

Invasive Plant Management in the Central Kootenay:

A Background Document for Strategic Planning

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EXECUTIVE SUMMARY

Invasive plants have been recognized as a serious problem in the Central Kootenay for over 60 years. In 1995, an estimated 35,000 hectares were affected by weeds and a further 2.5 million hectares were considered at risk to invasion throughout the greater Kootenay area. Uncontrolled, these species are capable of invading natural environments and altering the structure and function of native ecosystems. Prevention and control of invasive plants, however, is complex and often involves many land jurisdictions, and wide range of legislation, government policies, and guidelines.

In 2004, the Invasive Plant Council (IPC) of British Columbia prepared a provincial strategy aimed to build cooperation and coordination among agencies, organizations and individuals to minimize the social and economic impacts caused by invasive plants. In part, success of this strategy relies on a strong regional involvement in the plan. The Central Kootenay Invasive Plant Committee (CKIPC) was formed as a non-profit society in 2005, and since then it has taken on the lead role for coordinating a regional invasive plant program in the Central Kootenay.

This report reviewed the current status of invasive plants in the Central Kootenay. The report describes the history, issues, knowledge gaps, and possible actions that will form the basis for an invasive plant strategy. The objectives of the review were:

- To summarize issues relating to invasive plant management in the Central Kootenay including education, inventories, control strategies, and coordination.
- To provide an overview of the agencies involved in invasive plant management in the Central Kootenay, their current and planned activities, and areas of jurisdiction.
- To describe the current distribution for high priority invasive plant species in the region and their pathways of spread.
- To delineate containment lines for some of these species, where appropriate, as well as “zero tolerance” areas.
- To describe priorities and strategies for management, and recommendations for invasive plant management in this area including appropriate jurisdiction/agencies where appropriate.

1. Statutory Authority and Other Processes. Legislation, policy and land use planning provide authority and direction for invasive plant management. Although the *Weed Control Act*, the *Forest and Range Practices Act*, and possibly the *Community Charter Act* define legal obligations of landowners and tenure holders with respect to invasive plants on private and Crown land, further clarification of legislation may be necessary before all participants have a complete understanding of their responsibilities. In particular, the role of the *Community Charter Act* in regional weed management is not clear at present. This review recommends the CKIPC should participate in reviews of provincial legislation and policy that relate to the prevention and control of invasive plants to ensure that they meet the needs, and are consistent with, the Central Kootenay strategy.

2. Organization and Leadership. The CKIPC has acted as a liaison between the Central Kootenay and the IPC to ensure that regional programs are coordinated with other regional districts, government agencies, and provincial priorities. This review recommends that the committee advocates endorsement of the CKIPC coordinated strategy by provincial and local governments, First Nations, industry, private landowners, and the general public. It also suggests that the committee promote stable, consistent long-term funding to sustain all facets of the program; and supports establishing a permanent weed coordinator position to ensure program continuity.

3. Awareness and Education. Awareness and education are important factors in the identification and early detection of invasive plants, and in promoting public knowledge and interest in weed prevention and control. Well-trained land managers and an informed public are important assets that advance timely and effective invasive plant management. The CKIPC has been active in public outreach programs since 2005 and should continue these activities. It should also maintain and update the CKIPC website; prepare education programs and publications for recreational users of provincial and municipal parks; and inspect garden centers and extend information to retailers on hazardous ornamental plants.

4. Risk Assessment and Prevention. Risk assessment and prevention are practices that reduce the introduction and establishment of invasive plants in new locations. Presently, there are no recognized provincial or regional protocols for assessing risk and early intervention. The review recommends the development of a regional protocol for early intervention on new invaders; ensuring that inventory and monitoring includes detecting new invasive species; developing a surveillance strategy to monitor invasion pathways into the region; and circulating “invasive plant alerts” when new species are found in the region.

5. Inventory and Planning. Inventory and planning provide the basic information necessary for prioritizing invasive plant treatments, and direction for developing prevention practices and monitoring strategies. Several inventories have been completed in the Central Kootenay between 1994 and 2005 covering most of the prominent species in the area. The review proposes development of a regional inventory plan considering the short- and long-term inventory needs of participants. It also suggests that partners in the program should be encouraged to contribute to landscape-level inventories that cover multiple jurisdictions, and that inventories for all priority species and geographic areas in the region should be completed.

6. Early Detection and Rapid Response. Early detection and a rapid response is the most successful and cost-effective means of controlling invasive plants with the least environment damage. Rapid response is most effective when an agency (or agencies) has a clear mandate to act with the financial, human, and physical resources available for immediate use. This review suggests that the CKIPC continue to advertise and promote the “hot-line” so new infestations can be reported immediately and they continue the “landowner visit” program. It also suggests that a lead agency, which has an approved mandate and the resources to respond to new invaders immediately, should be appointed for rapid response. Consideration could be given to appointing a weed control officer through the regional district.

7. Invasive Plant Categories and Priorities. Classification of invasive plants is essential for developing effective weed management programs. Fifty-four invasive plant species in the CKIPC area have been classified into four categories based on the regional status of the weed species, and the relative ability to prevent, eradicate, contain, or control each species. The review recommends that the committee evaluate the present plant category criteria as they apply to the CKIPC area; and annually review and update plant lists. It also suggests that an invasive plant species risk assessment tool may be valuable in assigning species to categories, and the committee should consider participating in the development of such a tool if the opportunity arises.

8. Current Status and Management Strategy. Currently, numerous weed management plans are active within the CKIPC area using an Integrated Pest Management (IPM) approach. This review recommends continued use of IPM and that each agency should be responsible for prevention, containment, or control within their jurisdiction, and in accordance with their mandates and legal obligations. In addition, all weed management activities should be implemented in a coordinated fashion that is consistent with the broad objectives of the CKIPC strategy.

9. Monitoring and Evaluation. Monitoring and evaluation are important procedures for assessing the efficacy of treatments and the need for follow-up actions to meet program objectives. This review recommends developing a monitoring plan based on IAPP procedures and that regular monitoring should be conducted to evaluate treatment effects. It also suggests updating invasive plant distribution and density maps, and databases on a regular basis. The committee could contribute advice into the structure, content and possible outputs from the IAPP application to ensure that it serves Central Kootenay needs, should the opportunity arise.

10. Coordination and Partnerships. The distribution of invasive plants in the Central Kootenay transcends jurisdictional boundaries. Cooperation and coordination among agencies and private landowners is necessary to apply treatments across these boundaries in an ecologically effective manner. This review suggests that the CKIPC continues to encourage partnerships with provincial, local and non-government agencies, landowners, First Nations, and other interest groups to assist in accomplishing mutual goals and objectives. It also recommends that the CKIPC continues to support and cooperate with the IPC provincial invasive plant management strategy.

11. Program Evaluation. One of the main objectives of this strategy is to establish and build on coordination of weed management activities in the Central Kootenay. Annual evaluations determine if the strategic plan is accomplishing its goals and objectives, which provides a feedback loop for adaptive management and effective long-term planning. The review suggests that the program should be reviewed annually to monitor program success, and to ensure that participant's individual plans are consistent with the overall objectives for the project area.

Delivery of this strategy will play an important role in limiting the undesirable effects of invasive plants in the region. The strategic plan should be considered a dynamic document that requires involvement from all participants to ensure its implementation, and to improve the plan over the long-term.

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1.0 INTRODUCTION

Over the last decade, there has been growing recognition that effective invasive plant management can be accomplished only through a coordinated program involving all jurisdictions where these species grow. In 2004, the Invasive Plant Council (IPC) of BC prepared a provincial strategy aimed to *build cooperation and coordination to ...minimize the social and economic impacts caused by ...invasive alien plants* through an endorsement and commitment from a wide range of agencies, organizations, and individuals concerned with the control of invasive plants in the province (FBC 2004). A regional approach to invasive plant management was among the priority actions identified by the IPC that was considered necessary for a successful provincial-wide program.

The Central Kootenay Invasive Plant Committee (CKIPC) was formed as a non-profit society in 2005 and has taken on the lead role for coordinating a regional invasive plant program. The main goals of CKIPC are to:

- Raise awareness and educate public and private sector land managers, and the general public, about the biology and effects of invasive plants in the Central Kootenay;
- Prevent the introduction and spread of invasive plants through education and awareness, early detection and control, and coordinated integrated pest management;
- Promote coordinated and collaborative management of invasive plants among agencies and land occupiers;
- Advance containment or control high priority invasive plant species;
- Provide a conduit for information and a source of expertise on invasive plants; and
- Develop and maintain a comprehensive inventory of invasive plant species within the area of responsibility.

1.1 What Are Invasive Plants?

Numerous terms have been used to describe plants that are not part of the native flora of a region. *Alien plants*¹ are those species that have established in an environment outside their natural distribution. Common biological synonyms for alien include *non-native*, *exotic*, *adventives*, and *introduced* in contrast with words such as *native*, *indigenous* and *endemic*. Although introduced, most of these species integrate with the native flora and are generally not considered as problems.

Invasive plants, *weeds*, and *noxious weeds* are terms used to describe plant species that are regarded as harmful to the environment or economy (CEQ 1999). Only those species that are capable of adversely affecting ecosystems, plants, animals, human health, or interfering with economic pursuits are considered invasive or noxious weeds. The terms *invasive plant* and *weed* will be used interchangeably in this document. *Noxious weeds* will refer to those species designated noxious under the *Weed Control Act of BC*.

¹ See Appendix 1 for a glossary of technical terms.

1.2 History and Scope of Problem

Many alien plant species have been unintentionally or purposely introduced into British Columbia since European settlement, but interest in their control has only evolved over the last few decades. Spotted and diffuse knapweed² were found in Nanaimo in 1898, and Osoyoos in 1934, respectively. By 1915, numerous species, such as downy brome, Scotch broom, and yellow toadflax, were listed in the *Flora of Southern British Columbia and Vancouver Island* (Henry 1915).

Weed control began in the Central Kootenay area on St. John's-wort in the 1940s (Miller 1995). In 1951 the first biological control releases were made, and by the mid-1960s, St. John's-wort began to decline. Coinciding with this decline, spotted and diffuse knapweed became serious concerns in the region, and chemical control programs were initiated for their management along highways and on Crown land. The first knapweed biological control agents were released in 1974, and by 1995, 11 insects had been introduced into the region attacking the seed heads and roots of both species. Since then, several other biocontrol agents have become available and released on 14 invasive plant species (Miller 1995).

In 1995, a five-year noxious weed plan was prepared for the Nelson Forest Region (Miller 1995), which covered virtually all Crown land in the Central Kootenay. At the time, noxious weeds were estimated to affect more than 35,000 hectares (ha) and threaten up to 2.5 million ha in the Nelson Forest Region, but this area also included the Regional Districts of Kootenay-Boundary (RDKB) and East Kootenay (Miller 1995). In addition to spotted and diffuse knapweed, Dalmatian toadflax, leafy spurge, thistles, common hound's-tongue, and St. John's-wort were considered the most important species for control (Miller 1995). More recently, numerous other public and private agencies have implemented invasive plant management programs within their areas of jurisdiction which often overlap with other agencies.

2.0 GOALS AND OBJECTIVES

The goal of this report is to provide a basis for developing a long-term prevention, containment and control strategy for invasive plants in the Central Kootenay area of British Columbia (BC). Specifically, the report will provide background information for developing a regional strategy for:

- Determining the current status of invasive plants in the region;
- Setting regional priorities on invasive plant species and sites requiring management;
- Developing and coordinating invasive plant management activities by all agencies, companies, and other land managers; and
- Land managers to set specific priorities for species and areas under their jurisdiction requiring management.

² See Appendix 2 for common and scientific names of invasive plant species.

3.0 OVERVIEW OF THE PLAN AREA

3.1 Geographic Area

The subject area covers approximately 2.4 million ha of the Regional District of Central Kootenay (RDCK), and Areas A and B of the Regional District of Kootenay-Boundary. The RDCK extends from the Monashee Mountains on the west to the Purcell Mountains on the east, and from the United States (US) border to north of Duncan Lake (Figure 1). Areas A and B in the RDCK lie immediately east of the RDCK. Hereafter the geographic area will be called the Central Kootenay Invasive Plant Committee area or “CKIPC area.”

3.2 Physical and Ecological Conditions

The CKIPC area is characterized by a diversity of climate, topography, soils, and vegetation. Three mountain ranges (Selkirk, Purcell, and Monashee) dissect the area from north to south, and are interspersed with low-elevation valleys containing large lakes and rivers. Elevations range from approximately 400 m at Trail to mountain peaks exceeding 2800 m.

Virtually all of the area falls within the interior wet belt, which shares some climatic features with the coast, but has colder, snowier winters. Lower elevations are temperate and the average annual precipitation of 600 mm is evenly distributed through the year. At higher elevations annual precipitation can exceed 1000 mm and mostly falls as snow (Braumandl and Curran 1992). Slightly drier climates exist at the eastern and western margins of the CKIPC area, particularly in the Pend d’Oreille valley where annual precipitation averages approximately 500 mm (Braumandl and Curran 1992).

Interior Cedar Hemlock and Engelmann Spruce-Subalpine Fir forests cover most of the area although small pockets of Interior Douglas-fir (IDF) are present at lower elevations in the western part of the region. Alpine Tundra occurs along the heights of land in the main mountain systems. The numerous large lakes provide abundant riparian habitat that surrounds the shorelines of lakes, rivers, streams, and wetlands. Collectively, these ecosystems provide habitat for a wide range of plants and animals including numerous rare and endangered species that may be vulnerable to weed invasion. The variation in climate, soils and vegetation also provides habitat for a unique assemblage of invasive plants ranging from those adapted to temperate coastal climates to others suited to the hot, dry interior.

3.3 Land Use and Management Jurisdictions

The Central Kootenay has a diversified economy that is reflected in the land use patterns in the CKIPC area. Numerous federal, provincial, and private jurisdictions exist and overlap, which challenges a collaborative and cooperative approach to weed control (Appendix 3). The region covers most of the Arrow and Kootenay Lake Timber Supply Areas (TSA), and the forest industry is active throughout most parts of the region.

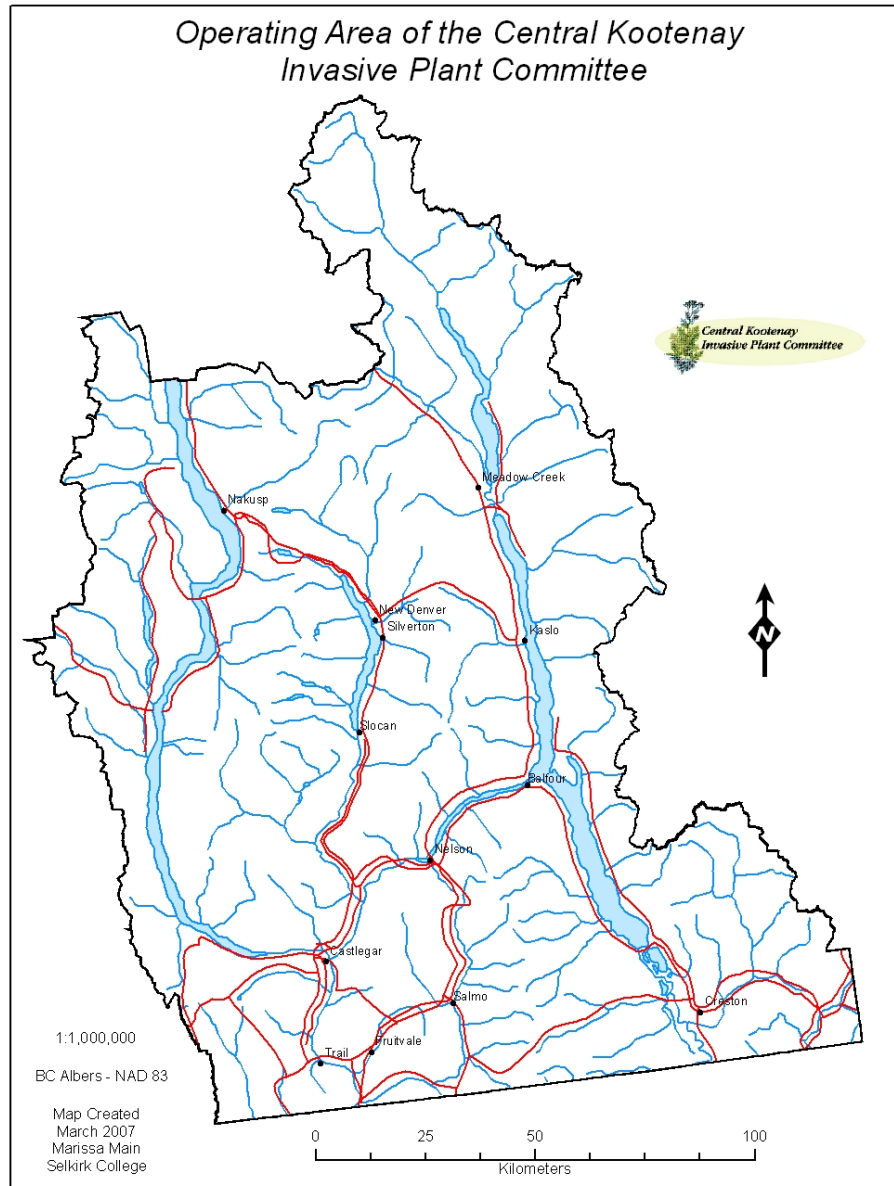


FIGURE 1. Map of the Central Kootenay Invasive Plant Committee area.

