

Invasive Plant Management Plan

City of Fernie

-DRAFT-

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Contents

EXECUTIVE SUMMARY 3

1.0 INTRODUCTION 3

 1.1 Background 3

 1.2 Purpose 4

 1.3 Scope 4

 1.4 What is an Invasive Species? 5

 1.5 What about the City of Fernie Pesticide Use Bylaw? 6

 1.6 Why Should We Be Concerned about Invasive Plants? 7

 1.7 Vision 9

 1.8 Goals 9

2.0 INTEGRATED MANAGEMENT 11

 2.1 Prevention 11

 2.2 Early Detection Actions 14

 2.3 Establishing Priority Actions 16

 2.3.1 Species Risk 16

 2.3.2 Site Risk 18

 2.3.3 Site Prioritization Objectives 19

 2.3.4 Identifying Future Sites 20

 2.4 Management and Control Actions 21

 2.4.1 Cultural Control 21

 2.4.2 Biological Control 21

 2.4.3 Mechanical/Manual Control 22

 2.4.4 Proper Disposal Requirements 23

 2.4.4 Chemical Controls 24

 2.4.5 Targeted Grazing 25

 2.5 Monitoring 26

 2.6 Evaluation 28

3.0 CONCLUSION 29

4.0 MORE RESOURCES 31

5.0 REFERENCES 33

APPENDIX I EKISC IPMA 02 Elk Valley South Sub-IMPA Plants Priority List 36

APPENDIX II Herbicide Selection Chart 37

APPENDIX III City of Fernie Bylaw No. 2093 38

APPENDIX IV Invasive Plant Species Identification and Management Guide 39

Figures

Figure 1. City of Fernie Lands 4

Figure 2. City of Fernie Lands - Sewage Lagoons south of City 5

Figure 3. City of Fernie Lands - City Gravel Pit on Caven Cr Rd near Elko, BC..... 5

Figure 4. Spotted knapweed infestation along Maiden Lake Trail..... 9

Figure 5. West edge of Public Works Yard; Common Tansy, Burdock, Wormwood infestation. 12

Figure 6. Japanese knotweed on private lot. 14

Figure 7. Spotted knapweed infestation in field on 2nd Ave. 23

Tables

Table 1. City of Fernie Invasive Plant Priority List 17

Table 2. Site Risk..... 18

Table 3. Priority Matrix..... 19

Table 4. Priority Management Objectives 19

Table 5. Addressing Goals and Recommendations from 2014 29

Table 6. Future Goals and Recommendations 30

EXECUTIVE SUMMARY

The City of Fernie Invasive Plant Management Plan has been updated from the 2014 Plan, it is now based on findings from the 2017 city-wide invasive plant inventory. This Plan describes why invasive plants are a concern and the legislation surrounding them; it depicts the overall goals for the City which include maintaining and promoting healthy native plant communities, greenspaces, natural habitats and local aesthetics. The application of integrated management actions will aid in preventing new invasive plants from establishing and controlling and ideally, eradicating existing infestations. Eliminating all invasive plants on a large scale is a challenging goal to attain, and consequently, a framework has been outlined for prioritizing areas based on species and site risk. Control methods including cultural, biological, mechanical, chemical, and targeted grazing are outlined in order to obtain the objective set out for each priority; the eradication of P1 sites, containment and potential eradication of P2 sites, and monitoring for the purposes of containment of P3 sites. The data collected from continual monitoring of existing and potential sites will indicate if the objectives are being met. The keystones to program success include strategic prevention-based management, communication, education, regular evaluation, and the understanding that successful invasive plant management is a long-term commitment. This will in turn support the vision to protect Fernie residents and their environment from the impacts of invasive plants.

1.0 INTRODUCTION

1.1 Background

The City of Fernie has historically applied invasive plant management efforts in varying degrees over the years. West Fork Resource Management Ltd. (WFRM) has played an integral role in helping to consolidate this management from broad, localized efforts to a refined, streamlined and prioritized effort. In 2013/2014, a Strategic Plan was developed by WFRM to guide the City in a more integrated management-based approach and recommended the development of a formal plan to encompass all aspects of invasive plant management specific to Fernie's environmental, economic and social values. Following this, an initial base Invasive Plant Management Plan was developed in 2014, it highlighted known areas of concern for treatment efforts and identified steps for preventative actions. It was recommended at this time that a comprehensive inventory of the City be conducted to identify all areas of concern and to prioritize these areas for future management. In 2017, WFRM was contracted to conduct an extensive city-wide inventory; survey results identified 191 invasive plant sites, containing fifteen different invasive plant species. Following the data summary and recommended actions, the City responded with a significantly increased budgeted to launch the fight against invasive weeds. In 2018, WFRM conducted treatments on high priority sites on City-owned lands. The *Invasive Plant Program Summary City of Fernie 2018* details the efforts by the invasive plant treatment crew. The contract included an update of the 2014 Management Plan, which now includes a broad scope of integrated invasive plant management actions for all areas within the City.

1.2 Purpose

The purpose of this Management Plan is to provide guidelines for City departments and contractors directly involved with managing invasive plants as they pertain to planning, design, or construction of new and renovated landscapes, facilities, and civic land. It will also provide administrative guidelines for Council, committees, and staff indirectly involved with invasive plant management. This Plan meets the goals set out in the *City of Fernie Invasive Plant Strategy 2014* and is intended to be an updated version to replace the *City of Fernie Invasive Plant Pest Management Program 2014*. This Plan provides specific management actions for implementation to achieve identified goals. Environmental stewardship can be demonstrated by applying the integrated management principles outlined in this Plan in all aspects of City planning and development. The actions outlined in this Plan can be applied to all activities relating to landscape management within the municipality.

1.3 Scope

This Plan encompasses all City-owned property, as current to the 2017 City lands database, as shown in Figure 1, Figure 2 and Figure 3. As the City expands or acquires new lands, this Plan is intended to be far-reaching and extend to all current and future lands. It will include all municipal right of ways and easements as established by the City of Fernie.

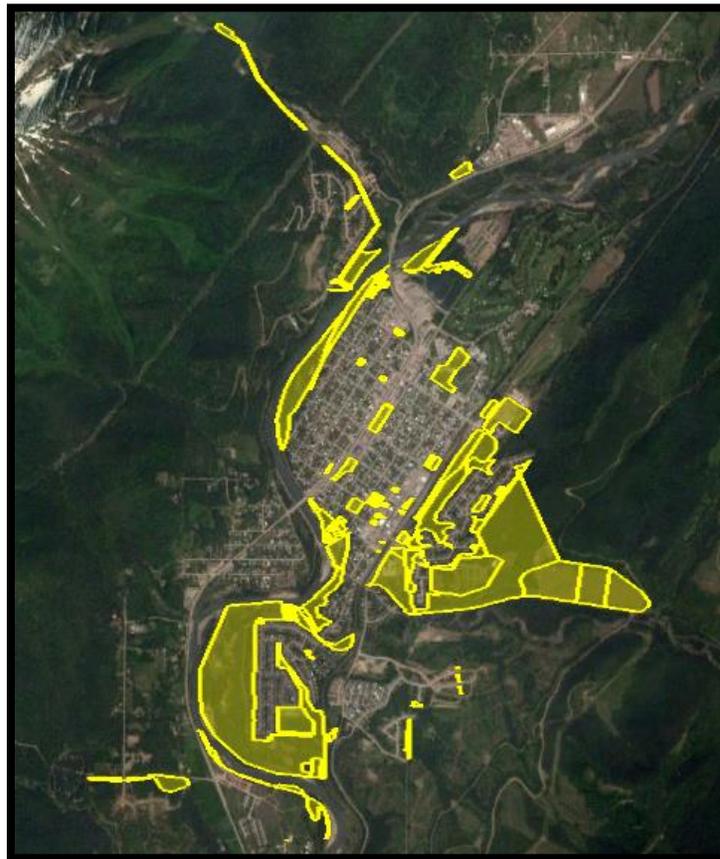


Figure 1. City of Fernie Lands



Figure 2. City of Fernie Lands - Sewage Lagoons south of City



Figure 3. City of Fernie Lands - City Gravel Pit on Caven Cr Rd near Elko, BC

1.4 What is an Invasive Species?

Invasive species are plants, animals and microorganisms that have been introduced beyond their natural range and become established in a new area. They are sometimes also called "exotic," "introduced," "non-native," "non-indigenous" or "invasive" species. Their introduction has the potential to cause serious damage to the environment, the economy and social values. They are considered to be a significant threat to the integrity of our ecosystems. This Plan pertains specifically to invasive plants at this time, however, it should be noted that there are numerous other invasive species threatening the region that are currently managed by government agencies and other organizations, such as Zebra and Quagga mussels and American bullfrogs.

In the study of plant management, the terms 'invasive plant' and 'noxious weed' are often used synonymously, however these terms are often used incorrectly. Noxious weeds should only be used to refer to species that are listed provincially or regionally in the British Columbia Weed Control Act and Regulations. Noxious weeds are species that landowners and occupiers have a legal responsibility to manage. Meanwhile, 'invasive plant' is more of a contemporary, catch-all term and can be used to refer to species that may or may not be also be listed as noxious.

Nine of the fifteen invasive plant species identified within the City of Fernie during the 2017 inventory are listed as either provincially noxious, or as regionally noxious within the Regional District of East Kootenay. The link to field guide containing this list can be found under [MORE RESOURCES 3](#).

Under the BC Weed Control Act, the City of Fernie, as an occupier, has as a "duty to control noxious weeds":

"In accordance with the regulations, an occupier must control noxious weeds growing or located on land and premises, and on any other property located on land and premises, occupied by that person."

