								
2015	1	1	1	1	1	1	1	1
Notes: Sites are monitored annually								
2016	1	1	1	1	1	1	1	1
Notes:								

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Mountain bluet (*Centaurea montana*)

Description: Mountain bluet may be distinguished from other *Centaurea* species by its mostly entire leaves and the blue-purple colour of the flowers. It is an evergreen that is popular in gardens as it is hardy, persistent and easily spreads to new locations. It grows in a variety of soils, is drought tolerant and grows well in cool northern climates.



Type: annual

Habitat & Impacts: Mountain bluet is found in a variety of dry habitats, particularly in disturbed areas and does not tolerate dark shade. Commonly used as an ornamental, it is starting to escape from gardens.

Method of Spread: spreads through seeds and has a rhizomatous root system.

Management Options:

Mechanical Control: Cutting or mowing prior to seed-set can reduce seed production, but cut plants may survive, re-bolt, and produce additional seed heads. Hand-pulling can be effective on small infestations, but must be repeated depending on the size of the initial population.

Chemical Control: Chemical treatments consist of Picloram, 2, 4-D, Aminopyralid and Glyphosate, and applied before flower production.

Biological Control: No approved biological control agents are present in British Columbia for Mountain bluet.

Treatment Options: Local Level – hand-pulling small sites, herbicide for larger sites.

Landscape Level – herbicide.

Mountain Bluet (*Centaurea montana*)

CCCIPC Priority & Treatment Strategy and Location: Mountain bluet is a common garden ornamental that can escape from gardens and take over natural and disturbed areas. The North West Invasive Plant Council lists mountain bluet as a high priority species.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2011	1	1	1	1	1	N/A	N/A	N/A
Notes: Found in small patches on the Blackwater Road, around Dragon Lake, in Williams Lake and side roads around 100 Mile House.								
2012	1	1	1	1	1	N/A	N/A	N/A
Notes: Number of sites is expanding.								
2013	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2014	1	1	1	1	1	N/A	N/A	N/A
Notes: Prevalent in Quesnel, Barkerville Cemetery, Canim Lake, and Forest Grove Rd. 97 sites have been recorded.								
2015	1	1	1	1	1	N/A	N/A	N/A
Notes: Escaping gardens and very aggressive in the North Cariboo. South Cariboo sites do not seem to be as aggressive.								
2016	1	1	1	1	1	N/A	N/A	N/A
Notes:								

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Nodding thistle (*Carduus nutans* L.)

Description: Nodding thistle is native to Europe and Asia and was introduced into North America in the early 1900's as a seed contaminant (Ball et al, 2006). It is an herbaceous biennial that can grow up to 1.5m tall. It produces a long fleshy taproot and one to several erect and highly branched stems. The stems are spiny and winged except below the flower head. The leaves are deeply lobed and alternate on the stem. A single large pink/purple flower head is produced at the tops of the branches. The flower heads tend to droop down or "nod" at maturity (Cranston et al. 2005). This plant is often confused with plumeless thistle.

Type: biennial forb

Habitat and Impacts: Nodding thistle prefers mid elevations, where it occurs in meadows, rangelands, roadsides and cut blocks. It can out-compete native plants and reduce pasture production. Livestock rarely eat nodding thistle.

Method of Spread: Nodding thistle reproduces primarily by seed. A single flower head can produce up to 1,200 seeds and the seeds can remain viable in the soil for up to 10 years (Alberta Fish and Game Association, 2006).

Management Options:

Mechanical: Persistent and continual mowing, clipping or hand-pulling can reduce infestations by reducing plant vigour and seed production. When hand-pulling or digging, it is important to completely remove the crown so the plant does not re-bolt.

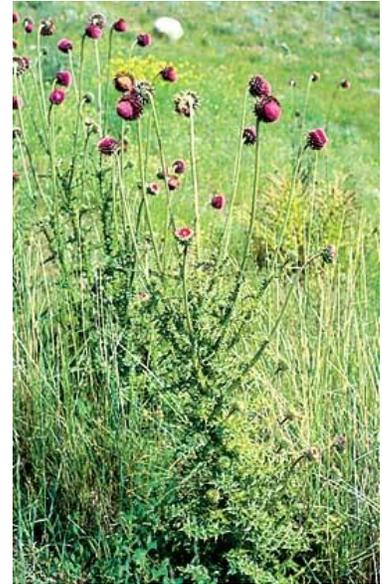
Chemical: Chemical treatment is also highly effective in controlling nodding thistle. Clopyralid, 2, 4-D or Dicamba can be used to manage plants in the spring prior to bolting. Picloram is effective on rosettes during fall application.

Biological: Biological control is available for nodding thistle in British Columbia. The agents that are used include *Rhinocyllus conicus* (weevil), *Trichosiocalus horridus* (weevil) and *Urophora solstitialis* (fly). These insects damage the seed heads and foliage of the plant, reducing seed production and plant vigour.

Rhinocyllus conicus and *Trichosiocalus horridus* agents have been released on most of the nodding thistle sites in the Cariboo Chilcotin Coast region. They have successfully reduced the vigour and spread of individual plants and infestations.

Treatment: Local Level – frequent hand-pulling and/or mowing small infestations.

Landscape Level – biocontrol releases, and chemical treatment on localized areas where appropriate.



Nodding thistle (*Carduus nutans* L.)

CCCIPC Priority and Treatment Strategy and Location: Existing and new sites will be managed primarily by biological control to prevent further spread. Small infestations may be treated chemically.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	4	4	4	4	4	1	1	1
Notes: There are several nodding thistle sites in the Cariboo Chilcotin Coast region. These are located south of Alexis Creek and Hanceville, and along the Taseko Lake Road, Vert Lake, Chimney Creek and Ahbau Road.								
2010	4	4	4	4	4	1	1	1
Notes: Presence in Hagensborg East is unconfirmed.								
2011	4	4	4	4	4	1	1	1
Notes:								
2012	4	4	4	4	4	1	1	1
Notes:								
2013	4	4	4	4	4	1	1	1
Notes:								
2014	4	4	4	4	4	1	1	1
Notes:								
2015	4	4	4	4	4	1	1	1
Notes: Some sites have been misidentified.								
2016	4	4	4	4	4	1	1	1
Notes:								

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Orange hawkweed (*Hieraceum aurantiacum*)

Description: Orange hawkweed was introduced to North America as an ornamental species towards the end of the 19th century in the eastern United States. Within 25 years it had spread from New England to Michigan and is currently one of the most widespread invasive plants in North America (Wilson and Callihan 1999).



Orange hawkweed is a creeping perennial with milky sap and a shallow, fibrous root system (Wilson and Callihan 1999). The basal rosette of hairy leaves and the cluster of dark orange compound flowers at the top of a 0.3 to 1.2 m tall, leafless flower stalk serve to distinguish this species from other hawkweeds in British Columbia.

Type: perennial

Habitat and Impacts: Orange hawkweed occupies a wide range of well-drained habitats, but prefers coarse soils and unshaded sites.

Method of Spread: It reproduces by seed or by stolon or rhizome and can form large, continuous mats with up to 3500 plants per square metre (Wilson and Callihan 1999). Seed production is generally low, but seeds can be produced sexually or asexually without pollination. Animals, people or vehicles disperse the majority of seeds. Although seeds are plumed, they are not widely spread by wind. Seeds can remain viable in the soil for more than 7 years, although most germinate within one year of production.

Management Options:

Mechanical: Hand pulling of young plants can be effective, but small root fragments can resprout and allow the infestation to persist. Mowing can control seed production, but encourages vegetative growth and spread. Digging plants or otherwise disturbing roots can help spread orange hawkweed, since new plants can become established from root, stolon, or rhizome fragments (Wilson and Callihan 1999). Orange hawkweed should not be tilled unless this treatment is done in combination with a chemical treatment and followed by reseeding.

Chemical: Dicamba, Picloram, Aminopyralid, Clopyralid or Picloram and 2,4-D are effective at controlling orange hawkweed during the spring growing season.

Biological: Biological control agents are currently being developed but are not yet available for distribution.

Cultural: Ammonium Sulphate (Nitrogen fertilizer) can be applied to fields to suppress the competitive edge of orange hawkweed.

Treatment Options: Local Level – hand pulling small infestations, chemical and fertilization for larger sites.

Landscape Level – chemical treatments.

Orange hawkweed (*Hieraceum aurantiacum*)

CCCIPC Priority and Treatment Strategy and Location: Preventing additional sites from establishing in western parts of the region is a priority. A containment line is established east of Highway 97 along the Interior Douglas Fir/Sub-Boreal Pine Spruce biogeoclimatic zone boundary to Williams Lake, then along the West Fraser Road to Narcosli/Deep Creek, then west to the Itcha Mountains (see maps in Appendix 6). All sites outside the containment line will be aggressively controlled.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Orange hawkweed is currently concentrated in the eastern part of the Cariboo Chilcotin Coast from east of 100 Mile House to the northern boundary but there are sites along the length of Highway 97. Scattered sites are recorded in the Chilcotin, and it is not recorded in the coastal areas of the region.							
2009	3	2	2	3	1	1	1	1
	Notes: Sites found on private property in Bella Coola							
2010	3	2	2	3	1	1	1	1
	Notes:							
2011	3	2	2	3	1	1	1	1
	Notes:							
2012	3	2	2	3	1	1	1	1
	Notes:							
2013	3	2	2	3	1	1	1	1
	Notes: Containment line moved to Dog Creek Road: to TNRD boundary in the south, north to Highway 97. Line moved for both orange hawkweed and yellow hawkweed.							
2014	3	2	2	3	1	1	1	1
	Notes: Orange hawkweed is still being managed in the Chilcotin, need to be on the lookout for it in the Tatlayoko and Bella Coola Valleys.							
2015	3	3	3	3	1	1	1	1
	Notes: Containment line moved to Dog Creek Road: to TNRD boundary in the south, north to Highway 97. Line moved for both orange hawkweed and yellow hawkweed.							
2016	3	3	3	3	1	1	1	1
	Notes:							

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Oxeye daisy (*Leucanthemum vulgare*)

Description: Oxeye daisy is a long-lived perennial forb introduced to North America from Europe both as a seed contaminant and as an ornamental (Olson and Wallander 1999).

Type: perennial

Habitat and Impacts: Although it is most common on neutral or basic soils, it can tolerate a wide range of moisture and soil texture conditions. Oxeye daisy does not tolerate shade well and is seldom found in areas with tall, thick vegetation. Oxeye daisy generally spreads slowly but once established, it is difficult to eradicate. Heavy infestations can reduce or eliminate native vegetation. Oxeye daisy is unpalatable to cattle and pigs, but is grazed by horses, sheep, and goats. Heavy infestations can result in decreased forage availability for livestock. Heavy grazing pressure tends to result in increased cover of oxeye daisy, whereas light grazing does not affect the cover in established infestations (Kydd 1964).



Method of Spread: Spreads by seed or by underground rhizome. A single plant may produce up to 26,000 seeds which are spread by wind. Oxeye daisy is a good seed banker with seeds remaining viable for up to six years in the soil (Olson and Wallander 1999).

Management Options:

Mechanical: Hand-pulling, cutting or mowing oxeye daisy can reduce or eliminate seed production, but may also result in the spread of the infestation through stimulated rhizome growth. This is not considered to be an effective method for reducing infestations. Cultivation can be used to reduce or eliminate oxeye daisy, as the shallow roots are easily killed by cutting and exposure.

Chemical: Oxeye daisy is moderately resistant to most 2,4-D based herbicides but Picloram has been found to be effective at controlling oxeye daisy, for at least some period. Clopyralid and Glyphosate can also be used.

Cultural: Fertilizer treatment with Ammonium Sulphate has been found to be almost as effective as herbicides at controlling oxeye daisy in some studies in the United States, and also resulted in increased forage production.

Biological: No biological control agents are available for this species.

Treatment: Local Level – tilling where possible, sulphur soil amendments, cutting or mowing and/or chemical treatments with Glyphosate or 2,4-D.

