Galiano Conservancy Association

Millard Learning Centre Introduced Species Management Plan

Published: 2014
Updated: 2021

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Introduction

This report is the updated introduced species management plan that was adapted from the 2018 report: "Learning Centre – Invasive Alien Species Control Plan". The updated plan includes current maps of key introduced species, updated prioritization of removal, and 7 additional plant species:

- *Crataegus monogyna* (Common Hawthorn)
- *Hedera helix* (English Ivy)
- *Hypericum perforatum* (St. John's Wort)
- *Jacobaea vulgaris* (Tansy Ragwort)
- *Phalaris arundinacea* (Reed Canary Grass)
- *Rosa rubiginosa* (Sweet-Brier)
- *Tanacetum vulgare* (Common Tansy)

Galiano Island

Galiano Island is located in the middle of the Strait of Georgia. Located in the Coastal Douglas-fir biogeoclimatic zone, the island experiences warm, dry summers and mild, wet winters, with an average annual rainfall of 920mm.

The Learning Centre

In February 2012, the Galiano Conservancy Association purchased The Millard Learning Centre (MLC; DL57), a 76-hectare parcel of land, for conservation and educational purposes. The principal goals of the Learning Centre are to practice ecological stewardship, create opportunities for learning, contribute to local food security and economic development, and provide recreation opportunities. This property is a critical addition to a network of over 500 hectares of protected areas forming the Mid-Island Protected Areas Network (Figure 1). DL57 faces the Trincomali Channel and encompasses almost two kilometers of nearly unbroken shoreline forest, making it one of the largest remnants of this type in the entire Gulf Islands (GLCMC 2013). In the past, parts of the MLC have been inhabited, farmed and logged. These disturbances to the land have allowed introduced species to establish and become a threat to the native ecosystem.

Goal

The goal of the GCA Introduced Species Management Plan is to provide guidance for the control and extirpation of introduced species on DL57 in accordance with the MLC Management Plan.

Objectives

1. Identify and map introduced species on DL57 annually.
2. Determine site appropriate methods for control of each species in accordance with the Learning Centre Management Plan.
3. Develop recommendations that prioritize species and locations for management, and actively remove high priority species.

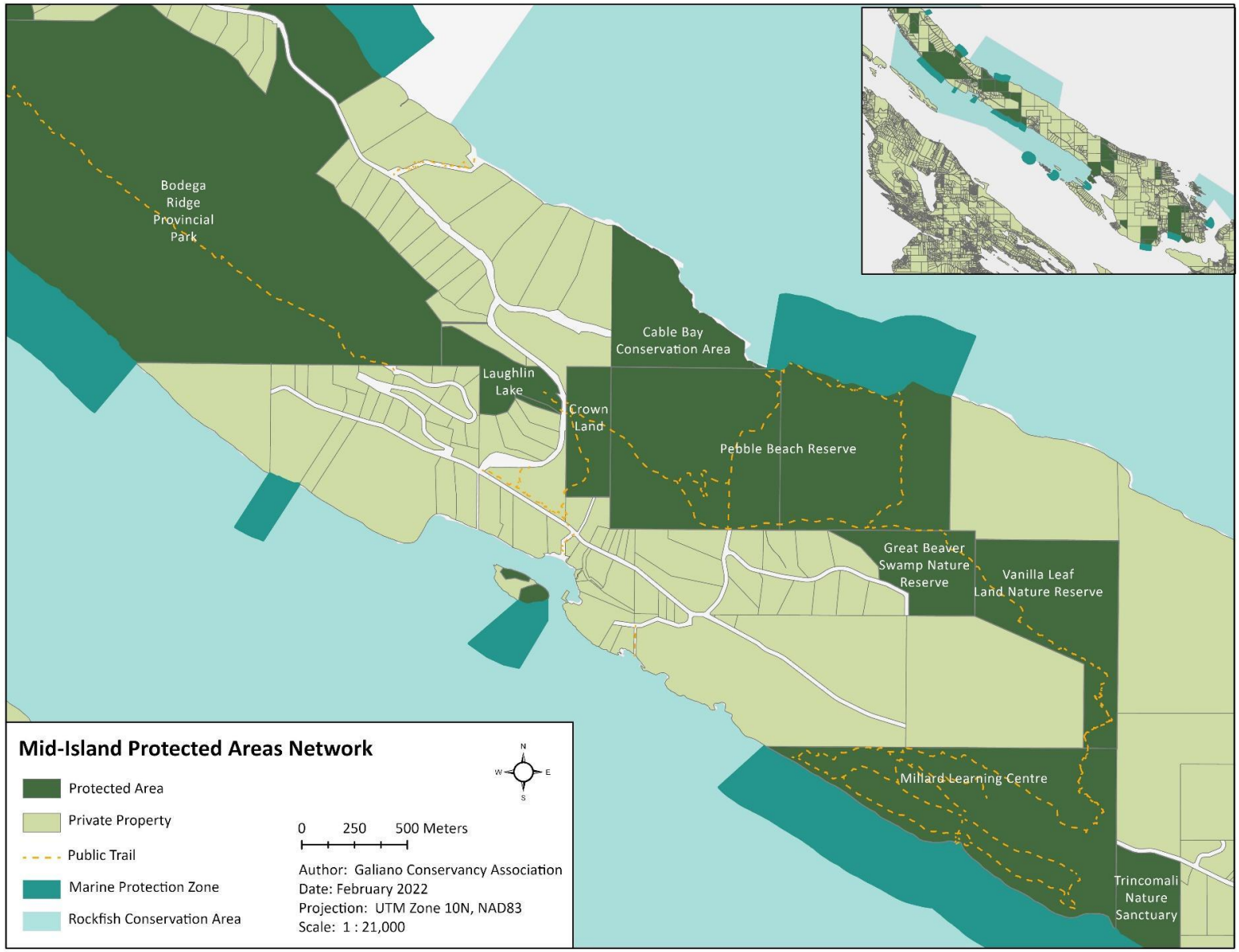
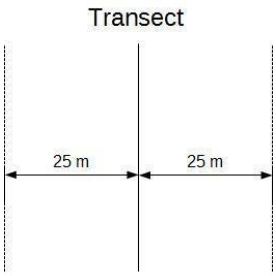


