

Operational Plan for Invasive Species Management in the Boundary
2014 to 2020



Yellow flag-iris

Hoary alyssum

Common tansy

Japanese knotweed

Common bugloss

Prepared by :

Barb Stewart, RP Bio
Boundary Invasive Species Program Coordinator

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1.0 Introduction

Invasive plants present a growing economic and environmental threat to the resources of not only the Boundary area but of the entire Province. They are one of the most serious threats to ecosystem health facing us today. Invasive plants are non-native plants and animals that have been introduced to British Columbia without the natural controls that kept them in check in their native habitats. For this reason, and because of their aggressive growth, these alien species can be highly destructive, very competitive and difficult to control. The Invasive Species Strategy for BC was developed in 2012 to provide a framework on how to effectively manage this growing problem¹.

1.1 Impacts of Invasive Species

Invasive species are considered one of the largest threats to ecosystem health facing us today. Invasive plants and noxious weeds negatively affect agricultural production, reduce crop yield and quality, reduce forage for wildlife, can lead to increased erosion and sedimentation, and can harbour pests and diseases of agricultural crops. Invasive plants can impact human health since some cause allergies, reduce sightlines along highways, and even can cause skin burns. It has become clear that it is not only our agricultural resources at risk, there are environmental impacts as well. Invasive plants can reduce forage for wildlife and alter nesting habitat for grassland dependant species. Knotweed infestations along creek systems not only block access for recreation and wildlife but also increase bank erosion. Introduced tree species like Russian olive moving into shrub dominated riparian areas can completely change the structure of the habitat. The full extent of impacts on species at risk are not known but information available suggests that there are far reaching impacts (Voller and McNay 2007). Dense patches of invasive aquatic plants like Eurasian watermilfoil are a safety hazard in addition to altering aquatic habitats in favour of introduced fish species. The potential introduction of new aquatic invasive species like zebra and quagga mussels, would disrupt aquatic food chains, litter beaches with sharp shells, clog water intakes, and impact water based recreation. Preventing new invasive species from being introduced into the Boundary is very important to the future health of our agricultural and environmental resources. Invasive Species affect us all so we all need to work together to minimise new introductions.

1.2 History of Invasive Plant Management in the Boundary

Development and the associated land disturbances continue to occur rapidly throughout the Boundary area resulting in increased soil disturbance, which in combination with our mild climate and low rainfall provides habitat conducive to the establishment and spread of many invasive plants.

Diffuse knapweed has been the species of primary concern in the Boundary as it has significantly reduced forage production throughout the low elevation grasslands. However large infestations of sulphur cinquefoil, hound's tongue, dalmatian toadflax and spotted knapweed have recently dwarfed the effects of diffuse knapweed on many range areas. Isolated infestations of common bugloss, blueweed, plumeless thistle, field scabious, orange hawkweed, leafy spurge and other invasive plants occur within the area and have the potential to become serious problems if not controlled. Recently concern has been raised about potential introductions of aquatic plants and animals and the devastating impacts that could result. It is imperative that invasive species are effectively managed by all land managers/owners to protect the remaining landscape from further degradation.

1.3 Key Organisations and Land Managers

A collaborative coordinated approach has proven very effective in management of invasive species since they do not respect arbitrary jurisdictional boundaries. The Boundary Invasive Species Society,

¹ Invasive Species Strategy for BC available at <http://www.bcinvasives.ca/special-events/invasive-species-strategy-for-bc>

a non-profit and registered charity, was founded in 1999 to undertake an education program and has taken on a key role in coordination of management activities and strategic planning. Key partners in the area include the Boundary include the Regional District of Kootenay Boundary (RDKB) who operate a weed management function under a bylaw that currently delivers all on ground herbicide treatments for partnering land managers. Land mangers include provincial government agencies, first nations, municipalities, utility companies, forest companies, agriculturalists, conservation and stewardship groups, private landowners, and industry including mining companies. A list of land jurisdiction types and applicable legislation is included in Appendix 3.

Each landowner or land manager has a legal obligation to manage invasive plants which could include prevention, containment and/or control depending on their mandate and legal obligations. This plan provides a framework for all land managers to develop priorities for invasive species management consistent with their specific land management objectives.

2.0 Boundary Region

2.1 Plan Area and Land Use Jurisdictions

The Boundary covers about 718,00 ha and is entirely within the Kettle River drainage. It is within the Regional District of Kootenay Boundary and includes all of the area within Electoral Areas C, D & E. It extends west of Anarchist Summit, east to the Paulson Summit, north to Big White, and south to the US border. The area has a diverse economy including forestry with one active sawmill that is the main economic driver in the area with agriculture, tourism, and mining providing supplementary benefits. The agriculture industry consists mainly of hay, beef cattle, commercial nurseries, grains, vegetables, tree fruit, and dairy. Farms are spread through the main valleys of the Kettle and Granby rivers and in the Bridesville and Sidley areas. Adjacent crown land is used for livestock grazing. Tourism is prevalent throughout the area and the Boundary Economic Development Commission and Christina Lake Gateway organisation are in operation and have further information on activities in the region to promote economic development. Utility corridors traverse the southern part of the region including hydro and gas rights-of-way, and a short railroad. The main highways, secondary roads, forest service access roads, and recreation trails, including the Trans Canada Trail, form a huge network of travel corridors that act as primary dispersal routes for invasive plant seeds.

