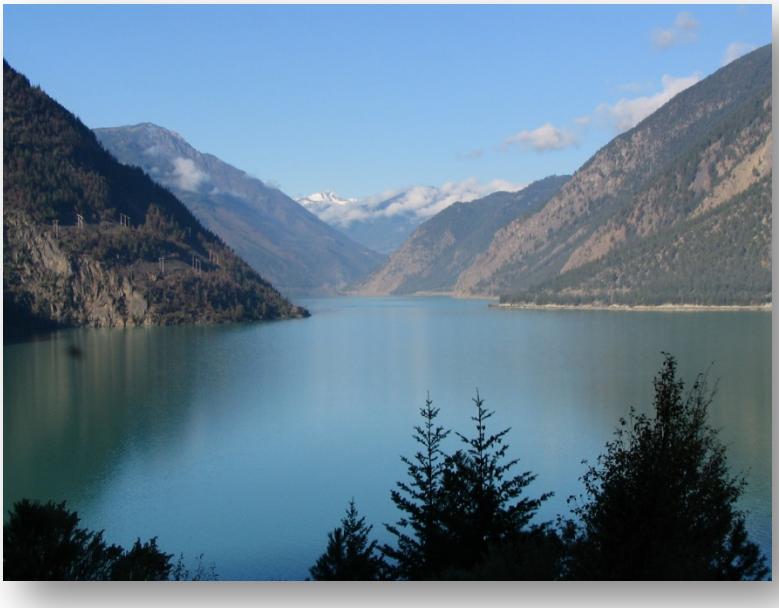
LILLOOET REGIONAL
INVASIVESPECIESSOCIETY

2013 STRATEGIC PLAN



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Prepared by Odin Scholz, Dr. Sue Senger, &
Jacquie Rasmussen, P.Ag

Acknowledgements

This inaugural strategy was prepared with the support and input of the Lillooet Regional Invasive Species Society (LRISS) board of directors. We would like to acknowledge their support and dedication to create this society and this document that will serve to guide the board and the coordinators in the management of invasive species.

LRISS would also like to thank all of the input from the stakeholders and agencies that have participated in our strategic planning workshop and our meetings.

The following government ministries and agencies have funded LRISS. We are very grateful for their support.

- BC Ministry of Forests, Lands and Natural Resource Operations
- BC Ministry of Transportation and Infrastructure
- BC Hydro
- Invasive Species Council
- Squamish Lillooet Regional District Area's A & B
- St'át'imc Government Services
- BC Gaming

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Introduction

The native flora and fauna of a region can be thought of as a dynamic web or network of co-dependent relationships. These species have evolved and adapted together, and create the living component of the environment in a region. Sometimes species not native to an area get introduced, purposefully or accidentally. While some of these introductions are benign, others are not. Invasive species are ones which rapidly take over resources and space from native species and in the process can dramatically change the local ecology, economy and cultural resources. Most often, these changes are detrimental to biodiversity and reduce the overall capability of the environment to support native species over the long term. This is especially pertinent for the Red and Blue listed species that are either endangered, threatened or of special concern in British Columbia (BC, please refer to Appendix 1 for the Red and Blue listed species in this region). Rapid, effective management to remove invasive species once detected can protect the native ecosystem from degradation.

Climate change adds significant challenges to the management of invasive species. The recent mountain pine beetle infestation, large wildfires and extended periods of drought are all examples of climate-related disturbances that create opportunities for aggressive and colonizing invasive species. These large scale disturbances, and the potential shift in ecosystem ranges for native species responding to climate change, should both be considered during the planning and implementation of invasive species management in the Lillooet region.

Integrated invasive species management planning (IISMP) is an approach to identifying, managing, and monitoring invasive species to facilitate regional biodiversity conservation in the short and long term. This document will provide a framework for invasive species management by:

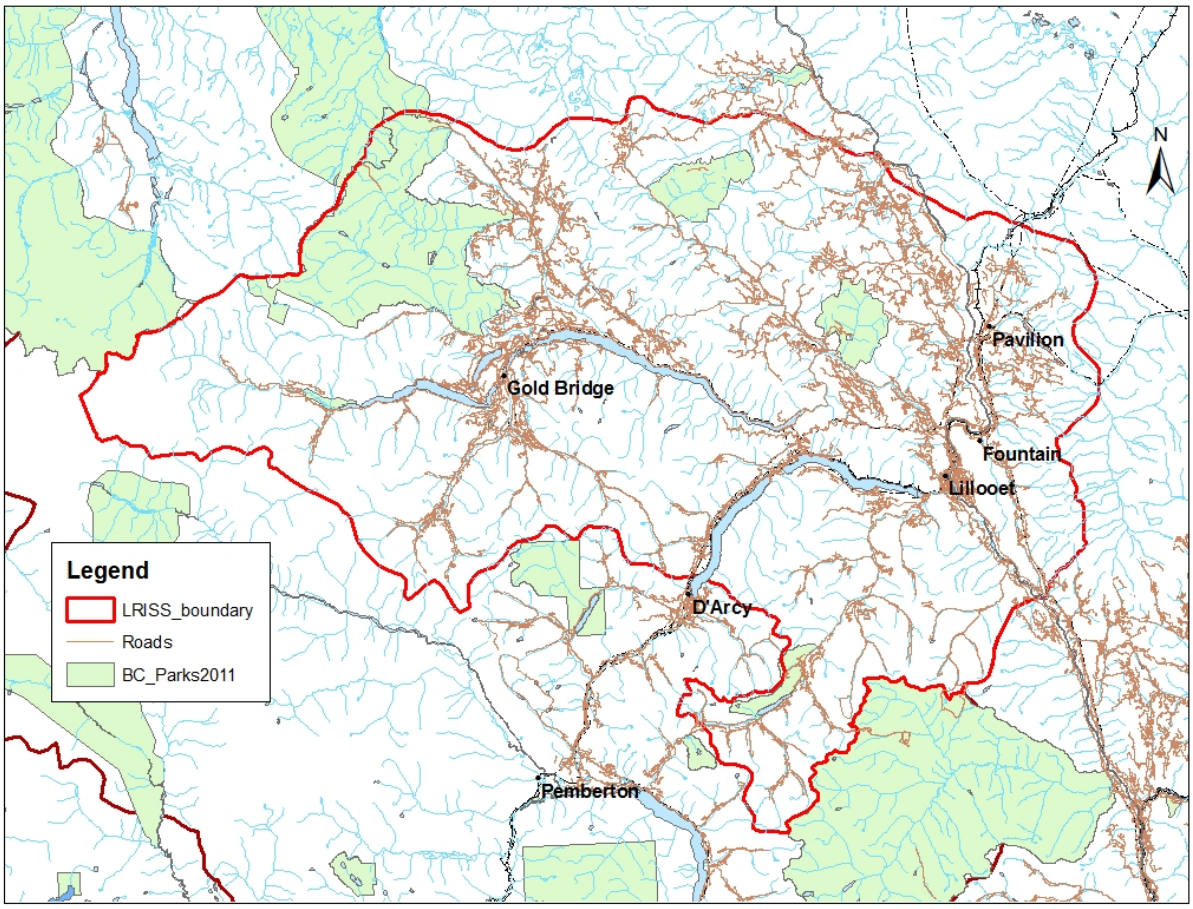
- Providing the context in which decisions for integrated management (including cultural, mechanical, biological and chemical techniques) will be considered and applied

Ensuring that management techniques will be carried out in a considerate, balanced, effective, and appropriate manner throughout the region

The intent of LRISS is to reduce and minimize the negative environmental, social, and economic impacts caused by the introduction, establishment, and spread of invasive species in the Lillooet region.