Figure 1. Galiano Island mid-island protected areas, including the Millard Learning Centre.

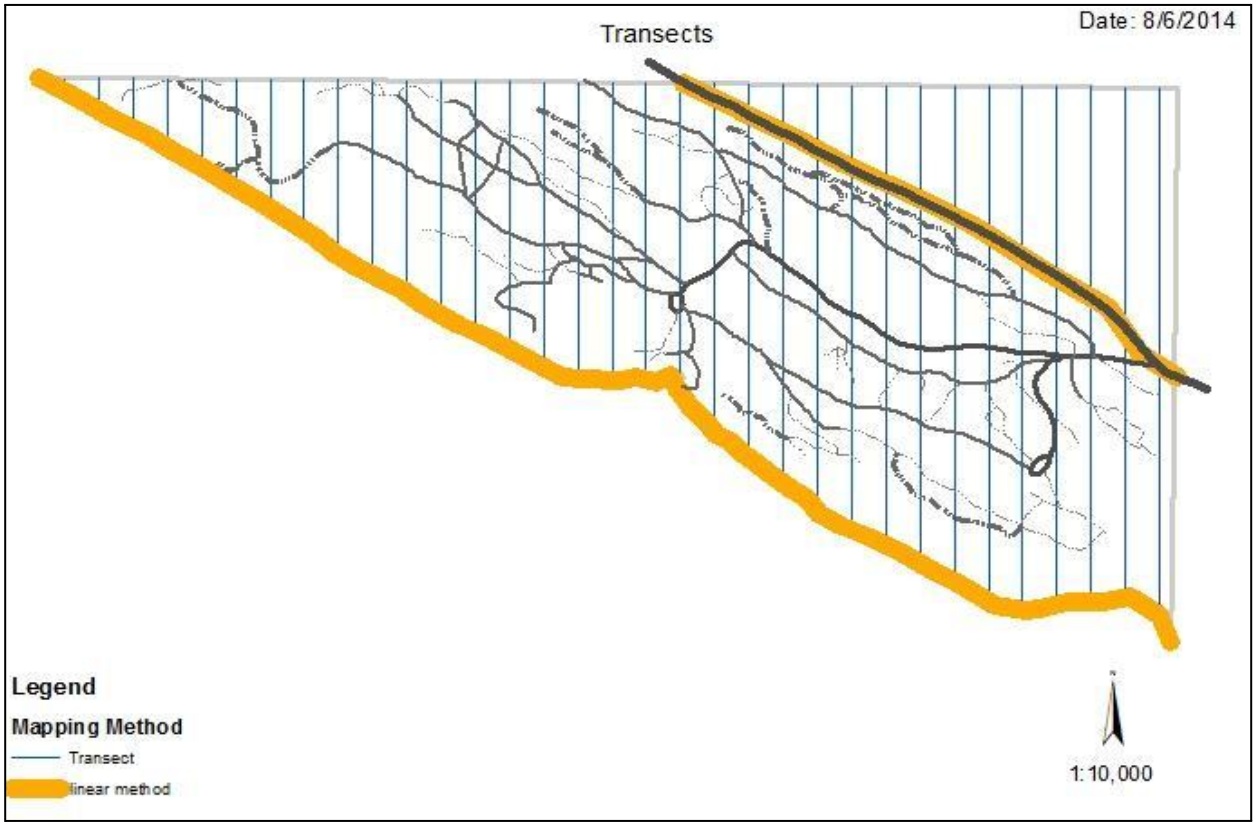
Methods



DL57 was surveyed by foot, using a modified transect method at 50 m intervals. One surveyor walked the north-south transect line, while two surveyors walked 25 m on either side of the line.