Three municipalities (Greenwood, Midway and Grand Forks) and five un-incorporated communities (Christina Lake, Rock Creek, Beaverdell, Westbridge, and Bridesville) are present in the southern half of the region. A variety of land holdings including private land, local government land, small parks, trails, industrial areas and undeveloped land comprise the bulk of the lower elevation areas. These areas have relatively high concentrations of invasive plants that are easily spread to adjacent areas through a variety of methods including wind, vehicles, animals, and other vectors. The Grand Forks and Midway airports are the only lands under federal jurisdiction although there may be other airports under federal jurisdiction as well. Traditional territories of eight first nations bands cover all of the Boundary and overlap in many areas.

There are eleven provincial parks, recreation areas and ecological reserves covering approximately 11% of the land base. An estimated 85% of the boundary is Crown land under the jurisdiction of various provincial agencies including Ministry of Forests, Lands and Natural Resource Operations, Ministry of Environment, Ministry of Transportation and Infrastructure and Ministry of Energy, Mines and Petroleum Resources. This crown land is used by forestry, range and mining interests under tenures, licenses and permits in addition to recreational users.

2.2 Invasive Plant Management Areas

Three Invasive Plant Management Areas (IPMA) have been set up for the Boundary which roughly

follow the RDKB Electoral Area Boundaries. West Boundary includes the area bounded by Electoral Area E with the addition of Hwy 3 west to Nine Mile Pit. East Boundary includes the area bounded by Electoral Area D. Christina Lake Area includes Area C and portion of Area B up to the Paulson Summit.

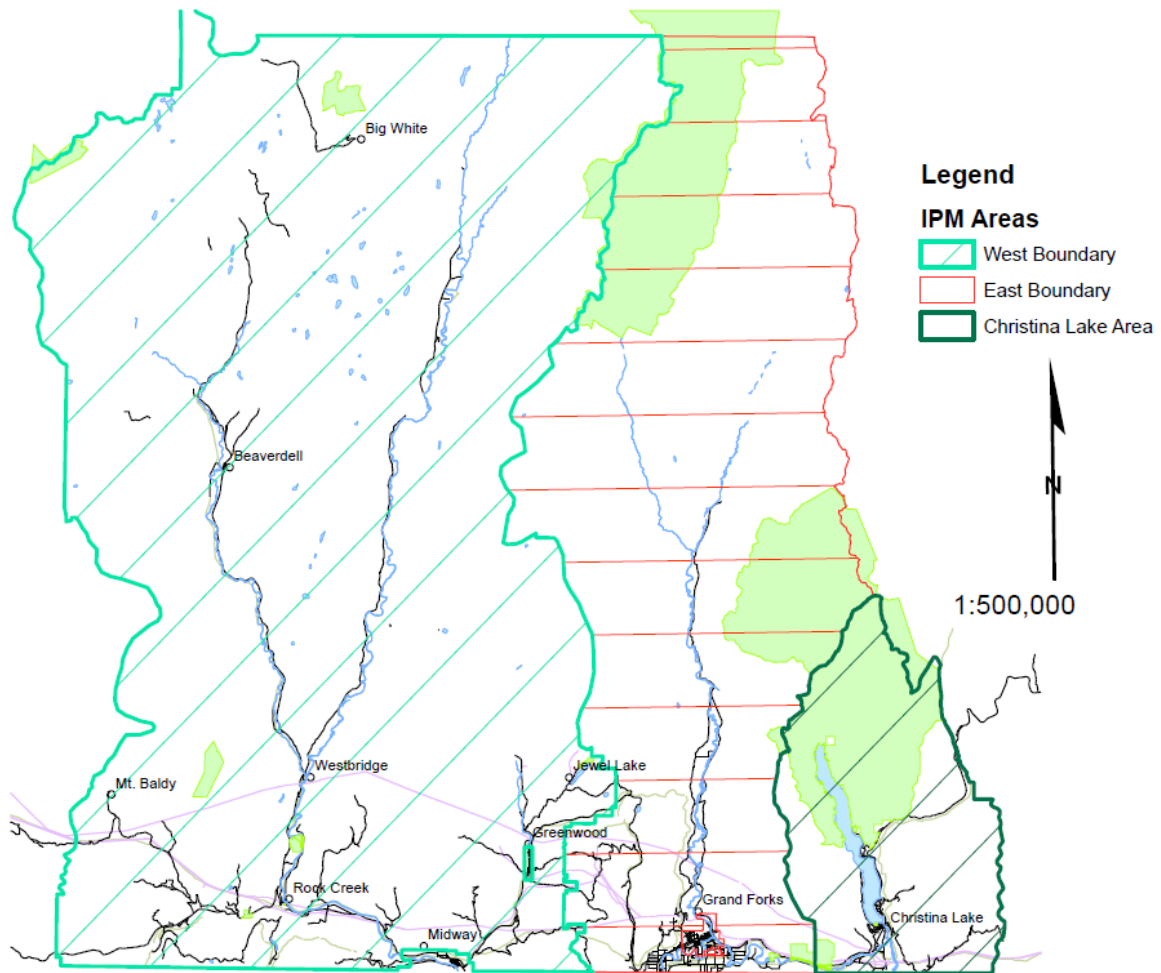


Figure 1. Map of the Boundary area with the management areas shown.

3.0 Priorities for Invasive Plant Management

Only a subset of the introduced species present in the Boundary are considered invasive with the potential to cause negative impacts either economically, environmentally or socially. Given the limited resources available it is important to focus management decisions on species where the most impact will be achieved. Preventing new species is the most cost effective strategy, followed by control of species with limited distributions to prevent spread. Setting priorities for each species followed these principles²:

Principal 1: Prevention and early intervention provide the most cost effective means of control.

Principle 2: Eradication of widely established invasive plants on a regional-scale is not a reasonable expectation.