Figure 1 shows the operational area for the Lillooet Regional Invasive Species Society.

Figure 1: Map showing the operational area of interest for the Lillooet Regional Invasive Species Society. The boundary includes SLRD Areas A and B, the District of Lillooet and the northern half of the St'át'imc Territory.



Goals of the Invasive Strategic Plan

The goals of the strategic plan are the same as the purposes of the Society. The strategic plan will be reviewed on an annual basis to ensure that the long-term vision is congruent with the purposes that were established by the Board of Directors.

The purposes of the Society, within the areas of the Northern Squamish Lillooet Regional District (Electoral Areas A and B, & the District of Lillooet), as well as the northern part of the St'át'imc Territory and the northern part of the Cascades Timber Supply Area, are:

a) To educate the general public, private landowners, public land managers and First Nations regarding invasive species and their impacts (Please refer to Appendix 2: Stakeholder groups to target in the LRISS area);

b) To minimize the further introduction and spread of invasive species in the areas of concern by promoting and assisting in efforts of: education and awareness, early detection, and coordinated integrated invasive species management and control;

c) To promote a coordinated and collaborative approach to the management of invasive species on public, private and First Nations lands within the LRISS operating area and neighbouring jurisdictions;

d) To provide a conduit for information and a source of expertise on invasive species;

e) To compile and maintain a comprehensive inventory of invasive species within the areas of concern; and,

f) To obtain the services of and direct a coordinator to fulfill the purposes of the Society, as funding permits.

Management Area

The operational area of this strategic plan is shown in Figure 1. Many different jurisdictions overlap with this area boundary including the St'át'imc Territory, the Squamish Lillooet Regional District Areas A and B, the District of Lillooet and the Cascades Forest District.

The ecological range in the area varies from the dry Fraser River benchlands (Ponderosa Pine, very hot, dry) through mid-elevation forests (Interior Douglas Fir and Montane Spruce zones), to high elevation forests (Englemann Spruce Subalpine Fir) and alpine tundra. The extensive elevation and ecological range in the area supports high levels of biodiversity and includes many species at risk and species of special concern (refer to Appendix 1: Regional red and blue listed species). Each of the biogeoclimatic zones and subzones within the LRISS area differ when it comes to susceptibility to invasion by weed species. Table 1 shows the zones that are present within our operating area and the potential for spread by invasive plant species. This information is important for planning and prioritizing infestation sites for treatment.

The operational area has been divided up into 6 management units as can be seen in Figure 2 below. It was essential to divide the large operational area into these smaller areas so that planning and operations could be coordinated on a more manageable scale. Each unit will have its own goals and objectives and management strategies based on its unique characteristics and invasive species.

Figure 2: Map showing Invasive Management Areas.

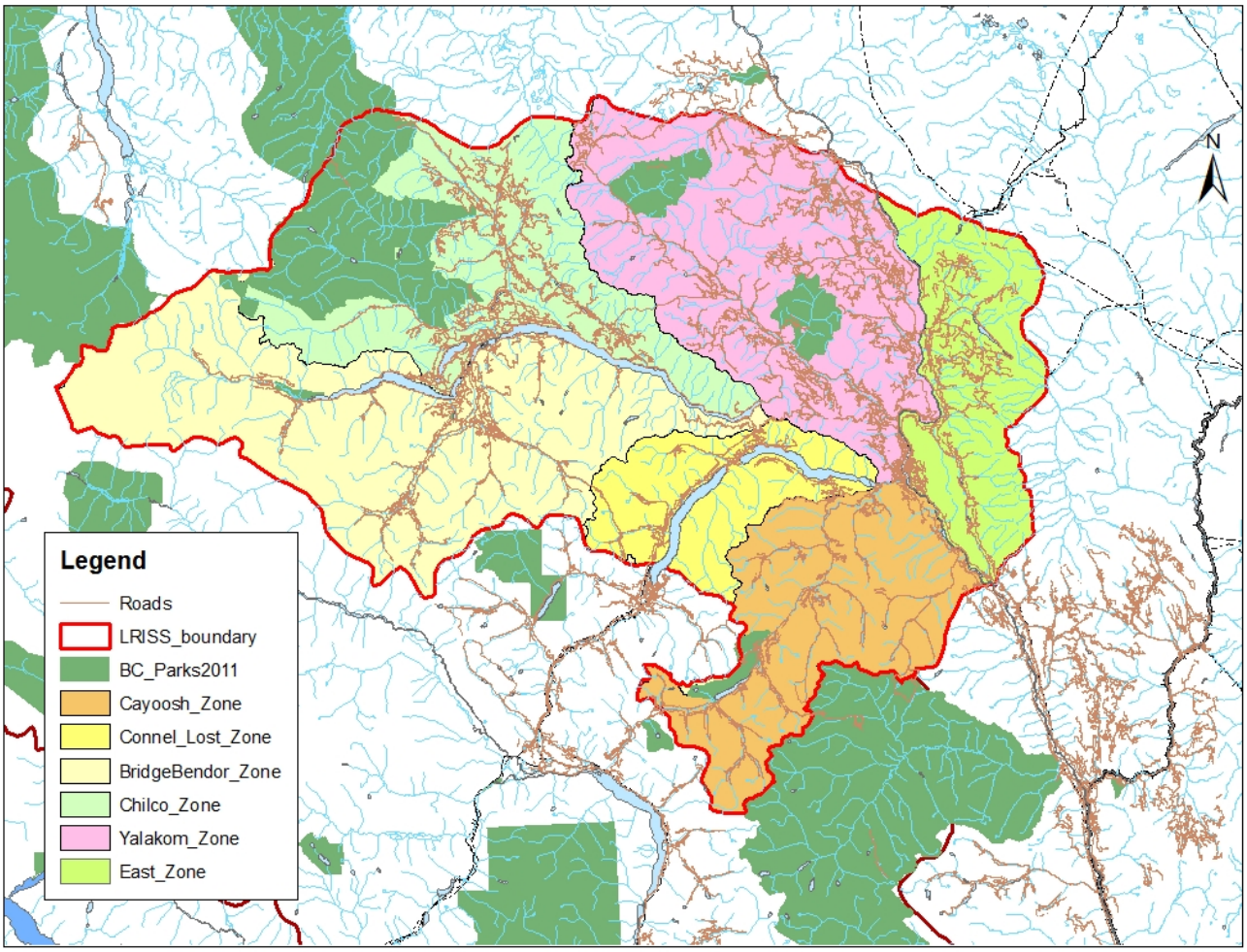


Table 1: Biogeoclimatic zones/subzones found within LRISS operational boundaries and their susceptibility to invasion by noxious weeds.