Landscape Level – chemical where important values are threatened.

Oxeye daisy (*Leucanthemum vulgare*)

CCCIPC Priority and Treatment Strategy and Location: No effective and economically feasible management solution is available for the widespread distribution of oxeye daisy found in our area. The increasing abundance and distribution of this species and the impacts to livestock producers highlight the need to develop controls for this species. Local control recommended for high value sites.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Oxeye daisy is widespread in the Cariboo Chilcotin Coast. Records of oxeye daisy are concentrated along the main highway corridors, all developed areas and utility rights-of-ways. The inventory of this species is poor.								
2009	3	3	3	3	2	1	3	3
Notes:								
2010	3	3	3	3	2	1	3	3
Notes:								
2011	3	3	3	3	2	1	3	3
Notes:								
2012	3	3	3	3	2	1	3	3
Notes:								
2013	3	3	3	3	3	1	3	3
Notes: Spreading rapidly in the Chilcotin. Larger patches too big to treat.								
2014	3	3	3	3	3	1	3	3
Notes:								
2015	3	3	3	3	3	1	3	3
Notes: It likes disturbed area and horse pastures. Otherwise not incredibly aggressive as it moved north.								
2016	3	3	3	3	3	1	3	3
Notes:								

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Perennial pepperweed (*Lepidium latifolium*)

PROVINCIAL EDRR

Description: Perennial pepperweed was introduced to North America from Eurasia and is a deeply rooted, perennial forb with waxy-coated leaves and stems. This member of the mustard family can grow up to 2 m tall.

Type: perennial

Habitat and Impacts: Grows on well-drained, often saline sites in unshaded areas. This species can be very invasive and overruns pastures, croplands, meadows, and riparian areas. Habitat quality in riparian areas can be seriously impacted. Croplands and pastures may have reduced yields and pepperweed seeds will contaminate the harvest.

Method of Spread: Perennial pepperweed reproduces by seed or by root fragments. Seed production is moderate and seeds do not significantly bank in the soil. Seeds are dispersed by wind and water, and most often land close to the parent plant.



Management Options:

Mechanical: Mowing and spring burning can control perennial pepperweed density if done prior to seed set. Hand pulling is difficult as rootstocks are deep-seated and extensive.

Chemical: A number of herbicides are effective at controlling this species, including Metsulfuron-methyl, Dicamba, Glyphosate, Imazapyr, and Glyphosate/2,4-D.

Biological: No biocontrol agent is currently available for perennial pepperweed in British Columbia.

Treatment Options: Local Level – hand pulling, cutting, chemical.

Landscape Level – chemical.

Perennial pepperweed (*Lepidium latifolium*)

PROVINCIAL EDRR

CCCIPC Priority and Treatment Strategy and Location: All known and new infestations of perennial pepperweed will be targeted for elimination. Heavy monitoring around the one existing site is required to ensure that new infestations do not become established.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Currently only one recorded site in the southern part of the region on Highway 97 at 91 Mile.								
2009	1	1	1	1	1	N/A	N/A	N/A
Notes: No growth at site								
2010	1	1	1	1	1	N/A	N/A	N/A
Notes: No growth at site								
2011	1	1	1	1	1	N/A	N/A	N/A
Notes: Site revisited and was treated.								
2012	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2013	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2014	1	1	1	1	1	N/A	N/A	N/A
Notes: After 3 years the one site has regrown, is being actively treated								
2015	1	1	1	1	1	N/A	N/A	N/A
Notes: Site will sometimes appear on both sides of the road								
2016	1	1	1	1	1	N/A	N/A	N/A
Notes: Site identified on the Beaver Valley Road and was treated.								

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Plumeless thistle (*Carduus acanthoides*)

Description: Plumeless thistle was introduced into North America in the late 1800's from Eurasia (Ball et al, 2006). It is a biennial tap rooted thistle that grows 1-2 meters tall. The upper stems are branched and have spiny wings that extend right up to the flower head. Flowers form at the top of the stems in clusters or singlets. The flowers are typically purple in color, although some are white/cream. This plant is often confused with nodding thistle (Ministry of Agriculture, Lands and Fisheries, 2002).



Plumeless thistle has been known to hybridize with nodding thistle when found inhabiting the same location (Ministry of Agriculture and Lands, 2002).

Type: biennial forb

Habitat and Impacts: Plumeless thistle prefers mid elevations where it is often found inhabiting pastures, fields, logged areas and roads sides (Ministry of Agriculture, Lands and Fisheries, 2002).

Method of Spread: This thistle is one of the more aggressive thistles, resulting from its heavy seed production. A single plant can produce up to 9,000 seeds which can remain viable in the soil for up to 10 years. Seeds spread predominantly by wind.

Management Options:

Mechanical: Persistent and continual mowing, clipping or hand pulling can reduce infestations by reducing plant vigour and seed production.

Chemical: Herbicides that contain Picloram, Dicamba, 2, 4-D or Glyphosate can be used to successfully manage this species. Herbicides should be applied in the spring prior to bolting or in the fall on new rosettes (Ministry of Agriculture and Lands, 2002).

Biological: Biological control agents are available for plumeless thistle. These include *Rhynocyllus conicus* (weevil) and *Trichosirocalus horridus* (weevil). These weevils cause damage to the seed head and plant foliage.

Treatment: Local Level – frequent hand pulling and/or mowing small infestations.

Landscape Level – Chemical application where appropriate.

Plumeless thistle (*Carduus acanthoides*)

CCCIPC Priority and Treatment Strategy and Location: The current management goal for plumeless thistle in the Cariboo Chilcotin Coast region is elimination via chemical and mechanical treatment.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	1	1	1	1	1	1	1	1
Notes: Sites have been confirmed in Williams Lake along the Williams Lake River Valley Trail (not on maps). It is thought to occur in the North Cariboo as well but this has not yet been confirmed.								
2010	1	1	1	1	1	1	1	1
Notes:								
2011	1	1	1	1	1	1	1	1
Notes: Sites found in Horsefly and Likely. Sites reported in the Chilcotin.								
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes:								
2014	1	1	1	1	1	1	1	1
Notes: Only 2 sites, River Valley Trail in Williams Lake.								
2015	1	1	1	1	1	1	1	1
Notes:								
2016	1	1	1	1	1	1	1	1

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Purple loosestrife (*Lythrum salicaria*)

Description: Purple loosestrife is a perennial forb or semi-shrub growing up to 3.5 m in height in a wide range of wet to moist habitats (Mullin 1999). This species was introduced into North America from Europe or Asia as early as the 1830s and was first reported on the west coast of North America in the 1940s.

Type: perennial

Habitat and Impacts: Loosestrife is very invasive and can displace native vegetation in riparian areas, reducing habitat quality, water flow, and forage potential. Purple loosestrife can form thick, monoculture stands where it becomes established and reduces habitat values and plant and animal diversity. Water flows can be impeded when infestations occur in streams and drainage ditches.



Method of Spread: Purple loosestrife can reproduce by seed or vegetatively. Root or stem fragments can also form adventitious roots and develop into new plants. Seed production is high, with up to 300,000 seeds per plant. Seeds are spread mainly by water, but also by animals and humans. Seed remains viable in the soil or sediments for up to 20 years.

Management Options:

Mechanical: Hand-pulling new sites with young plants is often the most effective treatment. Complete removal of all roots and seeds is not possible with older plants, so eliminating seed production is needed to prevent seeds from being spread to other suitable sites.

Chemical: Herbicide use is often not possible in the wet habitats purple loosestrife occupies.

Biological: Biocontrol agents have been released in British Columbia for Purple loosestrife and have resulted in decreased vigour and seed production along British Columbia's coast. Infestations need to be large enough to support a biocontrol agent population; a bioagent release was conducted in 2011 on the Dragon Lake site.

Treatment: Local Level – Hand pull young plants, cut to eliminate seed production for larger and older infestations. Do not use in ornamental plantings.

Landscape Level – Cut to eliminate seed production.

Purple loosestrife (*Lythrum salicaria*)

CCCIPC Priority and Treatment Strategy and Location: Reducing bare soil on wet sites is the best method of preventing new occurrences of purple loosestrife. The goal of eradication was changed to bio-control in 2011 with the first set of bioagent releases.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Two records of purple loosestrife are found in the Cariboo Chilcotin Coast, one on the Nazko Road north-west of Quesnel and the other at Alexandria								
2009	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2010	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2011	1	1	1	1	1	N/A	N/A	N/A
Notes: First year of bio-agent releases. An abundance of rain could slow establishment. More releases are recommended. New site recorded in Lac La Hache								
2012	1	1	1	1	1	N/A	N/A	N/A
Notes:								
2013	1	1	1	1	1	N/A	N/A	N/A
Notes: Biocontrol on Dragon Lake site needs monitoring								
2014	1	1	1	1	1	N/A	N/A	N/A
Notes: Nazko has 2 sites, extensive in Lac La Hache. More bugs would help.								
2015	1	1	1	1	1	N/A	N/A	N/A
Notes: New sites along Chimney Lake Road in a ditch.								
2016	1	1	1	1	1	N/A	N/A	N/A
Notes: Biocontrol appears to have established around Dragon Lake.								

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Russian knapweed (*Centaurea repens*)

Description: Russian knapweed was introduced to North America from Asia. It is a perennial that reproduces by roots, rhizomes and seeds. It can grow up to 1m tall and young stems are covered with soft, short, grey hairs. The flowers are urn-shaped and pink to purple in colour, occurring singly at the ends of stems. The bracts underneath the flowers are green with papery edges. Flowers become straw-coloured at maturity.

Type: Perennial

Habitat & Impacts: Russian knapweed thrives in any soil, but does very well in clay. It is not tolerant of shade, drought or wet sites. It can invade rangelands and pastures, reducing carrying capacities and yields. Russian knapweed contains toxic compounds that cause a neurological disorder in horses if they consume large quantities.

Method of Spread: Russian knapweed reproduces primarily through seed; however, it can re-grow from root and crown fragments. Seeds germinate throughout the growing season and plants typically flower from May to July. Seed is spread via humans, wind and animals and can remain viable in the soil for several years.



Management Options:

Mechanical: Removal of the plant to ground level prevents seed production. Repetition can help exhaust root reserves.

Chemical: Picloram, Dicamba or a combination of Clopyralid and 2,4-D are herbicides that effectively control Russian knapweed.

Biological: There is a gall-forming nematode and a rust fungus introduced in Alberta for biocontrol; these bioagents have been introduced into BC, but have not yet become established.

Treatment Options: Local Level – frequent mowing and hand pulling small infestations.

Landscape Level – chemical control and possible biological control for larger infestations.

Russian knapweed (*Centaurea repens*)

CCCIPC Priority & Treatment Strategy and Location: Russian knapweed is prevalent in southern BC. All new and existing sites will be treated with the goal of eradication.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2010	1	1	1	1	1	1	1	1
Notes: One site found along Hwy 24 in Lone Butte								
2011	1	1	1	1	1	1	1	1
Notes: A few known sites in the South Cariboo								
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes:								
2014	1	1	1	1	1	1	1	1
Notes: All sites need to be verified.								
2015	1	1	1	1	1	1	1	1
Notes:								
2016	1	1	1	1	1	1	1	1
Notes:								

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Scentless Chamomile (*Matricaria perforata*)

Description: Scentless chamomile was introduced to North America from Europe and is now found in all Canadian provinces. The large white flowers are similar to oxeye daisy, but the finely divided, scentless leaves help identify this species. Scentless chamomile is an annual to weak perennial forb with an extensive fibrous root system.

Type: annual or weak perennial

Habitat and Impacts: This species grows in a range of habitats, but prefers disturbed sites, such as landings, dumps, transportation corridors, and gravel pits.

Method of Spread: Scentless chamomile reproduces by seed, with a single plant producing up to one million seeds.



Management Options:

Mechanical: Hand pulling can be an effective management practice for new infestations. The abundant seed production of this plant requires that infestation sites be re-examined annually to catch any germinants from the seed bank. Scentless chamomile does not compete well with other tall vegetation, so maintaining a healthy vegetation community or seeding disturbed sites can minimize infestation.