Principle 3: Prevention of spread of some invasive plant species is possible through a coordinated effort and establishment of containment lines.

Principle 4: Invasive plant treatments are most effective when they occur in the context of long-term management which includes post-treatment restoration or remediation activities.

Principle 5: Coordinated planning and implementation with key stakeholders provides the greatest likelihood of long-term success.

The species considered included species already designated as invasive (or noxious) under current legislation in addition to species present on lists from adjacent jurisdictions that are not legislated in BC. The list has been limited to plants (terrestrial and aquatic) and some aquatic animal species. Additional species groups may be added in the future if needed. Information from risk assessments was used, where available, however this information is only available for a few of species. Criteria considered when setting species priorities included:

- Risk of spread (based on a combination of available habitat, biological methods of reproduction and the dispersal potential of the plant itself or via anthropogenic vectors of spread);
- Level of “invasiveness” (e.g. competitive ability, mode of reproduction, behaviour in similar ecosystems in other jurisdictions, does it out-compete existing vegetation to form dense stands, etc.);
- Potential to cause social, economic or environmental damage;
- Legal designation for control; and
- Likelihood of success, which depends on a combination of the control methods/tools available for the particular species, and its current range or distribution. New infestations and/or species with limited distribution are more likely to be successfully controlled than larger, well established populations.

² Central Kootenay Invasive Plant Committee (CKIPC). 2014. *Kaslo North IPMA Operational Framework*.

Table 1. Prioritisation of Invasive Species Based on Management Focus

Program Level	Status	Management Focus
Watch List (Prevention)	New Species not present in BC or in the Plan Area, but likely to establish if introduced	Early Detection and Rapid Response; Assess new species not currently on list.
Eradication or Annual Control (1- high)	Species that are new to the management area with limited distribution and low density on infested sites; and/or Species invading susceptible habitats, sensitive areas, or sites containing red- or blue-listed species.	Eradication or the permanent removal of 100% of an invasive species from a selected site or area. This is usually only attainable for small isolated patches/clumps of an invasive plant or noxious weed species and may take many years of repeated treatments to be achieved.
Containment (2- med)	New infestations of established species in the area outside of the main population; Can include established infestations along transportation corridors and areas of concentrated activities such as trails, campgrounds, parking lots, garbage dumps, maintenance yards, and gravel pits; For some species in this category, where agreement among agencies conducting invasive plant management programs in the area is reached, a containment line can be established and mapped online in IAPP.(regional EDRR)	Containment to the current location and/or distribution. Preventing or reducing access to areas with invasive species infestations is also a strategy employed in containment. Herbicide treatments or other removal method would generally only occur within the containment boundary if sensitive sites or unique resources were at risk; Management focus for some species may be strictly education.
Strategic Control (3 -low)	Established low-density or high-density infestations that are widely distributed and fairly common throughout the Boundary area; and Eradication or Containment is no longer possible within the management area. Targeted treatment for specific values or management objectives	Treatments will be focused in high value or sensitive areas only, either for environmental, social or economic reasons.
Biological Control (3a)	Established low-density or high-density infestations where effective biological control agents are established.	To suppress plant populations through biological control insect releases and monitoring effectiveness.
Unclassified	Species which are present but are either not considered invasive or have not yet been assessed.	To assess species that have not been assessed.

Table 2. List of Category 1 (high priority) Invasive Species with Management Goal of Eradication or Annual Control.

Common Name	Scientific Name	Management Status		Closest Known Location	West Boundary	East Boundary	Christina Lake Area
		FRPA	WCA				
Aquatic Species							
Fragrant waterlily	<i>Nymphaea odorata</i>			Christina Lake - N. Alba may also be present in Christina Lake	2	2	3
Terrestrial							
Common teasel	<i>Dipsacus fullonum</i>	X		Rock Creek, Grand Forks, Granby Rd	2	2	2
Cutleaf evergreen blackberry	<i>Rubus laciniatus</i>			Okanogan County, WA; may be present up Stewart creek	1	1	2
Field scabious	<i>Knautia arvensis</i>	x	RO	Boundary Creek	2	1	1
Giant knotweed	<i>Polygonum sachalinense</i>	x	PN	Rossland	1	1	1
Greater knapweed	<i>Centaurea scabiosa</i>			north of Grand Forks	1	2	1
Himalayan blackberry	<i>Rubus armeniacus</i>			Okanogan County, WA; may be present up Stewart creek	1	1	2
Bohemian knotweed	<i>Fallopia x bohemica</i>	x	PN	Contain to gardens	3	3	3
Japanese knotweed	<i>Fallopia japonica</i>	x	PN	Contain to gardens	3	3	3
Longspine sandbur	<i>Cenchrus longispinus</i>			Christina Lake	1	1	2
Plumeless Thistle	<i>Carduus acanthoides</i>	x	RO	Christina Lake	2	2	2
Rush skeletonweed	<i>Chondrilla juncea</i>	x	PN	Vernon, BC and slocan valley	Terrestrial		
Russian Knapweed	<i>Acroptilon repens</i>	x	RO	Rock Creek and Midway	2	2	2
Scotch broom	<i>Cytisus scoparius</i>	x		Christina Lake	2	2	2
Scotch Thistle	<i>Onopordum acanthium</i>	x	RO	Rock Creek and Grand Forks	2	2	2
Tansy ragwort	<i>Senecio jacobaea</i>	x	PN	west of Beaverdell	2	1	1
Yellow Flag iris	<i>Iris pseudacorus</i>	x	PN	Christina Lake, Christina Creek, Saunier Lake, Eugene Creek. Eradicate where we can and contain the rest.	2	1	2

Table 3. List of Category 2 (moderate priority) Invasive Species with Management Goal of Control and Contain.