[1]Table 1 Weed Species	Subzone															
	BG xh	BG xw	PP xh	IDF xh	IDF dk	IDF dm	IDF mw	MS xk	MS dm	MS dc	ESSF xc	ESSF dc	ESSF wc	CWH	BAFA	IMA
Spotted Knapweed	■	■	■	■	■	■	■	■	■	■	■	■				
Diffuse Knapweed	■	■	■	■	■	■										
Dalmatian Toadflax	■	■	■	■	■	■	■									
Leafy Spurge	■	■	■	■	■											
Sulphur Cinquefoil	■	■	■	■	■	■	■									
Rush Skeletonweed	■	■	■	■	■	■										
Hound's-tongue	■	■	■	■	■	■	■	■	■	■						
Blueweed	■	■	■	■	■	■										
Russian Knapweed	■	■	■	■	■	■										
Common Tansy				■	■	■	■	■	■	■						
Common Burdock		■	■	■	■	■	■	■	■	■						
Yellow Toadflax	■	■	■	■	■	■	■	■	■	■						
Plumeless Thistle	■	■	■	■	■	■	■	■	■	■						
Tansy Ragwort				■	■	■	■									
Canada Thistle	■	■	■	■	■	■	■	■	■	■	■					
Bull Thistle	■	■	■	■	■	■	■	■	■	■	■					
Scentless Chamomile	■	■	■	■	■	■	■	■	■	■						
St. Johns Wort	■	■	■	■	■	■	■	■	■	■						
Nodding Thistle	■	■	■	■	■	■		■	■	■						

Inventory

The main focus for the next 2 to 3 years will be inventory and monitoring. In order to gain a better understanding of species and site prioritization in the Lillooet region, inventory is a necessary process. Once we know what species we have and where they are, we can then move to methods of treatment. The LRISS inventories and monitoring will build on and contribute to the existing database held within the Provincial Government's Invasive Alien Plant Program. Inventories will focus on transportation corridors that are known vectors for invasive species establishment, introduction and dispersal.

Priorities

Our current priority is invasive plants. This is because we currently have the most information on plants from previous inventory and treatment data. There are many other invasive species, other than plants, that are found in British Columbia. LRISS, however, is fortunate because we only have one of these pests, to our knowledge, Didymo or "rock snot". In the table below, we have identified invasive species that we will continue to monitor. The Board of Directors may direct outreach resources in order to hopefully prevent the establishment of infestations. We will rely on resources and experts in their field to direct us on our risk to infestation, prevention and management of these species.

Table 2: Invasive Species (other than plants).

American Bullfrog	Common Carp	Didymo or "Rock Snot"
Eastern Grey Squirrel	European Cottontail Rabbit	Largemouth Bass
New Zealand Mudsnail	Yellow Perch	Zebra & Quagga Mussels

There are many tools for ranking invasive plant species and sites and LRISS will need to adopt a tool that fits our local species and sites. Once we have more information from our inventory data, we will be seeking ranking tools for species and sites that will allow us to cross reference these priorities to identify the best treatment options (and timing). Refer to Appendix 3 that gives a current ranking for invasive plant species for our region with the knowledge that we have gathered to date. Appendix 4 lists criteria and ways to manage invasive plants that have been identified in a strategic planning session with multiple stakeholders in February of 2012. These values will form the basis for a site priority system and reporting in the future. Appendix 5 lists vectors and methods of introduction, also identified in the strategic session, and will assist in the formation of the priority lists as well. Appendix 6 contains the plant profiles pertinent to our area.

Invasive Plant Management

The most effective means of preventing invasive species problems is early detection and rapid response to new infestations. A full inventory of the operational area is essential for this early detection. Education and awareness is also very important so that the general public can report new infestations. Once aware of a new species or site, there are 6 main management methods that can be considered for treatment. These management options overall follow the principles of Integrated Pest Management (IPM). IPM is based on the information of the life cycles of the invasive species, their natural predators and their interactions with the environment. . IPM takes advantage of all appropriate pest management options including, the judicious use of pesticides when no other viable alternative for control exists. The following sections describe the management methods that could be used for an infestation.

Management Methods

Prevention

There are a number of prevention methods and although it is the preferred method of control, it is often the most onerous to carry out. Awareness and education by means of outreach is the primary means of prevention.

Teaching specific stakeholder groups and the general public about invasive species can help with reporting new infestations and new species in addition to reduction of spread in our operating area. It is however, a large task to get the information to the public in such a large geographic region. Prevention, however, will continue to be an ongoing method supported by LRISS. We would like to educate and network with as many people and agencies as possible to raise the level of awareness of invasive species in the Lillooet region.

Mechanical Control

Mechanical control methods are by way of machine and the goal is to cut down a plant prior to seed production. Roadside mowing or weed whacking are the most common means of mechanical control. It is essential that the timing of these activities is planned correctly with the biology of the target invasive plants. If mechanical control takes place after seed is produced, it is essentially an effective means of weed spread rather than control. Mechanical control methods may not be appropriate for all plants and sometimes repeated treatment can be necessary. Invasive species biology knowledge and outreach play a crucial role when considering this method.

Manual Control

Manual control can be a very effective method especially with repeated treatment and when dealing with small and isolated infestations. It involves hand-pulling or digging with shovels to remove the entire plant and root system. In the LRISS region, manual control has been used extensively to control and in some cases, remove infestation sites altogether. This method, next to prevention, is the most time-consuming and labour intensive. Proper disposal of invasive plant material when using this method is essential.

Cultural / Competitive Control

This method takes commitment from the managers and owners of the land-base. Maintaining healthy plant communities can help to limit the spread of invasive plant species or inhibit the establishment of them altogether. When disturbance occurs, whether it is natural or human-induced, well-planned rehabilitation must establish a vegetation cover to prevent weed establishment and spread. LRISS seeks to network with all agencies that manage the land-base to ensure that best management practices are observed when carrying out activities that cause soil disturbance and a potential seed bed for invasives.