Historically, mineral explorations and smelting were common throughout the CKIPC area at Rossland, Nelson, and Trail. Presently, mining is mainly concentrated near Trail, although small mines still operate near New Denver, Silverton and Salmo.

Agriculture is primarily centered in the Creston valley on private land producing hay, grains, berry crops, tree fruits, and dairy and beef cattle. Adjacent Crown land is used for livestock grazing. Other agricultural holdings are scattered throughout the CKIPC area near Nelson, Trail, Castlegar, Slovan valley, and along Arrow Lakes.

Public utility corridors traverse the region including highways and secondary roads, hydro and gas rights-of-way, and railroads. In addition to the main highway systems, a large network of roads has been developed to service the forest and mining industries and utility companies in the region. All these corridors provide primary dispersal routes for invasive plants. Recreational use of gas/hydro rights-of-way and other Crown land is also very common, which further contributes to weed dispersal.

Nearly 9% of the CKIPC area is covered with provincial parks and ecological reserves that serve as protected areas for plants, animals and ecosystems. They also offer recreational opportunities for local and non-resident visitors. High-traffic sites within protected areas can be focal points for the introduction of new invaders from inside and outside the CKIPC area.

Almost 40 municipalities and unincorporated urban centers are distributed throughout the CKIPC area. In addition to residential properties, urban lands contain developed and undeveloped parks, trails, green spaces, maintenance grounds, commercial and industrial grounds, and vacant land. Although these areas cover only about 1% of the land base, they often harbor invasive plants and are centers for weed dispersal.

Seventeen regional parks exist or are proposed for the Regional District of Central Kootenay. These parks are geographically distributed among electoral districts with the aim to provide day-use recreational opportunities for local municipalities and electoral areas. Regional parks are divided into three types including multiple purpose parks, waterfront access parks, and regional trails. The regional district is responsible for park maintenance and may require a maintenance plan for each park. Each of these parks provides different opportunities for invasive plant establishment and challenges for prevention and control.

Lands under federal jurisdiction are rare in the Central Kootenay and represent much less than 1% of the CKIPC area. The Ktunaxa First Nation reserve near Creston (778 ha) and the Castlegar airport (85 ha) are the main federal lands in the region although other airports may fall under federal jurisdiction.

More than 85% of the CKIPC area is Crown land (BC Stats 2001), which is administered by various provincial government agencies such as the Ministry of:

- Agriculture and Lands (including the Integrated Land Management Bureau);
- Energy, Mines, and Petroleum Resources;
- Environment;
- Forests and Range; and
- Transportation.

Although forestry, mining, and range are important activities on these lands, recreational use is often high and contributes to the introduction and spread of invasive plants.

4.0 STATUTORY AUTHORITY AND OTHER PROCESSES

Legislation, policies and mandates provide authority and direction for invasive plant management on Crown and private land in British Columbia. Although CKIPC has no legislated authority, this information is presented for land managers who have legal responsibilities under various provincial and federal Acts.

The *Weed Control Act (WCA)*, *Forest and Range Practices Act (FRPA)*, *Community Charter Act (CCA)*, and *Integrated Pest Management Act* are the principal legislation governing invasive plant management in the province. Numerous other acts, regulations, policies and guidelines provide further authority and direction under specific circumstances (Appendix 6).

Higher level plans also influence the direction and context of invasive plant control. The entire CKIPC area is included under the Kootenay-Boundary Land Use Plan (KBLUP), which directly and indirectly addresses invasive plant management by asserting:

- The introduction of non-indigenous plant species will be severely restricted and efforts will be made to eliminate these species through ecosystem restoration measures;
- Critical habitats of red- and some blue-listed species will be protected, conserved or restored to manage to the desired habitat condition;
- Natural grassland communities will be restored and maintained;
- A comprehensive noxious weed management program will be implemented, and opportunities to expand implementation to include land jurisdictions will be explored;
- The introduction and spread of noxious weeds will be prevented or controlled on Crown land;
- Non-chemical methods will be used to control noxious weeds in rare species habitats;
- The effects of noxious weeds or weed species of concern that result from road development and off-road use will be minimized or reduced; and
- Soil disturbances will be minimized to reduce or eliminate establishment or spread of noxious weeds.

Gaps and Potential Actions:

The *Community Charter Act* is relatively new and contains an invasive plant species list. The role of the *Community Charter Act* requires clarification in regards to its force and influence in controlling invasive plants in the province and at the local level.

- Support a review the *Community Charter Act* through the Invasive Plant Committee for its relevance to regional districts and municipalities in the province.
- Participate in reviews of provincial legislation, regulations and policy that relate to the prevention and control of invasive plants to ensure they meet regional needs and are consistent with Regional District policies and legislation.

5.0 INTEGRATED PEST MANAGEMENT APPROACH

The main objective of invasive plant management is to minimize the adverse effects of invasive species on native plants and animals, natural ecosystems, human health, and economic pursuits. This will be accomplished using an Integrated Pest Management (IPM) approach that combines the optimum mix of prevention, cultural, mechanical, chemical, and biological methods to control the introduction, establishment, dispersal and reduction of invasive plants. This approach does not attempt eradicate all unwanted species under all circumstances. Rather, it aims to prevent “new” invasive plants from establishing in the region while minimizing undesirable effects of established species on other organisms and the environment through containment and control measures.

Integrated Pest Management includes the following components: 1) organization and leadership; 2) awareness and education; 3) risk assessment and prevention; 4) inventory; 5) early detection and rapid response; 6) integrated plant management treatment options; and 7) monitoring and data management. Each of these will be discussed below.

5.1 Organization and Leadership

A successful invasive plant program requires effective leadership and organization to implement and coordinate programs, and to develop partnerships. The Central Kootenay Invasive Plant Committee acts as a liaison between local participants and the Invasive Plant Council of British Columbia to ensure that regional programs are coordinated with other regional districts, government agencies, and provincial priorities. The ability of CKIPC to acquire and maintain consistent long-term funding is essential to sustain the program.

Gaps and Potential Actions:

- Promote and develop a coordinated approach to invasive plant management in the CKIPC area.
- Promote stable, consistent long-term funding to sustain the program.
- Advocate endorsement of the CKIPC Invasive Plant Strategy by provincial government, local governments, First Nations, industry, private landowners, and the general public.
- Identify potential funding sources that may be available for delivery of on-the-ground invasive plant management.
- Promote stable consistent funding for inventory, monitoring, and evaluation.
- Promote the use of the Invasive Alien Plant Program for developing and maintaining a comprehensive regional inventory.
- Support establishing a permanent weed coordinator position to ensure program continuity.

5.2 Awareness and Education

Awareness and education are important factors in the correct identification and early detection of invasive plants. Well-trained land managers and an informed public can be important assets for locating and reporting new infestations, which promotes timely and effective control of invasive plants.

The correct identification of plant species is the first step in effective invasive plant management. Numerous guidebooks, fact sheets, brochures and electronic sources on the internet are available to assist in identifying invasive plants in BC and adjoining US states. See the CKIPC website for more information and links (www.kootenayweeds.com).

The CKIPC initiated an education and awareness program in 2005 focussing on preparing and delivering talks and presentation, producing fact sheets on specific target weeds, developing a display booth and website, and conducting field days and landowner visits (Craig 2005; Craig 2006a).

Education programs and publications directed at recreational users of Crown lands and parklands would also increase early detection and help reduce spread. Specifically, an interpretation program should be developed that outlines the importance of native ecosystems and the impacts that weeds have on them. Tools for extension and education should draw on existing resources or be developed in appropriate partnerships with government and non-government agencies.

Gaps and Potential Actions:

- Continue to develop, expand and update the CKIPC invasive plant website. Specific additions could include the updated regional invasive plant list, weed alert list, best management practices, and a copy of the CKIPC invasive plant management strategy when they become available. Although several links are presently on the CKIPC website, other websites from adjoining US states could also be posted.
- Continue to implement the education and awareness programs initiated in 2005 and continued in 2006.
- Support partnerships and participate in the development and implementation of public awareness and education programs through the Invasive Plant Council.
- Provide information on the identification and management of invasive plants in the region through displays, pamphlets, brochures, videos, and field activity events.
- Visit garden centers annually to assess invasive species offered for sale and to provide information to retailers.
- Deliver education programs and publications focusing on recreational users of the parklands and Crown lands to assist in early detection and to help reduce spread.
- Provide initial weed management training for government and non-government participants, and the general public.
- Develop an invasive plant herbarium as an identification aid, and for training and education purposes.

- Work collaboratively with the Invasive Plant Council, other regional districts, government ministries, and plan participants to develop guidelines to prevent the introduction and spread of invasive plants (e.g. control of gravel, sand, mulch, and road-building materials, seeding guidelines, etc.).
- Create and maintain an expert information repository and retrieval system.

5.3 Risk Assessment and Prevention

All invasive plant species are adapted to a range of biological and physical factors, and without human intervention, each species will eventually disperse to its ecological limits. While a complete knowledge of the ecological range of each species would be desirable to project spread and impact, little is known about the biological adaptations of most species in BC. Currently, the known distribution of invasive species within the region, province, and adjoining American states is the best guide to their potential for invasion and impact locally.

Prevention is the practical procedure that is used to reduce the introduction and spread of invasive plants in new locations. A successful prevention program includes the abilities to: 1) predict which invasive species are likely to enter the province or CKIPC area; 2) identify new invasive plant entries into British Columbia and CKIPC area; 3) implement education, regulation, inspection, and/or quarantine programs to prevent entry of those species; 4) develop a rapid response plan for new invaders; and 5) apply site-specific measures to impede new species from establishing and spreading beyond their point of entry.

Prevention is not limited to the introduction of “new” species into the province. It also includes limiting the establishment of weeds from elsewhere in the province into the CKIPC area, and restricting dispersal of established species to other parts of the area. All invasive species should be considered of equal high priority at this management level and eradication should be the principal objective where practical. Effective rapid response can be accomplished only when an agency (or agencies) has authority to act, and has the resources available for immediate deployment.

Gaps and Potential Actions:

- Identify potential new invaders and high-risk sites in collaboration with the main participants conducting invasive plant programs in CKIPC area.
- Ensure that all inventory and monitoring includes vigilance to detect new invasive species.
- Circulate "invasive plant alerts" with photos, line drawings, and descriptions of new species entering the province and CKIPC area.
- Develop a regional protocol for early intervention on new invaders that provides for prompt action, and is consistent with other protocols in the province.
- Develop a surveillance strategy to regularly monitor invasion pathways into the region, particularly detect immigration of species into Canada along the US border.
- Assess species introduced as garden ornamentals and communicate risks to garden centers, landscape architects, and the general public.

- Assign responsibility for rapid response to a lead agency that has an approved mandate, and the resources, to respond to new invaders in a timely manner.

5.4 Inventory and Planning

Inventory provides the basic information necessary for prioritizing invasive plant treatments. It also provides clear direction for developing prevention practices and designing monitoring strategies. Objectives for weed inventories vary but most surveys aim to document the locations and density of invasive plants on an ecological basis. Other objectives might include determining the area covered by invasive plants and their rate of spread. Although inventory is fundamental to planning, weed infestations are not static, and inventory information can become obsolete quickly as plant populations grow and disperse. Therefore, it is essential that management practices are implemented as quickly as possible.

Before 2005, few formal weed inventories had been conducted in BC. In 1994, the relative densities of diffuse knapweed, spotted knapweed, common hound's-tongue, leafy spurge, and Dalmatian toadflax were mapped at a provincial level that included the Central Kootenay (MOF 1994). Since then, numerous surveys have been conducted between 1995 and 2006 for several species in the CKIPC area (Table 1; Kuromi 2000; Steele 2000; Wood 2000; Craig 2005; Craig 2006b). In these surveys, most invasive plant species appear concentrated along the main highway and secondary road systems and along utility corridors, which all act as primary sources of dispersal.

Review of the Invasive Alien Plant Program (IAPP) Application indicates 29 species have been recorded for the CKIPC area. Spotted knapweed, Dalmatian toadflax, and Scotch broom are the most common and widespread species at low elevations although other species such as hoary alyssum, orange hawkweed, common tansy, and the yellow hawkweed group have been spreading since 1995 (Miller 1995). At higher elevations, oxeye daisy, bull thistle and Canada thistle are often the most abundant species.

Most invasive plants in the CKIPC area occur primarily in the low-elevation subzones of the ICH in the southern part of the region, with the ICH mw1 and ICH mw2 contain 20 and 25 species, respectively. Considerably fewer infestations are found in the ESSF zone (Appendix 7). Areas of high weed density include Nelson to Harrop, Crawford Bay to Creston, Castlegar to Deer Park, the Pend d'Oreille and the corridor from Castlegar to Trail and Salmo.

Although considerable inventory progress has been made, additional information is required for some species before they can be classified into management categories. The main priorities for additional surveys are designated "Inventory Incomplete" in Table 1. Other species such as wild carrot (*Daucus carota*) and Persian cornflower (*Centaurea dealbata*) appear to be recent arrivals in the CKIPC area but no formal surveys have been conducted on these species yet.

Each agency can conduct invasive plant inventories to meet specific objectives within their jurisdiction, although combining resources can be effective in conduction landscape-level inventories over multiple jurisdictions. All inventory records should be entered into the IAPP

application by the agency conducting the inventory. Specifications for data collection and entry can be found in the IAPP Reference Guide (IAPP 2005).

Gaps and Potential Actions:

- All plant species on the CKIPC invasive plant list should be reviewed for new inventory, updated inventory, or no inventory required.
- Develop an inventory plan that considers the short- and long-term legal requirements of:
 - Forest and range tenure holders under FRPA to meet their requirements in stewardship and range use planning processes;
 - Any other Crown land tenures that have invasive plants as conditions of their tenure;
 - Regional District and Ministry of Environment obligations for invasive plant control in parks and protected areas; and
 - Municipal responsibilities for weed control under the *Weed Control Act* and the *Municipal Charter Act*.
- Identify roles and responsibilities of all partners in conducting inventories.
- Consider partnerships to conduct landscape-level inventories over numerous jurisdictions.
- Conduct inventory for all priority species using IAPP standards for entry into the application.
- Compile and enter inventory data or information that individuals or other agencies have into the IAPP application if it is compatible with the system.
- Compile inventory information that is not compatible with IAPP application in tabular format to determine presence and distribution of species not found in formal surveys.
- Participate in developing the structure, content, and outputs from the IAPP application to ensure that it meets CKIPC area needs

TABLE 1. Summary of invasive plant inventories and IAPP records for the Central Kootenay.