The City of Fernie has in place the Unsightly Property Prevention Bylaw No. 1587 which

"prohibits a person from causing or permitting water, rubbish, or noxious, offensive or unwholesome matter to collect or accumulate around their premises; and further, to prevent unsightliness on real property, and further, to require the owners or occupiers of real property, or their agents to clear property of brush, trees, noxious weeds or other growths."

When selling a property in BC, owners are now obligated under the Property Disclosure Statement to identify if there are noxious or invasive weeds on the property, using the Invasive Species Property Assessment Checklist (see under [MORE RESOURCES 9](#)). Species like Japanese knotweed can be devastating to structures; in Europe it has significantly devalued properties and has been the cause for refusal of property insurance and lawsuits between landowners. It is only a matter of time before our property values begin to reflect the damage noxious weeds can leave.

1.5 What about the City of Fernie Pesticide Use Bylaw?

The City of Fernie has in place Pesticide Use Control Bylaw No. 2093, which regulates the use of pesticides for non-essential purposes within the City Fernie. It states in Section 4:

"Except as permitted in this Bylaw, no person may apply or otherwise use Pesticides for the purpose of maintaining outdoor trees, shrubs, flowers, turf or other ornamental plants on a parcel if the parcel or part of the parcel is Private Land or Public Land. In this section "maintain" includes the control, suppression or eradication of a Pest."

"Section 4 does not apply to the application of Pesticides:

(g) for the control of Noxious Weeds and Invasive Plants”

Pesticides registered under the Federal Pest Control Products Act used on noxious weeds and invasive plants are allowable under this bylaw and can be useful tools for invasive plant management. This Plan outlines strategies for public education and community engagement in order to address concerns related to pesticide use. It is a standard principle of an effective invasive plant management program to maximize the use of non-chemical methods and minimize the use of pesticides.

1.6 Why Should We Be Concerned about Invasive Plants?

Once they are established, invasive plants have economic, environmental as well as social impacts. Unlike other disturbances associated with development, their effects are often subtle and incremental. They pose the following threats to values in natural areas and communities:

1. Increased economic costs

- Invasive plant infestations can have significant effects on our natural resources such as forestry, mining, guided and non-guided recreational industry such as hunting, fishing, skiing, hiking and mountain biking. In this region where most of the economy is dependent upon natural resources, it is imperative to focus efforts on preventing and controlling these invasive species.
- Examples of impacts on local economy:
 - Ungulates generally do not graze on or receive significant nutritional value from weeds, in areas with extensive infestations, these animals must move to find adequate forage. This displaces populations, upsets migration patterns, as far as economic concerns, it can negatively affect guided activities such as hunting, hiking and wildlife viewing tours.
 - When invasive plants infest a riparian zone along a river or stream, native vegetation is displaced, leaving the banks more susceptible to erosion which alters stream habitat. Lack of well-rooted native plant cover leaves less desirable habitat for fish and other aquatic species; this can negatively impact the guided fishing industry.
 - Substantial crop economic losses are reported damage in Canada each year due to weed damage and weed control costs. Livestock can also be affected, with increased weeds there is reduced edible forage available, therefore reducing weight gain and compromising health. Even though agriculture is not significant in the Fernie area, activities from adjacent communities can quickly spread invasives to these areas and have detrimental impacts on small acreages and farms.
- Invasive plants can also increase land management costs in terms of surveys, treatments, monitoring, and operational costs. As well, new development projects may require extensive weed removal which can increase future management and control costs.
 - Large infestations can negatively affect property values. Certain species such as Japanese knotweed have devastating impacts on infrastructure and can significantly devalue a property.

2. Impacts on ecosystem biodiversity

- Invasive plants dominate resources such as light, moisture, and soil nutrients that are required by native plants to establish and grow. Invasive species can essentially outcompete native species by depriving them of access to these resources. This can decrease the overall health of the native species population, making them more susceptible to disease, etc. They can also impact species at risk, pushing them to elevated levels of risk and potentially endangerment.

3. Impacts on ecosystem function

- Invasive plants can create fierce competition for native plants, spreading very quickly and densely. Lower productivity of native plants, animals and micro-organisms can have adverse effects on ecosystem function. Decreased nutrient cycling, decreased soil stability and increased erosion can negatively affect water bodies. A disruption in natural fire cycles can occur when invasive plants alter the fuel properties on a landscape, adversely changing the frequency, intensity, type and timing of fires.

4. Risks to human health

- Some invasive plants pose direct risks to human health, with effects such as skin irritation, or toxic ingestion of berries or leaves, for example:
 - Giant hogweed leaves and stems contain a clear, watery, highly toxic sap that when in contact with skin can cause Phyto photodermatitis, making skin extremely hypersensitive to sunlight, resulting in severe burns, blisters and scarring. It can also cause blindness if in contact with the eyes.

Communities are particularly complimentary to the problem of spreading invasive species into natural areas. They are the center of a network of paths, roads, railways, utilities and waterways that are often a gateway into these environments. Most parks and natural areas within the City of Fernie either already border undeveloped areas or are directly linked by roads or trails to these areas, see Figure 4. Weeds tend to sprout up first and thrive in these travel corridors, creating a call for action and the collaborated management efforts of multiple jurisdictions and levels of government, private companies, local landowners and organizations.



Figure 4. Spotted knapweed infestation along Maiden Lake Trail

The geographic location of Fernie provides extensive economic and recreational opportunity; the proximity to vital resources such as the Elk River and its neighboring wilderness abundant with native wildlife and plant species, are key incentives in preserving its natural landscapes.

1.7 Vision

The City of Fernie demonstrates stewardship by applying an integrated approach in protecting its green spaces and natural areas from the impacts of invasive species while supporting environmental, economic, recreational, social and aesthetic values of the community.

1.8 Goals

The main objective of this Invasive Plant Management Plan is to reduce the negative impacts associated with invasive plants through balanced management that is consistent with legislation, community values, and environmental protection. Balanced management includes broadening our understanding of our ecological processes and applying the best practices to maintain balance in our ecosystem. It includes minimizing the use of pesticides by identifying the most efficient, effective and safe treatment methods for each distinct microhabitat; it more importantly includes the use of preventative measures to stop new invaders and infestations from occurring. It means that invasive plants are managed, without compromising the health of humans and native ecosystems.

More specifically, goals for the City of Fernie include:

- Maintain and promote healthy native plant communities
- Maintain healthy and safe greenspaces for community enjoyment

- Maintain and enhance habitat for native birds, mammals, insects and microorganisms
- Maintain and enhance local natural aesthetic values

The environmentally based concepts behind these goals provide us with long-term human economic and social benefits:

- Increased local natural aesthetic values can contribute to increased eco-tourism opportunity
- Increased agricultural land values
- Invasive plant-free properties equate to more value
- Habitat enhancement increases guided and non-guided recreational values
- Healthy greenspaces provide a safe space for children, adults, and pets to play
- Lower long-term natural landscape maintenance costs

To achieve the above benefits, and ultimately program success, there are **critical keystones** to be continuously mindful of and implement into all aspects of City planning. These keystones include:

1. Strategic, prevention-based applied management;
2. Communication and partnership among municipal departments, non-government organizations, private industry, and landowners;
3. Education and awareness of invasive plants for residents, property owners, visitors and City staff;
4. Regular program evaluation;
5. Recognition that this is a long-term commitment and disruptions in scheduled management activities can cause major setbacks in meeting the outlined goals.

2.0 INTEGRATED MANAGEMENT

The following section summarizes the elements of an integrated management program and highlights key activities and recommendations.

2.1 Prevention

2.2 Early Detection

2.3 Establishing Priority Actions

2.4 Management and Control Actions

2.5 Monitoring

2.6 Evaluation

2.1 Prevention

The key to reducing invasive plant populations is to prevent them from establishing. Two different action types are identified, with a list of actions outlined for each one. When implemented accordingly, each of these actions will help to prevent new infestations in the City.

The following are **'On the Ground' Rapid ACTIONS** and can be implemented to immediately halt unintentional seed and plant material transport:

A crucial first step is to ensure all staff and contractors are following these actions when designing, constructing or modifying landscapes;

- Minimize soil disturbance, especially close to areas with weed infestations, as to prevent new infestations from establishing.
- If an area has been disturbed, it should be re-seeded as quickly as possible, and inspected for invasive plants within 1-3 years.
- Follow the Best Management Practices for Soil Movement and Disposal, as developed by the Invasive Species Council of BC (ISCBC), see document link under **MORE RESOURCES 12**. Highlights include:
 - Identify any invasive plant species in the soil prior to moving it;
 - Control identified invasive plants before moving soil, by means of pesticide, mechanical or manual treatment, depending on the species;
 - Responsible transport of soil; if it contains invasive species, loads should be securely tarped to ensure material does not escape during travel;
 - Cleaning equipment and trucks before and after soil transport, taking care not to drive through infested sites;
 - Know where imported top soil is coming from, ensure it is verified to be weed-free;

- Monitor locations where soil has been introduced, they should be checked regularly for invasive species, treating any infestations found in a timely manner;
- Establish ground cover quickly to prevent weeds from establishing, using certified weed-free seeds and plants.
- Use organic materials (e.g., leaves, wood chips and bark) as mulches to prevent weed emergence and establishment.
- Provide ideal growing conditions, including light, fertilizer, water, etc. for desired plants and grasses; when these communities are healthy, they can out-compete weeds.
- Use certified weed-free nursery stock or seed mixture to prevent the importation of invasive seeds to new planting areas or disturbed sites.
- Identify infestation locations which could be potential problem areas during the design and landscape construction stages, work with invasive plant contractor for potential treatment and to help mitigate the problem.
- Keep equipment yards and storage areas free of invasive plants; *the public works yard requires extensive efforts to remove established infestations, this is the highest priority site for control, see Figure 5.*
- Inspect equipment (mowers, etc.) undercarriages for seed heads and plant material after working in known invasive plant sites, wash equipment prior to moving to a different site.
- Promote trail users to utilize the City bike wash located at the Aquatic Centre, specifically built to help remove seeds and plant material from bikes when travelling around the city and especially onto adjacent back country trails.