Biological Control

In areas where infestations are very large and dense, biological agents are used to control invasive plant species. Biological agents are the natural predators of individual invasive plant species that have been rigorously tested and released to decrease the vigour or seed production of the plant. Biological control methods are used when the infestation site cannot easily be managed using the other methods. In order to release bio-agents, there must be a certain number of plants in order to support the agent population for it to have any impact on the infestation site. Biocontrol agents have been widely used in our area and will continue to be used. Releases, especially for knapweed species, have been made as far back as the early 1980's. Monitoring of these older sites will hopefully allow LRISS to understand the efficacy of the agents in our area.

Chemical Control

The treatment of invasive plants using herbicides can be a very effective method of control. Chemical treatment has been used as a method of control in the Lillooet area in the past. There has been, however, a moratorium banning the use of chemicals in the area declared by the St'at'imc Chiefs Council. It is the intent of the Society

to consider all other means of control prior to considering the use of chemicals to treat invasives. It may, however, be necessary to present chemical options for some cases. The Society would like to keep this as an option that could be discussed depending on the invasive species biology, infestation location, risk to other values and type of chemical recommended for use.

Cooperation and Coordination

The Lillooet Regional Invasive Species Society's mission is to address invasive species in the entire Lillooet Region which holds many different land jurisdictions. There is both public and private land that is managed by government and private industry. Public land management, including invasive plant species, is under the jurisdiction of the Ministry of Forests, Lands & Natural Resource Operations, Ministry of Transportation and Infrastructure and the Ministry of Environment. The Squamish Lillooet Regional District, BC Hydro and the Invasive Species Council of BC are also partnering with LRISS to manage invasive species. The Society has sought to bring representatives of all jurisdictions together to coordinate information and management tactics. The Society will continue to network and build relationships in order to coordinate invasive species management within the many jurisdictions in the Lillooet area.

LRISS has sought and will continue to build a solid relationship with the St'at'imc Nation and its individual communities and governments. It is LRISS's intent to involve the St'at'imc Nation in our decision making and management options. LRISS currently has a St'at'imc member on our Board of Directors and it will endeavour to recruit members for future elections. LRISS recognizes the unique knowledge and perspective that the St'at'imc hold and its important relevance to the management of invasive species.

Please refer to Appendix 2 which is an exhaustive list of stakeholders identified at the Strategic Planning Workshop held in February of 2012. This list will help guide the Society in their outreach efforts and relationship building.

Annual Reporting

Every year there will be a report prepared by the coordinators of the work completed. Please refer to Appendix 7 that describes indicators that could be used for this reporting. This list was developed at the strategic planning session in February 2012 as well.

Literature Cited

Southern Interior Weed Management Committee – 2012 Strategy

Southern Interior Weed Management Committee Plant Profiles

Plant photos and species information from:

http://www.agf.gov.bc.ca/weedsbc/weed_desc

http://www.agf.gov.bc.ca/cropprot/weedguid/weedguid.htm

http://www.for.gov.bc.ca/hra/plants/index.htm

Species at Risk for the Lillooet Area - St'at'imc - Lillooet Tribal Council Sara Study: Ken Wright

Appendices

Appendix 1: Regional Endangered Species List.

Species *St'at'imc and Lillooet Tribal Council SARA study – Author Ken Wright*	*COSEWIC Status*	*IUCN Status*
Alkaline Wing-nerved Moss (*Pterygoneurum kozlovii*)	Threatened	*not available*
American Badger (*Taxidea taxus jeffersonii*)	Endangered	Least Concern
Barn Owl (*Tyto alba*)	Special Concern	Least Concern
Burrowing Owl (*Athene cunicularia*)	Endangered	Least Concern
Coho Salmon (*Oncorhynchus kisutch*)	Endangered	*not available*
Columbian Carpet Moss (*Bryoerythrophyllum columbianum*)	Special Concern	*not available*
Common Nighthawk (*Chordeiles minor*)	Threatened	Least Concern
Dun Skipper (*Euphyes vestris*)	Threatened	*not available*
Flammulated Owl (*Otus flammeolus*)	Special Concern	Least Concern
Gopher Snake (*Pituophis catenifer*)	Threatened	Least Concern
Great Basin Spadefoot (*Spea intermontana*)	Threatened	Least Concern
Grizzly Bear (*Ursus arctos*)	Special Concern	Least Concern
Lewis's Woodpecker (*Melanerpes lewis*)	Special Concern	Least Concern
Long-billed Curlew (*Numenius americanus*)	Special Concern	Least Concern
Monarch (*Danaus plexippus*)	Special Concern	*not available*
Mountain Holly Fern (*Polystichum scopulinum*)	Threatened	*not available*
Olive-sided Flycatcher (*Contopus cooperi*)	Threatened	Near Threatened
Pallid Bat (*Antrozous pallidus*)	Threatened	Least Concern
Peregrine Falcon (*Falco peregrinus anatum*)	Special Concern	Least Concern
Rubber Boa (*Charina bottae*)	Special Concern	Least Concern
Rusty Blackbird (*Euphagus carolinus*)	Special Concern	Vulnerable
Rusty Cord-moss (*Entosthodon rubiginosus*)	Endangered	*not available*
Short-eared Owl (*Asio flammeus*)	Special Concern	Least Concern
Spotted Bat (*Euderma maculatum*)	Special Concern	Least Concern
Spotted Owl (*Strix occidentalis*)	Endangered	Near Threatened
Sockeye Salmon (*Oncoryhynchus nerka*)	Endangered (1)	Least Concern
Stoloniferous Pussytoes (*Antennaria flagellaris*)	Endangered	*not available*
Tailed Frog (*Ascaphus truei*)	Special Concern	Least Concern
Western Screech-Owl (*Megascops kennicottii macfarlanei*)	Endangered	Least Concern
Western Yellow-bellied Racer (*Coluber constrictor mormon*)	Special Concern	Least Concern
White Sturgeon (*Acipenser transmontanus*)	Endangered	Least Concern
Wolverine (*Gulo gulo*)	Special Concern	Near Threatened
Yellow-breasted Chat (*Icteria virens auricollis*)	Endangered	Least Concern
(1) The local spawners are not presently listed, but are experiencing significant decline		

List continued on next page.

Source: BC Conservation Data Center – Endangered Species

Common Name	Latin Name	Status
Fisher	Martes pennanti	Blue
Bighorn Sheep	Ovis canadensis	Blue
Great Basin Pocket Mouse	Perognathus parvus	Red
Western Toad	Anaxyrus boreas	Blue
Bull Trout	Salvelinus confluentus	Blue
Damoetus Checkerspot	Chlosyne whitneyi	Blue
Common Sooty Wing	Pholisora catullus	Blue
California Hairstreak	Satyrium californica	Blue
Slender Hawksbeard	Crepis atribarba ssp. atribarba	Red
Geyer's Onion	Allium geyeri var. tenerum	Blue
Tiny Suncress	Boechera paupercula	Red
Curved-spiked Sedge	Carex incurviformis var. incurviformis	Blue
Nine-leaved Desert-parsley	Lomatium triternatum ssp. platycarpum	Red
Diverse-leaved Cinquefoil	Potentilla diversifolia var. perdissecta	Blue

Appendix 2: Stakeholder groups to target in the LRISS area.