Invasive Plant Species	Number of Records in IAPP Database ¹	Year of Records	Comments / Status
Baby's Breath	3	2006	
Black Locust	0	2005, 2006	Inventory incomplete ²
Blueweed	2	2004, 2005, 2006	
Bristly Locust	0		Inventory incomplete
Brown Knapweed	10	2006	
Bull Thistle	10	1997	
Burdock	0		Known in Pend d'Oreille
Canada Thistle	23	1997, 2006	
Common Hound's-tongue	2	2000	
Common Tansy	31	1997, 2003, 2005, 2006	Inventory incomplete
Common Toadflax	0		
Curled Dock	0		
Dalmatian Toadflax	174	1994, 2000, 2005, 2006	
Diffuse Knapweed	23	2004, 2005, 2006	
Dodder	0		
Downy Brome	0		
Eurasian Water-milfoil	0		Inventory incomplete
Field Scabious	8	2000, 2002, 2005	
Fuller's Teasel	0		Known in 3 locations in Pend d'Oreille
Giant Knotweed	2	2003, 2005	
Himalayan Blackberry	0		Inventory incomplete
Hoary Alyssum	80	2005, 2005, 2006	
Hoary Cress	0		
Japanese Knotweed	51	2003, 2005, 2006	
Leafy Spurge	0		Eradicated from one site.
Meadow Knapweed	46	2004, 2005, 2006	
Mouse-ear Hawkweed	1	1995, 2005	
Orange Hawkweed	10	2005, 2005, 2006	Inventory incomplete
Oxeye Daisy	58	2005, 2006	
Plumeless Thistle	0		Known in Pend d'Oreille

Invasive Plant Species	Number of Records in IAPP Database ¹	Year of Records	Comments / Status
Policeman's Helmet	1	2006	Inventory incomplete
Purple Loosestrife	22	late-1990s, 2004, 2005, 2006	Inventory incomplete
Rush Skeletonweed	28	1994, 2000, 2004, 2005	
Russian Knapweed	3	2004	
Scentless Chamomile	6	2004, 2006	
Scotch Broom	335	1997, 2000, 2004, 2005, 2006	
Scotch Thistle	1	2005	
Spotted Knapweed	136	1997, 2000, 2001, 2002, 2003, 2006	
St John's-wort	5	2005	
Sulphur Cinquefoil	42	1997, 2005	
Wormwood	0		Inventory incomplete. Known in region.
Yellow Hawkweeds	43	2000, 2004, 2005	Inventory incomplete
Yellow Iris	3	2006	Known in region.
Yellow Salsify	0		Known in region.

¹ Data from the Invasive Alien Plant Program Application as of November 2006.

² Inventory assessments from Craig 2006b.

5.5 Early Detection and Rapid Response

Weed control is most successful, cost-effective, and the least environmentally damaging, when invasive plants are found before they establish high-density, persistent populations (Clark 2003). Figure 2 illustrates a generalized model of the introduction and population growth of an invasive plant species over time beginning with the introduction of a few individual plants. Unimpeded, the population initially grows slowly until a critical mass of individual plants has established and acclimatized to the new environment. Once the species is locally adapted, the population can expand quickly to its maximum potential under the prevailing habitat conditions. The cost and practicality of control options such as prevention, eradication, control, containment, and biological control vary depending on which part of the curve the invasive plant infestation has reached. Generally, the cost of control escalates rapidly once new species establish and begin to disperse, while the possibility of local eradication diminishes.

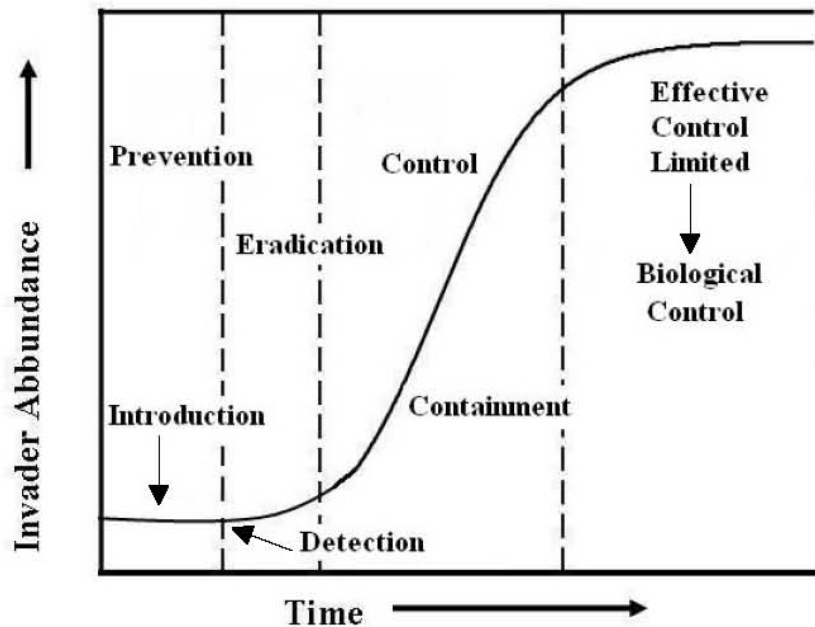


FIGURE 2. Invasion process and relative effectiveness of management options.

Gaps and Potential Actions:

- Continue to advertise and promote the CKIPC invasive plant alert process (hot-line) so that new infestations can be referred to all participants and new species can be eradicated or controlled quickly.
- Participate in developing a protocol through the Invasive Plant Council and /or Inter-Ministry Invasive Plant Committee to communicate regularly with other regional

districts, provincial government ministries, private landowners, non-government agencies, provinces, and adjoining American states to identify new or rapidly dispersing invasive species that may become a threat in British Columbia or the CKIPC area.

- Continue the “landowner visit” program initiated in 2005 where appropriate.
- Consider appointing a weed control officer through the regional district.

5.6 Invasive Plant Categories and Priorities

Classification of invasive plants is essential for developing effective weed management programs. Numerous protocols have been developed to classify invasive plants in an objective and systematic manner (APCC 2002; Morse et al. 2004). These approaches have used various combinations of factors to discriminate among the species such as plant biology, ecological adaptation and climatic suitability of species to geographic areas, the current size of infestations, the number and distribution of existing populations, potential for weed spread, and the relative ability to control species.

No such protocol has been developed and accepted for application in BC or regions of the province. Priorities for invasive plant management in the Central Kootenay have been based on the regional status of the weed species, and the relative ability to prevent, eradicate, contain or control each species (Table 2).

TABLE 2. Management priorities and management approaches for invasive plants.

Category ¹	Description	Management Approach
1	Weed Alert List. New species not present in BC or CKIPC area but likely to establish if introduced.	Prevention ²
2	New species to the CKIPC area with limited distribution and low density on infested sites. Species invading susceptible habitats, sensitive areas, or sites containing red- or blue-listed species.	Eradication
	New infestations of established species in the CKIPC area beyond the original population.	Eradication Containment Control
3	Established infestations along transmission and transportation corridors and areas of concentrated activities such as trails, campgrounds, parking lots, garbage dumps, maintenance yards, and gravel pits.	Containment Control
4	Established low-density or high-density infestations that are widely distributed throughout the CKIPC area.	Control

¹Based on USDA classification criteria (Beard and Carbone 2001).

² See glossary for definitions of prevention, eradication, control, and containment.

Fifty-four invasive species in the CKIPC area have been classified into these four categories (Table 3). All but five species including black locust, bristly locust, curly dock, mouse-ear hawkweed, wormwood, and the yellow hawkweeds, are listed in provincial legislation (Appendix 2). Curled dock, dodder and hops (*Humulus lupulus*), are also recognized as possible pests in agricultural or horticultural settings (Table 3).

Gaps and Potential Actions:

Although many species lists can be developed using different criteria and weighting systems, it is important that the CKIPC establish their own priorities so that all participants in the strategy have a common understanding of their roles and responsibilities. This may already have been accomplished (Table 3) in which case no further refinement is required. Some actions that could be considered include:

- Need to review and agree upon plant categories criteria as they apply to the CKIPC area.
- Need to review and agree upon plant species contained in each category.
- Construct a simple, objective and scientifically based invasive plant species risk assessment. This process should evaluate the relative invasiveness among species, environmental and economic impacts, and potential distribution of invasive plants.

5.7 Current Status and Management Strategy

Appendix 8 provides detailed information the current status and management strategy for each species listed Table 3. Recommendations for management approaches and options are at the plant population level and are based on the criteria described in Table 2.

Reference to monitoring and inventory in the profiles assumes an ongoing monitoring and inventory program even if only on an informal basis. The CKIPC hotline provides a mechanism for reporting new infestations of existing plants in the CKIPC area or new invasive plants that have arrived. These reports should be linked to the IAPP application so they can be retrieved for future analysis and planning (IAAP 2005).

No attempt was made to describe “containment lines” for widespread species, particularly those where inventory information is incomplete. Containment for some species, however, can be inferred when the species occurs on few sites and eradication may be a feasible option. A geographical analysis requires mapping to determine spatial distribution of each species based on existing inventory information. Such an analysis could partition the weed populations into electoral areas as “management zones” to describe containment areas.

Gaps and Potential Actions:

- A geographical analysis for containment will require mapping to determine spatial distribution of each species based on existing inventory information.
- Detailed analysis of habitat suitability and species adaptation could be considered to improve projections regarding the introduction and spread of species.
- Development of a plant treatment strategy by species based on inventory information, and current knowledge, reviewed and updated annually.

TABLE 3. Categories of invasive plant species for the Central Kootenay CKIPC area based on proposed action and treatment.

Category 1	Category 2	Category 3	Category 4
Black Knapweed	Blueweed	Baby's Breath	Bull Thistle
Common Bugloss	Fuller's Teasel	Black Locust	Burdock
Gorse	Giant Knotweed	Bristly Locust	Canada Thistle
Leafy Spurge	Hoary Cress	Brown Knapweed	Common Hound's-tongue
Marsh Thistle	Japanese Knotweed	Common Tansy*	Common Toadflax
Nodding Thistle	Mouse-ear Hawkweed	Diffuse Knapweed	Dalmatian Toadflax
Perennial Pepperweed	Scotch Thistle	Hairy cat's ear	Downy Brome
Puncturevine	Yellow Iris	Field Scabious	Oxeye Daisy
Russian Knapweed	Eurasian Water-milfoil*	Himalayan Blackberry	Spotted Knapweed
Tansy Ragwort		Hoary Alyssum	St. John's-wort
Yellow Starthistle		Meadow Knapweed	Sulphur Cinquefoil
		Orange Hawkweed*	
		Plumeless Thistle	
		Policemen's Helmet	Agricultural/Horticultural
		Purple Loosestrife	Curled Dock
		Rush Skeletonweed	Dodder
		Scentless Chamomile	Hops
		Scotch Broom	Perennial Sow Thistle
		Wormwood	
		Yellow Hawkweeds*	

* Insufficient inventory information available to accurately categorize species.

Note: Additional information regarding containment and control strategies are found in Appendix 8).

Legend
Category 1. New species not present in BC or in the Central Kootenay area but likely to establish if introduced. Early detection and rapid response is the main management focus.
Category 2. New species to the CKIPC area with limited distribution and low density on infested sites. Species invading susceptible habitats, sensitive areas, or sites containing red- or blue-listed species. New infestations of established species in the area beyond the original population. Eradication is the main management focus.
Category 3. Established infestations along transportation corridors and areas of concentrated activities such as trails, campgrounds, parking lots, garbage dumps, maintenance yards, and gravel pits. These species are well established in some parts of the Central Kootenay but not present throughout most of the region. Control and containment are the main management focuses.
Category 4. Established low-density or high-density infestations that are widely distributed throughout the Central Kootenay area. Containment and control are the main management focuses.
Species of Agricultural and Horticultural Concern. Invasive species that may interfere with agricultural production or become garden pests. Containment and control are the main management focuses.

5.8 Treatment Options for Establish Species

Once the scope of the invasive plant problem has been revealed through inventory, possible treatment options can be evaluated to determine appropriate management actions. The specific treatments chosen should consider factors such as the location and physical characteristics of the site, the relative availability of treatment options, the susceptibility of the target species to the treatment method, and the relative risks and benefits of the options. Important site factors include soil texture, slope, plant community composition, previous level of disturbance, nearness to water, species at risk, and potential effects on management objectives for the area.

5.8.1 Cultural and Mechanical Control

Cultural and mechanical control measures are usually used on areas that are unsuitable for herbicide applications, or where biological control is not possible. Both methods endeavor to prevent plants from germinating and producing seed and ultimately physically displacing invasive plants from a site.

Cultural methods, such as hand-pulling, hoeing, cutting, burning, mulching, seeding, fertilization, and girdling, are most effective for eradicating small patches of scattered plants or removing residual plants after other control methods have been used. These methods are most effective where weeds are beginning to occupy a new site, or to protect plant communities from reinvasion.

Mechanical methods, including mowing, cultivation and weed-whacking, often use chain saws, bulldozers, seeders, and disk-ploughs. These techniques can cause significant soil disturbance and adverse effects on native vegetation.

Cultural and mechanical methods should be conducted before plants produce and shed seeds. Follow-up treatments may be required to ensure control, especially for perennial plants with creeping roots, and for species whose seeds remain viable in the soil seed bank for long periods of time. All treatments should be recorded on the *Mechanical Treatment and Monitoring Data Form* that is available on the Invasive Alien Plant Program website (IAPP 2005).

5.8.2 Chemical Control

Chemical control is used to eliminate small, isolated patches of invasive plants or contain larger infestations that are adjacent to highly susceptible habitat. Herbicide applications are restricted by such factors as the distance infestations occur relative to water, soil texture, wind speed, air temperature, and relative humidity. Other ecological considerations that may restrict herbicide use include the presence of species at risk, proximity to sensitive or critical habitats, and potential impacts on non-target species. In addition, there are 88 community watersheds in the CKIPC area (Appendix 9). All treatments must conform to Ministry of Environment legislation and applicable local bylaws to ensure community watersheds are protected.

5.8.3 Biological Control

Biological control is the use of insects and pathogens to control invasive plants. This method is often regarded the most environmentally acceptable alternative for managing invasive plants at the landscape level. Biological control agents rarely eradicate invasive plant populations, but

they are expected to reduce weed populations to ecologically and economically acceptable levels. This method should not be considered where total eradication of the target species is the goal.

Biological control is primarily used on weed infestations where the population is too large to control cost-effectively with chemical, cultural or mechanical methods. Nearly 80 biological control agents have been introduced into British Columbia to control a variety of invasive plant species. Currently, 29 agents are available, or limitedly available, for operational release on 18 of the invasive plant species of concern in the Central Kootenay CKIPC area. See the CKIPC website for detailed information (www.kootenayweeds.com).

5.9 Monitoring and Evaluation

Monitoring is the process of collecting physical and biological information to evaluate progress in accomplishing invasive plant management objectives. Monitoring can be conducted to assess the current situation, or to evaluate changes over time. Generally, the presence or absence of the target weed species following treatment is the most important information needed to decide whether a management practice has succeeded. More detailed information regarding monitoring for target and non-target species can be obtained from the IAAP application (IAAP 2005).

Visual estimates usually provide adequate information for making operational management decisions. More detailed procedures involving transects, replicated plots, mapping and photography may be necessary where more rigorous information is required to evaluate effects on non-target species, plant community responses to treatments, or environmental impacts of the treatments. All monitoring approaches, however, can provide valuable information for management if they are conducted in an unbiased, systematic manner. The specific approach chosen depends on the amount of time, money, and human resources available; and the relative need for highly accurate information.