Figure 5. West edge of Public Works Yard; Common Tansy, Burdock, Wormwood infestation.

The following are **'Policy-driven' ACTIONS** that may take more time and review for implementation but have a significant impact once established:

- Post signage at each major trailhead with invasive species information, and how to look for and remove seed heads and plant material from shoes, clothing, bikes, and pets.
- Promote and support local and province wide initiatives such as Play Clean Go, Plant Wise, and Clean Drain Dry, links to these programs are found under [MORE RESOURCES 2](#).
- Construct additional bike washes at other critical vector points in the City.
- Educate and raise community awareness of invasive species and the importance of early detection and eradication. Collaborate with the East Kootenay Invasive Species Council (EKISC) annually for a public workshop/presentation.
- Collaborate with the Fernie Chamber of Commerce to inform visitors about invasive plants.
- Designate outlined responsibilities in this Plan to Council, managers and contractors directly or indirectly involved with invasive plants; create a chart identifying personnel responsible for specific actions and a timeframe for completion.
- Integrating invasive plant management into policies and initiatives, including the Official Community Plan and the Fernie Integrated Community Sustainability Plan.
- Establish soil movement and disposal procedures for City departments and developers, following Best Management Practices outlined in the Rapid Action section above and the ISCBC document in [4.0 MORE RESOURCES 12](#).
- Amend any relevant bylaws to include the management invasive plants/noxious weeds.
- Review development applications to include wording to avoid or restrict the use of invasive plants, and require mandatory control if infestations are present or introduced.
- Education of Bylaw officer(s) about invasive weeds by attending EKISC workshops, etc., increasing the competence to enforce the Unsightly Property Prevention Bylaw No.1587.
- Amend Waste Regulation Bylaw No.1845 to include the proper disposal measures for invasive plants/noxious weeds; they must be separated from regular yard and garden waste and disposed of according to [2.4.4 Proper Disposal Requirements](#).
 - Provide proper disposal information to residents and property owners.
- Maintain accountability of managers, Council, and anyone involved in the program implementation.
- Communicate with EKISC and others to identify keep current on new invaders before they establish.

Many of these actions can be accomplished with the help and support of local resources such as the RDEK, EKISC, and invasive plant specialists/contractors.

2.2 Early Detection Actions

Early detection of invasive plants within a landscape requires identification and documentation skills, which then provides a base for management decisions.

The following are **ACTIONS** to ensure infestations are identified early and dealt with in a timely manner to prevent negative impacts:

- Educate public works staff on invasive plant identification and emphasize the importance of early identification in the control and mitigation of weed populations.
- Hold an annual spring staff in-service with a slideshow, posters and/or brochures detailing the invasive plants that are currently found within the City, and others to be aware of.
- Identify high priority species infestations on private property, such as Japanese knotweed, see Figure 6, and manage these infestations appropriately.



Figure 6. Japanese knotweed on private lot

- Education of Bylaw officer(s) about invasive weeds by attending EKISC workshops, etc.; enforce Bylaw No.1587 by issuing weed notices to private property owners.
- Offer resident and property owners aid in control efforts; this could include incentives for property owners, similar to the RDEK 'New Invader Rebate', which will compensate residents with high priority species on the EKISC Early Detection Rapid Response (EDRR) List for 100% of treatment costs from a licensed herbicide applicator for one year¹.
- Educate residents with brochures and materials and where to obtain more information.

¹ RDEK Invasive Plant Control website:

https://www.rdek.bc.ca/departments/environmentalservices/invasive_plant_control/

- Use interpretive signage along pathways to educate the public on invasive plant identification.
- Collaborate with adjacent landowners for a coordinated approach to weed control;
 - There were found to be extensive invasive species infestations along many areas of the CPR railway right of way in Fernie. It is recommended to discuss this issue with CPR as well as the RDEK Weed Inspector in coordinating control efforts with CPR.
 - CanWel also has invasive plant infestations on adjacent lands.
- Consider implementing a City-wide reporting program, allowing staff and citizens to report weeds. This reporting system would include the following vital details; UTM's, location description, weed species, and approximate size of infestation. This can be as simple as maintaining a comprehensive spreadsheet of all documented weed reports, managed by an individual capable of organizing all incoming information.
 - Provide a form or a posted email address or website link that can be used as a reporting mechanism, ensuring that all information is collected and managed in one location.
 - Alternately, the existing BC Government Invasive Alien Plant Program Report (IAPP) online Report-a-Weed Tool can be utilized, creating a link from the City website.
- Managers and contractors directly involved with invasive plants should be competent in invasive plant identification in order to identify emerging species and infestations.
- Support the new initiative developed by the Invasive Species Council of BC (ISCBC), the British Columbia Society of Landscape Architects (BCSLA) and the Real Estate Foundation of BC (REFBC): an invasive species workshop and a free interactive invasive species e-learning resource for real estate professionals, professional landscape architects, land developers and other land use disciplines. The aims of these training options are to expand the knowledge and understanding of invasive species and their impacts, so professionals can provide their clients with useful information and educated advice; this link can be found under [MORE RESOURCES 10](#).

Many of these actions can also be accomplished with the help and support of local resources such as the RDEK, EKISC, and invasive plant specialists/contractors.

2.3 Establishing Priority Actions

It is difficult to control and eliminate all established invasive species in a municipality, as there are many limiting factors such as annual budget constraints, infestations on adjacent non-City owned lands, and continual potential seed spread from outside sources via vector routes.

In order to make the most efficient use of budget, the most favorable system is a management framework based on priorities. This framework will target the species considered to be most aggressive and invasive as well as targeting the sites that are most susceptible and environmentally and economically valuable. Prioritizing invasive plant sites involves consideration of both the species and the site and may be accomplished by using a priority matrix. Once assigned a priority, a site will be managed based on the objective for that priority.

2.3.1 Species Risk

Species-specific management actions outlined in the East Kootenay Invasive Species Council's (EKISC) Strategic Plan for adjacent lands in the Elk Valley have been taken into consideration in the development of this Plan. EKISC maintains an Invasive Plant Priority Species List (the 2018 List can be found in APPENDIX I EKISC IPMA 02 Elk Valley South Sub-IPMA) which is revised each year as part of their Annual Operating Plan based on infestation trends in the region; it is therefore recommended that the invasive plant contractor reference the current list for the Invasive Plant Management Area (IPMA) 02 Elk Valley South Sub-IPMA to aid in the determination of management actions.

Based upon the 2017 City of Fernie inventory, and the annual EKISC Invasive Plant Priority Species List, an Invasive Plant Priority List (see Table 1), has been compiled to guide management actions in the City of Fernie. It is anticipated that infestation trends may change over time; implementing and revising appropriate actions should be at the discretion of the invasive plant specialist/contractor. Invasive species found in the City of Fernie, as well as species not currently found on City property but are found in the Elk Valley, have been categorized into the following three priority classes with associated objectives:

- **Priority 1** species are currently found within Fernie, but with extremely limited distribution or are not found within Fernie but are found in the surrounding regions in very limited distribution.
 - The objective is to target these species for eradication.
- **Priority 2** species are found in varying distributions in Fernie or are not found in Fernie but are found in the surrounding region and are target for annual control or containment.
 - The objective is annual control and containment.
- **Priority 3** species are found in varying distribution in Fernie, some infestations are wide-spread and beyond landscape-level control, some have relatively low impact or invasiveness.
 - The objective is containment of these species based on site specific risk factors. These species may have biological control agents available.

The EKISC also maintains an Early Detection Rapid Response (EDRR) watch list of invasive species that are not currently known to exist in the East Kootenay region, and are targeted for mandatory control if found. Communication with local and provincial invasive plant committees can play an important role in determining current and upcoming priority species.

Table 1. City of Fernie Invasive Plant Priority List

Priority 1	
Common Name	Latin Name
Japanese knotweed ¹	<i>Gypsophila paniculata</i>
Common tansy ²	<i>Tanacetum vulgare</i>
Orange hawkweed ²	<i>Hieracium aurantiacum</i>
Blueweed ²	<i>Echium vulgare</i>
Flat peavine	<i>Fallopia Japonica</i>
Baby's breath ³	<i>Lathyrus sylvestris</i>
Leafy spurge ^{1,3}	<i>Euphorbia esula</i>
Rush skeletonweed ³	<i>Chondrilla juncea</i>
Nodding thistle ³	<i>Hypericum perforatum</i>
Hoary Alyssum ³	<i>Berteroa incana</i>
Priority 2	
Diffuse knapweed	<i>Centaurea diffusa</i>
Spotted knapweed ¹	<i>Centaurea biebersteinii</i>
Dalmatian toadflax ¹	<i>Linaria dalmatica</i>
Scentless chamomile ¹	<i>Matricaria maritima</i>
Absinth wormwood	<i>Artemisia absinthium</i>
Sulphur cinquefoil	<i>Potentilla recta</i>
Yellow hawkweed spp.	<i>Hieracium pratense</i>
Caraway	<i>Carum carvi</i>
St. John's wort	<i>Carduus nutans</i>
Priority 3	
Yellow/Common toadflax ¹	<i>Linaria vulgaris</i>
Burdock	<i>Arctium spp.</i>
Canada thistle ¹	<i>Cirsium arvense</i>
Bull thistle	<i>Cirsium vulgare</i>
Mullein	<i>Verbascum thapsis</i>
Hound's tongue ¹	<i>Cynoglossum officinale</i>
Annual sowthistle ¹	<i>Sonchus oleraceus</i>
Perennial sowthistle ¹	<i>Sonchus arvensis</i>
Chicory	<i>Chicorium intybus</i>
Bladder campion	<i>Silene vulgaris</i>
Curled dock	<i>Rumex crispus</i>
Bluebur	<i>Lappula echinata</i>
Oxeye daisy	<i>Leucanthemum vulgare</i>

¹ Designated as Provincially Noxious

² Designated as Regionally Noxious in the East Kootenay Regional District

³ No known infestations in the Fernie area currently

2.3.2 Site Risk

Invasive plant sites identified in the 2017 inventory were categorized according to size, location and their proximity to other infestations. Small, remote sites will generally be classified as a higher priority, particularly if they are in a susceptible area such as a backcountry trail where prohibiting seed travel to other remote locations is crucial. Smaller sites have a higher probability of control, and therefore should be targeted first in order to prevent large infestations from establishing. Infestations that border valuable natural areas and riparian areas should also be classified as higher priority in order to preserve and improve the ecological integrity of the area. Factors that also come into consideration when determining site priority include ecological, community, recreational, historical, and aesthetic values, as well as accessibility and feasibility of control. Guidelines to site risk prioritization are summarized in Table 2 below. The size of an infestation may be or may not be the determining factor of priority, other characteristics should be determined first.