Chemical: Metsulfuron-methyl, Picloram, and Clopyralid have shown to be effective.

Biological: The seed feeding weevil, *Omphalon hookeri* is doing well in the Chilcotin but haven't found the stem mining beetle *Microplontus edentulus* or gall forming midge *Rhopalomyia tripleurospermia* (released at the old Alexis Creek dumpsite)

Treatment: Local Level – hand pulling, encouraging competing vegetation establishment.

Landscape Level – evaluation of biocontrol agent effectiveness, chemical control where high values are threatened.

Scentless Chamomile (*Matricaria perforata*)

CCCIPC Priority and Treatment Strategy and Location: Scentless chamomile is scattered and widespread throughout the Cariboo Chilcotin Coast, with limited distribution in the South Cariboo. Two biocontrol agents have been released, but the effectiveness of these agents is still unknown. Inventory is poor.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008: Significant distribution along Hwy 20 through the Chilcotin to the Central Coast.								
2009	3	3	2	2	3	1	3	1
Notes:								
2010	3	3	2	2	3	1	3	1
Notes: Biological control was released is the primary means of control in the Chilcotin								
2011	3	3	2	2	3	1	3	1
Notes: Sites found near Horsefly and 108 Mile								
2012	3	3	2	2	3	1	3	1
Notes:								
2013	3	3	2	2	3	1	2	1
Notes:								
2014	3	3	2	2	3	1	2	1
Notes: Sites total 525 ha. Seed head feeding weevil is doing well in the Chilcotin.								
2015	2	3	3	2	3	1	2	1
Notes: Biocontrol is not yet a successful option. It is not treated in the NWIPC area except where it can contaminate the seed industry.								
2016	2	3	3	2	3	1	2	1
Notes:								

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Scotch broom (*Cytisus scoparius*)

Description: Scotch broom was introduced to North America as a garden ornamental from western and central Europe. The pea-like flowers are small and golden yellow. The stalked lower leaves are composed of three leaflets each, while the upper leaves are un-stalked and have a single leaflet. The plant can grow between 1-3m tall; older plants can develop woody stems. It has a deep taproot, and has been used as a bank stabilizer because of its rooting structure and rapid growth.

Type: perennial

Habitat and Impacts: This species grows in a range of disturbed habitats, but prefers dry, sandy soils at low elevations.

Method of Spread: Scotch broom reproduces by seed, it's large, black seed pods audibly cracking open in late summer and throwing the seeds from the plant. Each pod produces 5-9 seeds and each plant can produce upwards of 18,000 seeds. Seeds can lie dormant for up to 30 years. Scotch broom can also spread by lateral bud growth.



Management Options:

Mechanical: Hand pulling and cutting can be an effective management practice, if continued until the seed bank in the soil is depleted. The abundant seed production of this plant requires that infestation sites be re-examined annually to catch any germinants from the seed bank. Planting native plants following removal will assist in preventing Scotch broom from re-growing, as the native plants occupy the disturbed soil. Goat grazing has also shown to reduce some infestations.

Chemical: 2, 4-D, Triclopyr, Picloram, Glyphosate and Hexazinone have shown to be effective, especially spot treatments. Keep in mind that repeated treatments will often be required due to the long seed viability in the soil.

Biological: Seed-feeding beetles have been established in Washington State, and have moved north into southern BC, but there are no approved biocontrol agents available in BC at present.

Treatment: Local Level – hand pulling, cutting, encouraging competing vegetation establishment.

Landscape Level – chemical control where high values are threatened.

Scotch broom (*Cytisus scoparius*)

CCCIPC Priority and Treatment Strategy and Location: An unconfirmed Scotch broom site is present on the Outer Coast. All Scotch broom sites will be treated.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2013	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Bella Bella site unconfirmed								
2014	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Bella Bella site remains unconfirmed								
2015	N/A	N/A	N/A	N/A	N/A	1	1	1
Time was spent surveying the outer coast and sites have been confirmed.								
2016	N/A	N/A	N/A	N/A	N/A	1	1	1

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Spotted knapweed (*Centaurea biebersteinii*)

Description: Spotted knapweed is native to central Europe and Eastern Russia (Sheley *et al.* 1999). This species arrived in North America in the late 19th century as a contaminant in alfalfa seed and in soil used as ship's ballast. The first record of spotted knapweed on the continent is from Victoria, British Columbia in 1883. Spotted knapweed may grow up to 1.2 m in height, is less branched than diffuse knapweed and usually has darker red-purple flowers.



Type: biennial to short-lived perennial

Habitat and Impacts: Spotted knapweed grows in a wide range of dry habitats from grasslands to forests, although it prefers open sites with well-drained soils. Typically, spotted knapweed occurs in areas that receive 30 to 50 cm of annual precipitation but it does occur in drier areas. It is intolerant of complete shade. Spotted knapweed usually invades disturbed sites, but can then spread into adjacent undisturbed sites. Infestations can result in reduced yields of livestock forage and can displace native vegetation, particularly in areas of moderate grazing pressure.

Method of Spread: Spotted knapweed reproduces exclusively by seed and each plant can produce up to 140,000 seeds. Seeds are dispersed primarily by wind, but most seeds land close to the parent plant. Seeds can also be dispersed in cut hay or bedding or on vehicle undercarriages. The seed banks of spotted knapweed can be extremely large and can take years to manage using any control method available.

Management Options:

Mechanical: Hand-pulling or mowing prior to seed set with repeated treatments after the initial cutting.

Chemical: Chemical treatments consist of: Picloram, 2, 4-D, Aminopyralid and Glyphosate, applied before flower production.

Biological: Twelve different biocontrol agents have been used in British Columbia with good establishment and reduced plant vigour. Success at removing plants and reducing densities in infestations is limited at this time to localized areas in the southern parts of the Province. *Agapeta zoegana* (root feeding moth), *Cyphocleonus achates* (root feeding weevil), *Larinus minutus* and *L. obtusus* (seed feeding weevils), and *Metzneria paueipunctella* (seed feeding moth) have been released within the Cariboo Chilcotin. Specific monitoring to be conducted in the Little Fort and 100 Mile areas in 2014.

Treatment: Local Level – hand pulling small infestations and chemical where appropriate.

Landscape Level – chemical treatments, hand pulling, biocontrol releases and effectiveness monitoring.

Spotted knapweed (*Centaurea biebersteinii*)

CCCIPC Priority and Treatment Strategy and Location: There are significant infestations in residential subdivisions throughout the region. The inventory for this species is well developed, although many secondary roads are known to contain un-surveyed spotted knapweed. There is a large infestation within the Thompson Nicola Regional District. All sites west of the Fraser River will be eradicated. Sites east of the Fraser River will be managed on a site-specific basis to reduce the rate of spread and the density of existing infestations along the main corridors near Highway 97 and adjacent infested lands. Future containment lines may be considered in some heavily infested areas. A large percentage of the sites on the inventory map are 'monitor only', as the weed has been effectively controlled.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Widespread throughout the Cariboo Chilcotin Coast along corridors of transport and utility rights-of-way. Highest density of sites along main highways but scattered elsewhere over most of the region.							
2009	2	2	2	1	1	1	1	1
Notes:	Biocontrol is present in the Central Cariboo, but it may be a few years before it becomes effective.							
2010	2	2	2	1	1	1	1	1
Notes:								
2011	2	2	2	1	1	1	1	1
Notes:	Working on monitoring. Have plots in 150 Mile House for biocontrol and grazing.							
2012	2	2	2	1	1	1	1	1
Notes:								
2013	2	2	2	1	1	1	2	1
Notes:	Monitor biocontrols in Chilcotin.							
2014	2	2	2	1	2	1	2	1
Notes:	1500 sites of the 1715 treated in 2013. Not enough money to treat all the sites. Major infestations along the Pipeline, Green Lake, Spring Lake, Tatton Station, Watch Lake. Biocontrol is well established but does not appear to be having an effect. 100 Mile area biocontrol to be monitored in 2014.							
2015	2	2	2	1	1	1	1	1
Notes:	Management objective is to protect grasslands. Under bio-attack not biocontrol.							
2016	2	2	2	1	1	1	1	1
Notes:								

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St. John's-wort (*Hypericum perforatum* L.)

Description: St-John's-wort belongs to the *Clusiaceae* family and grows 0.1 to 1.0 m tall. It has numerous bright yellow flowers, 2 cm in diameter, that occur in flat topped clusters. Flowers have 5 separate petals that are twice as long as the sepals. The leaves are opposite, oval shaped, with prominent veins, 1-3 cm long and covered with transparent dots. The stems are erect, 2-sided, rust coloured and have numerous branches. This plant is native to Europe but arrived in North America in the late 1700s and became an established weed in BC in the 1940s (White et al. 1993).



Type: perennial forb

Habitat and Impacts: St-John's-wort invades grazed and disturbed lands along roadsides and grows in low to mid elevations in coastal, grassland and open forested regions. It can displace native plant species and reduce livestock and wildlife forage (Ministry of Agriculture, Lands and Fisheries, 2002). The plant contains a phototoxin, which can cause skin irritation to livestock with light coloured skin when exposed to sunlight. It is generally not palatable to cattle (Majak et al, 2008). St. John's-wort is also known to be a skin irritant for humans.

Method of Spread: St. John's-wort reproduces by seed and vegetatively from the roots. The rhizome root system spreads laterally and is capable of forming new buds that separate from the parent. Each plant produces approximately 15,000 - 30,000 seeds. The seeds have a gelatinous coat that allows long-distance dispersal and can remain viable in the soil for 6-10 years.

Management Options:

Mechanical: Can be managed by tillage in agricultural fields.

Chemical: Combinations of 2,4-D and Picloram, or 2,4-D and Glyphosate have been successful in managing this weed in the US.

Biological: Several biocontrol agents are available for St. John's-wort including *Agilus hyperici* (root feeding beetle), *Aphis chloris* (sap sucking aphid), *Aplocera plagiata* (foliar feeding moth), *Chrysolina hyperici* (foliar feeding beetle), *Chrysolina quadrigemina* (foliar feeding beetle), and *Chrysolina varians* (foliar feeding beetle). *Chrysolina hyperici* and *Chrysolina quadrigemina* have been successful in the Kootenay region of BC, but none of these agents have been tested in the CCCIPC region (Ministry of Forests and Range, 2007).

Treatment Options: Local Level – chemical control and tillage for agricultural sites.

Landscape Level – biological control for larger infestations.

St. John's-wort (*Hypericum perforatum* L.)

CCCIPC Priority and Treatment Strategy and Location: St. John's-wort is not well established in the Cariboo Chilcotin Coast Region. Biological control for St. John's-wort has a long history in BC and is the primary means of control.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	4	4	4	4	4	1	4	4
Notes: Most infestations have been located in the Bella Coola area and Tweedsmuir Park; however, a few sites have been located in the Quesnel area.								
2010	4	4	4	4	4	1	4	4
Notes:								
2011	4	4	4	4	4	1	4	4
Notes: Site on Hawks Creek FSR has flourished. Sites in Central Coast have been well controlled by the biocontrol.								
2012	4	4	4	4	4	1	4	4
Notes:								
2013	2	2	2	2	2	1	3	3
Notes: Parasite may be reducing numbers of bioagents. Sites are treatable. Evaluate sites in CCRD to determine status.								
2014	2	2	2	2	2	1	3	3
Notes: Sites in the Cariboo are treated., Central Coast are not. Biocontrol needs to be evaluated.								
2015	2	2	2	2	2	1	3	3
Notes: Havent seen any bio-agents. Looking into getting some to distribute.								
2016	2	2	2	2	2	1	3	3
Notes: Still seem to be having explosions of infestions. No feeding damage observed. Have not found a source to obtain bio-agents.								