Gaps and Potential Actions:

- Develop a monitoring plan for priority invasive species using IAPP procedures.
- Monitor and evaluate invasive plant treatments for effectiveness.
- Update invasive plant distribution and density maps and databases as an ongoing program activity.

6.0 COORDINATION AND PARTNERSHIPS

The distribution of invasive plants in Central Kootenay extends beyond jurisdictional boundaries. Therefore, cooperation and coordination among government agencies, industry, and private landowners is essential because it allows treatment across boundaries in an ecologically effective manner.

The CKIPC will take the lead role in promoting coordinated management of invasive plants among agencies and land occupiers in the Central Kootenay. The committee will provide education and training aimed at creating public and government awareness of weed issues, and coordinate and participate in invasive plant inventories within the CKIPC area. They will also

liaise with local participants and the IPC to ensure that regional programs are harmonized with other regional districts and provincial priorities.

Currently, numerous pest management plans are active within the CKIPC area and other plans are in preparation. In addition, Range Use Plans and Forest Stewardship Plans are required to address invasive plants through the *Forest and Range Practices Act*. All of these plans provide the foundation of on-the-ground delivery of invasive plant treatments in the Central Kootenay. Each agency is responsible for prevention, containment or control within their jurisdiction and in accordance with their mandates and legal obligations.

- **Central Kootenay Invasive Plant Committee** will assume the lead role in coordinating an invasive plant program in the region. Their main activities will include raising awareness and providing educational services to private and corporate land managers, and the general public. They will conduct inventories of invasive plants, and promote coordinated and collaborative management of invasive plants on public and private land.
- **Ministry of Agriculture and Lands and the Integrated Land Management Bureau** will provide technical advice and financial support for regional weed program as directed under their mandate, and be responsible for invasive plant management on Crown land under their jurisdiction in accordance the *Weed Control Act of BC*.
- **The Ministry of Environment, BC Parks** will be responsible for inventory, monitoring and invasive plant management in provincial protect areas in accordance with provincial statutes and Ministry policy (Appendix 6; MOE 1997; MOE 1999).
- **The Ministry of Forests and Range** will treat invasive plants on Crown range and forestland, service roads, with emphasis on invading new species, in accordance with the treatment strategies outlined in the *Pest Management Plan for the Southern Interior Forest Region Invasive Alien Plants* (MOF 2005). The Ministry program will also conduct inventory and monitoring within their jurisdiction, and assist the CKIPC in establishing biological control agents in mutually agreeable areas.
- **The Ministry of Transportation** will continue to treat highways and secondary roads, gravel pits, and other areas under their jurisdiction using the methods and standards outlined in *Pest Management Plan for the West Kootenay and Rocky Mountain Districts of the Southern Interior* (MOT 2003).
- **Regional District and Municipalities** will be encouraged to participate in managing invasive plants in Regional District Parks, gravel pits, maintenance areas, and rights-of-ways, and municipal-owned properties within the Regional District of Central Kootenay as interpreted through the *Community Charter Act* (Appendix 6). The Regional District of Kootenay-Boundary has funded invasive plant control in Electoral Area ‘A’ and will be encouraged to continue this funding in the future.
- **BC Transmission Corporation (BCTC)** has transmission lines and support facilities throughout most of British Columbia except in the Kootenay and Boundary regions between Creston and Rock Creek. The corporation operates under an Integrated *Pest Management Plan for Control of Vegetation Within Transmission Rights-of-way* (BCTC 2005). The plan describes methods for vegetation management along transmission corridors including control of invasive plants.

- **BC Hydro** operates under the *Pest Management Plan for Management of Vegetation at BC Hydro Facilities* (BC Hydro 2006). This plan describes the methods and standards they employ for inventory, monitoring, and treatment of invasive plants on all lands and facilities associated with their operations. BCTC also financially supports local cattlemen's association weed control programs where power lines cross private ranch land.
- **Canadian Pacific Rail** will treat invasive plants on all track ballasts, CPR rights-of-way, station grounds, railway yards, maintenance areas, and all other areas under their jurisdiction using the methods and standards outlined in *Integrated Vegetation Management Plan* (CPR 2005).
- **Columbia Power Corporation** will inventory and manage invasive plants on their private lands and rights-of-way in accordance with the *Weed Control Act of BC* and in coordination and collaboration with existing PMPs that cover their areas of operation.
- **Fish and Wildlife Compensation Program - Columbia Basin** manages invasive plants on approximately 1500 ha of land in the Pend d'Oreille valley. Invasive plant priorities, inventory and monitoring procedures, and treatment options are described in the *Pend d'Oreille Valley Noxious Weed Pest Management Plan 2004-2009* (CGFWC 2004).
- **FortisBC Inc.** has transmission lines and support facilities throughout most of the Central Kootenay CKIPC area. The corporation is working under the *Rights-of-way Vegetation Management Plan* (FortisBC 2005), which describes the methods and standards they employ for inventory, monitoring, and treatment of noxious on all lands and facilities associated with their operations.
- **Teck-Cominco Metals Ltd.** will inventory and manage invasive plants on their private lands in accordance with the *Weed Control Act of BC* and their corporate policy for land restoration.
- **Terasen Gas** will inventory, map, apply invasive plant control treatments, and monitor sites in their jurisdiction as specified in the *Southern Crossing Pipeline Noxious Weeds and Weeds of Management Concern Prevention and Control Plan* (Terasen Gas 2005).
- **Forest Companies, Community Forests and Woodlots Licensees** will implement measures to prevent the introduction and spread of invasive plants on Crown land according to approved Forest Stewardship Plans under the *Forest and Range Practices Act*. A draft invasive plant management strategy is being developed for Tree Farm License (TFL) 23 which will describe priority plants, inventory and mapping procedures, and appropriate treatment options for the TFL.
- **Livestock Tenure Holders.** Invasive plant control measures will be implemented according to approved Range Stewardship or Range Use Plans under the *Forest and Range Practices Act*.

Gaps and Potential Actions:

- It is likely that other participants have not been identified in this document. Other individuals, agencies, or government organizations should be encouraged to participate in the plan as the program develops and as their involvement is required.

- Support and cooperate with the Invasive Plant Council in developing a provincial invasive plant management program.
- Encourage partnerships with provincial ministries, local governments, non-government agencies, landowners, conservation groups, and First Nations to assist in accomplishing mutual goals and objectives.
- Local partners should support and participate in the CKIPC to develop and follow the invasive plant strategy and related work plans.

7.0 PROGRAM EVALUATION

One of the main objectives of an invasive plant management plan in the Central Kootenay is to establish and build on co-ordination of weed management activities in the CKIPC area. Annual meetings should be held to ensure that all participants are up to date on the direction and focus of invasive plant management in the CKIPC area, and to ensure that individual plans are consistent with the overall objectives for the area.

Gaps and Potential Actions:

- Provide advice as requested into the structure, content, and potential outputs from the provincial invasive plant application to ensure that it serves Central Kootenay needs.
- Monitor and evaluate invasive plant treatments and restoration projects for effectiveness and improvements.
- Update invasive plant distribution and density maps and databases as an ongoing program activity.
- Review plans annually to monitor program success and inter-agency success.

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Appendix 1. Glossary

Active ingredient (a.i.). The effective part of a pesticide formulation that actually destroys the target pest or performs the desired functions, or the actual amount of a technical material present in the formulation.

Alien (plant). Plant species that have established in an environment outside their natural distribution. Common synonyms include *non-native*, *exotic*, *adventives*, *introduced*, *naturalized*, and *non-indigenous* in contrast with terms such as *native*, *indigenous* and *endemic*.

Annual (plant). A plant species that lives for only one year or growing season.

Biogeoclimatic zone. A geographic area having similar patterns of energy flow, vegetation, and soil as a result of a broad, regional climate.

Biological control. The use of living organisms, such as predators, parasitoids, and pathogens, to control invasive plants.

Chemical control. The application of synthetic or naturally-derived herbicides to control or eradicate plant species using approved herbicides, rates and conditions specified in a confirmed Pest Management Plan.

Climate. The average weather conditions of a place over many years.

Community. Any group of organisms interacting among themselves.

Containment. An invasive plant practice that aims to geographically isolate infestations and prevent them from increasing beyond the edge of their current infestations.

Control. An invasive plant practice that aims to prevent seed production and recruitment of new plants within the target patch, and eventually reduce the area and density of the target plant over time. Control measures acknowledge that a low level of the invasive plant will likely persist after treatment.

Crown land. Land that is owned by the government of Canada or British Columbia.

Cultural control. A weed management practice that manipulates plant populations by cultivation, pulling, digging, cutting, removing seed heads or other techniques that are applied by hand.

Dispersal. The scattering of seeds or spores of a plant to a new habitat.

Ecosystem. Organisms together with their physical environment, forming an interacting system, inhabiting an identifiable space.

Environment. The sum of all external conditions that affect an organism or community and influence its development or existence.

Eradication. Elimination of every individual plant of an invasive plant population, including all viable seeds, and vegetative propagules.

- Habitat.** The natural abode of a plant or animal, including all biotic, climatic, and edaphic factors affecting life.
- Herbicide.** A chemical that is designed to kill or regulate the growth of specific plant species or groups of species.
- Integrated pest management.** An approach to invasive plant management that uses more than one control option including prevention, cultural, mechanical, chemical, and biological controls in an integrated program.
- Invasive plant.** A plant that is non-native to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.
- Landscape.** The fundamental characteristics of a specific geographic area, including its biological composition and physical environment.
- Mechanical control.** Control of invasive plants by physical and mechanical means such as mowing, cultivation, chain sawing, and weed-whacking.
- Native plant.** Plant species that are part of the original flora of an area.
- Non-native.** A species that is not native to the region in which it is found.
- Non-target.** Any plant that a management practice is not aimed at, but may accidentally be injured by the application.
- Noxious weed.** Any plant species so designated by the *Weed Control Act of British Columbia*.
- Perennial.** A plant species that lives for more than two years.
- Pesticide.** Any substance used to control, prevent, destroy, repel, or mitigate insects, rodents, fungi, invasive plants, or other organisms that are considered to be pests.
- Plant community.** An association of plant species growing together in different areas with similar site characteristics.
- Prevention.** All activities that interrupt the dispersal of new invasive plant species into a geographic area or specific location where they were not previously found.
- Propagule.** A plant part, such as a bud, tuber, root, or shoot that can be detached and is able to grow in a new environment.
- Risk.** In species risk assessment, the probability that an adverse effect (injury, disease, or death) will occur under exposure to a specific agent.
- Species at risk.** An extirpated, endangered, threatened species, or a species of special concern.
- Target species.** Invasive plant(s) that are the subject of eradication, control or containment.
- Weed.** 1) A plant growing where it is not wanted, 2) A plant that interferes with management objectives for a given area of land at a given point in time.

Appendix 2. Common and Scientific Names Of Invasive Plant Species Listed In BC Legislation

Invasive Plant Species Common Name ¹	Scientific Name	WCA ²	FRPA ³	CCA ⁴
Annual Sow-thistle	<i>Sonchus oleraceus</i>	P ⁵		•
Baby's Breath	<i>Gypsophila paniculata</i>		•	•
Black Knapweed	<i>Centaurea nigra</i>		•	
Blueweed	<i>Echium vulgare</i>	[R] ⁶	•	
Brown Knapweed	<i>Centaurea jacea</i>		•	
Bull Thistle	<i>Cirsium vulgare</i>		•	•
Burdock	<i>Arctium spp.</i>	R	•	
Canada Thistle	<i>Cirsium arvense</i>	P	•	•
Carpet Burweed	<i>Soliva sessilis</i>			•
Cleavers	<i>Galium aparine</i>	R		
Common Barnyard-grass	<i>Echinochloa crusgalli</i>			•
Common Bugloss	<i>Anchusa officinalis</i>	[R]	•	
Common Crupina	<i>Crupina vulgaris</i>	P		•
Common Hound's-tongue	<i>Cynoglossum officinale</i>	P	•	•
Common Reed	<i>Phragmites australis</i>			•
Common Tansy	<i>Tanacetum vulgare</i>	[R]	•	
Common Toadflax	<i>Linaria vulgaris</i>	P	•	•
Curly Pondweed	<i>Potamogeton crispus</i>			•
Dalmatian Toadflax	<i>Linaria genistifolia</i> ssp. <i>dalmatica</i> (<i>dalmatica</i>) [<i>Linaria dalmatica</i>]	P	•	•
Diffuse Knapweed	<i>Centaurea diffusa</i>	P	•	•
Dodder	<i>Cuscuta spp.</i>	P		•
Downy Brome	<i>Bromus tectorum</i>			•
English Ivy	<i>Hedera helix</i>			•
Eurasian Water-milfoil	<i>Myriophyllum spicatum</i>			•
Field Scabious	<i>Knautia arvensis</i>	[R]	•	
Flowering-rush	<i>Butomus umbellatus</i>			•
Fuller's Teasel	<i>Dipsacus fullonum</i>		•	
Garlic Mustard	<i>Alliaria petiolata</i>			•
Giant Hogweed	<i>Heracleum mantegazzianum</i>			•
Giant Knotweed	<i>Polygonum sachalinense</i>		•	•
Gorse	<i>Ulex europaeus</i>	P	•	•
Green Foxtail	<i>Setaria viridis</i>	R		

Invasive Plant Species Common Name ¹	Scientific Name	WCA ²	FRPA ³	CCA ⁴
Himalayan Blackberry	<i>Rubus discolor</i>			•
Hoary Alyssum	<i>Berteroa incana</i>	[R]	•	
Hoary Cress	<i>Cardaria draba</i>	R	•	
Hydrilla	<i>Hydrilla verticillata</i>			•
Japanese Knotweed	<i>Polygonum cuspidatum</i>		•	•
Jointed Oatgrass	<i>Aegilops cylindrica</i>	P		•
Kochia	<i>Kochia scoparia</i>	R		
Kudzu	<i>Pueraria montana</i> var. <i>lobata</i>			•
Leafy Spurge	<i>Euphorbia esula</i>	P	•	•
Marsh Thistle	<i>Cirsium palustre</i>	R	•	
Meadow Hawkweed	<i>Hieracium pilosella</i>		•	
Meadow Knapweed	<i>Centaurea pratensis</i>	R	•	
Night-Flowing Catchfly	<i>Silene noctiflora</i>	R		
Nodding Thistle	<i>Carduus nutans</i>		•	
Orange Hawkweed	<i>Hieracium aurantiacum</i>	[R]	•	
Orchardgrass	<i>Dactylis glomerata</i>			•
Oxeye Daisy	<i>Leucanthemum vulgare</i> [<i>Chrysanthemum leucanthemum</i>]	R	•	
Perennial Pepperweed	<i>Lepidium latifolium</i>	R	•	
Perennial Sow-thistle	<i>Sonchus arvensis</i>	P		•
Plumeless Thistle	<i>Carduus acanthoides</i>	[R]	•	
Poison-hemlock	<i>Conium maculatum</i>			•
Policeman's Helmet	<i>Impatiens glandulifera</i>			•
Puncturevine	<i>Tribulus terrestris</i>	R	•	
Purple Loosestrife	<i>Lythrum salicaria</i>		•	•
Purple Nutsedge	<i>Cyperus rotundus</i>	P		•
Quackgrass	<i>Agropyron repens</i>	R		
Reed Canary Grass	<i>Phalaris arundinacea</i>			•
Rush Skeletonweed	<i>Chondrilla juncea</i>	P	•	•
Russian Knapweed	<i>Acroptilon repens</i>	R	•	
Russian Thistle	<i>Salsola kali</i>	R		
Salt Cedar	<i>Tamarix ramosissima</i> , <i>T. parviflora</i>			•
Scentless Chamomile	<i>Matricaria perforata</i> [<i>Matricaria maritima</i>]	P	•	•
Scotch Broom	<i>Cytisus scoparius</i>		•	•
Scotch Thistle	<i>Onopordum acanthium</i>	R	•	
Smooth Brome	<i>Bromus inermis</i>			•

Invasive Plant Species Common Name ¹	Scientific Name	WCA ²	FRPA ³	CCA ⁴
Spotted Knapweed	<i>Centaurea biebersteinii</i> [<i>Centaurea maculosa</i>]	P	●	●
Spurge-laurel	<i>Daphne laureola</i>			●
St. John's-wort	<i>Hypericum perforatum</i>		●	●
Sulphur Cinquefoil	<i>Potentilla recta</i>	R	●	
Tansy Ragwort	<i>Senecio jacobaea</i>	P	●	●
Tartary Buckwheat	<i>Fagopyrum tataricum</i>	R		
Velvetleaf	<i>Abutilon theophrasti</i>	P		●
White Cockle	<i>Lychnis alba</i>	R		
Wild Chervil	<i>Anthriscus sylvestris</i>	R		
Wild Mustard	<i>Sinapsis arvensis</i>	R		
Wild Oats	<i>Avena fatua</i>	P		●
Yellow Iris	<i>Iris pseudacorus</i>		●	●
Yellow Nutsedge	<i>Cyperus esculentus</i>	P		●
Yellow Salsify	<i>Tragopogon dubius</i>			●
Yellow Starthistle	<i>Centaurea solstitialis</i>	P	●	●
Total Legislated Species (n = 82)		48	42	50

¹ All common and scientific names follow Douglas et al. (2002) except scientific names in square brackets, which are the original scientific names listed in various legislation.