Table 2. Site Risk

Priority	Characteristics	Examples
High Risk 1	<ul style="list-style-type: none"> • Areas with a size of 0-0.5ha • Remote sites • Close proximity to areas free of invasives • High probability of control or eradication • Newly disturbed sites • Individual plants or single patch or clump of a species • Sensitive ecological area • Areas impacting economic resources 	<ul style="list-style-type: none"> • Small infestations on backcountry trails or in sensitive habitat • Isolated infestations in immediate proximity to roads, trails or in parking lots • Landscape maintenance yards • Riparian areas on sloped banks down to a water body • High traffic areas • High public use areas • Gravel pits • Soil stockpiles
Moderate Risk 2	<ul style="list-style-type: none"> • Areas with a size of 0.5ha-1ha or less • Newly disturbed areas in close proximity to other infestations • Moderately susceptible areas • Good probability of control • Adjacent to sensitive ecological areas • Areas impacting aesthetic values 	<ul style="list-style-type: none"> • Medium sized infestations >10m from trails and roads • Infestations >10m from water bodies • Areas of moderate public use • Large mowed green spaces
Low Risk 3	<ul style="list-style-type: none"> • Areas greater than 1ha • Moderate to low susceptible risk • Not adjacent to sensitive areas • Low probability of control • Areas with little or no impact on economic resources • May have limited or no access • Potential for biocontrol • Continuous distribution of species 	<ul style="list-style-type: none"> • Areas of low public use • Isolated areas not near roads, trails or water bodies • Large scale, well established infestations • Large, unmaintained areas with low use

2.3.3 Site Prioritization Objectives

The final component to establishing priorities is the site and species combination matrix, as outlined below in Table 3. The priority ranking matrix is intended to assess the threat posed by infestations by considering the species characteristics as well as the nature and location of the infestation. Ultimately, as the environmental site risk decreases and the extent of invasiveness decreases, the management strategy becomes less aggressive and there is less opportunity to control the species. Table 4 identifies the specific objective associated with each site priority, from eradication of P1 sites, eradication and containment of P2 sites, and containment and/or monitoring and site-specific management for P3 sites. A site is considered to be ‘eradicated’ when target plants are no longer observed over an extended period of time (several years). A site is considered to be ‘contained’ if the size, distribution and density does not increase over time, but can decrease.

Table 3. Priority Matrix

Site Risk	Invasive Plant Species Priority		
	1	2	3
High	P1	P1	P1-P2
Moderate	P1	P2	P2-P3
Low	P1-P2	P2-P3	P3

Table 4. Priority Management Objectives

Site Priority	Management Objective
P1	Targeted for mandatory control/eradication to prevent spread to any other areas
P2	Targeted for annual control with the objective of containment, assessing habitat or other high-risk values.
P3	Control or monitoring with objective of containment will be based on cost/benefit analysis.

Example:

Blueweed is present along the Elk River at Dogwood Park; management for this area must take into consideration the ecological, community, and recreational values it represents:

- The City pathway system bisects this area, connecting it to many other parks and residential areas, therefore increasing the incidence of seed travel and establishment of infestations in other areas.
- The adjacent river system acts as a carrier for seed travel to other areas downstream.

- There is a boat launch in this area, which results in increased vehicular traffic and increased likelihood of seed travel.
- The actual size of the Blueweed site is about 0.5 ha.

The combination of species risk (P1) and site risk (High) makes the area a P1 site for treatment. The fact that there is a riparian zone limits the control methods available, and all options must be taken into consideration.

The priority matrix will identify the treatment priority of all sites and any new sites. Several treatment options are identified in this Plan and will dependent upon site variables. An identification guide to species found in the City of Fernie, and their associated management recommendations can be found **APPENDIX IV** Invasive Plant Species Identification and Management Guide

2.3.4 Identifying Future Sites

The 2017 inventory included all current City-owned property; however, invasive species infestations can establish at any time in any location. Areas that were inspected and determined to be weed free in 2017 are not necessarily exempt from any future weed infestations. It is imperative that diligence be implemented on the part of City staff, invasive plant contractors, residents, etc. to report and deal with any new infestations immediately. Any new sites will be prioritized using the above methods and added to the City of Fernie Invasive Plant Site List.

2.4 Management and Control Actions

A variety of treatment options are available for the control of invasive plants; an integrated management plan incorporates the use all control methods, selecting the most suitable methods based on site characteristics. Substituting biological, physical or cultural controls for chemicals is promoted wherever feasible to reduce impacts on the environment, if these non-chemical alternatives have lower potential environmental impacts.

2.4.1 Cultural Control

Cultural control includes seeding, irrigating or fertilizing to encourage the establishment of healthy ground cover to resist invasive plants. When natural vegetation or soil is disturbed, cultural control can be an effective tool in invasive plant management. Seeded or intensively managed plant communities can offer competition for invasive plants. Where non-selective herbicides are used, control of present invasive plants will leave bare ground. In these cases, cultural control (i.e. seeding) should be used in combination with chemical control as part of a long-term management strategy. Re-vegetation can assist in preventing the return of an invasive plant or the introduction of new invasive species in an area. Cultural control can be used in environmentally sensitive areas, such as riparian zones.

Example:

A site that would benefit from cultural control is Dogwood Park; if glyphosate (non-selective herbicide) or mechanical/manual treatment is used, it is important to re-vegetate any disturbed and bare areas following treatments, using seeding or planting in this area in order to deter Blueweed infestations.

2.4.2 Biological Control

Biocontrol agents are insects that are intentionally propagated because of their ability to target a specific plant species and decrease the population density of that plant species by surviving off its seeds or other plant structures vital for reproduction. The goal of biological control is not to eradicate infestations, but to reduce population levels down to an acceptable, manageable level where environmental damage does not occur.

When considering biocontrol, one or more of the following conditions should exist:

- Targeted invasive plant infestations that are large and well established
- Other treatment options have proven not to be feasible, i.e. site is remote and not accessible
- Targeted infestations should be in a low traffic area, as plants will continue to grow and reproduce normally until the bioagent is well established, therefore viable seeds can still be spread via pedestrians, animals and bike traffic.

- Targeted infestations will be in natural areas, where vegetation is not maintained by mowing, trimming, fertilizing, irrigation, etc.

In consideration of these factors, many sites that have been identified in the City of Fernie do not represent optimal characteristics for the use of bioagents. Many sites are large and may be well established but are also in areas that are maintained by mowing; many bioagents survive in the plant leaves and stem which will be removed if mowed. Many sites also have moderate to high public recreational use, which is a significant vector of seed travel, indicating that these sites would best be treated using other more initially effective control options. Treatment results from bioagents are generally slow to become apparent as some agents take years to establish and disperse, therefore other more efficient treatment options may be preferred.

2.4.3 Mechanical/Manual Control

Examples of mechanical controls are as follows:

- Pruning and cutting
- Mowing
- Tilling
- Covering/smothering
- Hand pulling, digging/excavating
- Spot burning

Mechanical control is feasible on small sites where herbicide cannot be used (i.e. infestations in close proximity to environmentally sensitive features or endangered species and where geographical features limit equipment access), or it can be an effective primary step, followed by herbicide treatment to control re-growth. The characteristics of individual invasive plant species influence whether mechanical control methods are appropriate. For example, mowing can increase the growth of some species, and timing of treatment is critical. Rhizomatous rooted species do not respond well to mechanical treatments unless 100% of the plant material has been removed from the site. Some species such as Spotted knapweed adapt to mowing treatments over time and instead of growing vertically, they begin to extend themselves horizontally along the ground, even managing to flower low enough to avoid mower blades, as shown in Figure 7. This has been observed in many of the mowed sites within the City of Fernie where Spotted knapweed occurs; in these instances, chemical treatments can play a secondary role in effective complete control. Physical treatment such as manual weeding, pruning and cutting are most appropriate on smaller, more intensively managed sites, as these labour-intensive activities become more inefficient on large sites.



Figure 7. Spotted knapweed infestation in field on 2nd Ave.

Appropriate practices for mechanical treatment of a site include:

- Multiple treatments throughout the season
- Proper disposal of invasive plants
- Re-seeding with a certified weed free mixture
- Conducting treatments prior to plant flowering and seeding

Many of the identified sites in the City of Fernie are public parks are currently maintained by public works operations by regular mowing, trimming, etc. which means there are already controls in place to help manage invasive plant populations. These physical and mechanical controls may be used throughout the entire growing season. There are dense knapweed infestations along some pathways and a mechanical treatment followed by a chemical treatment will help to prevent seed establishment and travel in these corridors. An important note to mechanical or manual control is that these methods may leave bare or disturbed ground, which invites more weeds. Cultural control must then be integrated to properly manage these sites; seeding or planting, fertilizing the area following mechanical or manual control.