Common Name	Scientific Name			Closest Known Location	West Boundary	East Boundary	Christina Lake Area
		FRPA	WCA				
Aquatic Species							
Curly leaf pondweed	<i>Potamogeton crispus</i>			Christina Lake	1	1	3
Eurasian Watermilfoil	<i>Myriophyllum spicatum</i>			Christina Lake, Osoyoos Lake	1	1	3
Terrestrial							
Baby's breath	<i>Gypsophila paniculata</i>	X		Local control in midway and rock creek areas	3	3	3
Blueweed	<i>Echium vulgare</i>	x	RO	Present	2	2	3
Common bugloss	<i>Anchusa officinalis</i>	x	R	Contain then eradicate	3	2	1
Common tansy	<i>Tanacetum vulgare</i>	x	RO	Mainly in Anarchist with isolated patches throughout Boundary; contain to private, remove other locations	3	3	3
Cypress spurge	<i>Euphorbia cyparissias</i>			Contain to private	3	3	3
Himalayan balsam / Policeman's helmet	<i>Impatiens glandulifera</i>			Contain to gardens	3	3	3
Hoary alyssum	<i>Berteroa incana</i>	x	R	contain to containment area; strategic control within containment area.	3	3	3
Hoary cress	<i>Cardaria draba</i>	x	RO	Contain to private	3	2	1
Leafy spurge	<i>Euphorbia esula</i>	x	PN	Present	3	3	2
Milk Thistle	<i>Silybum marianum</i>			Confirm if in local gardens	3	3	3
Russian olive	<i>Elaeagnus angustifolia</i>			Contain to private	3	3	3
Tamarisk/Saltcedar	<i>Tamarix Spp</i>			Contain to private	3	3	3
Yellow Archangel	<i>Lamium galeobdolon</i>			Contain to private	2	2	3

Table 4. List of Category 3 (lower priority) Invasive Species with Management Goal of Strategic Control(3a) or Biological Control (3b).

Common Name	Scientific Name			Closest Known Location	West Boundary	East Boundary	Christina Lake Area
		FRPA	WCA				
Strategic Control							
Absinth wormwood	<i>Artemisia absinthium</i>			contain to greenwood/kerr creek area	4	4	4
Burdock	<i>Arctium species</i>	x	RO	Present along creeks and river throughout Boundary	4	4	4
Chicory	<i>Chicorum intybus</i>			Present	3	4	3
Common toadflax	<i>Linaria vulgaris</i>	x	PN	Strategic control; secure biocontrol when available	4	4	4
Orange hawkweed	<i>Hieracium aurantiacum</i>	x	RO	Elevate management if resources available.	3	3	3
Scentless chamomile	<i>Matricaria perforata</i>	x	PN	Contain to private	3	3	3
Siberian elm	<i>Ulmus pumilla</i>			contain to private	4	4	4
Spotted Knapweed	<i>Centaurea stoebe</i>	x	PN	Contain to containment area; strategic control within containment area.	4	4	4
Sulfur cinquefoil	<i>Potentilla recta</i>	x	RO	Manage where managing other species	4	4	4
Yellow flowered non-native hawkweeds	<i>Hieracium Spp</i>	x		elevate management if resources available.	4	4	4
Curlycup gumweed	<i>Grindelia squarrosa var serrulata</i>			start management to reduce expansion into high value grasslands	4	4	4
Nodding Thistle	<i>Carduus nutans</i>	x		rely on biocontrol in containment area	4	4	4
Biocontrol							
Bull Thistle	<i>Cirsium vulgare</i>			present throughout boundary	4	4	4
Canada Thistle	<i>Cirsium arvense</i>	x	PN	Biocontrol	4	4	4
Dalmatian toadflax	<i>Linaria dalmatica</i>	x	PN	Biocontrol effective	4	4	4
Diffuse Knapweed	<i>Centaurea diffusa</i>	x	PN	Biocontrol effective	4	4	4
Field bindweed	<i>Convolvulus arvensis</i>			pursue biocontrol	4	4	4

Hound's tongue	<i>Cynoglossum offininalis</i>	x	PN	<i>Biocontrol effective</i>	4	4	4
St. John's wort	<i>Hypericum perforatum</i>	x		<i>monitor biocontrol effectiveness, treat where high habitat value.</i>	4	4	4

4.0 Prevention and Best Practices

Preventing introduction of species is the most cost effective way to manage invasive species. Many species follow similar pathways of introduction, so it is important to target and address common pathways of introduction rather than individual species prevention. Most aquatic invasive species are not yet present in our area making prevention a high priority. With respect to species ongoing initiatives on dumping aquarium contents appropriately, Clean-Drain-Dry of boats, and PlantWise programs are in process or in place. Promoting these programs within the region will help address these common introduction pathways. The Boundary Invasive Species Society has an annual work plan focused on prevention and identification and will be developing a communications plan for the Boundary. Until that is in place messaging with nearby regions will continue to be used.

Preventing spread of species already present in our area requires diligence and following a series of best practices to reduce spread while operating on the land base. Best practice activities including minimising soil disturbance, re-vegetating exposed soil, using seed free of invasive plants, cleaning vehicles and equipment, using weed free gravel and careful disposal of invasive plant material will all help to prevent further spread. With respect to invasive plants best practices are available for road maintenance and construction, forestry activities, and for residential land development (listed in Appendix 1). Best practices specific to mining exploration are still needed.