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Sulphur cinquefoil (*Potentilla recta*)

Description: Sulphur cinquefoil is a long-lived perennial with fibrous roots. Sulphur cinquefoil has lime-green coloured leaves with hairs on both sides of the leaf. The flower is pale yellow with heart shaped petals. The stem has perpendicular hairs along its length. This plant is similar to the native graceful cinquefoil.

Type: perennial

Habitat and Impacts: This species is found in a wide range of environmental conditions, from dry grasslands to moist forests. It can grow in all light conditions except complete shade. Heavy infestations can eliminate native vegetation. This species is unpalatable and will increase under heavy grazing conditions.

Method of Spread: Sulphur cinquefoil can reproduce by seed or vegetatively. Plants can produce a moderate amount of seed, up to 1,650 per plant. Most seeds land near the parent plant but animals may disperse some seeds, either by ingesting them or by transporting them on fur or feathers. Seeds may also be transported in cut hay or bedding material. Sulphur cinquefoil seeds do not survive well in the soil and few seeds remain viable after 2 years.



Management Options:

Mechanical: Hand-digging may be successful at controlling small infestations; however, removing the entire root system can be difficult.

Chemical: A number of herbicides are effective at controlling sulphur cinquefoil including Picloram, Clopyralid, 2,4-D Amine and Aminopyralid.

Biological: No biocontrol agents are currently available for sulphur cinquefoil. New agents are currently being researched.

Treatment Options: Local Level – hand pulling small infestations.

Landscape Level – chemical treatments.

Sulphur cinquefoil (*Potentilla recta*)

CCCIPC Priority and Treatment Strategy and Location: All sites are treated. Due to the difficulty in controlling this species mechanically, chemical control is the only recommended treatment. A major vector of spread is deer.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2008:	Sulphur cinquefoil is widely distributed in area D and F (Central Cariboo) and area G around Lac La Hache. There are scattered sites in Quesnel, Tatlayoko Valley, 1100 Road, Sulphurous Lake and 83 Mile Road in 100 Mile House.							
2009	1	2	1	1	1	N/A	N/A	N/A
	Notes: Significant infestations at Sugarcane east of Williams Lake. Other sites are near Lac La Hache, San Jose River and Exeter Road in 100 Mile House.							
2010	1	2	1	1	1	N/A	N/A	N/A
	Notes: Moving through Big Lake.							
2011	1	2	1	1	1	N/A	N/A	N/A
	Notes: New site in Beecher Prairie.							
2012	1	2	2	1	1	N/A	N/A	N/A
	Notes:							
2013	1	2	2	1	1	N/A	N/A	N/A
	Notes: Proposed containment line from eastern edge of sulphur cinquefoil habitat to Highway 97. Treat sites west of Highway 97, along main highway rights-of-way within containment area. Prevent from moving into grassland habitats both within containment area and outside containment area.							
2014	1	2	2	1	1	N/A	N/A	N/A
	Notes: 192 sites total, 33 ha. 116 sites within the containment area. Everything outside is treated.							
2015	1	2	2	1	1	N/A	N/A	N/A
	Notes: New site now in Nazko							
2016	1	2	2	1	1	N/A	N/A	N/A
	Notes:							

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Tansy ragwort (*Senecio jacobaeae*)

Description: Tansy ragwort belongs to the Sunflower family. This plant is native to Europe and was most likely introduced to North America in the 1900's as a medicinal plant (Ball et al, 2006). Tansy ragwort grows 0.3 to 1.2m tall. The deeply cut leaves of these plants give it a ragged appearance. Plants contain several daisy-like, bright yellow flowers that form flat-topped clusters (Ball et al, 2006).

Type: Biennial/ short-lived perennial

Habitat and Impacts: Tansy ragwort grows in disturbed areas such as pastures, hay fields, roadsides, clear-cuts and stream banks. It has been known to reduce pasture production and is toxic to livestock; however, the plant is often avoided.

Method of Spread: Tansy ragwort reproduces by seed and each plant can produce up to 150,000 seeds that can remain viable in the soil for over 20 years (Ministry of Agriculture, Lands and Fisheries, 2002). Wind, animals and water transport seeds.



Management Options:

Mechanical: Mowing and hand pulling plants prior to flowering and seed production can reduce seed production.

Chemical: 2, 4-D is an effective herbicide at controlling young seedlings and rosettes. Dicamba and/or a mixture of Dicamba and 2, 4-D is effective at controlling the plant at more advanced growth stages.

Biological: Several biological control agents are used to control tansy ragwort. These include *Cochylis atricapitana* (root crown feeding moth), *Botanophila seneciella* (seed feeding fly), *Longitarsus flavicornis* (root feeding flea beetle), *Longitarsus jacobaeae* (root feeding flea beetle) and *Tyria jacobaeae* (foliar feeding moth) (Ministry of Forests and Range, 2007).

Treatment Options: Local Level – frequent mowing and hand pulling small infestations.

Landscape Level – chemical control and possible biological control for larger infestations.

Tansy ragwort (*Senecio jacobeeae*)

CCCIPC Priority and Treatment Strategy and Location: Tansy ragwort is not well established in the Cariboo Chilcotin Coast region. Inventory for this plant is lacking.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: It occurs in the Bella Coola valley and has been confirmed south of HWY 20 on Douglas Road.								
2010	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Site was not found								
2011	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Site was not found								
2012	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes:								
2013	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes:								
2014	N/A	N/A	N/A	N/A	N/A	1	1	1
Notes: Scattered individuals in the Chilcotin								
2015	N/A	N/A	N/A	N/A	1	1	1	1
Notes: Several years the site has not been found in Bella Coola. Change to not known to exist.								
2016	N/A	N/A	N/A	N/A	1	1	1	1
Notes:								

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Yellow-flag iris (*Iris pseudacorus*)

Description: Yellow-flag iris is native to Europe and the Mediterranean regions, including North Africa and Asia Minor. It was introduced into eastern North America in 1911 and into British Columbia in 1931 (Department of Natural Resources and Parks, Water and Land Resources, 2009).

Yellow-flag iris is a perennial herb with large, showy yellow flowers. The flowers have three large, downward facing sepals and three smaller, erect petals. The yellow flowers often have purple/brown veins at the base of the petals. Flowering stalks can produce one to several flowers. The leaves are found at the base of the plant and clasp the stem. A mature plant can range from 1.0 to 1.5m tall. The root system at the base of each plant forms a dense mat. This mat can be 1m in diameter and extend to 30cm deep (Simon, 2008).



Type: perennial

Habitat and Impacts: The preferred habitats of yellow-flag iris include freshwater wetlands, fens, ponds, lake shores, rivers, stream banks, wet pastures and ditches. These plants tend to grow more proficiently in shallow waters; however, they can form extensive mats in deep water. This iris species tends to displace natural aquatic and riparian vegetation and reduces critical fish and wildlife habitat. This plant can also cause gastroenteritis in cattle and skin irritation in humans (Simon, 2009).

Method of Spread: Yellow-flag iris spreads by seed and roots via water. Because it can reproduce by its roots, an entire infestation can be connected by the same root system. Also, if a piece of root is broken off, it is possible for that fragment to form a new plant. Root fragments that dry out can re-establish if they become wet again (Simon, 2008).

Management Options:

Mechanical: Small infestations of yellow-flag iris can be managed by hand pulling young plants that are not yet established. Larger plants can be dug out, ensuring as much as possible of the root mass is removed. Mowing or cutting prior to seed set may also be effective to reduce seed production. This is a long term method of control that must be done persistently over several years.

Chemical: Chemical control is difficult, as most herbicides cannot be sprayed near water. Chemical application can be achieved by carefully wiping/wicking herbicide on the emerged portion of the plant, or by stem injection. Glyphosate will control yellow-flag iris.

Biological: There is no biological control agent available in British Columbia for this plant.

Treatment: Local Level – frequent hand pulling and/or digging small infestations.

Landscape Level – Mechanical and chemical application, where possible.

Yellow-flag iris (*Iris pseudacorus*)

CCCIPC Priority and Treatment Strategy and Location: Yellow-flag iris has been classified as a new invader in the Cariboo Chilcotin Coast area. The current management objective for yellow-flag iris in the Cariboo Chilcotin Coast region is elimination via chemical and mechanical treatment.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2009	1	1	1	1	1	1	1	1
Notes: It is thought to occur in the Central Cariboo in the city of Williams Lake near Scout Island.								
2010	1	1	1	1	1	1	1	1
Notes: Site confirmed and treated. Found to be sold at many garden centers								
2011	1	1	1	1	1	1	1	1
Notes: New sites found at Lac La Hache, Bridge Lake, Alexis Lake. Potential for it to move into San Jose Creek.								
2012	1	1	1	1	1	1	1	1
Notes:								
2013	1	1	1	1	1	1	1	1
Notes: Monitor downstream along San Jose Creek.								
2014	1	1	1	1	1	1	1	1
Notes:								
2015	1	1	1	1	1	1	1	1
Notes: A research project for treatment with covering is being done on Lac La Hache.								
2016	1	1	1	1	1	1	1	1
Notes: Project appears successful. They were using old belting to smother plants.								

Species ranks that are in **white** indicate the species is **NOT known to exist** in that sub-region (i.e. if black, the species is present). An **N/A** indicates that this species is not ecologically suited to that given sub-region and is not expected to occur there.

Invasive yellow hawkweeds (*Hieracium piloselloides*, *H. caespitosum*, *H. praealtum*, *H. flagellare*)

Description: Introduced hawkweeds generally have a leafless stem with black hairs along the stem and leaves, and rhizomatous roots. Introduced yellow hawkweeds are difficult to distinguish from a number of native hawkweeds, so inventory is probably incomplete. This is a concern in the Chilcotin, where it may not be distinguished from native yellow *Hieracium* species.

Type: perennial

Habitat and Impacts: The biology of these species is similar to that of orange hawkweed, but these species establish more quickly on drier sites. The introduced yellow hawkweeds, like orange hawkweed, are able to spread very rapidly into areas of disturbance. The disturbed soil at the edge of roads and ditch lines are the pathways of spread. Once established, this species is able to colonize undisturbed sites.

Method of Spread: Introduced yellow hawkweeds reproduce by seed or vegetatively by stolon or rhizome. Seed production is generally low, but seeds can be produced sexually or asexually without pollination. Animals, people, or vehicles disperse most of the seed. Although seeds are plumed, they are not spread widely by wind. Seeds can remain viable in the soil for more than 7 years, although most germinate within one year of production.

Management Options:

Mechanical: Hand pulling of young plants can be effective, but small root fragments can re-sprout and allow the infestation to persist. Mowing can control seed production, but encourages vegetative growth and spread. Digging plants or otherwise disturbing roots can help spread yellow hawkweeds since new plants can become established from root, stolon, or rhizome fragments (Wilson and Callihan, 1999).

Chemical: Dicamba, Picloram, Aminopyralid or Picloram and 2,4-D are effective at controlling yellow hawkweeds during the spring growing season.

Biological: There is currently no biocontrol agent for the yellow hawkweeds.

Treatment Options: Local Level – hand pulling new and small infestations, chemical for large sites.

Landscape Level – chemical treatments.



Invasive yellow hawkweeds (*Hieracium piloselloides*, *H. caespitosum*, *H. praealtum*, *H. flagellare*)

CCCIPC Priority and Treatment Strategy and Location: A containment line has been drawn for this species (same line as for orange hawkweed). All sites of these species outside the hawkweed containment area will be managed in a similar manner to orange hawkweed.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
<p>2008: Introduced yellow hawkweeds are currently concentrated in the north and eastern part of the Cariboo Chilcotin Coast. Yellow Hawkweeds are expanding aggressively through the Chilcotin, north of Highway 20. With preference to drier sites, they are prevalent in the Nazko area.</p>								
2009	3	2	2	3	2	1	3	1
Notes:								
2010	3	2	2	3	2	1	3	1
Notes:								
2011	3	2	2	3	2	1	3	1
Notes: Are becoming very aggressive in the South Cariboo. The containment area may need to be moved.								
2012	3	2	2	3	2	1	3	1
Notes:								
2013	3	2	2	3	2	1	3	1
Notes: Containment line moved to Dog Creek Road, to TNRD boundary in the south, north to Highway 97. Line moved for both orange hawkweed and yellow hawkweed.								
2014	3	3	2	3	2	1	3	1
Notes:								
2015	3	3	3	3	2	1	2	1
Notes: Yellow and orange hawkweeds have been seen to hybridize. FLNR is still working on bio-control.								
2016	3	3	2	3	2	1	2	1
Notes:								

Species ranks that are in **white** indicate the species is **NOT known to exist** in that sub-region (i.e. if black, the species is present). An **N/A** indicates that this species is not ecologically suited to that given sub-region and is not expected to occur there.