2.4.4 Proper Disposal Requirements

The RDEK requires proper disposal of invasive plants to include:

- Carefully placing plant material and seed heads into garbage bags and tying tightly.
- Sealed bags should be disposed of in household waste in an RDEK landfill or transfer station.
- Garbage bags should be a minimum of 3mm thickness to prevent ripping and/or tearing and inadvertent spread of weeds.
- Do not compost any weed materials.

These guidelines should be provided to City of Fernie residents and property owners as part of the Waste Regulation Program.

2.4.4 Chemical Controls

Pesticide use should be the last option when deciding on a control method, possibly where other methods have proven ineffective or are not feasible. When pesticides are used, they should be applied as efficiently as possible, through careful timing and properly calibrated equipment by certified applicators. Certified applicators and license holders must conform to specified guidelines that are set out in the BC Ministry of Environment Integrated Pest Management Regulation and the Canadian Pesticide Education Program Applicator Core Manual in the areas of storage, handling, transport, application, equipment calibration, spill response, and environmental protection strategies. The applicator must be aware of pesticide use procedures required to protect human health and take precautions to prevent unprotected human exposure to pesticide. They must perform an inspection of a proposed treatment area to ensure that the applicable regulatory requirements and standards can be met in carrying out the pesticide use. Particular care must be taken when treating large areas, using hazardous chemicals, near bodies of water, or close to sensitive fish and wildlife habitat. Chemical controls have restricted use within close proximity to species at risk, domestic water intakes, water licenses, agricultural food production systems, environmentally sensitive or riparian areas, pesticide free zones (PFZ), no treatment zones (NTZ), or public use areas. They should be carefully selected with these variables in mind. Herbicides selected for use must be applied with target specific application techniques whenever practical.

Factors that must be considered in the decision to use herbicides include:

- The impacts of invasive plants on natural and managed resources (i.e. native plants, animals, communities, crops, waterways, etc.)
- Clear evidence that herbicide use to remove non-native invaders will improve the health of the resources rather than further jeopardize it.
- A clear understanding of provincial and local regulations on herbicides being used.
- Provincial and local requirements on applicator licences and posting of treated areas.

When determining invasive plant control methods within a municipality, the level of public use must be taken into consideration. All precautions must be taken in order to protect public safety and prevent contact with pesticides. Any pesticide application within the City must comply with the regulations outlined in the Pesticide Use Control Bylaw No. 2093, and specifically sections 10 and 11 in reference to signage, see **APPENDIX III City of Fernie Bylaw No. 2093**.

Understanding the product is the key to appropriate application precautions including methods, treatment, and specific regulatory guidelines. Each herbicide is unique in respect to modes of action, appropriate

application precautions for both the applicators safety, and the protection of the environment. In deciding which herbicide to use, the following herbicide properties should be considered:

- The effectiveness of the herbicide against a target species;
- How the herbicide will improve the overall health of a natural area;
- How the herbicide will dissipate in the environment (how long it will persist before it degrades and whether it will be moved to non-target areas by air or water);
- Herbicide behavior in soils, water, and vegetation;
- Herbicide toxicity to humans, animals, aquatic species, and other non-target organisms;
- Application methods;
- Accessibility and proximity to water and the hydrology of the system that is being treated, including depth of groundwater;
- Presence of managed and natural resources (i.e. rare and endangered species) that are being protected, and
- Possible impact of trampling on protected resources during the application effort.

The ideal herbicide is effective against a target weed, does not drift, does not leach into groundwater, does not runoff into streams and waterways, is non-toxic to people and other non-target organisms, is not persistent in the environment, and is easy to apply. A list of common herbicides can be found in APPENDIX II Herbicide Selection Chart.

When used safely and properly, chemical control can have many benefits;

- Large areas can be effectively controlled;
- Soil disturbance is minimized and limited to vehicle or ATV/UTV or foot disturbance;
- Residual chemicals can control new plant growth for multiple years before degrading (depending on soil texture; coarse gravelly soils enable more permeation and less chemical persistence, where as fine textured soils enable encourage more chemical residual);
- Costs are significantly lower than mechanical/manual methods; and
- Infested natural areas can be restored back to their original state, improving the health of the ecosystem.

2.4.5 Targeted Grazing

Goats have been used in many regions for weed control and is becoming a popular method in areas where other control methods may be limited or restricted. Recently there have been several projects in BC using goats for targeted grazing on invasive weeds, including the City of Kamloops, Ministry of Transportation in Interior BC and the Aq'am First Nation on the St. Mary's Band lands and Tobacco Plains Reserve. All of these projects have reported significant results in the reduction of weeds. Specifically, the Aq'am Goat Grazing Project in 2015 consisted of grazing a herd of 300 goats on 1000 acres (404ha) of Band land infested with

Sulfur Cinquefoil over a three-week period. The goats 'treated' an average of four to five hectares per day and yielded remarkable results.

Sheep and other livestock have been used for targeted grazing, however, goats are preferred over other livestock for grazing invasive weeds, due mostly to the fact that the digestive system of a goat can breakdown seeds completely, with very little viable seed material being left behind. Goats also tread very lightly on the ground; they do not leave extensive soil compaction as compared to cattle. The droppings left behind from goats are small, dry pellets and can be a very beneficial fertilizer to an area. Goats also tend to target weed material as opposed to native grasses; after the weed material is eaten down, the native grasses then begin to flourish. Goat grazing can be especially beneficial on areas that cannot be treated by herbicides, such as riparian zones or sensitive habitats, and also steep slopes where chemical treatments are inefficient or inadvisable due to a safety hazard.

The use of goats requires subsequent annual treatments over a period of at least 3 years, at which time infestations may begin to recede to a manageable level. This is mainly due to the fact that large infestations generally carry large seed banks in the soil, which can germinate years into the future. By grazing annually, this allows for native grasses to re-establish and provide healthy competition for the weeds.

Targeted grazing within the City of Fernie is a viable option for invasive plant control. Invasive plant sites along river pathways that fall in the riparian zone where herbicide is restricted, and where the use mechanical or manual control would be very intensive, could potentially be good candidate sites for targeted grazing. There may be an exemption required to permit targeted grazing on City-owned land.

This option is cost-effective, environmentally friendly, and is an effective method of control on slopes and near water bodies where control options are otherwise very limited.

2.5 Monitoring

Monitoring is the repetitive compilation of data to measure changes over time. Successful invasive plant management programs are based on these regular inspections which provide the information required to decide whether treatments are necessary, the best timing of treatments, and how the treatments are working. Most invasive plants are persistent and difficult to control and monitoring for several years is required to ensure management objectives are being met.

As an integral part of the City of Fernie Invasive Plant Program, the invasive plant contractor should be responsible for conducting monitoring annually. The invasive plant management objectives have been identified in this Plan; sites have been prioritized based on variables, and actions will be implemented based on each site priority (P1 - eradication, P2 - containment, P3 - containment based on cost/benefit analysis).

Monitoring actions include surveying a site prior to treatment:

- If it is determined that the site meets the objective (i.e. a P1 site is observed to have no plants at the time of monitoring, it will be deemed to have met the objective of eradication and no management actions will be necessary, and therefore no treatment will be conducted. This site will require monitoring annually to observe if any management actions are necessary at a future point in time.)
- If it is determined that the site does not meet the objective, (i.e. if target weeds are present) the site will be designated for treatment in an attempt to obtain the management objective of eradication or containment.
- If it is determined that the site requires treatment, the most suitable control method should be determined. If it is decided that herbicide treatment is most suitable, a Planned Herbicide Treatment Notice can be posted at this time.
- If during monitoring, no target weeds are observed, a treatment/survey record will be completed indicating “No Weeds Found” and will should be added to the database for long term program evaluation.

Additional actions to support monitoring should include:

- All P1 sites should be treated in early summer then monitored in late summer/fall for new growth or missed plants and re-treated if deemed necessary. It is recommended that this protocol should be followed each year for P1 sites in order to successfully eradicate and contain these high priority infestations.
- Regular monitoring of treated sites should take place at a minimum of 14 days following treatment to gauge treatment effectiveness; sites showing ineffective treatment should be investigated and re-treated as necessary in the same treatment year.
- For 2019 and onward, for any treatments and monitoring conducted, field data collection will include a recommended site priority ranking for the following year (i.e. if a P1 site treated in 2019 was found to contain very few or no target invasive plants, the treatment crew will have the authority to identify, based on site specific factors, the site priority ranking to be the same (P1) or lower (P2 or P3); this will in turn automatically generate the 2020 Site List, which can still be reexamined and altered by the qualified contractor at any time.

Containment of a site will have deemed to have been achieved if the size of the site, density and distribution has not increased. It is important to note that sites that may show a decrease in population density or distribution and are observed to not have any new plants emerging cannot be removed from the Site List until years later when no plants have been observed. Seeds may lay dormant in the soil for many years before germinating, therefore once added to the site list; each of these sites must be

monitored/treated and documented on a regular basis. It will be at the discretion of the invasive plant contractor to assess and determine the sites most in need of treatment each year.

2.6 Evaluation

Evaluation is an essential part of an integrated management program, it helps managers to determine what methods worked well, what aspects may need improvement and can assess the long-term costs and benefits of the program. Program success will be dependent upon the participation, communication, support and accountability of managers and contractors directly involved with the implementation of the management plan. A detailed annual report from the invasive plant contractor will contribute to the long-term evaluation of the program.