² *Weed Control Act.*

³ *Forest and Range Practices Act.*

⁴ *Community Charter Act.*

⁵ P = Provincial noxious under the *Weed Control Act.*

⁶ R = Regional noxious in British Columbia under the *Weed Control Act.* Species in square brackets (eg. [R]) are regional noxious for the Regional Districts of Central Kootenay and Kootenay-Boundary.

Appendix 3. Land Jurisdictions and Selected Potential Participants

Federal Jurisdiction

Castlegar Airport (possibly other local airports)
Ktunaxa First Nation (Lower Kootenay First Nation)

Provincial Jurisdiction

Ministry of Agriculture and Lands
Ministry of Environment
Ministry of Forests and Range
Ministry of Transportation
Municipalities (Incorporated and Unincorporated)
Regional District of Central Kootenay
Regional District of Kootenay-Boundary

Corporate Jurisdiction

ATCO Lumber Co.
BC Transmission Corp.
BC Timber Sales
Burlington Northern Santa Fe Railroad
Canadian Pacific Rail
Fish and Wildlife Compensation Program – Columbia Basin
Creston Community Forest
Creston Valley Beef Growers
FortisBC
Harrop-Procter Watershed Protection Society
Kalesnikoff Lumber Company
Kaslo and District Community Forest
Pope and Talbot Ltd.
Slocan Valley Watershed Alliance
Teck-Cominco Metals Ltd.
Terasen Gas
West Kootenay Woodlot Association (60 members)

Private Land

Farms and ranches
Rural acreages
Industry-owned land
Resorts
Private residential property
Recreational properties
Campgrounds

Other Stakeholders and Interest Groups

BC Wildlife Federation
College of the Rockies
Contractors/Consultants
Creston Valley Agriculture Society
Earth Matters
Friends of West Kootenay Parks
Integrated Vegetation Management Association of BC
Kootenay Citizen's Against Pesticides
Kootenay Organic Grower's Society
The Land Conservancy
West Kootenay Eco Society
West Kootenay Naturalists
Selkirk College
Rocky Mountain Elk Foundation

Appendix 4. Protected Areas in Central Kootenay Regional District

Protected Area ¹	Area (ha)
Arrow Lakes Park - A Multi Site	93
Beaver Creek	81
Champion Lakes Park	1,426
Cody Caves	63
Drewry Point Park	24
Erie Creek Park	14
Goat Range Park	78,947
Grohman Narrows Park	10
Inonoaklin Park	12
Kianuko Park	11,638
King George VI Park	162
Kokanee Creek Park	260
Kokanee Glacier Park	32,035
Kootenay Lake Park - A Multi Site	343
Kootenay Lake (Midge Creek) Provincial Park	223
Lew Creek Ecological Reserve	815
Lockhart Beach Park	3
Lockhart Creek Park	3,743
McDonald Creek Park	468
Nancy Greene Park	203
Pilot Bay Park	347
Purcell Wilderness Conservancy (East) Park ²	202,709
Rosebery Park	32
Ryan Park	59
Stagleap Park	1133
Summit Lake Park	6
Syringa Park	4417
Valhalla Park	49,893
West Arm Park	25,319
Yahk Park	9
Total Area	414,487

¹ Data for park areas www.env.gov.bc.ca/bcparks/

² Park spans Central Kootenay and East Kootenay Regional Districts.

Appendix 5. Population and Area of Selected Municipalities in the Central Kootenay Plan Area

Municipality/ Unincorporated Urban Area	Population ¹	Area (ha)
Regional District Central Kootenay		
Ainsworth	50	62
Balfour	445	400
Blueberry	568	92
Bonnington	412	257
Brilliant	146	93
Burton	167	280
Castlegar	7,000	2,034
Crawford Bay	328	1,396
Creston	5,040	926
Edgewood	160	277
Fauquier	159	480
Glade	259	312
Harrop-Proctor	619	2,084
Kaslo	1,025	312
Kitchener	254	709
Nakusp	1,700	1,059
Nelson	9,300	915
New Denver	540	138
Ootischenia	850	979
Riondel	306	89
Robson-Raspberry	1,599	765
Salmo	1,120	224
Shoreacres	288	170
Silverton	220	63
Six Mile	1,120	340
Slocan	335	92
Taghum	205	160
Winlaw	273	449
Wynndel	591	587
Yahk	168	573
Ymir	227	119
Indian Reserve	122	778
Sub-Total	35,596	17,214
Regional District Kootenay-Boundary - Areas A & B		
Beaver Falls	298	136

Municipality/ Unincorporated Urban Area	Population ¹	Area (ha)
Genelle	823	293
Fruitvale	2,115	269
Montrose	1,065	132
Rossland	3,800	5,753
Trail	7,575	3,623
Warfield	1,800	207
Sub-Total	16,355	9,984
Total	51,951	27,198

¹ Population and area data from BC Stats 2001.

Appendix 6. Legislation and Statutory Authority Relating to Invasive Plant Species

Federal Legislation

Fisheries Act. Outlines criteria to protect fish and fish habitat from pesticides.

Migratory Birds Convention Act. Explains obligations to protect migratory birds from pesticides.

Pest Control Products Act. Regulates products used for the control of pests in order to protect human health and safety, and the environment.

Pesticide Control Products Act. Describes the criteria for registration of pesticides, and the safe conditions for their use.

Plant Protection Act. Describes the requirements for the introduction of biological control agents into Canada.

Seeds Act. Provides guidelines respecting the testing, inspection, quality, sale and transportation of seed in Canada. Includes Regulations that identify the species of plants classified as noxious weed seeds for the purpose of establishing seed grades.

Species at Risk Act. Protects species at risk and their habitat in Canada.

Waste Management Act. Describes methods for the safe disposal of pesticide wastes.

Provincial Legislation and Policy

Ecological Reserve Act. Provides guidelines for protecting native vegetation in Ecological Reserves.

Forest and Range Practices Act. Describes responsibility for the introduction and spread of invasive plants resulting from a forest or range practice. Lists target species under the Invasive Plant Regulation.

Integrated Pest Management Act. Regulates the use of pesticides (including herbicides) for invasive plant control. Requires a confirmed Pest Management Plan before they can be applied to areas exceeding 50 hectares.

Park Act. Describes the management of native plants and their habitat, and the protection of natural features.

Plant Protection Act. Regulates the spread of insects, plant pests or diseases that adversely affect plants in British Columbia.

Pipeline Act. Designates responsibility to control noxious weeds along pipeline rights-of-way.

Ministry of Environment, BC Parks Conservation Program (Vegetation Management Policy). Describes conditions under which the ministry will consider control measures against invasive plant species within provincial protected lands.

Weed Control Act. Applies to all provincial Crown and private land in BC. Outlines the obligations to control designated noxious weeds by the land occupier.

Municipal Legislation

Community Charter Act. Provides municipalities with the authority to control or eradicate alien invasive species within their jurisdiction. Lists target species under the Regulation of the Act.

Appendix 7. Distribution and Number of Invasive Plant Species in Central Kootenay Area Found in the Invasive Alien Plant Application by Biogeoclimatic Unit

Invasive Plant Category	IDFun	ICHdm	ICHdw1	ICHmk1	ICHmw2	ICHmw3	ICHmw4	ICHvk1	ICHwk1	ICHxw	ESSFdm1	ESSFwc1	ESSFwc4	ESSFwc5	ESSFwc6	ESSFwm	ATun
Category 1																	
Black Knapweed																	
Common Bugloss																	
Gorse																	
Leafy Spurge																	
Marsh Thistle																	
Nodding Thistle																	
Perennial Peppergrass																	
Puncturevine																	
Russian Knapweed																	
Tansy Ragwort																	
Yellow Starthistle																	
Category 2																	
Blueweed			•		•					•							
Fuller’s Teasel			•							•							
Giant Knotweed			•		•					•							
Hoary Cress			•							•							
Japanese Knotweed			•		•					•							
Mouse-ear Hawkweed			•														

Invasive Plant Category	IDFun	ICHdm	ICHdw1	ICHmk1	ICHmw2	ICHmw3	ICHmw4	ICHvk1	ICHwk1	ICHxw	ESSFdm1	ESSFwc1	ESSFwc4	ESSFwc5	ESSFwc6	ESSFwm	ATun
Scotch Thistle	•		•							•							
Yellow Iris	•		•		•					•							
Category 3																	
Baby's Breath			•							•							
Black Locust	•		•							•							
Bristly Locust			•														
Brown Knapweed			•		•												
Common Tansy	•		•	•	•			•	•	•							
Diffuse Knapweed		•	•	•	•					•		•					
Eurasian Water-milfoil					•												
Field Scabious			•														
Himalayan Blackberry	•		•		•												
Hoary Alyssum	•		•		•			•		•							
Meadow Knapweed			•		•			•	•	•							
Orange Hawkweed			•	•	•	•				•							
Plumeless Thistle										•							
Policeman's Helmet			•														
Purple Loosestrife			•							•							
Rush Skeletonweed			•							•							
Scentless Chamomile			•				•										
Scotch Broom	•		•		•					•							
Wormwood			•							•							
Yellow Hawkweeds	•		•	•	•			•		•		•					

Invasive Plant Category	IDFun	ICHdm	ICHdw1	ICHmk1	ICHmw2	ICHmw3	ICHmw4	ICHvk1	ICHwk1	ICHxw	ESSFdm1	ESSFwc1	ESSFwc4	ESSFwc5	ESSFwc6	ESSFwm	ATun
Category 4																	
Bull Thistle	•		•		•	•				•							
Burdock	•		•		•					•							
Canada Thistle	•		•		•					•		•					
Common Hound's-tongue			•	•						•		•					
Common Toadflax			•		•												
Dalmatian Toadflax	•	•	•	•	•					•							
Downy Brome	•		•							•							
Oxeye Daisy	•		•	•	•	•		•	•	•							
Spotted Knapweed	•		•	•	•			•	•	•		•					
St John's-wort	•		•	•	•					•							
Sulphur Cinquefoil	•		•	•	•					•		•					
Yellow Salsify			•		•					•							
Agricultural or Horticultural																	
Curled Dock			•		•					•							
Dodder			•														
Total Species by BEC Unit ¹	17	1	40	10	25	3	1	6	4	32	0	5	0	0	0	0	0

¹Totals represent the total number of species reported in the IAPP application and from personal observations. BEC units with zero invasive plant means none have been reported or are known in that unit.

Appendix 8. Profiles for Classified Species

Category 1 – Weed Alert List

New species not present in BC or in the Central Kootenay area but likely to establish if introduced.

Early detection and rapid response is the main management focus.

Black Knapweed (*Centaurea nigra*)

Family: Asteraceae (Sunflower).

Other Common Names: Lesser knapweed.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seed.

Legal Status Central Kootenay: FRPA.

Habitat: Appears best adapted to moist soils; tolerates a wide range of environmental conditions from low- to mid-elevations. Disturbed sites, roadsides, fields, riverbanks, irrigation ditches, pastures, clear cuts, and croplands.

Proximity Distribution: Rare south of 51° N in BC. Ferry, Stevens, Pend Oreille Counties, Washington.

Common Bugloss (*Anchusa officinalis*)

Family: Boraginaceae (Mustard).

Other Common Names: Anchusa, common alkanet.

Origin: Europe.

Growth Form/Reproduction: Biennial to perennial. Seed.

Legal Status Central Kootenay: FRPA.

Habitat: Disturbed sites on dry, fertile, lime-free, well-drained soils. Roadsides, dry fields, pastures.

Proximity Distribution: Rarely in south central BC and southern Vancouver Island. Rock Creek, Kelowna, south Okanagan, and Keremeos. Ferry and Pend Oreille Counties, Washington.

Gorse (*Ulex europaeus*)

Family: Fabaceae (Pea).

Other Common Names: Furze, whin, prickly broom.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seed.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Occurs at low-elevations with mild winters and relatively dry, cool summers. Tolerates a wide range of soils from sands to clays and is adapted to low fertility. It grows best on acidic soils. Grows on dry, open, sandy or rocky clearings, coastal bluffs, old fields, flood plains, roadsides, logged areas, and utility corridors.

Proximity Distribution: Southern Vancouver Island, Gulf and Queen Charlotte Islands. West coast, Washington State.

Leafy Spurge (*Euphorbia esula*)

Family: Euphorbiaceae (Spurge).

Other Scientific Names: *Euphorbia virgata*.

Other Common Names: None.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from lateral roots.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Adapted to a wide range of ecological conditions from very dry to very wet at low- to mid-elevations. Best adapted to semi-arid sites on coarse-textured soils. Disturbed sites, roadsides, fields, grasslands, open forests.

Management Strategy: Eradicated at one site in the CKIPC area. Monitor existing site to ensure that past control efforts continue to be successful. Eradicate or contain plants to present sites if new plants have emerged. Mowing and hand-pulling are generally ineffective, especially on mature plants owing to the extensive root system. Picloram, and a combination of picloram and 2,4-D have been effective on small infestations when applied in spring. Annual applications of dicamba with 2,4-D, and glyphosate at monthly intervals have produced positive control as well. Seven biocontrol agents have been released in BC with varying success depending on specific habitat conditions.

Marsh Thistle (*Cirsium palustre*)

Family: Asteraceae (Sunflower)

Other Common Names: Marsh plume thistle.

Origin: Europe.

Growth Form/Reproduction: Biennial. Seed.

Legal Status Central Kootenay: FRPA.

Habitat: Well adapted to moist-to-wet forest open sites on a wide range of soil types providing seepage is present. Generally shade intolerant but will germinate under forest canopy. Roadsides, riparian areas, wetlands, logged forest areas.

Proximity Distribution: Cariboo, Robson valley between McBride and Prince George.

Nodding Thistle (*Carduus nutans* spp. *leiophyllis*)

Family: Asteraceae (Sunflower).

Other Common Names: Musk thistle, nodding plumeless thistle.

Origin: Eurasia or north Africa.

Growth Form/Reproduction: Biennial. Seed.

Legal Status Central Kootenay: FRPA.

Habitat: Disturbed sites at mid-elevations in areas with > 25 cm annual precipitation. Tolerates a wide range of soil textures, but appears best adapted to well-drained soils. Roadsides, pastures, overgrazed grasslands, abandoned fields.

Proximity Distribution: Boundary, Similkameen, and Okanogan. Okanogan, Spokane, Pend Oreille Counties in Washington State, and Idaho State.

Perennial Pepperweed (*Lepidium latifolium*)

Family: Brassicaceae (Mustard).

Other Common Names: Tall whitetop, broad-leaved peppergrass, Virginia pepperweed.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seed.