Wild Chervil (*Anthriscus sylvestris*)

Description-

Type- Annual, biennial or perennial

Habitat and Impacts

Management Options

Mechanical

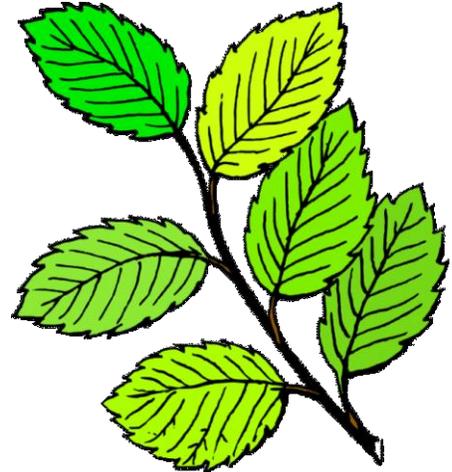
Chemical

Biocontrol

Treatment Options

Local Level - hand pulling and/or digging out deep taproots

Landscape Level



Wild Chervil (*Anthriscus sylvestris*)

CCCIPC Priority and Treatment Strategy and Location:

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
201	1	1	1	1	1	N/A	N/A	N/A
Notes: Added to this list								
2017	1	1	1	1	1	N/A	N/A	N/A
Notes:								

Species ranks that are in **white** indicate the species is **NOT known to exist** in that sub-region (i.e. if black, the species is present). An **N/A** indicates that this species is not ecologically suited to that given sub-region and is not expected to occur there.

Wild Parsnip (*Pastinaca sativa*)

Description- Wild Parsnip, also known as poison parsnip is a member of the carrot/parsley family and is native to Europe and Asia. The roots of Wild Parsnip are edible; however, the sap of the plant can cause severe burns. This single stemmed plant can grow up to 1.5 meters tall and is usually 2-5 centimeters thick. Leaves are arranged in pairs and are sharply toothed. Flowers are yellowish green and form umbrella shaped clusters that are 10- 20 centimeters across. Seeds are flat and round while roots are a thick round taproot that is edible.

Type- Biennial

Habitat and Impacts – Wild Parsnip grows in a wide range of conditions from dry to wet. Typically thriving in disturbed areas such as waste sites, roadsides and embankments, it also spreads quickly in abandoned yards, meadows and open fields. The seeds are easily dispersed by water and wind making it a very aggressive spreader. Wild Parsnip has the potential to modify a variety of open habitats, by outcompeting native habitats and reducing biodiversity. Due to the toxic compounds in the sap, this plant can cause severe dermatitis and is also known to reduce weight gain and fertility in livestock that consume the plant. Wild Parsnip reduces quality and saleability of crops.



Management Options

Mechanical – Dig out by cutting the taproot with sharp spade or shovel. This is most effective in the spring when soil is moist and more of the taproot can be removed. Revisiting the site will be required to deal with any regrowth from the plant – typically every couple of weeks. Mowing can be effective for larger infestations if done just after peak blooming and before seeds set, regrowth will need to be dealt with.

Chemical – Can be effective if done at the correct time (mid-May to mid-June), when the plant is bolting to the time that it flowers. Fall treatments can also be effective on the rosette stage. Herbicides with the most effect are 2,4-D, Escort or Glyphosate.

Biocontrol – there are no biocontrol available for this species

Treatment Options

Local Level Dig out and control regrowth mechanically, large infestations could be managed by mowing or through the use of chemicals.

Landscape Level – dig out and control regrowth mechanically

Wild Parsnip (*Pastinaca sativa*)

CCCIPC Priority and Treatment Strategy and Location: Currently located in riparian and roadsides habitats in Australian and Alkali Creek areas. Because of its impact in human health, public education and removal of the plant is of high importance.

Year	North Cariboo	Central Cariboo	South Cariboo	Nazko	Chilcotin	Outer Coast	Hagensborg East	Bella Coola
2017	1	1	1	1	1	N/A	N/A	N/A

Notes: Added to this list due to human health concerns.

Species ranks that are in **white** indicate the species is **NOT known to exist** in that sub-region (i.e. if black, the species is present). An **N/A** indicates that this species is not ecologically suited to that given sub-region and is not expected to occur there.

Appendix 2: Introduced plant species in the Cariboo Chilcotin Coast Cariboo

Scientific Name ¹	Common Name	Comments
<i>Abutilon theophrasti</i>	velvet-leaf	
<i>Acinos arvensis</i>	basil-thyme	
<i>Acroptilon repens</i>	Russian knapweed	
<i>Aegopodium podagraria</i>	goutweed	
<i>Agropyron cristatum</i> ssp. <i>pectinatum</i>	crested wheatgrass	agronomic species
<i>Agropyron fragile</i>	Siberian wheatgrass	agronomic species
<i>Agrostis capillaris</i>	colonial bentgrass	
<i>Agrostis gigantea</i>	redtop	
<i>Agrostis stolonifera</i>	creeping bentgrass	
<i>Alchemilla subcrenata</i>	lady's-mantle	
<i>Alopecurus geniculatus</i>	water meadow-foxtail	
<i>Alopecurus pratensis</i>	meadow-foxtail	
<i>Alyssum alyssoides</i>	pale alyssum	
<i>Amaranthus blitoides</i>	prostrate pigweed	
<i>Amaranthus retroflexus</i>	rough pigweed	
<i>Anthoxanthum aristatum</i>	annual vernalgrass	
<i>Anthriscus sylvestris</i>	wild chervil	
<i>Arabis glabra</i> var. <i>glabra</i>	tower mustard	
<i>Arabis lyrata</i>	lyre-leaved rockcress	
<i>Arctium lappa</i>	great burdock	
<i>Arctium minus</i>	common burdock	
<i>Armoracia rusticana</i>	common horseradish	
<i>Artemisia absinthium</i>	wormwood	
<i>Artemisia biennis</i>	biennial wormwood	
<i>Atriplex hortensis</i>	garden orache	
<i>Atriplex patula</i>	common orache	
<i>Axyris amaranthoides</i>	Russian pigweed	
<i>Barbarea vulgaris</i>	bitter winter cress	
<i>Bassia hyssopifolia</i>	five-hooked bassia	
<i>Berteroa incana</i>	hoary alyssum	
<i>Bidens cernua</i>	nodding beggarticks	
<i>Bidens frondosa</i>	common beggarticks	
<i>Brassica campestris</i>	field mustard	
<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	soft brome	agronomic species
<i>Bromus hordeaceus</i> ssp. <i>thominei</i>	soft brome	agronomic species
<i>Bromus inermis</i> ssp. <i>inermis</i>	smooth brome	agronomic species
<i>Bromus japonicus</i>	Japanese brome	widespread and invasive but no viable control methods
<i>Bromus tectorum</i>	cheatgrass	widespread and invasive but no viable control methods
<i>Camelina microcarpa</i>	littlepod flax	
<i>Camelina sativa</i>	falseflax	
<i>Capsella bursa-pastoris</i>	shepherd's purse	
<i>Cardaria draba</i>	heart-podded hoarycress	
<i>Cardaria pubescens</i>	globe-pod hoary cress	
<i>Carduus nutans</i>	nodding thistle	
<i>Carduus nutans</i> ssp. <i>leiophyllus</i>	nodding thistle	
<i>Carum carvi</i>	caraway	
<i>Centaurea biebersteinii</i>	spotted knapweed	
<i>Centaurea cyanus</i>	cornflower	
<i>Centaurea jacea</i>	brown knapweed	
<i>Cerastium fontanum</i> ssp. <i>triviale</i>	mouse-ear chickweed	
<i>Cerastium glomeratum</i>	sticky chickweed	
<i>Chenopodium album</i>	lamb's-quarters	
<i>Chenopodium botrys</i>	Jerusalem-oak	
<i>Chenopodium glaucum</i>	oak-leaved goosefoot	
<i>Cichorium intybus</i>	chicory	
<i>Cirsium arvense</i>	Canada thistle	
<i>Cirsium arvense</i> var. <i>horridum</i>	Canada thistle	
<i>Cirsium palustre</i>	marsh plume thistle	
<i>Cirsium vulgare</i>	bull thistle	infestations typically short-lived following disturbance
<i>Convolvulus arvensis</i>	field bindweed	
<i>Conyza canadensis</i> var. <i>glabrata</i>	horseweed	
<i>Corispermum hyssopifolium</i>	bugseed	
<i>Cotula coronopifolia</i>	brass buttons	
<i>Crepis tectorum</i>	annual hawkbeard	

Scientific Name ¹	Common Name	Comments
Cuscuta approximata	clustered dodder	
Cymbalaria muralis	ivy-leaved toadflax	
Cynoglossum officinale	common hound's-tongue	
Cynosurus cristatus	crested dogtail	
Dactylis glomerata	orchard-grass	agronomic species
Descurainia sophia	flixweed	
Digitalis purpurea	common foxglove	
Echium vulgare	viper's bugloss	
Elymus repens	quackgrass	
Erodium cicutarium ssp. cicutarium	common stork's-bill	
Erysimum cheiranthoides	wormseed mustard	
Euphorbia cyparissias	cyprus spurge	
Euphorbia esula	leafy spurge	
Euphrasia nemorosa	eastern eyebright	
Galeopsis tetrahit	hemp-nettle	
Geranium dissectum	cut-leaved geranium	
Glechoma hederacea	ground-ivy	
Gnaphalium uliginosum	marsh cudweed	
Gypsophila paniculata	baby's breath	
Helianthus annuus	common sunflower	
Hesperis matronalis	sweet rocket	
Hieracium aurantiacum	orange-red king devil	
Hieracium caespitosum	yellow king devil	
Hieracium piloselloides	tall hawkweed	
Hieracium umbellatum	narrow-leaved hawkweed	
Hieracium umbellatum ssp. umbellatum	narrow-leaved hawkweed	
Holcus lanatus	common velvet-grass	
Hordeum vulgare	common barley	agronomic species
Hypericum perforatum	common St. John's-wort	
Hyoscyamus niger	black henbane	reported from the Chilcotin, verified 2009
Impatiens glandulifera	policeman's helmet	
Iris pseudacorus	yellow iris	
Knautia arvensis	field scabious	
Kochia scoparia	summer-cypress	
Lactuca muralis	wall lettuce	
Lactuca serriola	prickly lettuce	
Lappula squarrosa	bristly stickseed	
Lepidium latifolium	broad-leaved pepper-grass	
Leucanthemum vulgare	oxeye daisy	
Linaria genistifolia ssp. dalmatica	Dalmatian toadflax	scattered in region but less invasive than Dalmatian toadflax
Linaria vulgaris	butter-and-eggs	
Lolium arundinaceum	tall fescue	agronomic species
Lolium pratense	meadow fescue	
Lotus corniculatus	birds-foot trefoil	agronomic species
Lythrum hyssopifolia	Hyssop loosestrife	
Malva sylvestris	common mallow	
Matricaria perforata	scentless mayweed	
Medicago lupulina	black medic	
Medicago sativa	alfalfa	agronomic species
Melilotus alba	white sweet-clover	agronomic species
Melilotus officinalis	yellow sweet-clover	agronomic species
Mentha spicata	spearmint	
Monolepis nuttalliana	poverty weed	
Myosotis arvensis	field forget-me-not	
Myosotis sylvatica	wood forget-me-not	
Myosotis verna	spring forget-me-not	
Myriophyllum spicatum	Eurasian water-milfoil	
Neslia paniculata	ball mustard	
Nymphaea alba	European white waterlily	
Nymphaea odorata	fragrant waterlily	
Onobrychis viciifolia	sainfoin	
Pastinaca sativa	common parsnip	
Pheum pratense	common timothy	agronomic species
Plantago lanceolata	ribwort plantain	
Poa annua	annual bluegrass	
Poa compressa	Canada bluegrass	agronomic species
Poa nemoralis ssp. interior	interior bluegrass	