This list was created on February 12, 2012 at a LRISS workshop.

- iPhone and iPad apps
- Schools – teach younger students to spread awareness
- Travellers into an area (Weed stops)
- Workers – Forestry and others who work in the bush
- Boaters
- Recreation groups – ATVs, Motorcycles
- Horseman and backcountry recreation groups
- Alpine and Mountaineering groups/rock climbers
- Hunters
- Unity Riders
- District staff and the SLRD staff
- Ministry staff and Highways (check their parking lots!)
- Campsites and rec sites (Wanted dead or alive posters)
- Fire wardens and fire protection staff
- Forest licensees and Mining companies
- Ranchers – although many are already aware
- Highways
- Create a half or one-day workshop that can be used in schools
- Track patrol – railway speeders
- Fisheries
- Sport Fisherman
- Hunting guides/Guide outfitters

Appendix 3: LRISS Species Invasiveness Categories

		LRISS PRIORITY RISK RATING						
Common Name	***Scientific***	***V.High***	***High***	***Mod***	***Low***	***Provincial Noxious***	***Regional Noxious □ TNRD***	***Proposed Provincial Prohibited Noxious Weeds***
black henbane	***Hyoscyamus niger***							□
common crupina	*Crupina vulgaris*					□		□
purple nutsedge	*Cyperus rotundus*					□		□
yellow starthistle	***Centaurea solstitialis***					□		
blueweed	*Echium vulgare*						□ □	
common bugloss	*Anchusa officinalis*						□	
corn spurry	***spergula arvensis***							
garlic mustard	***Alliaria petiolata***					□		□
giant hogweed	*Heracleum mantegazzianum*					□		
Eurasian milfoil	*Myriophyllum spicatum*							
field scabious	*Knautia arvensis*					□	□ □	
henbit	*Lamium amplexicaule*							
Japanese knotweed	*Fallopia japonica*					□		
marshplume thistle	*Cirsium palustre*						□	
puncture vine	*Tribulus terrestis*						□	
purple loosestrife	*Lythrum salicaria*					□		
rush skeletonweed	*Chrondrilla juncea*					□		
Russian knapweed	*Centaruea repens/Acroptilon repens*						□	
Scotch broom	*Cytisus scoparius*							
Scotch thistle	*Onopordum acanthium*						□	
common St. John's wort	*Hypericum perforatum*							
tansy ragwort	*Senecio jacobea*					□		
velvetleaf	*Abutilon theophrasti*					□		□
yellow flag iris	*Iris pseudacorus*					□		
yellow nutsedge	*Cyperus esculentus*					□		
annual sowthistle	*Sonchus oleraceus*					□		
baby's breath	*Gypsophila paniculata*							
bull thistle	*cirsium vulgare*							

Appendix 4: Criteria for prioritization and management of invasive species.

Criteria for prioritization of Species:

- Degree of invasiveness:
  Rate of spread
  Method of spread: sexual, vegetative
- Potential ecological, social and economic harm.
- Difficulty of eradication
- Current distribution of the species
- Presence on EDRR lists for Province and Region. (Is there a comparable EDRR list for other species?)

Criteria for Prioritization of Sites

- Proximity to sensitive habitats
- Proximity to waterways
- Proximity to alpine
- Proximity to residences
- Proximity to cultural values or to economic interests
- New species detection vs. an established species
  Length of time the patch has been established
  Spread potential from that site
- Size of the patch
- Distribution of patches
  How accessible is the patch? Cost to get there for treatment?
  Isolated patches may be low priority because they are too expensive to get in and treat, or conversely may be a high priority to prevent further spread (species dependent).
  The opportunity to eradicate easily accessible patches should be taken.

Management Strategy Identification

- What is the biology of the invasive species? Rate of reproduction, longevity, reproductive abilities, toxicity, etc.
- What is the range of management options appropriate to this species? If necessary consider trial treatments to assess effectiveness before implementing broad application.
- Evaluate the options on a site-specific basis to determine:
  Effectiveness at eliminating or controlling the invasive?
  Probability of success in what time frame?
  Non-target risks and consequences?
- Develop annual, and when possible multi-annual, action plans

Appendix 5: List of invasive plant species vectors and methods of introduction.

Waterways:

- Boaters-Boats
- Fishing gear
- Float Planes

Off road vehicles:

- ATV's
- mountain bikes
- motorcycles,
- 4X4's

Agriculture:

- Seed mixes
- Mowing
- Hay moving
- Livestock

Roads:

- Vehicles
- Mowers,
- Weed whackers
- Ploughs
- Ditching
- Gravel moving
- Spoil sites

Industry and Utilities

- CN Railway
- BC Hydro lines and workers
- Aspen Planers-logs and logging trucks
- Mining
- Wild Fire Fighters

Nurseries, Plants:

- Topsoil
- Gravel
- Soil amenities
- Wildlife/Birds

Recreation:

- Hiking boots
- Hunting and fishing

Back Country:

- Horses & pack animals

Misc:

- Dogs

Appendix 6: Plant Profiles

Blueweed (*Echium vulgare*)

BW ECHI VUL

Erect biennial to short-lived perennial herb up to 1 meter (3 feet tall). Introduced from North Africa as a garden ornamental.

Quick ID

- Purplish-blue, funnel-shaped flowers.
- Flowers on the upper side of short arching branches.
- Seed stalk resembles a viper's head.
- Entire plant is bristly/hairy.

Flowers: Numerous bright, purplish-blue (occasionally white or pink), funnel-shaped flowers arranged on the upper side of short arching branches. Five petals. Buds are reddish-purple before opening.

Leaves and Stems: First year basal rosette radiates from central point. Rosette leaves have entire margins, taper toward stalk, and are rounded at the tips. Flowering stalks grow from the rosette during the second year. Stem leaves are lance-shaped with entire margins, and are alternately arranged. Stem hairs are painful to touch.

Seeds: Fruit is a cluster of four angular, wrinkled seeds that are grayish-brown when mature. Each plant may produce up to 2, 800 seeds.

Roots: Stout, black taproot with smaller fibrous lateral roots. Reaches 60 cm (2 feet) long.

Reproduction and Dispersal: By seeds. Most seeds fall near the parent plant, but seeds also travel through infested gravel, water, animals, heavy machinery and vehicles.

Habitat Preference: Found in gravely riparian areas, roadsides, pastures and meadows at low to mid-elevations. Well-adapted to dry, rocky sandy or shallow soils especially glacial till.

Interesting Facts:
Typically not eaten by grazing animals and thus increases in overgrazed areas.