5.0 Early Detection and Rapid Response (EDRR)

Early detection of new invasive plant species enables treatment before they are allowed to spread and cause serious impacts. This approach is both cost effective and reduces the risk to the environment. A provincial EDRR strategy for invasive plant species that are new to BC is in place and is in the process of being broadened to include invasive species. All species new to the province fall under this process and the province will lead in the response. Risk assessments are being completed on a provincial level for prohibited species and are available at <http://www.for.gov.bc.ca/hra/invasive-species/edrr.htm> . A new species is typically present for twenty years before it is found (per comm R. Olds) the success of an early detection program will depend on establishing a network of people trained to identify new species to enable reporting of infestations at early stages of infestation. BIS and other agencies will promote the “Report-A-Weed” app for online invasive plant reporting.

A regional EDRR protocol has been developed to provide guidance on dealing with new species to the Boundary that are already present in the province. Climate and site conditions can limit suitability for new species so it is important to assess the potential of a new species to be invasive within our area. Habitat suitability modelling has been completed for seven species that are already present. There is very little information available on the potential range of most invasive plants so the known distribution and impacts in similar areas is used as a guide for whether a plant will become a problem in a new area. Where information is not available for a species a precautionary approach will be used based on professional judgement. Table 5 contains a list of species near our jurisdictional boundaries or not present in a specific IPMA that would be considered regional EDRR species. For provincial EDRR species inventory is done by province but they do not do inventory for regional EDRR species. Some local staff training is needed on recognising watch list species to increase likelihood of detection at an early stage.

This could be done for many species by doing a field trip down into Okanogan and Ferry Counties to see locations the plants are growing.

5.1 EDRR Protocol

This protocol outlines the steps to follow to deal with new species found in the Boundary.

1. Spotter reports the sighting to BIS and BIS immediately reports sightings of provincial EDRR species to the Provincial Invasive Plant Specialist (plants) or Frogwatch BC (amphibians) or BC MOE (animals).
2. BIS representative visits the site to confirm the identification of the species, record GPS coordinates, take photos, and collect a voucher. If the species cannot be identified, voucher specimens and photos will be submitted to the Provincial EDRR specialist or other appropriate specialists for confirmation. Information will also be shared with the Regional Invasive Plant Specialist and the spotter. The affected land owner will be kept involved.
3. If the species is new to BC, the Provincial Invasive Plant Specialist will trigger the Provincial EDRR Response Plan (IMISWG 2010). If a species is not provincial EDRR it is referred to BIS to determine its risk. BIS will seek information on risk through other regions, provincial staff, or neighbouring jurisdictions. If unsure of whether to deal with the species then control should be undertaken to at least stop seed or vegetative spread until further information is available. If there is any question of whether it is a native then treatment should be delayed until identification is confirmed.
4. If the species is considered Regional EDRR for the Boundary but not for BC, BIS will contact the land owner to further inventory the area to determine the full extent of the species, and to develop a strategy for eradication. If possible, all root and seed material will be bagged immediately until further treatments can be conducted. For aquatic species BIS will work with MOE Ecosystems to develop a management plan.
5. BIS will issue an Alert on the new species through BIS contact network during the field season.
6. BIS will enter the site into IAPP during the calendar year.

Table 5. List of Invasive Species not present in the Boundary - Watch List

Common Name	Scientific Name	FRPA	WCA	Closest Location Known
Aquatic Plants				
Common/European frogbit	<i>Hydrocharis morsus-ranget</i>			Present in Washington
Giant salvinia	<i>Salvinia molesta</i>			Present in Texas
Parrotfeather	<i>Myriophyllum aquaticum</i>			Vancouver, BC; Washington; Boise ID.
Water chestnut	<i>Trapa natans</i>			present in eastern US
Water Hyacinth	<i>Eichhornia crassipes</i>		PP	Hagerman, ID. Snake River
Yellow Floating Heart	<i>Nymphoides peltata</i>			Stevens County and Clark County (coast) WA
Fanwort	<i>Cabomba caroliniana</i>			King county WA (on coast)
Hydrilla	<i>Hydrilla verticillata</i>		PP	King county WA (on coast)
Variable-Leaf-Milfoil	<i>Myriophyllum heterophyllum</i>			Fraser Valley, BC

Brazilian Elodea/ Waterweed	<i>Egeria densa</i>	PP	Vancouver Island and several counties on the coast of Washington; Moscow, ID.
European Common Reed	<i>Phragmites australis</i>	PP	Osoyoos, BC
Flowering Rush	<i>Butomus umbellatus</i>	pn	Pend Oreille River, ID
Garden Yellow Loosestrife	<i>Lysimachia vulgaris</i>	PP	Vancouver and Vancouver Island
Giant Mannagrass / Sweetgrass Reed	<i>Glyceria maxima</i>	PP	Fraser Valley, BC

Common Name	Scientific Name	FRPA	WCA	Closest Location Known
Terrestrial Plants				
African-rue	<i>Peganum harmala</i>		PP	Grant County, WA (south of Okanogan)
Bighead Knapweed	<i>Centaurea macrocephala</i>		PP	Okanogan and Pend Oreille Counties
Black Henbane	<i>Hyoscyamus niger</i>		PP	Ferry County north of Curlew Lake, WA.
Black Knapweed	<i>Centaurea nigra</i>	x		Ferry Count, WA
Blackgrass, Foxtail, Slender/Meadow	<i>Alopecurus myosuroides</i>		PP	Lincoln and Spokane County, WA
Bohemian knotweed	<i>Fallopia japonicus x bohemica</i>			Central Kootenay
Brown Knapweed	<i>Centaurea jacea</i>			Okanagan valley; Nakusp?; Pend Oreille County, WA
Camel Thorn	<i>Alhagi maurorum</i>		PP	Grant County, WA (south of Okanogan)
Clary Sage	<i>Salvia sclarea</i>		PP	Stevens County, WA
Common Crupina	<i>Crupina vulgaris</i>		PP	Okanogan County, WA
Dyer's Woad	<i>Isatis tinctoria</i>		PP	Eholt
Eggleaf Spurge	<i>Euphorbia oblongata</i>		PP	coastal washington
Garlic Mustard	<i>Alliaria petiolata</i>		PP	Vernon, BC
Giant hogweed	<i>Heracleum mantegazzianum</i>			Slocan Valley and Kaslo
Giant Reed	<i>Arundo donax</i>		PP	California, may be in BC
Goatsrue	<i>Galega officinalis</i>		PP	Whatcom County, WA (coast)
Halogeton/Saltover	<i>Halogeton glomeratus</i>		PP	southern WA and ID
Iberian Starthistle	<i>Centaurea iberica</i>		PP	Kittitas County, WA (south of chelan county)