An annual report from the invasive plant contractor should include:

- Review of the current year's treatment and monitoring/survey records
- Review any limiting factors to treatments, such as proximity to residential areas, or sensitive habitat
- Review any historical databases, monitoring reports and annual evaluations to determine trends
- Observations as well as specific aspects of the program that were successful, and others that require improvement
- Feedback from City departments and Council
- Recommendations moving forward

These annual reports should be used to optimize future program success. This may include trying different treatment methods, varying the timing of treatments, integrating more educational programs, etc. The Invasive Plant Management Plan should be reviewed and updated as deemed necessary.

Evaluating treatment and survey records over a period of several years will indicate if management objectives are being met:

- Have P1 sites been eradicated?
- Are P2 sites being contained and possibly eradicated?
- Are P3 sites being monitored or controlled on a site-specific basis for containment?

If the answer to any of these questions is 'no', then the program methods should be scrutinized and altered. If the answer to these questions is 'yes', this indicates a successful invasive plant program, and continuing with the current program methods would be appropriate.

3.0 CONCLUSION

Several goals and recommendations were identified in the 2014 Management Plan, below is a summary of the goals, if they have been met, and the actions taken to accomplish them.

Table 5. Addressing Goals and Recommendations from 2014

2014 Goals and Recommendations	Goal met?	Actions Done
All City-owned property will be surveyed for invasive plants by 2019. This survey will be planned and initially stem from the original mapped areas of infestation, and continue to immediately adjacent areas, and connecting areas through pathway systems. A documentation system of all areas will be implemented, with new infestations being added to the treatment list.	Yes	City-wide invasive plant survey in 2017
The Invasive Plant Management Plan should be reviewed and updated every five years.	Yes	The current 2019 Invasive Plant Management Plan will serve as the updated version.
Managers and contractors directly responsible for administering this program will review all aspects of the program on an annual basis, in the off-season, highlighting factors that have contributed to program success, and aspects that may require improvements. Documented annual success of the program will provide justification for continued funding.	Yes	Following the 2017 survey results, Managers designated a budget to address invasive plants for 2018.
Interpretive signs are planned to be installed in City parks in 2015. A goal is to take advantage of this opportunity in educating the public by featuring information on these signs such as invasive plant identification, their impacts, and the importance of management.	?	Do these signs contain invasive plant info?
Integrate the invasive plant management program into the City Geographic Information System (GIS); this will provide a consistent base for monitoring program success year to year.	?	
Examine the feasibility of implementing a quantitative monitoring program which will include specific sampling procedures for monitoring for all existing sites annually.	Yes	The 2019 Invasive Plant Management Plan addresses a monitoring system.
Develop an initial reporting program for public works and other field staff, and potentially expand this program to enable residents/trail users/organizations to report weed sightings.	Yes	Residents are able to submit "Service Requests" Discuss more in 2019
Review and enforcement of Bylaw No. 1587 requiring property owners to control and remove noxious and invasive plants on their properties, with associated fines for non-compliance.	No	Review in 2019/2020

The most important goal is to be able to conduct an evaluation of the invasive plant program in the future and be able to demonstrate program success. In order to demonstrate program success in another five years;

- A sufficient budget for invasive plant management activities must be maintained, and
- Actions outlined in this Plan are designated to Council, managers and contractors directly or indirectly involved with invasive plants; add to the chart below identifying personnel responsible for specific actions and a timeframe for completion.

The following are new goals and recommendations that should be addressed in 3-5 years:

Table 6. Future Goals and Recommendations

Goals and Recommendations	Timeframe	Personnel Responsible
Develop annual treatment plan and budget Details: Invasive plant contractor provides treatment estimate for as many sites as feasible.	Annually prior to May 1	
City Staff education, workshop Details:	Annually prior to July 15	
Fernie resident education: Details: Open house, etc	Ongoing	
Collaboration with CPR/RDEK Details:	2019/2020	
Treatment/maintenance plan for Public Works Yard Details: to include regular mowing/weed whipping by public work staff and chemical treatments by invasive plant contractor	2019/2020	
Discussion of potential goat grazing opportunity for control method Details: identify potential sites	2019	

4.0 MORE RESOURCES

The following is a list of valuable resources to support the implementation of the City of Fernie Invasive Plant Management Plan. Many of these links to publications, programs, etc. are credited to the Invasive Species Council of BC (ISCBC). EKISC is also an excellent local resource for education; they provide educational workshops, presentations for organizations as well as invasive plant identification and management technique courses and weed pull events.

1. East Kootenay Invasive Species Council (EKISC)
<https://www.ekisc.com/>
2. PLAY CLEAN GO
<http://www.playcleango.org/>
3. Field Guide to Noxious Weeds and Other Selected Invasive Plants of British Columbia, Eighth Edition, 2014 https://bcinvasives.ca/documents/Field_Guide_to_Noxious_Weeds_Final_WEB_09-25-2014.pdf
4. Local Government Toolkit for Invasive Plant Management
https://bcinvasives.ca/documents/Local_Govt_Toolkit_2011_03_31_WEB.pdf

ISCBC Publications:

5. Plant Wise
https://bcinvasives.ca/documents/PlantWise_TIPS_Final_03_17_2016.pdf
6. Outdoor Recreation
https://bcinvasives.ca/documents/Outdoor_Rec_Factsheet_Final_05_06_2016.pdf
7. Water Based Recreation
https://bcinvasives.ca/documents/Aquatcs_TIPS_WaterRec_web.pdf
8. Seed Mixtures
https://bcinvasives.ca/documents/Seed_Mixtures_WEB.pdf
9. Invasive Species Property Assessment Checklist
https://bcinvasives.ca/documents/Invasive_Species_Property_Assessment_Checklist.pdf
10. Invasive Species Training for Real Estate and Land Use Professionals
<https://bcinvasives.ca/resources/invasive-species-training/real-estate-and-land-use/>
https://bcinvasives.ca/documents/ISCBC_realtors_land_use_webinar_20180627.pdf

11. Local Governments Call to Action Against Invasive Species
<https://bcinvasives.ca/documents/ISCBC-GovAction-180906-WEB.pdf>
12. Soil Movement, Contamination and Invasive Species Presentation by the Union of BC Municipalities
https://docs.wixstatic.com/ugd/0e63db_1a9993461ecd47fcb2c362c23c9763dc.pdf
13. Best Management Practices for Soil Movement and Disposal
https://bcinvasives.ca/documents/ISCBC-Soil-BMP-180926_Final_web.pdf

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APPENDIX I EKISC IPMA 02 Elk Valley South Sub-IPMA Plants Priority List

EKISC Annual Operating Plan – 2018

IPMA 02: ELK VALLEY SOUTH SUB-IPMA

North and West: Boundaries are the Eastern edge of IPMA 03-Bull River boundary, height of land between the Bull River and the Elk Valley

South: South to the border of IPMA 02 Flathead.

East: Junction of Hwy 43 & Hwy 3.

Table 8: Elk Valley South Sub-IPMA Invasive Plants Priority List

EDRR WATCHLIST - Not currently known in this IPMA (and may also not be known in the EKISC region*). Follow EDRR reporting and action protocols.		
- Bighead knapweed	- Hoary cress	- Queen Anne’s lace*
- Black henbane	- Leafy spurge	- Rush skeletonweed
- Black knapweed	- Marsh plume thistle*	- Russian knapweed
- Black locus	- Meadow clary	- Russian thistle
- Common bugloss	- Meadow knapweed	- Scotch broom*
- Field scabious	- Nodding thistle*	- Tansy ragwort*
- Flowering rush*	- Perennial pepperweed	- Teasel*
- Garlic mustard*	- Policeman’s helmet	- Velvetleaf*
- Gorse*	- Plumless thistle*	- Wild four o’clock*
- Himalayan blackberry*	- Purple loosestrife	- Wood sage
-	- Puncturevine*	- Yellow starthistle*
PRIORITY 1. ERADICATION - These species are known in the IPMA but with extremely limited distribution. These species may be relatively new to the IPMA. Eradication is the objective.		
- Baby’s breath	- Knotweed spp.	- Flat peavine
- Hoary alyssum		
PRIORITY 2. ANNUAL CONTROL – Species known in IPMA but with very limited distribution. Enter inventory data, report and treat or monitor annually.		
- Common tansy	- Diffuse knapweed	- Scentless chamomile
PRIORITY 3. CONTAINMENT – Site specific approach used. Enter inventory data, report and treat all sites outside containment lines. Some of these species have biocontrol available which can be used within the containment line (BC).		
- Blueweed	- Orange hawkweed	- Spotted knapweed
PRIORITY 4. ESTABLISHED (BIOCONTROL OR SITE-SPECIFIC APPROACH) – Widespread species that are beyond landscape-level control or have relatively low impact. Treat based on specific land management objectives.		
- Annual sowthistle	- Dalmatian toadflax	- Sulphur cinquefoil
- Burdock	- Hound’s tongue	- Wormwood
- Canada thistle	- Oxeye Daisy	- Yellow/common toadflax
- Caraway	- Perennial sowthistle	- Yellow hawkweed spp.
- Chicory	- St. John’s wort	
PRIORITY 5. INSUFFICIENT INFORMATION – There is insufficient information on the distribution, impacts and potential for spread and/or control of the following species. Further information is required.		
- Field Bindweed	- Milkvetch spp.	-