Scientific Name ¹	Common Name	Comments
<i>Poa nemoralis</i> ssp. <i>nemoralis</i>	woods bluegrass	
<i>Poa pratensis</i> ssp. <i>angustifolia</i>	Kentucky bluegrass	agronomic species
<i>Poa trivialis</i>	rough bluegrass	
<i>Polygonum aviculare</i>	common knotweed	
<i>Polygonum convolvulus</i>	black bindweed	
Polygonum x bohemicum	Bohemian knotweed	
Polygonum cuspidatum	Japanese knotweed	
<i>Polygonum ramosissimum</i> var. <i>prolificum</i>	proliferous knotweed	
Polygonum sachalinense	Giant knotweed	
<i>Portulaca oleracea</i>	common purslane	
<i>Potentilla argentea</i>	silvery cinquefoil	
Potentilla recta	sulphur cinquefoil	
<i>Prunella vulgaris</i> ssp. <i>vulgaris</i>	self-heal	
<i>Puccinellia distans</i>	weeping alkaligrass	
<i>Ranunculus acris</i>	meadow buttercup	
<i>Ranunculus repens</i>	creeping buttercup	
<i>Ranunculus testiculatus</i>	hornseed buttercup	
<i>Rudbeckia hirta</i> var. <i>pulcherrima</i>	black-eyed Susan	
<i>Rumex acetosa</i> ssp. <i>acetosa</i>	green sorrel	
<i>Rumex acetosella</i>	sheep sorrel	
<i>Rumex crispus</i>	curled dock	
<i>Rumex obtusifolius</i>	bitter dock	
<i>Salsola kali</i>	Russian thistle	
<i>Saponaria officinalis</i>	bouncing-betty	
<i>Sedum acre</i>	goldmoss stonecrop	
<i>Senecio vulgaris</i>	common groundsel	
<i>Setaria viridis</i>	green bristlegrass	
<i>Silene cserei</i>	biennial campion	
<i>Silene latifolia</i>	white cockle	
<i>Silene noctiflora</i>	night-flowering catchfly	
<i>Silene vulgaris</i>	bladder campion	
<i>Sisymbrium altissimum</i>	tall tumble-mustard	non-invasive, rarely occurs outside highly disturbed sites.
<i>Solanum rostratum</i>	buffalo-bur	
<i>Sonchus arvensis</i>	perennial sow-thistle	
<i>Spergularia rubra</i>	red sand-spurry	
<i>Stellaria media</i>	common chickweed	
Tanacetum vulgare	common tansy	
<i>Taraxacum laevigatum</i>	red-seeded dandelion	rarely invasive, widespread and palatable to livestock
<i>Taraxacum officinale</i>	common dandelion	rarely invasive, widespread and palatable to livestock
<i>Thlaspi arvense</i>	field pennycress	
<i>Tragopogon dubius</i>	yellow salsify	widespread and palatable to livestock
<i>Tragopogon pratensis</i>	meadow salsify	widespread and palatable to livestock
<i>Trifolium aureum</i>	yellow clover	
<i>Trifolium campestre</i>	low hop-clover	agronomic species
<i>Trifolium hybridum</i>	alsike clover	agronomic species
<i>Trifolium pratense</i>	red clover	agronomic species
<i>Trifolium repens</i>	white clover	agronomic species
<i>Triticum aestivum</i>	wheat	agronomic species
<i>Ulmus pumila</i>	Siberian elm	
<i>Urtica dioica</i> ssp. <i>dioica</i>	stinging nettle	
<i>Verbascum thapsus</i>	great mullein	confined to disturbed sites, non-invasive
<i>Veronica hederifolia</i>	ivy-leaved speedwell	
<i>Veronica peregrina</i> var. <i>peregrina</i>	purslane speedwell	
<i>Veronica serpyllifolia</i>	thyme-leaved speedwell	
<i>Viola tricolor</i> ssp. <i>tricolor</i>	Johnny-jump-up	
<i>Zizania aquatica</i>	wild rice	

Species in **bold** are CCCIPC priority species

Appendix 3: Targeted Grazing

Invasive plants are disruptive pests that agricultural producers have been dealing with for years. They reduce crop production and can limit forage available for livestock. In order to maintain a certain level of production, invasive plants must be controlled. There are considerable costs associated with controlling invasive plants, especially over large areas, with traditional methods like mechanical or chemical control. Many invasive plants are considered unpalatable for livestock, but studies have shown that livestock are creatures of habit; they will eat what they are taught to eat by their mothers.

Producers can train their livestock to seek out and eat desired plant species. By using livestock to control invasive plants, the cost of traditional control will be greatly reduced. As well, the time spent controlling invasive plants can be diminished and replaced by other tasks. Studies have compared the nutritional values of invasive plants to more traditionally grazed plants; many invasive plants can be just as or more valuable as forage. The CCCIPC has collected and analyzed the nutritional values of local invasive plants

Table 6: Nutritional values of invasives

Plant	Moisture	Dry Matter	Crude Protein	TDN*
Dalmation Toadflax	72%	24%	8%	63%
Oxeye Daisy	78%	22%	8%	61%
Spotted Knapweed	63%	37%	10%	65%
Sulphur cinquefoil	67%	33%	6%	61%

*Total Digestible Nutrients

Ministry of Agriculture in Williams Lake reports alfalfa and grass hays that range from 5-22% protein with TDN averaging 55% in Cariboo Region forage tests.

Appendix 4: CCCIPC Containment Areas

A containment area identifies a core infestation of invasive plants. Invasive plant control is generally done from the outside (less dense) to the inside (more dense, source population) of the containment area, using multiple control methods (e.g. biocontrol inside the containment area and mechanical and/or chemical control outside the area). A containment area with complete elimination or naturalization (using biocontrol) of the target species can be removed.

The CCCIPC invasive plant containment areas are identified by consensus decisions by the Regional Strategic Planning subcommittee. Once the CCCIPC board of directors has agreed on a containment area and its perimeter is defined, this information is sent to the Inter-Ministry Invasive Species Working Group (IMISWG) for final approval. When approval is obtained, the containment area polygon is sent to the Invasive Alien Plant Program application manager to be included in the database. For more information about establishing containment lines, please refer to the IMISWG Protocol to Establish Containment Lines.

There are currently 5 containment areas in the CCCIPC. [These containment areas are for Dalmatian toadflax, field scabious, marsh plume thistle, orange and invasive yellow hawkweeds and sulphur cinquefoil.](#) These containment lines can be seen on the species maps found in Appendix 10. The marsh plume thistle containment line joins up with the containment line just north of the CCCIPC border that the NWIPC has established to delineate the areas of intensive concern and minimize the spread of MPT. There is a knapweed containment line to the south of the CCCIPC's geographic boundaries on the border of the Thompson-Nicola Regional District.

Appendix 5: Local Area Agreements

Tatlayoko Valley and Tatla Lake Area

These goals were developed by residents and resource users in conjunction with the Cariboo Chilcotin Coast Invasive Plant Committee at the Invasive Plant Workshop held in Tatla Lake on January 14, 2010. A portion of private property was removed from the containment area in 2012.

Short term goals:

- Re-establishment of desirable plant species
- Stop, suppress and eliminate smaller invasive plant sites
- Stop establishment of new sites
- Signage to educate the travelling public
 - o Signs at campsites, access roads, boat launches, Cariboo Chilcotin Tourism kiosks
- More education tools (continuing into long-term)
- Investigation of methods to prevent the spread of invasive plants, such as vehicle wash stations

Long term goals:

- Re-establishment of desirable plants
 - o Decision of which native plants to bring in
- Further establishment and spread of DT biocontrol weevil population
- Increased education so residents know about nearby or threatening invasive plants (ie: hawkweed species), report new infestations and take action
- Biocontrol introduction for Canada thistle

Dalmatian Toadflax Containment Line:

- The containment polygon for Dalmatian toadflax is agreed upon in order to delineate current infestation boundaries within the Tatlayoko Valley and to designate differences in management actions.
- Without all available biocontrol agents fully established on Dalmatian toadflax in the area, plants will continue to spread. Small, new occurrences outside the containment line will be treated to prevent the main infestation from impacting more area. Infestations inside the containment line will be treated where values are being threatened (ie: healthy bunchgrass communities, agricultural values). Monitoring of bio-agents and introduction of other available insects will be conducted to estimate the impacts of bio-agent populations on plant vigour and reproduction.
- Once populations of agents are sufficient enough to cause noticeable impacts on Dalmatian toadflax, collections can be made to aid in any further distribution required for other more isolated infestations in the west Chilcotin.
- Long term goal of biological control is to return the plant community to its former health while tolerating periodic outbreaks of Dalmatian toadflax until a stable equilibrium between plants and insects is achieved.

Appendix 6: Cariboo Chilcotin-Coast Invasive Plant Council Contact Information

The Cariboo Chilcotin Coast Invasive Plant Committee welcomes anyone interested in invasive plant issues to become a member of the committee. All interested individuals or groups may contact the CCCIPC for information on invasive plant control in the region, to report an invasive plant location or other issues regarding invasive plants.

Harry Jennings, Chair

Glen Davidson, Vice Chair

Coordinator

info@cccipc.ca

104-197 Second Ave. N.,

Williams Lake, BC V2G 1Z5

Web address www.cccipc.ca

Appendix 7: Invasive Plant Management Agencies

Agencies with invasive plant management responsibility in the Cariboo Chilcotin Coast

Jurisdiction	Type	Occupier	Responsibility and/or Legislation	Tenure
Federal	Indian reserves	Indian and Northern Affairs Canada	Governed by Indian Act and other federal legislation. First Nations may develop bylaws for the destruction and control of noxious weeds; however, funding is not currently available from INAC. Traditionally funded on an ad hoc basis using provincial assistance.	Reserves are set apart for the use and benefit of First Nations by Order-in-council.
	Military reserves	Department of National Defence	DND policy is to meet the most stringent legislation that applies. Not legally bound to meet them if regulations not federal.	Contractual – grazing leases contain preventive actions, as will future logging contracts
	Railways	Rail company or Transport Canada?	?	?
	Coast guard bases	Department of Fisheries and Oceans		
	Harbours, ports			
Provincial	Crown range and forest lands, woodlot licences	FLNRO	Forest Act, Range Act, Forest and Range Practices Act	Forest and Range Practices Act Agreements
	Grazing Leases	FLNRO	Land Act	Grazing Leases
	Grazing Leases	BC Parks	Park Act	<ul style="list-style-type: none"> ▪ Recreational permits ▪ Grazing ▪ Utilities ▪ Park use permits ▪ Park facility operators
	Parks, Class A and C	BC Parks	Park Act	<ul style="list-style-type: none"> ▪ Recreational permits ▪ Grazing ▪ Utilities ▪ Park use permits ▪ Park facility operators
	Protected Areas	BC Parks	Park Act, Environment and Land Use Act	<ul style="list-style-type: none"> ▪ Recreational permits ▪ Grazing ▪ Utilities ▪ Park use permits

Jurisdiction	Type	Occupier	Responsibility and/or Legislation	Tenure
				<ul style="list-style-type: none"> ▪ Park facility operators
	Ecological Reserves	BC Parks	Ecological Reserve Act	<ul style="list-style-type: none"> ▪ Park use permits
	Conservancies	BC Parks and Partners	Environment and Land Use Act	<ul style="list-style-type: none"> ▪ Park use permits
	Conservation Lands (owned by conservation organization)	BC Parks and Partners	Wildlife Act, or private land	<ul style="list-style-type: none"> ▪ Park use permits
	Highways	MOTI		Maintenance contractors
	Ferry terminals	MOTI	BC Ferries	
	Utilities	FLNRO		Utility companies (Duke, Spectra, BC Hydro, Terasen)
	Crown leases (commercial, residential, recreational, gravel pits)	FLNRO		Various (individuals, businesses, NGOs, etc.)
	Recreation sites and trails	FLNRO		FLNRO
Private	Located within a regional district			
	Located within a municipality			
	Managed by cons'n group			
	Gravel pit			
Regional District lands	Owned by a regional district			
Municipal lands	Owned by municipality			

Appendix 8: Information Sources

Information on invasive plant identification, herbicide use, biological control agents, and effective herbicides can be found on-line at sites listed below.