Italian Thistle	<i>Carduus pycnocephalus</i>		PP	Whitman County (south of Spokane County)
Johnsongrass	<i>Sorghum halepense</i>		PP	Chelan and Douglas County, WA
Jointed goatgrass	<i>Aegilops cylindrica</i>		PP	Ferry and Stevens County, WA
Kudzu	<i>Pueraria montana var. lobata</i>		PP	Washington
Meadow Clary	<i>Salvia pratensis</i>		PP	Stevens County, WA
Meadow Knapweed	<i>Centaurea nigrescens</i>	x	RO	Vernon, BC; Pend Oreille County, WA; Rossland.
Meadow Salsify	<i>Tragopogon pratensis</i>			old record in Christina Lake, BC
Mediterranean Sage	<i>Salvia aethiopis</i>		PP	southern WA and Central ID
Medusahead	<i>Taeniatherum caput-medusae</i>		PP	
Milk Thistle	<i>Silybum marianum</i>			confirm if in local gardens
Mountain Bluet	<i>Centaurea montana</i>			contain to gardens
Mouse-ear hawkweed	<i>Hieracium pilosella</i>			Christina Lake
North Africa Grass	<i>Ventenata dubia</i>		PP	Okanogan County, WA
Perennial Pepperweed	<i>Lepidium latifolium</i>	x	PP	
Puncturevine	<i>Tribulus terrestris</i>	x	RO	Osoyoos, BC. Previously found by Kerr Creek but controlled.
Purple Nutsedge	<i>Cyperus rotundus</i>		PP	Oregon
Purple Starthistle	<i>Centaurea calcitrapa</i>		PP	Adams County, WA (central)
Purple loosestrife	<i>Lythrum salicaria</i>	x		Osoyoos, BC and Arrow Lakes
Red Bartsia	<i>Odontites serotinus</i>		PP	Alberta
Ricefield/ Bog Bulrush	<i>Schoenoplectus mucronatus</i>		PP	Oregon
Rush skeletonweed	<i>Chondrilla juncea</i>	x	PN	Vernon, BC and slocan valley
Shiny Geranium	<i>Geranium lucidum</i>		PP	Washington (coast)
Silverleaf Nightshade	<i>Solanum elaeagnifolium</i>		PP	southeast Washington
Slender False-brome	<i>Brachypodium sylvaticum</i>		PP	
Slenderflower Thistle	<i>Carduus tenuiflorus</i>		PP	Washington (coast)
Spanish Broom	<i>Spartium junceum</i>			
Spring Milletgrass	<i>Milium vernale</i>		PP	
Spurge Flax	<i>Thymelaea passerina</i>		PP	Okanogan WA
Squarrose Knapweed	<i>Centaurea virgata</i>		PP	
Syrian bean-caper	<i>Zygophyllum fabago</i>		PP	
Texas blueweed	<i>Helianthus ciliaris</i>		PP	
Velvetleaf	<i>Abutilon theophrasti</i>		PP	

Wild four-o'clock	<i>Mirabilis nyctaginea</i>			Okanogan WA
Yellow Nutsedge	<i>Cyperus esculentus</i>		PP	
Yellow Starthistle	<i>Centaurea solstitialis</i>	x	PP	Kettle Falls, WA

Common Name	Latin Name	Type	Controlled Alien Species Regulation
<u>Zebra Mussel</u>	<u><i>Dreissena polymorpha</i></u>	Aquatic Invertebrates	Prohibited
<u>Quagga Mussel</u>	<u><i>Dreissena rostriformis bugensis</i></u>	Aquatic Invertebrates	Prohibited
<u>New Zealand Mud Snail</u>	<u><i>Potamopyrgus antipodarum</i></u>	Aquatic Invertebrates	Prohibited
<u>Asian Clam</u>	<u><i>Corbicula fluminea</i></u>	Aquatic Invertebrates	
<u>American Bullfrog</u>	<u><i>Lithobates catesbeianus / Rana catesbeiana</i></u>	Amphibians	
<u>Red-eared Slider</u>	<u><i>Trachemys scripta elegans</i></u>	Reptiles	
<u>Snapping Turtle</u>	<u><i>Chelydra serpentina</i></u>	Reptiles	Prohibited
<u>Red Claw Crayfish</u>	<u><i>Cherax quadricarinatus</i></u>	Aquatic Invertebrates	Prohibited
<u>Yabby Crayfish</u>	<u><i>Cherax albidus, Cherax destructor</i></u>	Aquatic Invertebrates	Prohibited
<u>Rusty Crayfish</u>	<u><i>Orconectes rusticus</i></u>	Aquatic Invertebrates	Prohibited
<u>Red swamp crawfish</u>	<u><i>Procambarus clarkii</i></u>	Aquatic Invertebrates	Prohibited
<u>Spiny Waterflea</u>	<u><i>Bythotrephes cederstroemi</i></u>	Aquatic Invertebrates	Prohibited
<u>Fishhook Waterflea</u>	<u><i>Cercopagis pengoi</i></u>	Aquatic Invertebrates	Prohibited