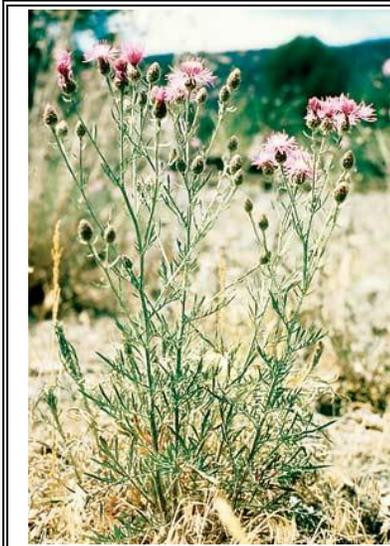
APPENDIX II Herbicide Selection Chart

Herbicide Trade Name	Active Ingredient	PCP #	Application Rate/Ha	Weeds Treated	Treatment Information
Milestone	Aminopyralid	28137	0.25 - 0.5 L/ha	Canada Thistle Common Tansy Knapweed Scentless Chamomile Absinthe wormwood	Post emergence, selective, broadleaf herbicide, provides long-term residual control for 2+ years.
Lontrel 360	Clopyralid	23545	0.42 - 0.83L/ha	Canada Thistle Scentless Chamomile Perennial Sowthistle Ox-eye Daisy Spotted Knapweed Diffuse Knapweed	Post emergence, selective, broadleaf herbicide for use on medium to fine textured soils. Little to no residual. No impact on woody vegetation.
Clearview	Aminopyralid & Metsulfuron-methyl	29752	125 – 230 grams/ha	Canada Thistle Field Scabious Ox-eye Daisy Plumeless Thistle Russian Thistle Scentless Camomile Spotted Knapweed Wild Mustard	Selective broadleaf weed control in right-of-way, industrial and other non-crop areas.
Tordon 22K	Picloram	9005	2.25 – 4.5L/ha	Scentless Chamomile Diffuse Knapweed Spotted Knapweed Perennial Sowthistle Canada Thistle Russian Knapweed Leafy Spurge Dalmatian Toadflax Yellow Toadflax	Selective broadleaf weed control on medium to fine soils. Avoid trees and coarse textured soils due to residual factor of 3-7 years. Not for commercial and residential-zoned use.
2,4-D Amine 600	Dimethyl Amine	14726	0.7 - 4.5L/ha	Burdock Bull Thistle Canada Thistle Hoary Cress Leafy Spurge	Post emergence broadleaf control, restricted use on MOTI lands.
Round-Up, Vantage	Glyphosate	13644	1.5 – 2.5% Solution	Annual grasses and many perennial weeds and brush	Post emergence, non-selective control, used for spot applications.
Grazon	Picloram/2,4-D		3.7-7.0L/ha	Burdock, Canada thistle, Common tansy, Hound's tongue, Orange hawkweed, Scentless, chamomile, Knapweeds	Post emergence broadleaf control. Remains active in the soil for 3-4 years.

APPENDIX III City of Fernie Bylaw No. 2093

10. Written notice must be posted on public or private land where the Pesticide will be used and must comply with the following requirements:
 - (a) The notice must be posted on the public or private land at least 48 hours before the Pesticide will be used;
 - (b) The notice must remain on the public or private land until the later of 72 hours after the application of the Pesticide or the time, if any, indicated on the product label specifying when the area can safely be re-entered after application;
 - (c) Notices must be posted in locations that are clearly visible from each highway or public pathway adjoining the public or private land, and
 - (i) within three metres of each of the property lines intersecting each highway or public pathway; and
 - (ii) at driveways, walkways, and other usual entrances to the public or private land;
 - (d) The notice must be made of material that is weather resistant;
 - (h) The notice must measure at least 12 centimetres by 17 centimetres;
 - (i) The notice must include the following information:
 - (i) the location, date and approximate time of the Pesticide use;
 - (ii) in the event of inclement weather, an alternate date or dates on which the Pesticide use may occur;
 - (iii) the brand name and registration number of the Pesticide that will be used;
 - (iv) the Pest for which the Pesticide is being used;
 - (v) the time, if any, indicated on the product label specifying when the area can safely be re-entered after application; and
 - (vi) the following phrase: "Permission to undertake this activity was obtained from the City of Fernie. Further details may be viewed at the municipal hall, 501 3rd Avenue, Fernie, BC."
11. Written notice must be delivered to residents of lots that are adjacent to the public or private land where the Pesticide will be used and must contain the information set out in section 10(f).

APPENDIX IV Invasive Plant Species Identification and Management Guide



Source: bcinvasives.ca

Spotted Knapweed (*Centaurea maculosa*)

Provincial Noxious Weed

Biennial to short-lived tap rooted perennial with branched stems growing to 1.5 meters in height; deeply cut hairy leaves; very bitter to taste; purple, occasionally white flowers; flowerhead bracts with black-tipped fringe giving head a "spotted" appearance.

Management:

Cutting, mowing or pulling before the plant sets seed can be effective on small infestations. The entire root system should be removed so that the plant will not re-sprout from the crown or remaining roots.

Aminopyralid, picloram, a mixture of picloram and 2,4-D, 2,4-D alone, clopyralid and glyphosate are effective in controlling spotted knapweed. Herbicides should be applied before the mature plants set seed for maximum effectiveness. There are many biological control agents for managing knapweed.



Source: bcinvasives.ca

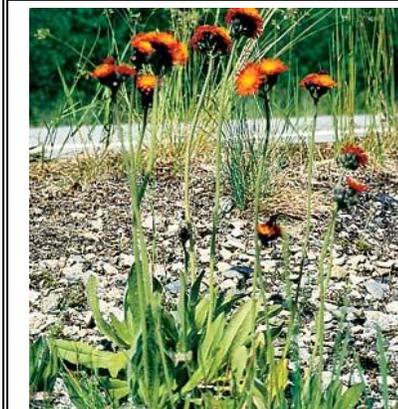
Blueweed (*Echium vulgare*)

Regional Noxious Weed

Biennial to short-lived tap rooted perennial growing to 1 meter high; stems covered in stiff hairs with swollen reddish to black bases where attached to stem. Invades rangelands, pastures, roadsides and idle areas particularly on coarse, sandy to gravelly soils. Produces 500 to 2,000 seeds per plant.

Management:

Hand-pulling may be an effective control for small infestations; while cutting larger infestations will decrease seed production. Due to the ability to re-sprout, multiple treatments will likely be required to deplete root reserves to the point where flowering and seed production are improbable. Glyphosate can be used for short-term control in non-vegetated areas but is not recommended for use in areas where desirable perennial vegetation occurs. Picloram provides long term, residual control. Recent studies indicate that the addition of surfactants improves herbicide effectiveness, and fall treatments are more effective than spring treatments. Clopyralid is effective at high rates and is recommended for use under or near conifers. Recent trials of metsulfuron-methyl fall treatments have proven effective.



Source: bcinvasives.ca

Orange Hawkweed (*Hieracium aurantiacum*)

Regional Noxious Weed

Fibrous-rooted perennial with milky juice and above ground runners grows 30 to 60 cm tall; leaves mostly basal; leafless flowering stalk covered with stiff, black, glandular hairs; vibrant orange-red flowers.

Management:

Hand-pulling small infestations can be effective if the roots and stolons are not scattered. Mowing can prevent seed production but will encourage vegetative reproduction. Picloram, clopyralid, aminopyralid, or picloram/2,4-D mix provide good control when applied to actively growing plants in spring and early summer. There are currently no biological control agents available for orange hawkweed.



Source: bcinvasives.ca

Common Tansy (*Tanacetum vulgare*)

Regional Noxious Weed

Aromatic perennial growing to 1.8 meters tall; deeply divided dark green leaves; yellow "button" flowers in cluster at top of plant; no ray flowers.

Management:

Common tansy cannot be controlled with single mowing events (e.g. once-a-year), as the plants will respond with an increase in vegetative growth. Mowing sites very low to the ground before July can prevent seed production. Combined mowing and subsequent herbicide treatment of re-growth appears to be an effective control method. Treatments must be repeated over several years. Hand pulling may be used in areas where mowing and herbicide application are not feasible. Gloves and other protective clothing should be worn to prevent skin irritation.

The following herbicides provide effective control for common tansy: picloram, picloram/2,4 D, metsulfuron methyl, and aminopyralid.

There are currently no biological control agents available for Common Tansy.



Source: bcinvasives.ca

Japanese knotweed (*Fallopia japonica*)

Provincial Noxious Weed

Rhizomatous, semi-woody, herbaceous perennial in the Buckwheat Family that grows to 3 metres in height; "bamboo-like" stems are green to reddish brown and spotted; leaves are egg-shaped, stalked, 10 to 15 cm long, flattened or rounded at the base with a pointed tip and are dark green above and lighter green below; greenish to creamy-white flowers are produced in clusters from the leaf axils. An escaped ornamental originating from eastern Asia, Japanese knotweed forms aggressive, dense thickets maintained by extensive and deep, creeping rhizomes. New shoots are known to penetrate thick asphalt.

Management:

Mowing and cutting may be effective if done close to the ground. Repeat this treatment for at least 5 years to exhaust root reserves. Mechanically controlled areas should be monitored throughout the growing season to ensure new infestations do not develop from root fragments. All cut plant parts should be incinerated or undergo deep burial at landfill. Care should be taken to ensure that plant parts are not distributed during transport. There are no biocontrol agents available for the control of invasive knotweed species. Effective herbicides include: imazapyr, glyphosate and triclopyr. Stem injections/cut surface treatments are most effective in the summer or fall, while foliar applications are most effective at the late bud stage.



Source: bcinvasives.ca

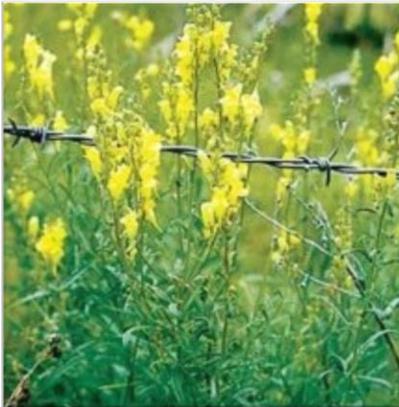
Burdock (*Arctium spp.*)

Regional Noxious Weed

Biennial weeds common in farmyards, fence lines, roadsides, stream banks and idle areas well known for their rounded flower heads with hooked spines that easily attach to clothing and animals. Grows 1 to 3 meters in height; lower leaf stalks are hollow; flower heads are less than 2.5 cm across and scattered along the stems.