Legal Status Central Kootenay: FRPA.

Habitat: Best adapted to open, unshaded areas on disturbed, and often saline soils. Disturbed sites, beaches and tidal shores, marshy floodplains, riparian areas, roadsides, fields.

Proximity Distribution: Vancouver, Walachin, Cranbrook, and Windermere. Ferry, Stevens, Pend Oreille Counties, Washington. Boundary County, Idaho.

Puncturevine (*Tribulus terrestris*)

Family: Zygophyllaceae (Caltrop).

Other Common Names: Goathead, bullhead, Mexican sandbur, Texas sandbur.

Origin: Eurasia.

Growth Form/Reproduction: Annual. Seed.

Legal Status Central Kootenay: FRPA.

Habitat: Best adapted to hot, dry sites and a range of soil conditions ranging from compacted soils, sandy or moist soils, to rich soils. Disturbed sites, dry grasslands, roadsides, pastures, lakeshores, abandoned fields.

Proximity Distribution: South Okanagan from Oliver to Osooyos Lake. Okanagan County, Washington. Idaho State.

Russian Knapweed (*Acroptilon repens*)

Family: Asteraceae (Sunflower)

Other Scientific Names: *Centaurea repens*.

Other Common Names: Turkestan thistle, mountain bluet, creeping knapweed.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Vegetatively from rhizomes and seeds.

Legal Status Central Kootenay: FRPA.

Habitat: Adapted to a wide range of soil conditions in low- to mid-elevation grasslands and forests. Disturbed sites, roadsides, grasslands, riverbanks, irrigation ditches, pastures, clear cuts, and cropland.

Proximity Distribution: Thompson, Okanagan and Kootenay. Okanogan, Ferry, Stevens, Pend Oreille Counties, Washington. Idaho State.

Tansy Ragwort (*Senecio jacobaea*)

Family: Asteraceae (Sunflower).

Other Common Names: Common ragwort.

Origin: Eurasia.

Growth Form/Reproduction: Biennial or short-lived perennial. Seed.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Best adapted to open sunlight and moist habitats. Tolerant of light shade and a wide range of soil conditions. Disturbed sites, roadsides, pastures, hay fields, recently harvested forest sites.

Proximity Distribution: Lower mainland, southern Vancouver Island, south Okanagan. Idaho State.

Yellow Starthistle (*Centaurea solstitialis*)

Family: Asteraceae (Sunflower).

Other Common Names: St. Barnaby's thistle.

Origin: Europe.

Growth Form/Reproduction: Winter annual. Seed.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Shade intolerant. Adapted to soils ranging to well-drained shallow and rocky soils on sites where annual precipitation varies from 25 - 100 cm. Disturbed sites, grasslands, pastures, roadsides, and cropland.

Proximity Distribution: Stevens County, Washington.

Category 2

New species to the CKIPC area with limited distribution and low density on infested sites. Species invading susceptible habitats, sensitive areas, or sites containing red- or blue-listed species. New infestations of established species in the area beyond the original population. Eradication is main management focus.

Blueweed (*Echium vulgare*)

Family: Boraginaceae (Mustard).

Other Common Names: Viper's bugloss, blue devil.

Origin: Europe.

Growth Form/Reproduction: Biennial. Seeds.

Legal Status Central Kootenay: WCA (R), FRPA.

Habitat: Well adapted to dry, rocky or shallow soils, especially over limestone. Disturbed sites, dry roadsides, pastures, grasslands, utility corridors at low- to mid-elevations.

Status and Distribution: Small patches in Creston area, Powder Creek, Whatshan, and south of Nakusp.

Management Strategy: Present populations should be contained or eradicated if possible. Cutting established plants can reduce seed production but repeated cuttings may be required. Hand-pulling can eradicate small patches. Spring and fall applications of 2,4-D effective.

Fuller's Teasel (*Dipsacus fullonum*)

Family: Dipsacaceae (Teasel).

Other Common Names: Fuller's teasel, Venus's basin, card thistle, barbers brush, brushes and combs, church broom.

Origin: Europe.

Growth Form/Reproduction: Biennial or short-lived perennial. Seeds.

Legal Status Central Kootenay: FRPA.

Habitat: Adapted to open, sunny habitats that range from wet to dry at low elevations. Disturbed sites, moist fields, meadows, roadsides, irrigation ditches, pastures, open forest.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Rare in south central BC. Present at one site in the Pend d'Oreille valley near Seven Mile Dam, on the highway just north of Patterson, and at Warfield, and at Creston.

Management Strategy: Eradicate or contain plants to present sites. Small populations can be hand-pulled when plants are seedlings or rosettes. Larger plants have large root systems. Flowering plants can be cut before seed set. Triclopyr is effective during the growing season but glyphosate is less effective (MDC 2004).

Giant Knotweed (*Polygonum sachalinense*)

Family: Polygonaceae (Buckwheat)

Other Scientific Names: *Fallopia sachalinensis* (F. Schmidt ex Maxim.) R. Decr.,
Reynoutria sachalinensis (F. Schmidt ex Maxim.) Nakai.

Other Common Names: Sachaline.

Origin: Japan.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from rhizomes.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Moist disturbed sites, stream banks, roadsides, and railway corridors.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Throughout the Central Kootenay as garden escape. Highway 6 Nakusp and New Denver, and south to Winlaw. Nelson, Castlegar, and Trail areas. Pend d'Oreille valley, Salmo River at Willow Spring Farm.

Management Strategy: Eradicate or contain plants to present sites if possible. No specific information available on this species regarding control. Presence of rhizomes suggests difficulty in cultural control but this is likely the most effective choice for small populations, especially where new plants are establishing. No recommendations are available for chemical control. Educate garden centers, landscape architects and public about this species.

Hoary Cress (*Cardaria draba*)

Family: Brassicaceae (Mustard).

Other Scientific Names: *Lepidium draba*.

Other Common Names: Whitetop, heart-podded hoary cress, pepperweed, whitetop, whiteweed, peppergrass, hoary cardaria.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds and long rhizomes.

Legal Status Central Kootenay: FRPA.

Habitat: Open, sunny sites from low- to mid-elevations. Disturbed sites, dry roadsides, fields, meadows, pastures.

Status and Distribution: Limited distribution. Private land and roadsides at Columbia Gardens and Rosslund.

Management Strategy: Eradication would be desirable but the plant is difficult to control culturally, mechanically or with herbicides. Multiple cuttings over several years can reduce seed production and spread. Metsulfuron-methyl, a combination of 2,4-D and dicamba at pre-bud, and glyphosate alone during flowering have been effective on some sites.

Japanese Knotweed (*Polygonum cuspidatum*)

Family: Polygoniaceae (Buckwheat).

Other Scientific Names: *Fallopia japonica*, *Reynoutria japonica*.

Other Common Names: Fleeceflower, Huzhang, Hancock's curse, elephant ears, donkey rhubarb, Japanese bamboo, American bamboo, and Mexican bamboo.

Origin: Japan.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from rhizomes.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Adapted to moist condition and to a variety of soil types; generally shade intolerant. Disturbed sites, roadsides, streams banks, wetlands, riparian areas, and railroad and utility corridors.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Throughout the Central Kootenay as a garden escape. Nelson to Balfour and Kaslo. Nelson to Salmo. Edgewood, Slocan to New Denver, and Nakusp.

Management Strategy: Eradicate new infestation where feasible. Contain or control existing populations. Presence of rhizomes suggests difficulty in cultural control but this is likely the most effective choice for small populations, especially where new plants are establishing. No recommendations are available for chemical control. Educate garden centers, landscape architects and public about this species.

Mouse-ear Hawkweed (*Hieracium pilosella*)

Family: Asteraceae (Sunflower).

Other Common Names: None.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from rhizomes and stolons.

Legal Status Central Kootenay: None.

Habitat: Grassland and dry forests from low- to mid-elevations. Disturbed sites, Roadsides, campgrounds.

Status and Distribution: Kokanee Creek Provincial Park boat launch; Champion Lakes Provincial Park.

Management Strategy: Monitoring should confirm the status of the on all known sites. Eradication of existing populations if possible or containment to present sites.

Scotch Thistle (*Onopordum acanthium*)

Family: Asteraceae (Sunflower).

Other Common Names: Cotton thistle, winged thistle, heraldic thistle, woolly thistle.

Origin: Eurasia.

Growth Form/Reproduction: Biennial or perennial. Seeds.

Legal Status Central Kootenay: None.

Habitat: Best adapted to moist, open habitats. Tolerates dry soils and partial shade. Disturbed sites at low-elevations. Disturbed sites, roadsides, pastures, overgrazed grassland, irrigation ditches, and cultivated fields.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Very limited distribution; known from single sites at Nelson, Castlegar, Rossland and in the Slokan valley. Found in Syringa Park in 2005. Hand-pulled at two locations in the Pend d'Oreille in the mid-1990s and on one site in 2005.

Management Strategy: Eradicate or contain plants to present sites. Mowing or cutting seed heads impedes seed production but plants can re-sprout from roots. Spring applications of picloram, dicamba, 2,4-D, and clopyralid have been effective.

Yellow Iris (*Iris pseudacorus*)

Family: Iridaceae (Iris).

Other Common Names: Yellow flag iris.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from rhizomes.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Low- to mid-elevation grassland and forest. Moist ditches, wetlands, meadows and stream banks.

Status and Distribution: Limited distribution. Creston Valley Wildlife Management Area, Kootenay Lake, Nancy Greene Lake, Erie Lake, Meldeanna Lake, Arrow Lake.

Management Strategy: Eradicate where possible. Contain existing populations to limit spread. Hand-pulling and digging are best prospects to eradicate or control this species. Public awareness, prevention, and immediate eradication of new introductions.

Category 3

Established infestations along transportation corridors and areas of concentrated activities such as trails, campgrounds, parking lots, garbage dumps, maintenance yards, and gravel pits. These species are well established in some parts of the Central Kootenay but not present throughout most of the region. Containment is the main management focus.

Baby's Breath (*Gypsophila paniculata*)

Family: Caryophyllaceae (Pink)

Other Common Names: None.

Origin: Eurasia.

Growth Form/Reproduction: Annual. Seeds.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Open to partly shaded sites in grassland and open forest from low- to mid-elevations. Disturbed sites, roadsides, fields, railway and utility corridors.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Robson and Edgewood areas, Columbia Gardens.

Management Strategy: Evaluate existing sites to assess where eradication possible. Contain existing populations at Edgewood, Robson, and Columbia Gardens to prevent further spread. Hand-pulling and digging can be effective if the root crown is removed. Mowing and clipping can reduce seed production. There is little information on effective herbicides but dicamba and picloram are limited in their effectiveness (CDFA 2006).

Black Locust (*Robinia pseudoacacia*)

Family: Fabaceae (Legume).

Other Common Names: False acacia, yellow locust, post locust, shipmast locust.

Origin: Native to eastern North America.

Growth Form/Reproduction: Perennial. Seeds. Vegetatively from stumps and roots.

Legal Status Central Kootenay: None.

Habitat: Adapted to a wide range of soil conditions from well drained to salty substrates except soils that are permanently wet. Able to grow in full sun or partial shade.

Status and Distribution: Widespread in Trail area as an ornamental escape. Deer Park, north shore of Kootenay Lake. Small patch at Seven Mile Dam in the Pend d'Oreille valley.

Management Strategy: Inventory incomplete. Contain existing populations and eradicate new infestations where feasible. Mature plants very difficult to eradicate and control. Cultural and mechanical control limited to newly establishing plants as mature plants re-sprout from roots and trunks. Triclopyr and glyphosate can be effective.

Bristly Locust (*Robinia hispida*)

Family: Fabaceae (Legume).

Other Common Names: Rose acacia, rose locust.

Origin: Southwestern United States.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: None.

Habitat: Tolerates a wide range of soil conditions from silt loams and loamy soils with good drainage, and from neutral to acidic conditions. Disturbed sites, roadsides, abandoned fields.

Status and Distribution: North shore of Kootenay Lake, and in Trail and Fruitvale areas.

Management Strategy: Inventory incomplete. Eradicate where feasible or contain existing populations. Cultural and mechanical control limited to newly establishing plants as mature plants re-sprout from roots and trunks. Little known about other control measures.

Brown Knapweed (*Centaurea jacea*)

Family: Asteraceae (Sunflower).

Other Common Names: None. Closely related to meadow knapweed (*Centaurea jacea x nigra*).

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds and from the woody root crown.

Legal Status Central Kootenay: FRPA.

Habitat: Grasslands and open forest at mid-elevation; tolerates partial shade. Disturbed sites, fields, roadsides, logged areas.

Status and Distribution: Dense in East Arrow Park and along Saddle Mountain Road. Found in Whatshan area, and between Nakusp and Fauquier.

Management Strategy: Contain populations to current distribution. Monitor for further spread. Hand-pulling and cutting may reduce seed production. Glyphosate, picloram, clopyralid and 2,4-D have been suggested for control in Washington State. *Urophora quadrifasciata* also has been used with limited success (WSNWCB 2006).

Common Tansy (*Tanacetum vulgare*)

Family: Asteraceae (Sunflower).

Other Common Names: Garden tansy.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from rhizomes.

Legal Status Central Kootenay: WCA (R), FRPA.

Habitat: Best adapted to full sun and fertile, well-drained soil at low- to mid-elevations. Disturbed sites, roadsides, ditches, stream banks, lakeshores, riparian areas, pastures.

Status and Distribution: Widespread throughout the Central Kootenay especially along roadsides and in riparian areas. Edgewood, Arrow Park, Saddle Mountain Road. Whatshan Lake north and south of Nakusp. Pend d'Oreille valley at Seven Mile Dam. Nelson to Balfour, and throughout the Slocan Valley. Crawford Bay to Creston area, Highway 21 to US boarder.

Management Strategy: Inventory incomplete. Priority should be given to control and containment of populations near or in riparian habitat. These populations should be eradicated where possible but limiting their dispersal along riparian corridors is critical. Small plants can be pulled and dug out. Cutting reduces seed production. Picloram, dicamba and glyphosate can be effective in the early growth stages under the proper soil conditions and set backs from water.

Diffuse Knapweed (*Centaurea diffusa*)

Family: Asteraceae (Sunflower).

Other Common Names: Spreading knapweed, tumble knapweed.

Origin: Eurasia.

Growth Form/Reproduction: Biennial. Seeds.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Grasslands, shrublands, and dry open forests at low- to mid-elevations. Poorly adapted to cultivation or mesic sites. Disturbed sites, pastures, roadsides, pastures, utility corridors.

Status and Distribution: Limited distribution in CKIPC area. West end of the Pend d'Oreille valley and at Columbia Gardens. A few patches and isolated plants south of Nakusp. One site near Kaslo, and Bombi Summit east of Castlegar.

Management Strategy: The status of this species has changed little since 1995 and appears mostly confined to the southeastern part of the CKIPC area. Eradicate satellite populations at Kaslo, Nakusp south, and Bombi Summit. Contain populations at Pend D'Oreille and Columbia Gardens. Hand-pulling can be effective to eradicate new, small patches. Picloram, dicamba, clopyralid, glyphosate and 2,4-D are all effective on seedlings, rosettes and mature plants. Although herbicides are effective, management of this species relies on natural dispersal of biocontrol agents. Monitoring biocontrol releases for agent establishment and efficacy.

Eurasian Water-milfoil (*Myriophyllum spicatum*)

Family: Haloragaceae (Water-milfoil).

Other Common Names: None.

Origin: Eurasia and Africa.

Growth Form/Reproduction: Perennial. Mostly vegetatively from rhizomes. Seeds.

Legal Status Central Kootenay: CCA.

Habitat: Adapted to disturbed lake beds and slow-moving streams with alkaline soils and a high concentrations of dissolved inorganic carbon. Lakes, ponds, reservoirs, and slow-moving rivers and streams.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Champion Lakes Provincial Park, and in Kootenay River system at Duck Lake and Thrums.