Native "Look-Alike" Species

Lupine, *Lupinus spp.*, appears similar but the main distinguishable difference is that lupine has leaves that are palmate shaped, that are smooth above and hairy below and the leaves are soft to the touch. The flowers are pea-like.

Manual Treatment: Hand pulling or digging is effective; done best when soil is moist. Wear gloves, avoid skin contact. If any portion of flower is beginning to emerge, or if seed heads are formed, pick, bag, and remove.

Jan	*Feb*	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*

Burdock (*Arctium spp.*)

BU ARCT SPP

Erect biennial thistle ranges in heights from 1 to 3 meters tall.

Quick ID

- Burdock is well-known for producing prickly burrs that easily attach to clothing and animals.
- Large purple flowers that are scattered in rounded clusters along the stems.

Interesting Facts:
Livestock eat the leaves, and the foliage can impart a bitter taste in milk.
Burrs can become entangled in the fleece of sheep, damaging the quality and reducing the value of wool. Burdock has diuretic properties

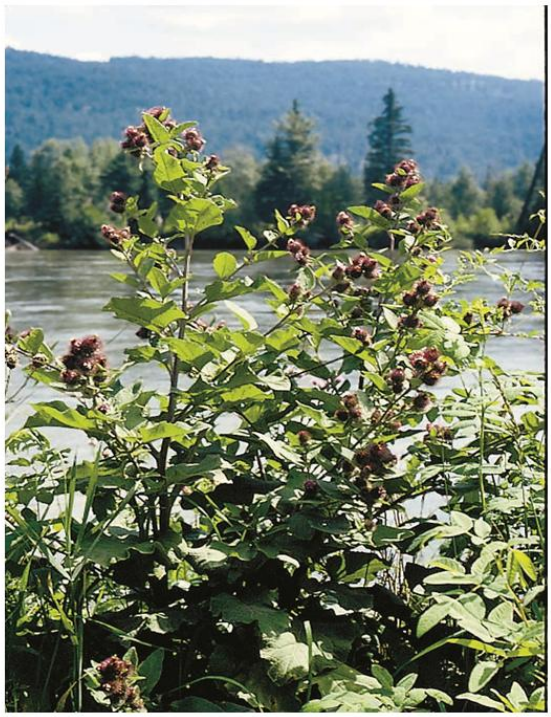
Flowers: Large purple flowers that are scattered in rounded clusters along the stems.

Leaves and Stems: The leaves are toothed or wavy -edged, broad, dark green, and woolly underneath .

Roots: Large fleshy taproot.

Reproduction and Dispersal: Burr-like seed heads are readily dispersed by attaching to animal fur or clothing.

Habitat Preference: Burdock is found at low- to mid-elevations in grasslands and forests, along roadsides, ditches, stream banks, pastures, and disturbed habitats. It is frequent in coastal, west central, and southern British Columbia and a major concern in the Okanagan, Thompson, Cariboo, Omineca, and Peace regions .



Manual Treatment: Tillage can be used to kill the plants at the rosette stage. Mowing or cutting can be used to eliminate seed production. Mow after the plant has bolted but before it has flowered

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Diffuse Knapweed (*Centaurea diffusa*)

DK CENT DIF

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Larinus minutus	Overwintering Adult				Adult		Adult/larva	Larv/pup	Adult	Overwintering adult		
Cyphocleonus achates	Overwintering		Larva			Pupa	Pupa/adult		Adult		Overwintering	

Quick ID

- White (or pinkish-purple) flowers
- Deeply lobed basal and lower stem leaves
- Triangular floral bracts tipped with slightly re-curved spines
- Stems bread off at ground level after seed matures, creating a tumbleweed.

Interesting Facts:
A fertile hybrid between Diffuse and Spotted knapweed has been identified.

Flowers: One white (or pinkish-purple) urn-shaped flower head, comprised of 12 to 13 disk flowers, develops on the end of each stem branch. The triangular floral bracts are tipped with a short, cream to brown-colored spine that is slightly recurved. Margins of bracts have slender, comb-like teeth.

Leaves and Stems: Coarse; covered with fine hairs that give them a grayish-green appearance. First year basal rosette has leaves up to 15.24 cm long with deeply lobed segments. Flowering stalks with alternate leaves grow from the rosette during the second year. Single main stem divides into numerous spreading branches on mature plant, giving it a bushy appearance.

Seeds: Oblong, 3 mm long, dark brown or gray.

Roots: Deep, elongated taproot.

Reproduction and Dispersal: Primarily by seed but root and crown fragments also resprout. Wind-blown 'tumbleweeds' help to disperse seeds greater distances.

Habitat Preference: Found in fields, roadsides and other open areas. Can spread rapidly in disturbed sites. Prefers well drained, light textured soils that receive ample sunlight. Prefers a drier site that spotted knapweed.

Native "Look-Alike" Species

Many native species of **Purple aster** appear similar at first glance, but can be distinguished by the presence of white or purplish petal-like ray flowers, a center of yellow disk flowers, and bracts below the flowerheads in series of unequal length.

Manual Treatment: Cutting or mowing before seed-set can be effective to reduce seed production, but it will not eliminate large infestations. Cut plants and rosettes may survive and re-bolt. Ideally, mowing should be followed by an autumn herbicide treatment. Hand-pulling can be effective on small infestations, but it often needs to be re-peated, depending on the size of the initial weed population.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Hoary Alyssum (*Beteroa incana*)

HA BERT INC

Regional Noxious. Annual to short-lived perennial. Hoary alyssum grows erect to 0.7 meters tall and has white flowers carried on long slender stalks.

Quick ID

- White flowers with deeply notched petals.
- The entire plant is covered with star shaped hairs.
- Upper leaves are elliptic and clasp stem.
- Oval seedpods are 5-8 mm long, somewhat flattened and held close to the stem.

Interesting Facts: Hoary alyssum is toxic to horses, and can cause fever, edema, and laminitis. Sensitivity varies when small or single doses are ingested, and death has only been reported in horses that have consumed hay infested with a large proportion (30-70%) of hoary alyssum.

Flowers: Has small (5-8 mm in length), white flowers with deeply notched petals that are supported on slender stalks. Sepals are hairy and transient.

Leaves and Stems: The whole plant is covered in star-shaped hairs that are rough to touch, with grey leaves that clasp closely to the stem.

Seeds: Oval seedpods are chambered and held close to the stem with each chamber containing 5-7 black seeds.

Reproduction and Dispersal: Hoary alyssum spreads rapidly through a long season of seed production. Each plant flowers and produces a large number of seeds between early summer and fall up to frost. Seeds disperse as a contaminant in hay and are spread by vehicles, equipment, footwear, wildlife, and birds.