Web Sites	Topic	Web Address
Cariboo Chilcotin Coast Invasive Plant Committee	Management, coordinate, education	http://www.cccipc.ca
Northwest Invasive Plant Council	Identification and management	http://www.nwipc.org
Southern Interior Weed Committee	Identification and management	http://siwmc.ca
Weeds BC	Identification and management	http://www.weedsbc.ca
Invasive Species Council of BC	Identification and management	http://www.bcinvases.ca
Inter-Ministry IS Working Group	EDRR, legislation, PMP's and strategies	http://www.for.gov.bc.ca/hra/invasive-species/index.htm
Ministry of Agriculture	Identification, management, and pesticide information	http://www.agf.gov.bc.ca/cropprot/weeds.htm http://www.agf.gov.bc.ca/cropprot/invasive_plants_report.pdf http://www.agf.gov.bc.ca/pesticides
Ministry of Forests Lands and Natural Resource Operations	Biological control Report a Weed IAPP Southern Interior PMP	http://www.for.gov.bc.ca/hra/Plants/biocontrol/index.htm http://www.for.gov.bc.ca/hra/Plants/raw.htm http://www.for.gov.bc.ca/hra/Plants/application.htm http://www.for.gov.bc.ca/hra/Publications/invasive_plants/PMs/FLNR_Southern_Interior.pdf
NA Invasive Species Mngt Association	NA weed management	http://www.naisma.org
Fraser Basin Council	2004 BC Weed Strategy	http://www.fraserbasin.bc.ca
Cariboo Regional District	Regional weed control strategy	http://www.cariboord.bc.ca
The Nature Conservancy	Global invasives page	http://tncweeds.ucdavis.edu
Livestock for Landscapes	Management and nutritional information	http://livestockforlandscapes.com http://thetaoofcow.com
E-Flora	Plant id	http://www.geog.ubc.ca/biodiversity/eflora/invasives.html
Health Canada PMRA	Pesticide Mngmt & Regulation	http://hc-sc.gc.ca/ahc-asc/branch-dirigen/pmra-arla

Appendix 9: Glossary

Alkaline – pertaining to substances that release hydroxyl ions (OH⁻) in water, having a pH greater than 7

Alkaloids – nitrogen-containing compound, frequently used as a chemical defence by plants

Basic soils – a soil with a pH greater than 7.0

Biennial – a plant completing its life cycle within two growing periods

Eradicate – the complete removal of all viable plants and plant parts from a region/ from the province.

Determination of successful eradication is a function of seed viability and the number years where confirmed surveys have found zero no plants.

Eradicate – to remove or destroy completely

Extirpate – The localized removal of all viable plants and plant parts from a specific site. No longer found in an area. Determination of successful extirpation is a function of seed viability and the number years where confirmed surveys have found no plants.

Hybridize – the ability for two plants of the same or closely related species differing in one or more genes to produce offspring which may or may not be viable

Infestation – (of insects or organisms) be present in large numbers, typically so as to cause damage or disease

Inflorescence – a shoot bearing clusters of flowers

Naturalization – to adapt or acclimate (a plant or animal) to a new environment; to establish as if native

Neutral soils – soil with a pH value of 6.6-7.3

Pathogen – a micro-organism that can cause disease

Perennial – a plant living through several growing seasons

Seed bank (in soil) – ungerminated but viable seeds that lie in the soil

Sod-forming grass – grass that spreads by sending out rhizomes or stolons that forms a mat

Unpalatable – unpreferred forage due to taste, texture, low nutrient values, toxins, or unfamiliarity

Vegetative growth – growth of non-floral parts of the plant

Appendix 10: Containment Maps

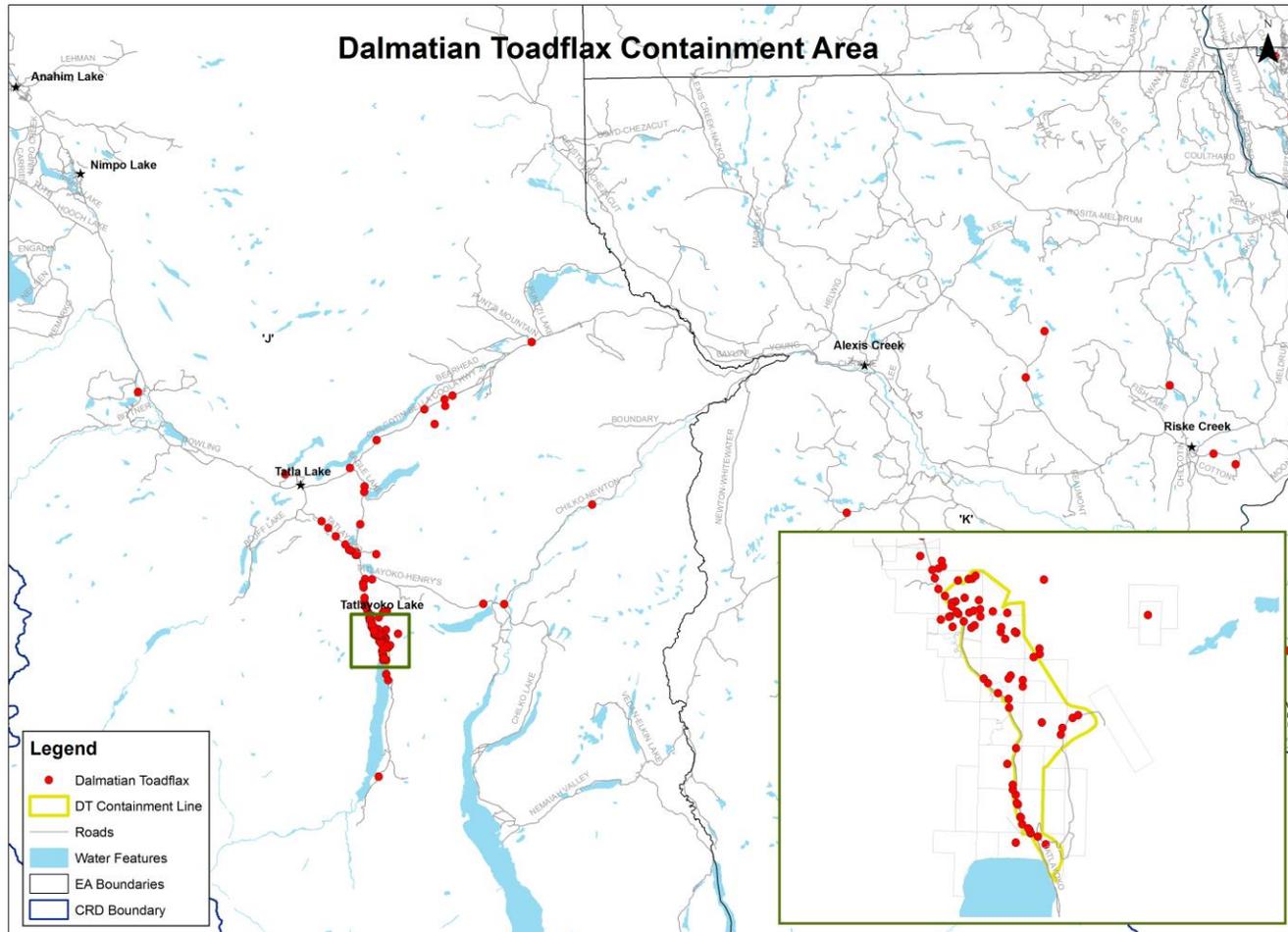


Figure 3: Dalmatian toadflax containment area in the Tatlayoko Valley as determined by a local advisory committee as part of a local area agreement.

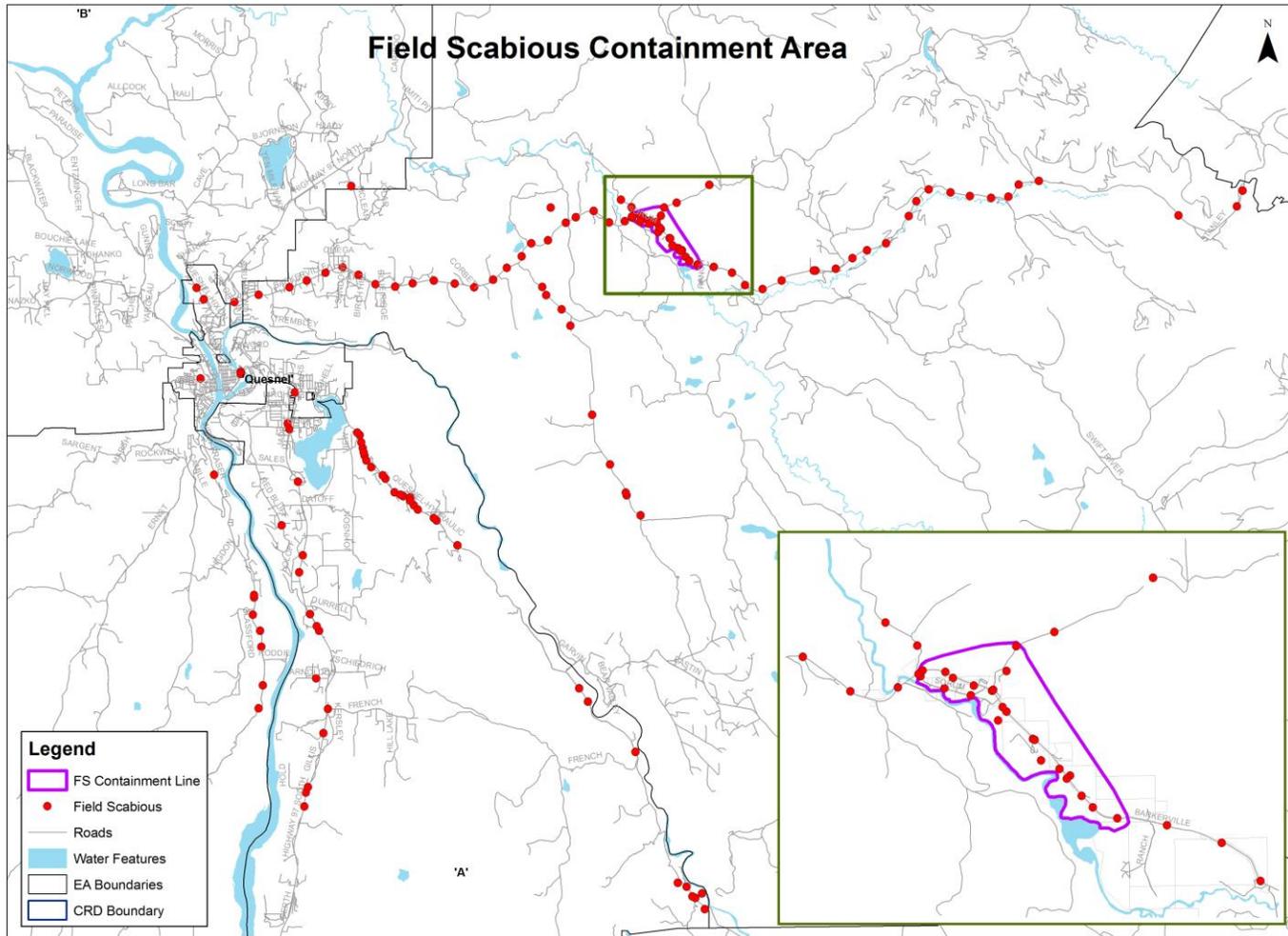


Figure 4: Field scabious containment area in the Cottonwood River area near Quesnel.