Management Strategy: Inventory incomplete. Eradicate or contain existing populations where feasible. Awareness and prevention are probably the best practices presently given the limited distribution of the plant in the CKIPC area. Barriers have been used to prevent spread in ponds and lakes in the US. Fluridone, a selective herbicide for milfoil, has also successfully controlled the plant in the US (Bugwood Network 2006). Hand pulling has been effective at Champion Lakes. Inventory this species to determine abundance and distribution.

Field Scabious (*Knautia arvensis*)

Family: Dipsacaceae (Teasel).

Other Scientific Names: *Scabiosa arvensis*.

Other Common Names: Blue buttons, pincushion.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: WCA (R), FRPA.

Habitat: Adapted to moist to dry, nutrient-rich loam soils. Disturbed sites, roadsides, pastures, and fields at mid-elevations.

Status and Distribution: Limited distributed in CKIPC area. Dense along Airport Road at Salmo. Also found at Porcupine Road in Ymir, and Meadows.

Management Strategy: Eradicate population at Porcupine Road in Ymir and Meadows, Contain plants to present sites at Salmo. Small patches may be cut or pulled to remove seed heads and plants. Larger patches can be treated with picloram or metsulfuron-methyl to eradicate, contain or control patches. Eradicate plants found outside Salmo where feasible.

Himalayan Blackberry (*Rubus discolor*)

Family: Rosaceae (Rose)

Other Scientific Names: *Rubus procerus*, *R. fruticosus*, *R. armeniacus*.

Other Common Names: None.

Origin: Western Europe.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from stolons.

Legal Status Central Kootenay: CCA.

Habitat: Well adapted to moist but not true wetland soils; tolerates a wide range of soil moisture conditions. Forms dense thickets along roadsides, fence lines, pastures, forest plantations, stream banks, riparian areas, and utility corridors.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Isolated patches along lower Arrow Lake near Syringa Park. North and east shores of Kootenay Lake near Boswell.

Management Strategy: Inventory incomplete. Monitor for new infestations and eradicate where possible by cultural or chemical means but control is very difficult. Immediate eradication of new and small infestations should be a high priority. This plant is very difficult to control as plants mature and populations size increases. Hand-pulling and cutting are effective on young plants but brush cutters, weed-eaters and power saws are required for mature plants. Several herbicides have been used with varying effectiveness including picloram, dicamba, triclopyr ester and amine, and 2,4-D (Soll 2004).

Hoary Alyssum (*Berteroa incana*)

Family: Brassicaceae (Mustard).

Other Common Names: None.

Origin: Eurasia.

Growth Form/Reproduction: Biennial. Seeds.

Legal Status Central Kootenay: WCA (R), FRPA.

Habitat: Most abundant on dry sandy or gravelly soils. Disturbed sites, roadsides, meadows, pastures, overgrazed grasslands, railway and utility corridors, wetlands, gravel pits, forest openings, skid tails, and landings.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Currently widespread throughout the Central Kootenay. Main infestations in Pend d'Oreille valley, Columbia Gardens, Rossland, and Fruitvale areas. Growing populations in the Castlegar, Robson to Deer Park areas. Small isolated patches from Nelson to Balfour, and in higher densities from Harrop to Procter primarily along roadsides. Small infestations at Edgewood, Salmo, Creston, Highway 21 to US boarder. Regional Kootenay-Boundary.

Management Strategy: Present distribution covers many jurisdictions. Eradication of small patches should be encouraged for all participants. Contain existing populations to minimize further spread beyond current geographic distribution. Hand-pulling or cultivation can

eradicate small populations, and mowing can eliminate seeds. Spring or fall applications of dicamba, glyphosate and 2,4-D are effective.

Meadow Knapweed (*Centaurea debauxii*)

Family: Asteraceae (Sunflower).

Other Scientific Names: *Centaurea x pratensis*.

Other Common Names: None.

Origin: Southern Europe.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: FRPA.

Habitat: Disturbed sites, roadsides, fields, open grassland, pastures, and forest edge at low- to mid-elevations.

Status and Distribution: Described as common in 1995 at Needles and Edgewood. Currently distributed throughout the Nakusp, Fauquier, Octopus Creek, Whatshan, and Edgewood areas.

Management Strategy: Eradicate satellite populations at Octopus Creek and Whatshan area. Contain infestations in core area from Nakusp to Fauquier, Edgewood, and East Arrow.

Larger infestations can be treated with picloram, dicamba, or a combination of clopyralid and 2,4-D at all stages of growth. *Urophora affinis* and *U. quadrifasciata* can use this plant as a host.

Orange Hawkweed (*Hieracium aurantiacum*)

Family: Asteraceae (Sunflower).

Other Common Names: Orange-red king devil, devil's paintbrush.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds, and from rhizomes and stolons.

Legal Status Central Kootenay: WCA (R), FRPA.

Habitat: Adapted to well drained coarse-textured soils that are often acidic at mid- to high-elevation. Disturbed sites, roadsides, pastures, meadows, clearings.

Status and Distribution: Scattered patches Edgewood to Whatshan Road, lower Inonoaklin Road, south of New Denver. Small patches in Pend d'Oreille valley at Tillicum Creek and Nine Mile Creek. Dense populations in Nelson, north shore, Kaslo and north. Roadside along Highway 3A Crawford Bay to Gray Creek, and from Creston and US border.

Management Strategy: Inventory incomplete. Eradicate small patches, or contain or control existing sites. Hand-pulling and hoeing can eradicate small infestations if roots and stolons are completely removed. Cutting reduces seed production but can stimulate vegetative reproduction. Picloram, and picloram plus 2,4-D, are effective during active growth.

Plumeless Thistle (*Carduus acanthoides*)

Family: Asteraceae (Sunflower).

Other Common Names: Bristly thistle, spiny plumeless thistle.

Origin: Eurasia.

Growth Form/Reproduction: Winter annual or biennial. Seeds.

Legal Status Central Kootenay: WCA (R), FRPA.

Habitat: Open grassland and dry open forest, low- mid-elevation. Disturbed sites, pastures, fields, roadsides, utility corridors.

Status and Distribution: Limited distribution in CKIPC area. Has been reduced from wide spread to a few, isolated sites in the Pend d'Oreille since the mid-1980s. Eradicated at Creston in the mid-1990s.

Management Strategy: Eradicate if possible. Focus on cultural control to prevent seed dispersal or chemical control to eradicate small patches. Flower heads can be cut and removed to eliminate seed production. Picloram, dicamba, 2,4-D and glyphosate are all effective for control. Reserve biocontrol to large patches. Two biocontrol agents are available that appear to contain populations. Monitor biocontrol sites for agent establishment and efficacy.

Policeman's Helmet (*Impatiens glandulifera*)

Family: Balsaminaceae (Balsam or Touch-me-not).

Other Scientific Names: *Impatiens roylei*.

Other Common Names: Himalayan balsam.

Origin: India and the western Himalaya.

Growth Form/Reproduction: Annual. Seeds.

Legal Status Central Kootenay: CCA.

Habitat: Tolerates a wide range of soil condition; requires high soil moisture from low- to mid-elevations. Cold temperatures may limit distribution. Partially shade tolerant. Disturbed sites, roadsides, riparian areas, stream banks, meadows.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Localized populations throughout the Central Kootenay at Trail, Nelson, north shore of Kootenay Lake. Red Mountain Road between Slocan City and Silverton.

Management Strategy: Inventory incomplete. Eradicate or contain plants to present sites. Cutting and hand-pulling can reduce seed production and eradicate small infestations but follow-up treatments are likely required. Response to herbicides is not known and no biological controls available. Educate garden centers, landscape architects and public about this species.

Purple Loosestrife (*Lythrum salicaria*)

Family: Lythraceae (Loosestrife).

Other Common Names: Purple lythrum.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from rhizomes.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Tolerates a variety of light and soil conditions from calcareous and acidic soils from low- to mid-elevation. Moderately shade tolerant, grows in standing water. Ditches, irrigation canals, marshes, stream and lake shores, and wetlands.

Status and Distribution: Scattered populations along Kootenay Lake and Kootenay Canal. Patches at Six Mile area north of Nelson, and south along Kootenay River to near Shoreacres. Isolated plants were found near Selkirk College at Castlegar in the mid-1990s. Isolated patch at Fauquier. Isolated plants hand-pulled at Harcourt Creek in the Pend d'Oreille valley in 2004 and 2005. Satellite populations at Meldeanna Pond, Casino (Trail), Creston.

Management Strategy: Inventory incomplete. Eradicate populations at Meldeanna Pond, Casino (Trail) and Creston. Contain existing populations at Kootenay Lake, Kootenay Canal, and Fauquier. Biocontrol should be used on larger, inaccessible populations if available. Monitor for agents where control is expected through biocontrol.

Rush Skeletonweed (*Chondrilla juncea*)

Family: Asteraceae (Sunflower).

Other Common Names: Skeletonweed, gum succory, devil's-grass, naked weed, hog-bite.

Origin: Southern Europe.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from lateral roots.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Adapted to a wide range of soil and moisture conditions at low- to mid-elevations on well-drained, light-textured soils. Appears best adapted to areas with cool winters and warm summers with winter and spring rainfall. Disturbed sites, grasslands, open forests, roadsides, rail road corridors.

Status and Distribution: Widespread in the Slocan valley near Crescent Valley, Krestova, Passmore, and Pass Creek. Two small populations near Creston at the Sirdar railway siding, and at Erickson. Both sites chemically treated in 1990s, some plants remained at Erickson in 2004. One plant found at Lasca Creek Road, Harrop.

Management Strategy: Maintain current program of containment and control. Eradicate new infestations and satellite populations at Passmore, Creston, Erickson, and Harrop. Contain populations to core areas of Krestova, Crescent valley and Shoreacres. Hand pulling can be effective on small infestations but not on established mature plants. Picloram, dicamba and clopyralid have been effective on rosettes and may be effective for small, new infestations. Biocontrol agents are available for larger infestations but have limited success. Monitor for agents where control is expected through biocontrol and for efficacy of control.

Scentless Chamomile (*Matricaria perforata*)

Family: Asteraceae (Sunflower).

Other Scientific Names: *Matricaria maritima* var. *agrestis*; *Matricaria maritima* var. *inodora*.

Other Common Names: Scentless mayweed; mayweed, false-chamomile, wild chamomile, German chamomile, Baldr's Brow.

Origin: Eurasia and North Africa.

Growth Form/Reproduction: Annual, biennial, sometimes perennial. Seeds.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Adapted to a wide range of moist soil conditions from low- to mid-elevations in open or partial shade. Disturbed sites, roadsides, pastures, utility rights-of-way, drainage ditches, forest landings, and skid-trails.

Status and Distribution: Limited distribution in the Central Kootenay at Edgewood, Giveout Creek, Burton, and one site at Harrop.

Management Strategy: Contain population in core area near Edgewood. Eradicate satellite populations at Giveout Creek, Harrop, and Burton. Hand-pulling and digging can eradicate small patches or reduce seed production. Picloram and dicamba applied before flowering have been effective. Biocontrol agents have been released in BC with unknown success.

Scotch Broom (*Cytisus scoparius*)

Family: Fabaceae (Legume).

Other Common Names: European broom, Scots broom, Irish broom, English broom, broomtops, common broom.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Tolerant of a wide range of soil conditions including coarse textured, seasonally dry soils with low to moderate fertility. Shade intolerant. Disturbed sites, fields, rocky slopes, roadsides, rail road and utility corridors, and logged areas at low- to mid-elevation.

Status and Distribution: Characterized as "rare" in the IAPP application by 1997, and widespread by 2000. Presently, widespread in the lower Central Kootenay from Nelson to Balfour, Riondel to Creston, Salmo, Fruitvale, Trail, Castlegar, New Denver, and Nakusp.

Management Strategy: Eradication of populations at Salmo, Fruitvale, Castlegar and south of Nakusp where feasible. Local eradication and control along lakeshores and riparian areas near Nelson, on the north and east shores of Kootenay Lake and at Nakusp should be a high priority. Biocontrols unproven so cultural, mechanical and chemical controls are best prospects. Small plants can be hand-pulled while large plants can be cut to ground level with saws. Roundup or 2,4-D can be effective when applied to seedlings or, when applied with a diesel oil surfactant to cut stems on mature plants.

Wormwood (*Artemisia absinthium*)

Family: Asteraceae (Sunflower).

Other Common Names: Absinthe, absinthe wormwood, common wormwood.

Origin: Eurasia and Africa.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: None.

Habitat: Adapted to coarse, dry sandy soils in grasslands to open forests from low-to mid-elevations. Disturbed sites, roadsides, pastures, shrublands, grassland, pastures.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Small isolated patches in southern part of region, especially at Creston. One larger infestation at Kaslo. Assess both sites for feasibility to eradicate.

Management Strategy: Inventory incomplete. Eradicate or contain plants to present sites. Hand-pulling and mowing before seed-set can reduce seed production but after seed-set may result in more germination. Spring and fall applications of dicamba, 2,4-D, picloram, and glyphosate are effective controls (Eckardt 1987).

Yellow Hawkweeds (*Hieracium* spp.)

Family: Asteraceae (Sunflower).

Other Common Names: Hawkweed, king devil.

Origin: Native/Europe.

Growth Form/Reproduction: Perennial. Seeds, and from rhizomes and stolons.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Low- to mid-elevation grassland and forest. Disturbed sites, roadsides, fields.

Status and Distribution: Numerous species widely distributed but infrequent.

Management Strategy: Inventory incomplete. Eradicate new populations. Contain existing populations to limit spread. Cultural control limited owing to rhizomes. Picloram plus 2,4-D, and dicamba effective on small infestations.

Category 4

Established low-density or high-density infestations that are widely distributed throughout the Central Kootenay area. Control is the main management focus.

Bull Thistle (*Cirsium vulgare*)

Family: Asteraceae (Sunflower).

Other Common Names: Common thistle, spear thistle, Fuller's thistle.

Origin: Eurasia.

Growth Form/Reproduction: Biennial. Seeds.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Not listed in the Nelson Noxious Weed Plan in 1995. Adapted to dry to moist habitats on a wide range of soil types ranging from gravelly to clay-textured. Mostly shade intolerant. Occupies disturbed sites on roadsides, cultivated fields, pastures, utility corridors, railway rights-of-way, logged forest land, skid trails and landings.

Status and Distribution: Common throughout the Central Kootenay.

Management Strategy: Prevention by seeding and minimizing soil disturbance. Contain existing populations. Cutting and mowing top growth reduces seed production. Picloram, dicamba, glyphosate, and 2,4-D all provide good control especially at rosette stage. *Urophora stylata* can reduce seed production on larger populations.

Burdock (*Arctium* spp.)

Family: Asteraceae (Sunflower).

Other Scientific Names: Two introduced species in BC: *Arctium lappa*, *A. minus*.

Other Common Names: Common burdock, great burdock, lesser burdock, wild burdock, bardane, wild rhubarb, beggar's button.

Origin: Eurasia.

Growth Form/Reproduction: Biennial. Seeds.

Legal Status Central Kootenay: FRPA.

Habitat: Adapted to a wide range of soil conditions in moist habitats from low- to high-elevations. Tolerant to partial shade. Roadsides, ditches, stream banks, pastures; riparian areas.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Sporadically distributed throughout the Central Kootenay. Wynndel, Highway 21 Creston to US border.

Management Strategy: Prevention by seeding and minimizing soil disturbance. Contain existing populations. Small patches of newly established plants can be eradicated by hand-pulling seedlings and rosettes. Mowing and cutting seed heads will reduce seed production. Picloram, dicamba, glyphosate, and 2,4-D are effective, especially at the rosette stage.

Canada Thistle (*Cirsium arvense*)

Family: Asteraceae (Sunflower).