Management:

Mowing after the plant has bolted but before it has flowered can be used to eliminate seed production. Aminopyralid, 2,4-D, picloram and glyphosate are effective when applied to first-year rosettes. There are currently no biological control agents available for common burdock control.

 <p>Source: bcinvasives.ca</p>	<p>Flat Peavine (<i>Lathyrus sylvestris</i>)</p> <p>Flat Peavine, now found throughout many parts of North America, is originally a native plant of Europe, North Africa and the Middle East. It has recently been found in the East Kootenays in isolated occurrences. Its invasiveness results from multiple methods of reproduction including seeds, rhizomes and ramets (self-clones), that allow it to quickly take over a surrounding area. It can climb 46 to 76 cm without support and up to 2m+ with support, as well as its tendency to form a dense tendrill entangled blanket that chokes out underlying native vegetation. As a result, Flat Peavine lowers plant biodiversity and forms dense impassable thickets that block hiking trails and wildlife pathways while increasing fire risks. Most importantly, however, Flat Peavine lessens native food sources for wildlife and livestock, leaving in its place a poisonous alternative. The negative economic impact affects the raising of livestock, hunting opportunities and other recreational opportunities.</p> <p><u>Management:</u> Flat Peavine is most successfully controlled using herbicides including clopyralid or aminopyralid. Plants respond quickly to herbicide treatments and can be destroyed after one treatment. While hand pulling and digging could be attempted in a small area such as a home garden, the necessity of removing all the rhizomes make eradication very difficult and annual monitoring and removal is required.</p>
 <p>Source: bcinvasives.ca</p>	<p>Yellow Toadflax (<i>Linaria vulgaris</i> Mill.) Provincial noxious weed</p> <p>Yellow toadflax, also known as Common toadflax or Butter and Eggs, is a perennial weed that spreads through an extensive creeping root system and forms dense patches. Plants have leaves that are numerous, narrow, waxy and pointed at both ends, stems are smooth, green and 1.5-3 ft tall, flowers are bright yellow with an orange spot on the lower petal, similar to a snapdragon. This plant contains a poisonous glucoside that is unpalatable and moderately poisonous to livestock.</p> <p><u>Management:</u> Hand pulling is only effective on seedlings before they develop extensive creeping root systems. Mowing can effectively prevent seed production but can also stimulate vegetative growth from the roots and rhizomes. Tillage can be used for control but must be done repeatedly throughout the season and for several consecutive years, which can cause soil erosion. Post-emergent herbicides Picloram, 2,4-D, chlorsulphuron, imazipic, imazapyr, metsulfuron and glyphosate can all provide effective control when applied during active stages of growth. There are currently several bioagents available for use on Yellow toadflax in many different regions, most with varied effectiveness.</p>
 <p>Source: bcinvasives.ca</p>	<p>Scentless chamomile (<i>Matricaria perforate</i>) Provincial noxious weed</p> <p>Scentless chamomile looks similar to daisy flowers, with white petals and yellow centers; plants can grow 5-100cm tall; leaves are fine and delicate and odourless when crushed; there is an extensive fibrous root system.</p> <p><u>Management:</u> Frequent shallow tillage can reduce infestations; mowing is only effective if stands are mowed early and often lowering the blade each time, otherwise plants will produce flowers below mowing height. Picloram, dicamba, aminopyralid and metsulfuron-methyl are effective herbicides.</p>

 <p>Source: bcinvasives.ca</p>	<p>Hound's tongue (<i>Cynoglossum officinale</i>) Provincial noxious weed</p> <p>The Hound's Tongue name comes from the resemblance of the leaf's shape and roughness to a dog's tongue. All parts of the plant are covered with bristly hairs and can grow up to 1.5m tall. Flowers are reddish-purple, have 5 petals and hang in small clusters, the roots consists of a thick woody taproot. The heavily barbed seeds of Hound's tongue cling readily to clothing and animal hair/fur, wherever the seed carrier goes, so does the weed.</p> <p><u>Management:</u> Mowing before flowering will prevent seed production. Hand pulling is effective in softer soils. If roots break it will result in re-sprouting, sever the root below ground to prevent this. The toxic properties of this plant make it undesirable for grazing control. Picloram and Picloram/2,4D mix, and Dicamba have been successful for chemical control. Biocontrols have been introduced and one of them, <i>Mogulones cruciger</i>, a root mining weevil, has been successful at controlling this plant.</p>
 <p>Source: abinvasives.ca</p>	<p>Absinthe wormwood (<i>Artemisia absinthium</i>)</p> <p>Absinthe wormwood, or just Wormwood is an herbaceous perennial with a strong sage odor. Mature plants may reach a height up to 1.5 meters. Leaves and stems are covered with fine silky hairs that give the plant a grayish appearance. There are many small, inconspicuous yellow flowers produced in each head.</p> <p><u>Management:</u> Mechanical mowing reduces but does not eliminate seed production, stems respond by growing horizontally. Late season tillage can kill new rosettes. Established plants can survive tillage with sufficient moisture. Small patches can be hand-pulled or dug and disposed of in landfill bound garbage. Aminopyralid, glyphosate and dicamba are registered for use on absinthe wormwood.</p>
 <p>Source: abinvasives.ca</p>	<p>Wild Caraway (<i>Carum carvi</i>)</p> <p>Wild caraway, also referred to as just Caraway, is a biennial, edible plant that was imported and is cultivated as a spice crop in Canada and the US, it has since escaped and invaded many landscapes. Infestations in forage crops have led to weed seed dispersal in baled hay.</p> <p>Plants have delicate and very finely divided (very carrot-like) leaves; they can grow up to 60 to 90 cm tall; the flowers are very tiny, white, but occasionally pinkish, and occur in groups at the top of stems. When crushed, Caraway seeds and flowers have a distinct licorice odor.</p> <p><u>Management:</u> Hand pulling prior to flowering is effective, especially in soft soils. After flowering the plants are very fragile and seeds are easily scattered – at this stage a plastic bag can be carefully placed over the mature plant and closed tightly around the stem. Repeated mowing is not effective, as plants re-bloom below cutting height. Currently no selective herbicides are registered for use on Wild caraway, however, aminopyralid and picloram have proven to be effective.</p>



Source: bcinvasives.ca

Yellow Hawkweeds (*Hieracium spp.*)

There are about 14 species of invasive hawkweeds and also 14 species of native hawkweeds in the Pacific Northwest. The non-native species readily hybridizes which makes both identification and management complicated. Plants generally consist of basal rosette leaves with no upper leaves; stems are typically solitary and unbranched, they can be smooth to moderately hairy, when broken, they secrete a milky juice. Flowers are conspicuous yellow to pale yellow or white ray flowers borne singly or in clusters on top of stems.

Management:

Mowing before flowers bloom will help reduce the seed production however soil disturbances may help this species to spread. Very small infestations can be hand-pulled however great care needs to be taken to ensure that roots and stolons are carefully bagged and not spread. Application of fertilizers may enhance the competitive abilities of desirable species such as perennial grasses, legumes and other forbs to reduce hawkweed infestations or resist against hawkweed invasion. Picloram alone and plus 2, 4-D, aminopyralid alone and plus 2, 4-D effectively provide longer term control when applied to actively growing plants (spring and early summer). Dicamba alone and plus 2,4-D provide effective shorter-term control. Glyphosate is also effective at certain times.



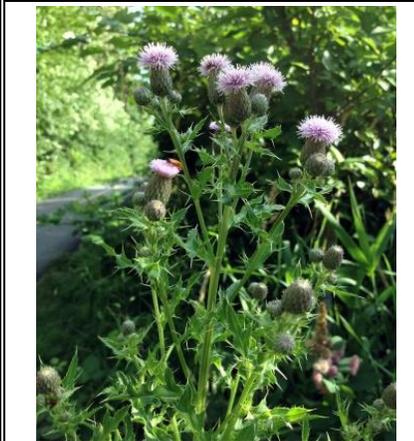
Source: bcinvasives.ca

St John's wort (*Hypericum perforatum*)

St. John's Wort is a perennial herb most known for its medicinal properties. However, it is also known as a highly invasive species across North America. Plant leaves are small and elliptic; stems are 10-110cm tall, smooth and woody at the base; flowers are bright yellow, numerous (25-100 per stem); plants are connected by rhizomes.

Management:

Tillage followed by sowing of perennial grasses and legumes is an effective method of control. Hand pulling, digging or mowing will stimulate re-sprouting and is not effective. Herbicides effective for the control of St John's Wort include 2,4-D, glyphosate, Picloram, triclopyr, metsulfuron and flouroxypyr. Two biocontrol species of *Chrysolina* were released in BC in 1952 and have since dispersed and established readily. Early 1950s biocontrol programs were effective at dramatically reducing large infestations in the western US, however, recent studies indicate some populations are still increasing while other areas are stable.



Source: bcinvasives.ca

Canada thistle (*Cirsium arvense*)

Provincial noxious weed

Canada thistle is a perennial weed, it can produce up to 5,200 seeds per plant; it also reproduces by an extensive root system. Leaves are alternate and spiny; stems can grow from 0.3m to 2m tall. Flower heads are white to purple in clusters of 1 to 5 flowers per branch with a strong vanilla scent.

Management:

Repeated mowing can be effective in reducing infestations, or intensive cultivation to deplete root reserves, followed by planting of competitive crops is effective in the long term. There are numerous herbicides registered for Canada thistle including clopyralid, dicamba, 2, 4-D, aminopyralid, picloram. The most effective time for applications are spring and fall, during the rosette or pre-bud stages.