In addition to walking transects, introduced species along the northern edge of DL57 were mapped by walking Porlier Pass Drive. Scotch broom along the southern cliffs was not mapped because the area is cleared of broom every year, and the only remaining broom is in inaccessible locations.

Key introduced species were mapped using Garmin etrex 30 units and Trimble GeoExplorer 6000 Geo XS. Individuals or groups up to 10 m^2 were marked as points, and groups larger than 10 m^2 were marked as polygons.



Equipment

- Trimble Geoexplorer 6000 GeoXH
- Garmin etrex
- Compass
- Notebook
- Tape measure

Data Collection Codes **(based on Durand, Ryan; 2003)**

Distribution within patch:

Code	Description
1	Rare individual, single occurrence
2	Few sporadically occurring individuals
3	Single patch or clump of a species
4	Several sporadically occurring individuals
5	Few patches or clump of a species
6	Several well-spaced patches or clumps
7	Continuous uniform occurrence of well-spaced individuals
8	Continuous occurrence of a species with a few gaps
9	Continuous dense occurrence of a species

Vigor within patch:

Code	Description
0	Species dead
1	Vigour poor
2	Vigour fair
3	Vigour good
4	Vigour excellent

Lifestage:

Code	Description
1	Seedling
2	Juvenile
3	Mature
M	Mixed
NA	Annual

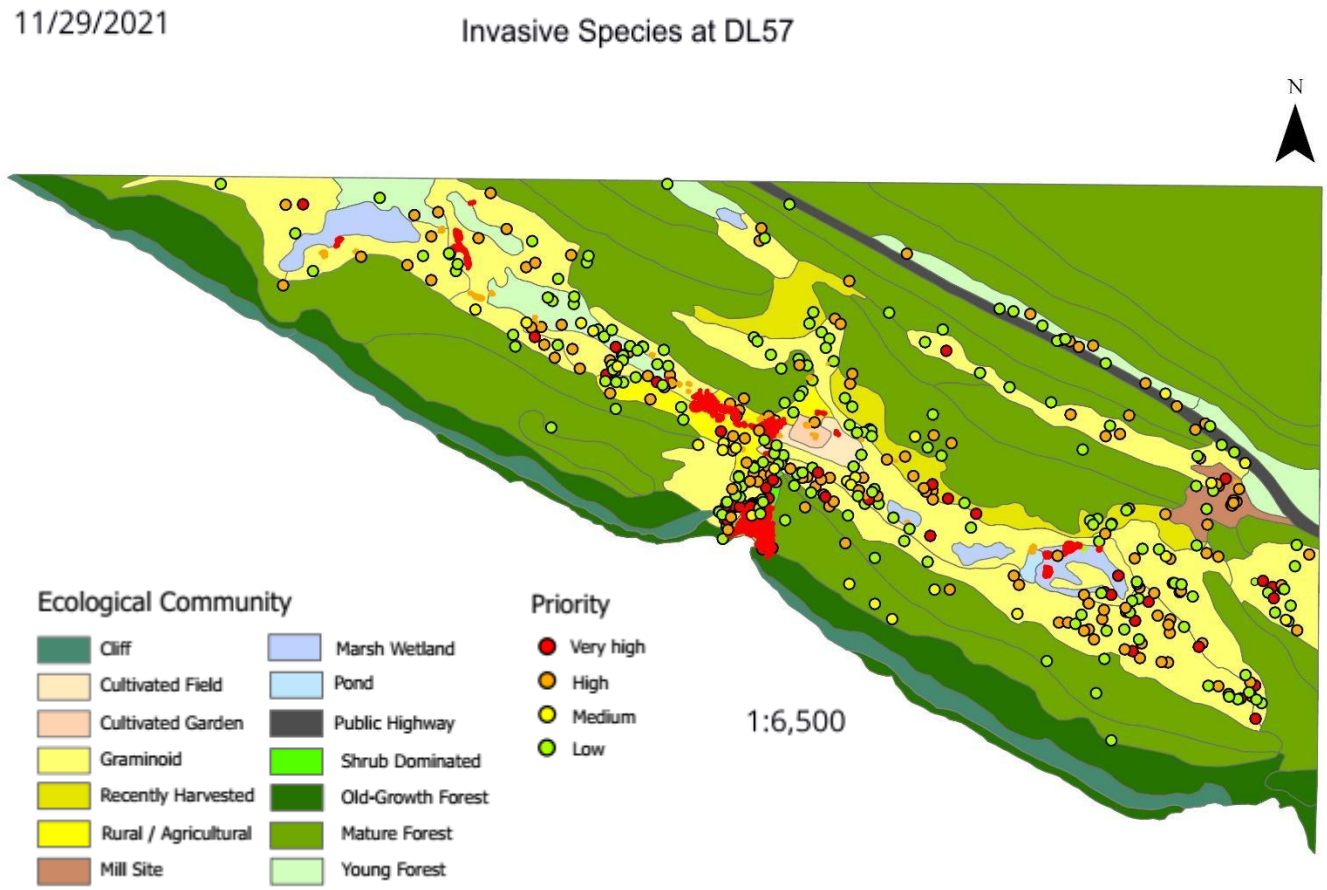
Results

Mature individuals and high densities are considered higher priority due to their spreading capability. Each occurrence (point, line, area) of a species was rated according to the following parameters:

Priority	Lifestage (Distribution Code)
Very High	Mature (4, 5, 6, 7, 8, 9)
High	Mature (1, 2, 3); Juvenile (7, 8, 9)
Medium	Juvenile (4, 5, 6); Seedling (7, 8, 9)
Low	Juvenile (1, 2, 3); Seedling (1, 2, 3, 4, 5, 6)

Most introduced species occurred in Chrystal Cove, disturbed fields, and along roads. These areas should be prioritized for introduced removal. In particular, Chrystal Cove should be prioritized due to the density of introduced species found there.