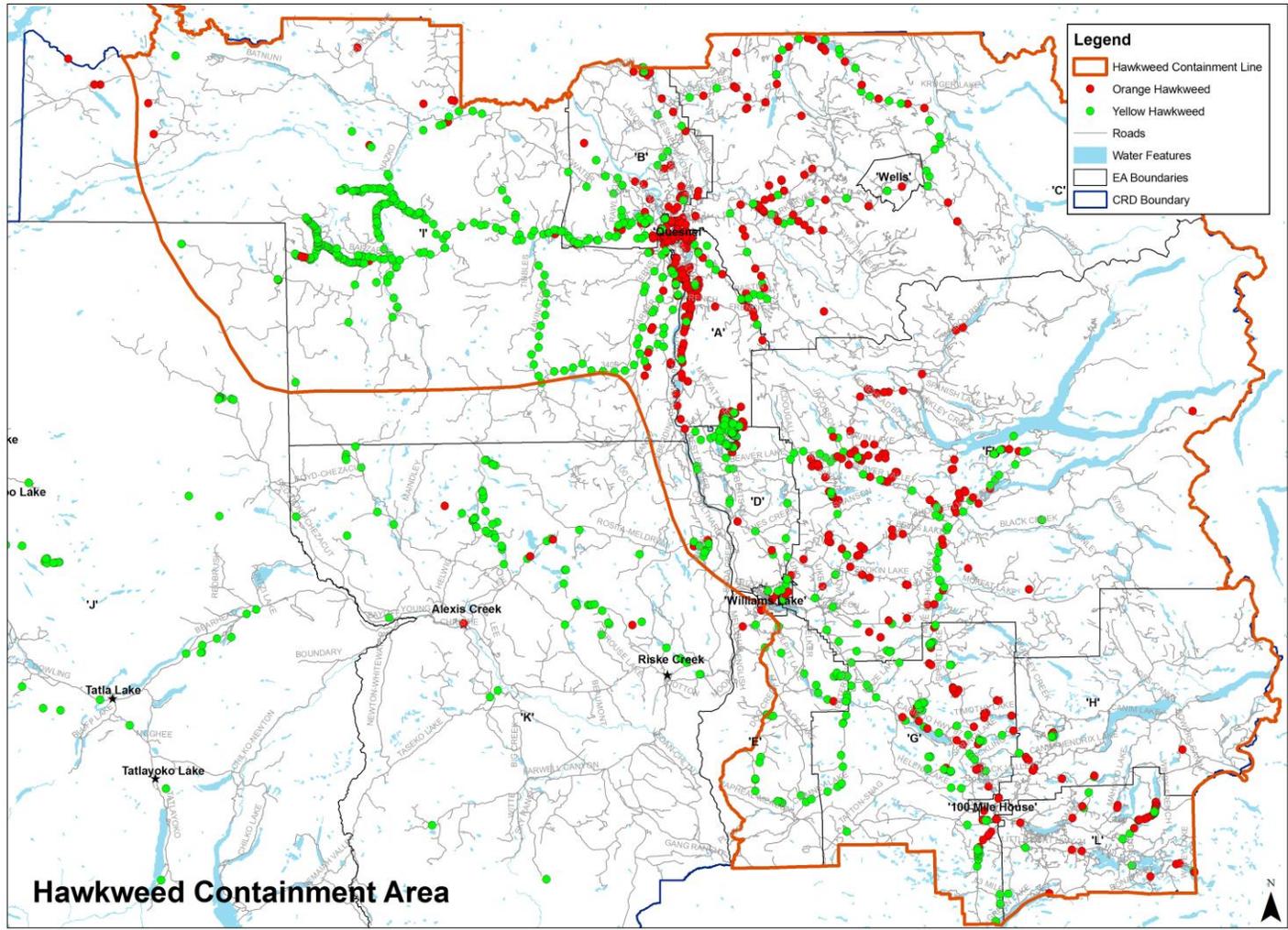


Figure 5: Orange and invasive yellow hawkweed containment area

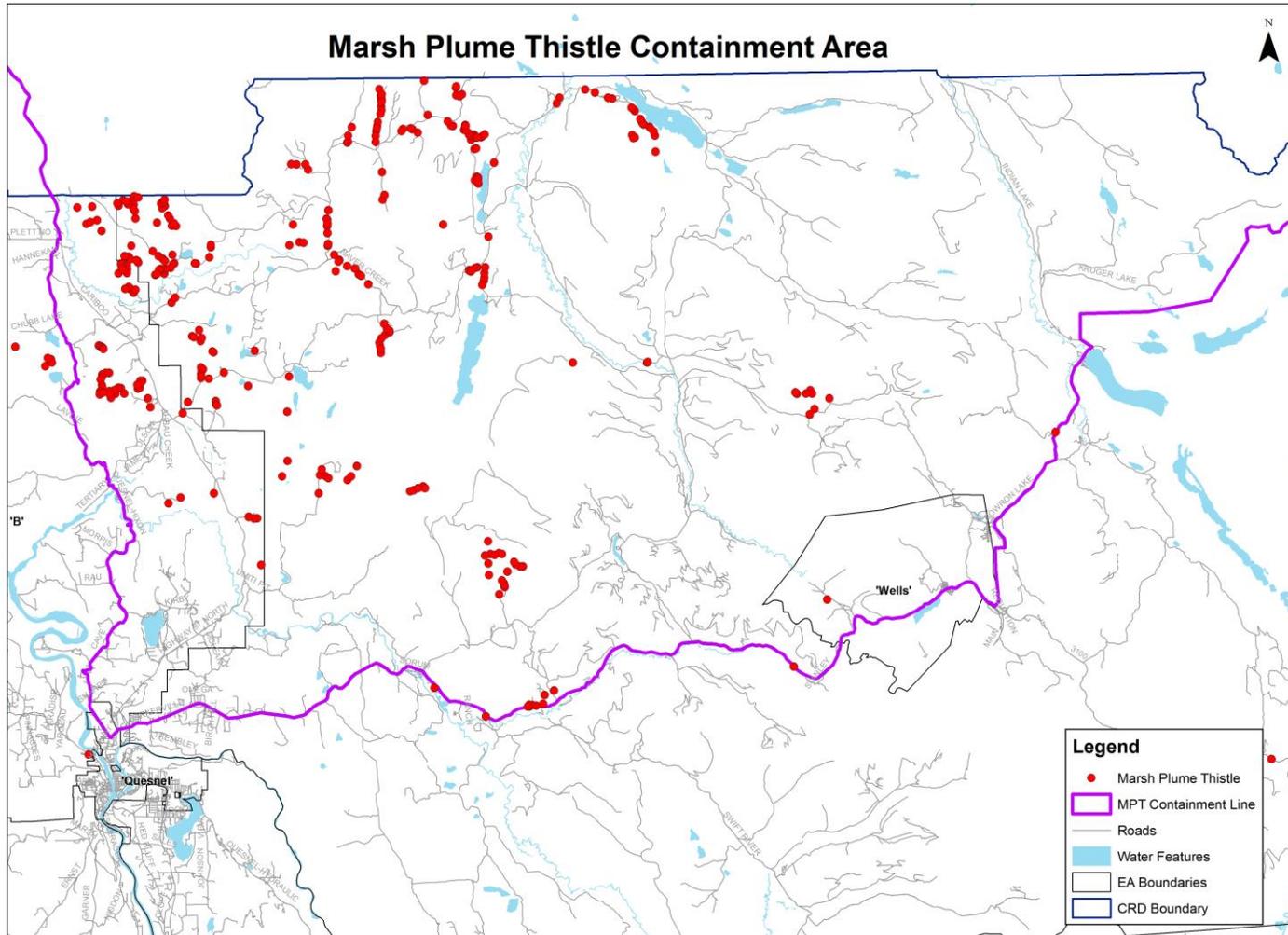


Figure 6: Marsh plume thistle containment area.

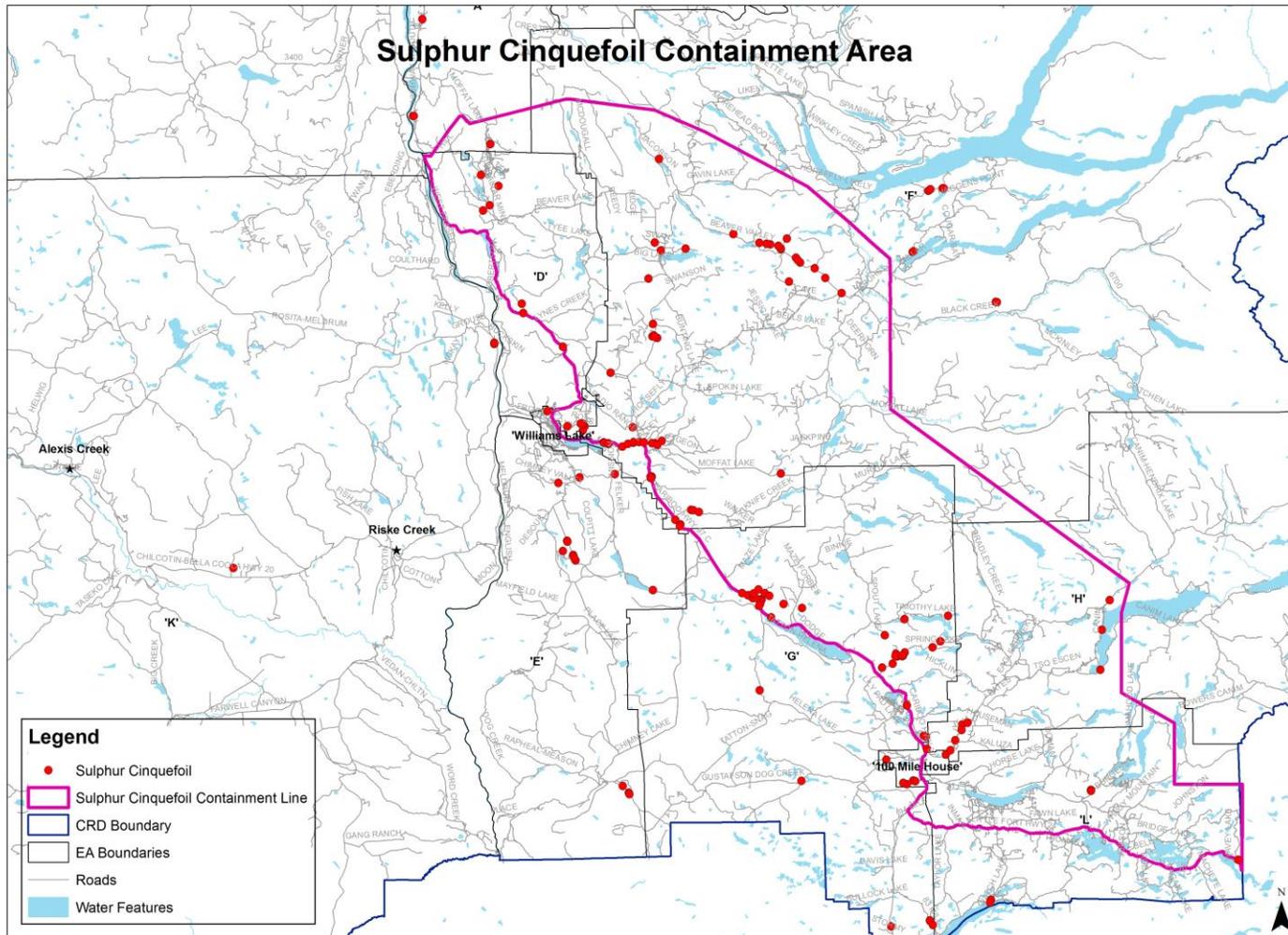


Figure 7: Sulphur cinquefoil containment area.