6.0 Inventory and Monitoring

Inventories and surveys³ provide the basic information necessary to prioritize locations for management action. Accurate distribution information is essential to planning an effective management program. Location information on invasive plant occurrences are housed in the Invasive Alien Plant Application (IAPP) and this program has standards for data collection for plant species. Information on aquatic species occurrences are contained in an aquatic invasive species database maintained by Min. of Environment and data will be collected following the standards identified by BC Frogwatch Program. Habitat susceptibility models have been developed for seven species in our region and this information is being used to prioritise areas for inventories to be conducted.

Inventory efforts will focus on new species to the Boundary high risk areas for introduction based on likely pathways. Use of digital data collection has potential to improve accuracy of data and improve efficiency. It also enables real time sharing of maps, treatment progress and site pictures. Digital data collection is being implemented in 2014.

Sites with species designated for Eradication or Annual Control will be monitored at least once per season to ensure effective control and that the sites have not expanded beyond known boundaries.

Efficacy monitoring will be done on all site/species designated for Eradication in addition to other sites for a combined minimum of 10% of all herbicide treated sites. Additional monitoring will be done on hard to kill species (ex. blueweed, common bugloss) to ensure herbicide treatments are achieving

³ In this plan inventory and survey are used interchangeably. Technically, "...and inventory an inventory is a cataloguing of all invasive plants of concern within a management area, whereas a survey is an individual observation or a sampling of a representative portion of a larger landscape" such as a road survey. (BC Ministry of Forests and Range 2010)

desired levels of control. Where deficiencies are found herbicide experts will be consulted to review herbicide efficacy, timing, and equipment to determine if more effective control can be achieved. This is currently being done for common bugloss and blueweed.

7.0 Coordination and Partnerships

Coordination between agencies reduces duplication of effort, increases availability of invasive species related information, and increases the effectiveness of the programs being used. BIS has been successful in getting many organisations involved in the program and currently acts as the main coordinating body for stakeholder management programs. The Regional District of Kootenay Boundary (RDKB) plays a key role in administration and coordination of operational herbicide treatment programs through a partnership delivery model where the RDKB administers funding from other stakeholders and hires contractors to deliver treatment for all participating stakeholders. Partnerships have been formed with adjacent invasive plant management groups. Work will continue to explore opportunities to support invasive species related work of other local organisations.

8.0 Planning and Management

Planning management strategies and designing site-specific treatments is critical to the delivery of an effective program. The focus will remain on invasive plants, primarily terrestrial plants, until a good inventory is completed for other species to have better information on what is already present in the area and the potential risks. IPM principals will be used in designing management programs using effective management options for each species. The overall long-term goal is to develop or maintain a healthy ecosystem that is relatively invasive species free and resistant to invasion. Management options available include prevention, biological control, mechanical control and herbicide control. Containment areas may be established for widespread species and if they are established be submitted to IAP based on established protocol available on the website. The partnership delivery of the biological control program will shift to focus more on monitoring and less on collection and release based on current needs.

An annual work plan will be developed each year for the planning areas based on species priorities and will be updated through the season based on inventory and monitoring findings. Presence of Species at Risk will be considered when planning management. Information on current know locations of species and habitats at risk are available from <http://www.env.gov.bc.ca/cdc/>.

9.0 Education

The ability to recognise and be aware of the impacts of invasive species is a key component towards effectively addressing the invasive species problem. The activities of the BIS education program over the past fourteen years has achieved a general awareness by residents that invasive plants are impacting our resources. The majority of residents can now identify one or more species of invasive plants but there is still a lot of work to be done to educate everyone on how to recognise and control species. The education program is shifting focus to include aquatic species and preventing spread through common pathways rather than specific species. With this approach people do not need to know how to recognise all species but rather need to know what activities to do to prevent introduction or spread of any species. The program is expanding to include aquatic invasive species. For more details on specific activities refer to the *Boundary Invasive Species Education Program Annual Work Plan*

10.0 Enforcement

The Village of Midway is the only municipalities enforcing control of noxious weeds under its unsightly premise bylaw. The RDKB does not currently enforce control of noxious weeds but does not currently have a bylaw enforcement officer making it difficult to implement. Discussion by electoral directors in November of 2013 indicated an interest in possibly pursuing enforcement for new species only however

this discussion will need to continue after the municipal election in fall of 2014. Any work to establish enforcement should encompass all invasive species rather than just terrestrial plants.

11.0 Program Evaluation

In order to have a fully effective program, an evaluation process is required to track the progress towards achieving management objectives. The completion of activities towards short term (1 -3 year) objectives will be assessed each year at the fall stakeholders meeting with a summary presented including recommended changes to improve the program. The species list will be sent out in the fall for review by interested organisations and updated each spring prior to the field season beginning. Program activities will be summarised in an annual report each year provided at the spring stakeholder meeting. The longer-term objectives will be assessed in five years.

12.0 References

BC Inter-Ministry Invasive Species Working Group. 2010. *Invasive Plant Early Detection and Rapid Response Plan for British Columbia*. December 2010.

<http://www.for.gov.bc.ca/hra/invasive-species/edrr.htm>

BC Invasive Species Council. 2012. Invasive Species Strategy for British Columbia.