Other Common Names: Field thistle, Californian thistle.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from horizontal roots.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Adapted to a wide range of soil types, environmental conditions, and elevations. Best adapted to rich, heavy loam, clay loam, and sandy loam soils; tolerates slightly saline soils. Partially shade tolerant. Roadsides, pastures, fields, meadows, wetlands; utility corridors, forest edges, logged forests, and forest openings.

Status and Distribution: Widespread throughout the Central Kootenay.

Management Strategy: Prevention by seeding and minimizing soil disturbance. Contain existing populations. Repeated mowing removes seed heads but plants can re-sprout from extensive root systems. Spring and autumn applications of clopyralid or dicamba/2,4-D mix can be effective on small patches. Two biocontrol agents are available for larger patches. Monitoring biocontrol agents released to determine agent status and efficacy.

Common Hound's-tongue (*Cynoglossum officinale*)

Family: Boraginaceae (Borage).

Other Common Names: Common hound's-tongue, dog bur, gypsy flower.

Origin: Eurasia.

Growth Form/Reproduction: Biennial. Seeds.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Cool, moist habitats from low-and mid-elevations on grasslands to open forests. Adapted to alkaline soils and is moderately shade tolerant. Disturbed sites, pastures, roadsides, utility corridors, logged forestland, landings, and skidtrails.

Status and Distribution: Most common in the Pend d'Oreille and Creston areas. Smaller populations in Blewett and Harrop, US border to Creston, Fruitvale area.

Management Strategy: Eradicate new infestations culturally or chemically. Individual plants and small infestations can be hand-pulled or cut to impede seed production. Picloram, dicamba, metsulfuron-methyl and glyphosate are all effective on actively growing plants. Biocontrol agents are available and effective for large infestations. Reserve biocontrol for larger weed populations.

Common Toadflax (*Linaria vulgaris*)

Family: Scrophulariaceae (Figwort).

Other Common Names: Butter and eggs, wild snapdragon, yellow toadflax.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from rhizomes.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

General requirements: Found on sites with well-drained sandy or gravelly soils, dry summers, and sites with open, sparse vegetation from low- to high-elevations. Disturbed sites, grasslands and open forests roadsides, railroad and utility corridors, logged forest land, and gravel pits.

Status and Distribution: Scattered in small patches throughout the Central Kootenay since 1995. Plant populations appear to be relatively stable throughout the CKIPC area.

Management Strategy: Eradicate small and new populations. Control existing populations where the probability for dispersal is high. Cutting and mowing reduces seed production but may stimulate vegetative reproduction from roots. This species is difficult to control with herbicides. Picloram, dicamba, and picloram with 2,4-D are most effective when the plant is flowering. Five biocontrol agents are used on this species for larger populations of the plant.

Dalmatian Toadflax (*Linaria genistifolia* spp. *dalmatica*)

Family: Scrophulariaceae (Figwort).

Other Scientific Names: *Linaria dalmatica* (L.) Miller.

Other Common Names: Broad-leaved toadflax, wild snapdragon.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds and vegetatively from horizontal roots.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Adapted to a wide range of environmental conditions, and is tolerant of low temperatures and coarse-textured soils. Disturbed sites, cultivated fields, grassland and transitional forest-grassland.

Status and Distribution: Widespread at low elevations. Inonoklin to Needles, Nelson to Kaslo, East shore of Kootenay Lake to Creston. Highway 21 Creston to US Boarder. Castlegar to Trail, and the Columbia Gardens/Seven Mile dam areas.

Management Strategy: Monitor existing sites. Maintain current containment and control program. Eradicate new populations outside existing distribution. Cutting reduces seed production but cutting and hand-pulling are generally not effective in killing plants. Autumn applications of picloram and 2,4-D have been effective on small patches. The biocontrol *Mescinus janthinus* is widely distributed in the CKIPC area and has been effective on larger areas. Monitor for agents where control is expected through biocontrol.

Downy Brome (*Bromus tectorum*)

Family: Poaceae (Grass).

Other Common Names: Cheatgrass downy chess, early chess, drooping brome, downy cheat, slender chess, downy brome grass, military grass, broncoglass, Mormon oats.

Origin: Eurasia.

Growth Form/Reproduction: Annual. Seeds.

Legal Status Central Kootenay: CCA.

Habitat: Widespread in grasslands and dry forests of the interior at low- to mid-elevations. Disturbed sites, overgrazed grasslands, abandoned fields, roadsides, pastures, and railroad and utility corridors.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Widely distributed throughout the Central Kootenay, particularly in the southern part of the region.

Management Strategy: Prevention though minimizing disturbance or seeding disturbed sites most feasible option. Containment and control may be required on sensitive sites. Repeated mowing or grazing by livestock can help control populations but will not eradicate this species. Repeated burning has been successful in some locations. Spring applications of quizalofop, fluazifop-p-butyl, sethoxydim, and glyphosate have been successful in some locations.

Oxeye Daisy (*Leucanthemum vulgare*)

Family: Asteraceae (Sunflower).

Other Scientific Names: *Chrysanthemum leucanthemum*.

Other Common Names: White daisy.

Origin: Eurasia.

Growth Form/Reproduction: Short-lived perennial. Seeds and from short rhizomes.

Legal Status Central Kootenay: FRPA.

Habitat: Occurs at low- to high-elevations in grasslands, open forests, dense forest openings. Disturbed sites, roadsides, pastures, utility and railway corridors, logging landing, skid trails, forest openings.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Widespread throughout the Central Kootenay.

Management Strategy: Prevention by seeding and minimizing soil disturbance. Contain existing large populations and control smaller populations that may extend the distribution of the species geographically. Hand-pulling and cultivation can kill plants providing roots are removed. Picloram, dicamba, 2,4-D and glyphosate are effective herbicides.

Spotted Knapweed (*Centaurea biebersteinii*)

Family: Asteraceae (Sunflower).

Other Scientific Names: *Centaurea maculosa*.

Other Common Names: None.

Origin: Europe.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: WCA (P), FRPA, CCA.

Habitat: Adapted to well-drained, light to coarse-textured soils at low- to mid-elevation in grasslands and dry open forests. Intolerant of dense shade; best adapted to 30 -75 cm annual precipitation but survives in very dry climates.

Status and Distribution: Common and widespread throughout the Central Kootenay area. Present but not common in East Arrow Park, Incomappleux and Creston.

Management Strategy: Maintain current containment and biocontrol program on large patches. Eradicate new populations outside existing distribution. Eradication may be feasible with cultural and chemical measures on new infestations outside established populations. Picloram, dicamba, clopyralid, glyphosate and 2,4-D are all effective on seedlings, rosettes and mature plants. Biological control methods are most suitable for patches larger than 0.5 ha. Continue monitoring biocontrol releases and other treatments for efficacy.

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

Family: Clusiaceae (St. Johnswort).

Other Common Names: Common St. John's-wort, Klamath weed, goatweed.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Mostly seed and short rhizomes.

Legal Status Central Kootenay: FRPA, CCA.

Habitat: Disturbed sites in grasslands and open forest, moist to dry fields, roadsides.

Status and Distribution: Occurs in scattered populations in the Kootenays and Boundary. Widespread throughout the Central Kootenay, and particularly abundant in drier areas of the region such as Deer Park and the Pend d'Oreille valley.

Management Strategy: This species is expected to be under biological control but some populations of the plant are out of phase with the agents. Tillage can manage the plant in agricultural fields. Combinations of 2,4-D and picloram, or 2,4-D and glyphosate have produced control in the US. Several biocontrol agents are available to control large patches. Monitor sites to confirm agents are present and the plant is not dispersing.

Sulphur Cinquefoil (*Potentilla recta*)

Family: Rosaceae (Rose).

Other Common Names: Rough-fruited cinquefoil.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: FRPA.

Habitat: Adapted to a wide range of soils and climates in grasslands and dry forests but shade intolerant. Roadsides, pastures, overgrazed grasslands, and disturbed forest openings.

Status and Distribution: Widely distributed and usually infrequent throughout the Central Kootenay. Most abundant in drier areas, such as the Pend d'Oreille valley, and from Robson to Deer Park. Very limited distribution Highway 21 Creston to US boarder.

Management Strategy: Conduct fill-in inventories as required to determine the distribution of the plant. Maintain current program of containment and control. Eradicate new populations outside existing distribution. Small infestations may be controlled by hand-pulled or digging. Picloram, clopyralid and 2,4-D are effective on small patches. No prospects for biocontrol currently.

Agricultural and Horticultural

Invasive plants that may interfere with agricultural crops or garden settings.

Containment and control are the main management focuses.

Curled Dock (*Rumex crispus*)

Family: Polygonaceae (Buckwheat).

Other Common Names: Curly dock, sour dock, yellow dock.

Origin: Eurasia.

Growth Form/Reproduction: Perennial. Seeds.

Legal Status Central Kootenay: None.

Habitat: Most abundant in riparian areas, wet meadow, pond edges, and irrigation ditches from low- to mid-elevations. Open disturbed sites, roadsides, railway and utility corridors, pastures, abandoned fields.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Widespread but not abundant throughout the Kootenays. Above confluence of Salmo River in the Pend d'Oreille valley.

Management Strategy: Eradicate new populations. Contain existing populations to limit spread. Cutting and cultivation reduces seed production. Spring applications of MCPA, dicamba, and 2,4-D amine have been effective. Glyphosate also effective when plants at full flower. Herbicide use may be restricted because this species often grows wet areas.

Dodder (*Cuscuta* sp.)

Family: Cuscutaceae (Dodder).

Other Scientific Names: Several native species. *C. approximate*, *C. epithimum* introduced.

Other Common Names: Parasitic dodder, strangleweed, hellweed, devil's guts.

Origin: Eurasia or Africa.

Growth Form/Reproduction: Annual. Seeds.

Legal Status Central Kootenay: WCA (P), CCA.

Habitat: Coastal, dry grasslands and open forest at low; occasionally found at mid-elevations in the southern interior. Well adapted to cultivated habitats and succeeds with many crops, especially legumes.

Status and Distribution: Not listed in the Nelson Noxious Weed Plan in 1995. Small isolated patches throughout Central Kootenay, particularly in the Krestova area. Generally associated with agricultural fields.

Management Strategy: Eradicate if possible, especially populations adjacent alfalfa crops. Cutting and burning aftermath reduced seed production and dispersal. Glyphosate at very low rates is effective in alfalfa crops when applied before dodder attaches to alfalfa plants.

Appendix 9. Community Watersheds in the Central Kootenay Area

Description ^{1,2}	Source Name	Area (ha)
Kootenay Lake Forest District (51 Watersheds)		
Anderson Community Watershed	Anderson Creek	1,308.7
Arrow Community Watershed	Arrow Creek	7,872.2
Bird Community Watershed	Bird Creek	780.3
Bjerkness Community Watershed	Bjerkness Creek	2,499.3
Blunt Community Watershed	Blunt Creek	7.3
Bourke Community Watershed	Bourke Creek	127.8
Bradley Community Watershed	Bradley Creek	324.7
Brooks Community Watershed	Brooks Creek	5.4
Cameron Community Watershed	Cameron Brook	88.9
Camp Run Community Watershed	Camp Run Creek	6.4
Clayton Community Watershed	Clayton Creek	11.6
Davis Community Watershed	Davis Creek	6,290.7
Duck Community Watershed	Duck Creek	5,195.9
Duhamel Community Watershed	Duhamel Creek	5,689.5
Eagle Community Watershed	Eagle Creek	573.5
Falls Community Watershed	Falls Creek	3,381.7
Five Mile Community Watershed	Five Mile Creek	4,705.1
Fletcher Community Watershed	Fletcher Creek	1,450.7
Floyd Community Watershed	Floyd Creek	1,782.5
Foster Community Watershed	Foster Creek	109.8
Four Mile Community Watershed	Four Mile Creek	331.7
Hansen Community Watershed	Hansen Brook	24.0
Hendryx Community Watershed	Hendryx Creek	522.9
Indian Community Watershed	Indian Creek	482.7
Jarvis Community Watershed	Jarvis Creek	4.5
Kemp Community Watershed	Kemp Creek	1,179.5
Kleef Community Watershed	Kleef Brook	60.4
La France Community Watershed	La France Creek	5,583.6
Lockhart Community Watershed	Lockhart Creek	3,735.3
Longueval Community Watershed	Longueval Creek	3.9
McDonald Community Watershed	McDonald Creek	217.9
Mcgregor Community Watershed	McGregor Creek	383.7
Mortimer Community Watershed	Mortimer Creek	50.9
Procter Community Watershed	Procter Creek	825.2

Description^{1,2}	Source Name	Area (ha)
Rover Community Watershed	Rover Creek	4,277.5
Russell Community Watershed	Russell Creek	2,350.2
Sanca Community Watershed	Sanca Creek	10,879.4
Sandy Community Watershed	Sandy Creek	1,213.0
Selous Community Watershed	Selous Creek	1,519.6
Sitkum Community Watershed	Sitkum Creek	2,702.8
Smallwood Community Watershed	Smallwood Creek	1,739.6
Smoky Community Watershed	Smoky Creek	433.9
South Blunt Community Watershed	South Blunt Creek	70.7
South Rykert Community Watershed	South Rykert Creek	7.2
Sullivan Community Watershed	Sullivan Creek	620.8
Sutherland Community Watershed	Sutherland Creek	143.5
Tetzel Community Watershed	Tetzel Creek	701.3
The Rivulet Community Watershed	The Rivulet	10.4
Twin Bays Community Watershed	Twin Bays Creek	1,136.3
Urmston Community Watershed	Urmston Creek	688.2
Watts Community Watershed	Watts Brook	31.9
Total Area Kootenay Lake District		84,144.5
Arrow Lakes District (37 Watersheds)		
Angel Community Watershed	Angel Creek	7.1
Aylard Community Watershed	Aylard Creek	3.9
Baerg Community Watershed	Baerg Creek	410.4
Bartlett Community Watershed	Bartlett Creek	541.0
Bath Community Watershed	Bath Creek	151.0
Batys Community Watershed	Batys Creek	217.1
Blueberry Community Watershed	Blueberry Creek	14,738.2
Brouse Community Watershed	Brouse Creek	310.7
Caribou Community Watershed	Caribou Creek	23,734.6
Casino Community Watershed	Casino Creek	202.5
China Community Watershed	China Creek	2,778.3
Climax Community Watershed	Climax Creek	215.8
Deer Community Watershed	Deer Creek	8,136.3
Dog Community Watershed	Dog Creek	1,083.1
Elgood Community Watershed	Elgood Creek	133.1
Fruitvale Community Watershed	Fruitvale Creek	506.5
Gander Community Watershed	Gander Creek	830.1
Glade Community Watershed	Glade Creek	2,979.4
Gwillim Community Watershed	Gwillim Creek	7,863.4

Description^{1,2}	Source Name	Area (ha)
Halfway Community Watershed	Halfway Creek	408.1
Hanna Community Watershed	Hanna Creek	3,384.4
Heart Community Watershed	Heart Creek	2,628.0
Humphries Community Watershed	Humphries Creek	762.7
Kelly Community Watershed	Kelly Creek	2,391.4
Kuskanax Community Watershed	Kuskanax Creek	34,905.2
Mads Community Watershed	Mads Brook	42.4
Mcdermid Community Watershed	McDermid Creek	761.2
Mcfayden Community Watershed	McFayden Creek	582.3
McNally Community Watershed	McNally Creek	440.5
Norns Community Watershed	Norns Creek	20,242.9
Petersen Community Watershed	Petersen Brook	82.7
Quartz Community Watershed	Quartz Creek	589.4
Rashdell Community Watershed	Rashdell Creek	12.3
South Murphy Community Watershed	South Murphy Creek	279.0
Springer Community Watershed	Springer Creek	4,897.4
Topping Community Watershed	Topping Creek	2,098.8
West Little Sheep Community Watershed	West Little Sheep Creek	422.8
Total Area Kootenay Lake District		139,774.0
Total Area in Central Kootenay		223,918.5

¹ All watersheds created June 15, 1995

² Source: Water Resource Information, Province of British Columbia, 2006.