Habitat Preference: Most common on sandy or gravely soils, hoary alyssum establishes in dry, disturbed habitats, such as roadsides and railway embankments. Hoary alyssum invades dry land, irrigated alfalfa fields, and rangelands, tending to increase in forage crops following periods of drought or winterkill, thus reducing hay quality and value.

Native "Look-Alike" Species

Field Chickweed, *Cerastium arvense,* is a native perennial found in subalpine meadows and rocky hillsides. It has opposite, slender, stemless leaves and white flowers with five, deeply lobed petals.

Manual Treatment: Small populations are killed by hand pulling or hoeing. Mowing can prevent seed production.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Hoary Cress (*Cardaria draba*)

HC CARD DRA

Erect, perennial herb up to 0.6 meters (2 feet) tall. Has a flat-topped appearance. Introduced from Eurasia, most likely in contaminated alfalfa seed. Also known as *Lepidium draba*.

Quick ID

- White flowers with 4 petals, approx. 1/4 inch across.
- Dense flower clusters give a flat topped appearance.
- Lower leaves are stalked and hairy while upper leaves clasp the stem and are usually hairless.
- Inflated, upside down, heart-shaped seedpods.

Interesting Facts:
Above ground parts are high in vitamin C.

Flowers: White flowers with 4 petals, approximately ¼ inch across. These dense flower clusters give the weed a flat-topped appearance early in the season, but this is lost as the stem elongates.

Leaves and Stems: Leaves on mature plant are shaped like arrowheads, alternately arranged, and have finely toothed edges. Basal rosette has bluish-green, lance shaped leaves. A single stem, often branched near the top, has one flower cluster.

Seeds: Inflated seedpods are shaped like an upside down heart. Seedpods contain two reddish brown, egg-shaped seeds separated by a narrow partition. Viable up to three years.

Roots: Rhizomatous, with vigorous creeping root system. Below ground buds develop new shoots. Root system comprises over 75% of the plants total biomass; can grow up to 9 meters (30 feet).

Reproduction and Dispersal: Primarily by rhizomes and root fragments; can form dense patches of clones over an area of 3.6 meters (12 feet). Also reproduces by seed. Can produce two crops of seeds per year.

Habitat Preference: Meadows, fields, roadsides, ditches, waterways, cultivated lands and rangelands. Particularly adapted to sub-irrigated pastures with alkaline soils.

Native "Look-Alike" Species

Common Yarrow, *Achillea millefolium*, has a similar white, flat-topped flower cluster. The leaves are easily distinguished as they are very finely pinnately-divided, appearing feather like, and have a fragrant aroma when crushed.

Manual Treatment: Mowing 2–3 times a year for several years may slow the spread and reduce seed production. Mowing should be conducted during the bud stage and repeated when the plants re-bud.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Hounds Tongue (*Cynoglossum officinale*)

HT CYNO OFF

A biennial to short-lived perennial. It forms a rosette in the first year with leaves shaped like a dog's tongue. Mature plants are 0.3 to 1.2 metres tall and have rough, hairy, wide leaves and reddish-purple, five-petal flowers.

	Jan	*Feb*	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*
Mogulones cruciger	Overwinter			Adult	All stages			Adult		Overwinter - mixed stages		

Quick ID

- Dull, reddish purple flowers with five petals.
- Soft, hairy rosette of leaves in first year
- Burr-like seeds stick to fur and clothing.

Interesting Facts:
Hound's-tongue contains toxic alkaloids that can cause liver damage in cattle, deer, pigs, horses, and goats.

Flowers: Dull, reddish purple flowers in terminal branches with five petals, united at the base.

Leaves and Stems: Rough, hairy/velvety, 2.5 to 30 cm long leaves with entire margin (lacking teeth or lobes). Alternate leaves in second year. Erect hairy stem, usually branched near the top. May produce a single flowering stem or multiple stems per plant.

Seeds: Fruit is composed of four prickly, flattened, burr-like nulets (seeds) that are green when immature and roughly the size of a corn kernel. Seeds turn brown and become adhesive when mature, readily clinging to clothing or animals.

Roots: Mature hound's tongue plants have a woody taproot.

Reproduction and Dispersal: By seed. 'Hitchhiking' seeds can easily be spread great distances by animals and humans. Mature plants can produce hundreds of seeds per year. Viable for 2-3 years.

Habitat Preference: Shade tolerant. Open forested and meadow areas, along roads and trails, disturbed areas.

Manual Treatment: Hand-pull plants and/or remove flowering stems before seed-set (by mowing or picking). Wear gloves to prevent skin irritation.

Jan	*Feb*	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*

Japanese knotweed (*Fallopia japonica*)

JK FALL JAP

Erect perennial 1.3 to 2.7 meters (4-9 feet) tall. Grows in clumps with 40 or more stems per clump. Introduced from Asia as an ornamental.

Quick ID

- Hollow, bamboo-like stems with spots.
- Creamy-white flowers in clusters from leaf joints.
- Heart shaped leaves are lighter green on underside.
- Forms dense thickets.

Interesting Facts:
Typically not eaten by grazing animals and thus increases in overgrazed

Flowers: Creamy white flowers in large plume-like clusters at leaf axil. Composed of five slightly fused sepal-like petals. Petals are lacking. Papery cup-like bracts surround the flowering stalk at each joint.

Leaves and Stems: Stout, hollow stems with reddish-brown spots at maturity. Nodes (or stem joints) are slightly swollen and surrounded by thin sheaths; usually fringed at the top. Alternate, heart-shaped, leathery leaves, 5-15 cm, on short stalks.

Seeds: Three-sided fruits with narrowly winged sepals. Seeds are glossy, brown/black.

Roots: Creeping rhizomes usually 5 to 6 meters (16—20 feet) long.

Reproduction and Dispersal: primarily from rhizomes and stems; also by seed. Rhizomes and stem fragments disperse with water currents, flooding, and with natural or human-facilitated soil movement. Fruits disperse by wind.

Habitat Preference: Disturbed areas, riparian areas, wetlands, roadsides, pastures and ditches. Prefers moist soils.

Native "Look-Alike" Species

Black or Red Elderberry, *Sambucus racemosa*, also has hollow spotted stems clustered with white flowers. Distinguished from Japanese knotweed by opposite branches, leaves divided into 5 to 9 sharply toothed leaflets, and clusters of dark red fruits.

Manual Treatment: Cutting the stalks at least three times per growing season for several years and covering with black plastic or shade cloth may be effective at depleting energy reserves in rhizomes.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Orange Hawkweed (*Hieracium aurantiacum*)

OH HIER AUR

A 30 cm to 1 meter (1-3 feet) tall perennial with above ground runners, similar to those of strawberries. Introduced from Europe as a garden ornamental.

Quick ID

- Vibrant orange-red flowers.
- Milky latex juice when broken.
- Hairy leaves mostly found at base of plant.
- Stems mostly leafless with black bristly hairs.