<http://www.bcinvasives.ca/special-events/invasive-species-strategy-for-bc>

BC Ministry of Forests and Range (BC MFR). 2010. *Invasive Plant Pest Management Plan for the Southern Interior of British Columbia: MFR PMP 402-0656-10/15*. Range Branch, Ministry of Forests and Range.

<http://www.for.gov.bc.ca/hra/Plants/PMP.htm>

Ministry of Forests and Range. 2010. *Ministry of Forests and Range Invasive Alien Plant Program Reference Guide*. Prepared by Range Branch, Ministry of Forests and Range.

<http://www.for.gov.bc.ca/hra/plants/RefGuide.htm>

Voller, J. and R.S. McNay. 2007. Problem Analysis: Effects of Invasive Species on Species at Risk in British Columbia. FORREX Series 20.

APPENDIX 1. Information Sources

Information on invasive species identification, management, legislation, biological control agents, and reporting can be found on-line at sites listed below:

Species Identification:

- [Eflora](#) - a comprehensive online searchable database with info on plant species present in BC.
- [Field Guide to Noxious and Other Selected Weeds in BC](#) has all the provincial and regional noxious weeds in BC.
- [New Invaders of the Northwest](#) has potential new invasive plants from the Pacific Northwest.
- [USDA Plants Database](#) has information on whether a species has been listed as noxious or invasive.
- [Aquatic Invasive Species Threatening the Crown of the Continent](#) contains aquatic plants and animals of concern that is relevant to the Boundary.

Invasive Plant Management:

- BC Ministry of Agriculture website has information on management and alerts for new species www.agf.gov.bc.ca/cropprot/weeds
- [Biological Control Agents in BC](#) includes a matrix of biological control insects being used in BC and their status.
- Backpack Calibration Video by ISCBC <http://www.youtube.com/watch?v=gBbv9Ouag7Q>

Reporting Invasive Plants Locations:

- [Invasive Alien Plant Program - IAPP](#) is an online database with invasive plant locations in BC.
- [Report A Weed](#) is an online reporting system for invasive plants with an app available for smartphones.
- [Frogwatch BC](#) is an online information and reporting system for frogs and salamanders.
- To report invasive mussels contact the RAPP line at 1-877-952-7277 or #7277 on Telus Mobility Network.
- Other invasive animal species should be reported directly to Ministry of Environment Staff by contacting Matthias Herborg by email at Matthias.Herborg@gov.bc.ca

Invasive Plant Legislation:

- Local Government Toolkit for Invasive Plant Management IPCBC A Legislative Guidebook to Invasive Plant Management in BC
- Weed Control Act of BC
- Forest and Range Practices Act Invasive Plant Regulation
- Community Charter Act Environment and Wildlife Regulation:

General Information and Best Practices:

- [Invasive Species Council of BC - ISCBC](#) has information on programs across BC including TIPS factsheets on invasive plants, some Best Practices guidebooks and other resource materials.
- [Protect Your Waters](#) has information on preventative measures to prevent spread of aquatic invasive species.

Species and Habitats at Risk:

- [Conservation Data Centre](#) is searchable online database with information on occurrence of Species at Risk in BC.
- [BC Species and Ecosystem Explorer](#) is a searchable database that lists species at risk in BC
- [Important Bird Areas](#) is an online database of important bird areas.
- [Wildlife Tree Stewardship Initiative - WiTS](#) - info on the Wildlife Tree Stewardship Program in BC.

APPENDIX 2. Boundary Invasive Species Program Contact Information

APPENDIX 3. Land Jurisdictions with Responsibility for Management of Invasive Species

Jurisdiction	Type	Occupier	Responsibility and/or Legislation	Tenure
Federal	Airport Lands	Transport Canada	Local governments - Village of Midway and City of Grand Forks manage the airports	?
	Traditional Territories	Bands		Add list of current bands with claims
Provincial	Crown range and forest lands, Woodlots	FLNRO	Forest Act, Range Act, Forest and Range Practices Act	Forest and Range Practices Act Agreements
	Grazing Leases	FLNRO	Land Act	Grazing Leases
	Grazing Leases	BC Parks	Park Act	Recreational permits; Grazing; Utilities; Park use permits; Park facility operators
	Parks, Class A and C	BC Parks	Park Act	Recreational permits; Grazing; Utilities; Park use permits; Park facility operators
	Ecological Reserve	BC Parks	Park Act, Environmental and Land Use Act	Recreational permits; Grazing; Utilities; Park use permits; Park facility operators
	Conservancies	BC Parks and Partners	Ecological Reserve Act	Park Use Permits
	Conservation Lands (owned by conservation organization)	FLNRO	Wildlife Act, or private land	?
	Public highways and secondary roads	MOTI		maintenance contractors
	Utilities	FLNRO		Utility Companies (Fortis BC, BC Hydro)
Crown leases (commercial, residential, recreational, gravel pits)	FLNRO		Various (individuals, businesses, NGOs, etc.)	

	Recreation Sites and Trails	FLNRO		FLNRO and some community groups (GFAA)
	Waterbodies	MOE	?	Permits required to do any work below the high watermark on all waterbodies.
	Waterbodies	DFO	Fisheries Act	Notification or permit required to do any work below the high watermark on all waterbodies.
Private	Located within a regional district		Local Bylaws; Weed Control Act; Controlled Alien Species Regulation	all landowners
	Located within a municipality		Local Bylaws; Weed Control Act; Controlled Alien Species Regulation	all landowners
	Gravel pit		Mines Act?	
Regional District Lands			Weed Control Act; Controlled Alien Species Regulation	
Municipal Lands			Weed Control Act; Controlled Alien Species Regulation	