Interesting Facts:
Above ground runners create a dense mat that impedes other vegetation. Grazed by sheep, goats, horses, occasionally by cattle, and native grazing animals.

Flowers: Cluster of 5 to 30 dandelion-like, showy, red-orange flower heads. Petals have notched tips.

Leaves and Stems: Hairy leaves in a rosette at the base of the plant. Leaves darker green on top than underneath. Few to no leaves on stem.

Seeds: Tiny purplish-black seeds with tawny-white, brittle plumes attached on the flattened end.

Roots: Rhizomatous. Shallow fibrous roots with a woody stem base.

Reproduction and Dispersal: By above ground runner, seeds and roots.

Habitat Preference: Low to mid-elevations. Disturbed areas, meadows, roadsides, grasslands, forest openings and lawns. Will not tolerate heavy shade.

Native "Look-Alike" Species

Indian paintbrush, *Castilleja miniata*, has a flower set in a cluster with long, tube-like petals that are pale green to red on the ends and is mostly hairless. Many native hawkweeds exist in this ecosystem as well but all have white or yellow flowers.

Manual Treatment: Hand pulling or digging is effective; done best when soil is moist. Wear gloves, avoid skin contact. If any portion of flower is beginning to emerge, or if seed heads are formed, pick, bag, and remove.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Spotted knapweed (*Centaurea biebersteinii*)

SK CENT BIE

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Larinus minutus	Overwintering Adult				Adult		Adult/larva	Larv/pup	Adult	Overwintering adult		
Cyphocleonus achates	Overwintering		Larva			Pupa		Pupa/adult	Adult		Overwintering	

Quick ID

- Pinkish-purple flowers.
- Grayish-green stems and leaves.
- Floral bracts have brown, triangular tips with comb-like fringe.
- Seed head persists until following year.

Interesting Facts:
Exudes a chemical called catechin into the soil, which prevents the germination of neighboring plants.

Flowers: One pinkish-purple (sometimes white), urn-shaped flower head, comprised of 30 to 50 disk flowers, develops on the end of each stem branch.

Leaves and Stems: Coarse; covered with translucent resin dots and fine hairs. First year basal rosette has deeply-lobed leaves. Flowering stalks with deeply-lobed, alternate leaves grow from rosette in second year. Short, narrow upper-stem leaves. Stems on mature plants have many branches. Bitter to taste.

Seeds: Brownish or black seeds, 3 mm long. Seeds are notched on one side of the base and have a short tuft of bristles at the tip. A single plant can produce up to 40,000 seeds.

Roots: Deep, stout taproot that helps plant compete for water and nutrients.

Reproduction and Dispersal: Primarily by seed but root fragments also re-sprout. Seeds that do not germinate form a seedbank in the soil and may remain viable for eight or more years.

Habitat Preference: Found in disturbed areas, fields, roadsides, and other open areas. Prefers well-drained, light textured soils that receive summer rainfall and ample sunlight. Does not tolerate dense shade.

Manual Treatment: Cutting, mowing, or pulling spotted knapweed before the plant sets seed can be effective on a local basis for small populations. However, spotted knapweed seeds can remain dormant in the soil for long periods, so follow-up treatments will be required to make sure the plant has been controlled. Attempt to remove the entire root system so the plant will not re-sprout from the crown or remaining roots.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Sulphur Cinquefoil (*Potentilla recta*)

SC POTE REC

Erect, long-lived perennial 0.3 to 0.8 meters (1-3 feet) tall. Older plants often form a ring-shaped clump as old roots die in the center and new shoots grow on the outside edges. Native to Eurasia.

Quick ID

- Pale yellow flower with 5 petals.
- Long, stiff hairs perpendicular to stem.
- Relatively few leaves at plant base.
- Underside of leaf is green, not silver.
- Palmate leaves.

Interesting Facts:
Unpalatable to grazing animals due to high tannin content.

Flowers: Pale yellow flowers, 1.3 to 2.5 cm in diameter, five heart-shaped petals; bright yellow centers. Contain 25 to 30 stamens. Found on top of stems.

Leaves and Stems: A rosette on long-stalked leaves develops first and withers before flowering. Stems and leaves are covered with long, coarse, shiny hairs at right angles. Stem leaves are alternate, green on the underside, and composed of 5 to 7 leaflets with toothed margins. Leaflets appear like marijuana leaves (palmately compound).

Seeds: Oval shaped dark brown seeds covered with net-like ridges.

Roots: Woody taproot may have several spreading roots but no rhizomes.

Reproduction and Dispersal: By seed only. Most seeds fall near parent plant and disperse greater distances with water, soil movement, human activities and animals. Seeds survive three years or longer.

Habitat Preference: Disturbed areas, grasslands, open forests, shrubby areas, roadsides and fields. Can invade healthy plant communities but does not tolerate full shade. Associated with knapweed infestations.

Native "Look-Alike" Species

Many native cinquefoils, such as *Potentilla gracilis*, appear similar but Sulphur cinquefoil can be distinguished by long, right angled hairs; numerous stem leaves but few basal leaves; and leaves that appear green on the

Manual Treatment: Although primarily a seed producer, simply eliminating seed production is not very effective in reducing or eliminating sulphur cinquefoil infestations. Plants are able to perpetuate by vegetative growth and continue to slowly spread. Hand-pulling is effective on small infestations provided the entire root is removed.

Jan	*Feb*	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*

Appendix 7: Key information to be tracked for reporting.

Indicator Lists

Below is an outline of key information to be tracked for the purposes of improved decision-making by LRISS and various partners and funding agencies. These values can be formatted into a simple table or report structure to facilitate annual reporting to the Board.

Regional:

- Number and type (terrestrial, aquatic, plant, animal, insect, etc) of invasive species identified
- Proportion of the region actively monitored or surveyed by LRISS for invasive species
- Number of independent reports provided to LRISS of invasive species
- Area of occupation by invasive species (actual or estimated)
  - Looking for trends in expansion or contraction of range
- Number of invasive species being actively managed and by whom
- Number of active treatment sites
- Area of active management treatments
- Area of treatment monitoring (post-active phase)
- Area of direct threat to other resources (e.g. range, private land, cultural sites, species-at-risk habitat, etc.)

Species Specific:

- Species Name
- Priority Rank/Status
- Area of occupation (actual or estimated)
  - Continuous?
  - Patches? – number and extent
  - Spreading or under control
- Key biological features
- Appropriate Strategies List
- Decision tree for strategy choice
- Site specific strategy applied including month/year of application and area treated
- Monitoring requirements

Communications/Society Information

- Annual LRISS report completed and accepted by the board (yes/no – by year)
- Number of board members
- Number of Society members
- [Some measure of public education or stakeholder education??] number of events hosted, participated in, number of people reached, number of volunteers, Volunteer (hrs)
- Funding summary