Note: we did not map Scotch broom along the MLC cliffs (“old-growth forest” and “cliff” ecological communities) because we clear those areas of broom every year. The only occurrences of broom in “old-growth forest” and “cliff” ecological communities are in inaccessible locations on cliffs.



Introduced Species Profiles

Introduced species actively managed at the MLC:

- *Crataegus monogyna* (Common Hawthorn)
- *Cytisus scoparius* (Scotch Broom)
- *Hedera helix* (English Ivy)
- *Hypericum perforatum* (St. John's Wort)
- *Ilex aquifolium* (English Holly)
- *Iris pseudacorus (*Yellow-Flag Iris)
- *Jacobaea vulgaris* (Tansy Ragwort)
- *Phalaris arundinacea* (Reed Canary Grass)
- *Rosa rubiginosa* (Sweet-Brier)
- *Rubus laciniatus* (Evergreen Blackberry)
- *Rubus armeniacus* (Himalayan Blackberry)
- *Tanacetum vulgare* (Common Tansy)
- *Vinca minor/major* (Periwinkle)

Introduced and/or introduced species not actively managed at the MLC:

- *Agrostis capillaris* (Colonial Bentgrass)
- *Anthoxanthum odoratum* (Sweet Vernal Grass)
- *Cirsium arvense* (Canada Thistle)
- *Cirsium vulgare* (Bull Thistle)
- *Digitalis purpurea* (Common Foxglove)
- *Holcus lanatus* (Common Velvetgrass)
- *Silene coronaria* (Rose Campion)

Additional introduced species found at the MLC (without species profiles in this report):

- *Cynosurus echinatus* (Hedgehog Dogtail)
- *Dactylis glomerata* (Orchardgrass)
- *Galium aparine* (Cleavers)
- *Geranium molle* (Dovefoot Geranium)
- *Hypochaeris radicata* (Hairy Cat's-ear)
- *Leucanthemum vulgare* (Oxeye Daisy)
- *Mycelis muralis* (Wall Lettuce)
- *Plantago lanceolata* (Ribwort Plantain)
- *Ranunculus repens* (Creeping Buttercup)
- *Rumex acetosella* (Sheep Sorrel)
- *Sonchus asper* (Prickly Sow-thistle)
- *Taraxacum officinale* (Common Dandelion)
- *Torilis arvensis* (Spreading Hedge-parsley)
- *Trifolium repens* (White Clover)
- *Vicia sativa* (Common Vetch)

Target Species

The following introduced species are actively managed at DL57.

Convolvulus arvensis (Morning-Glory)

Description

- Perennial
- Spreads through deep, aggressive rhizomes
- Trailing to twining stems
- Showy, funnel shaped white flowers
- Alternate, arrowhead-shaped leaves, blunt or sharp at tip

Habitat

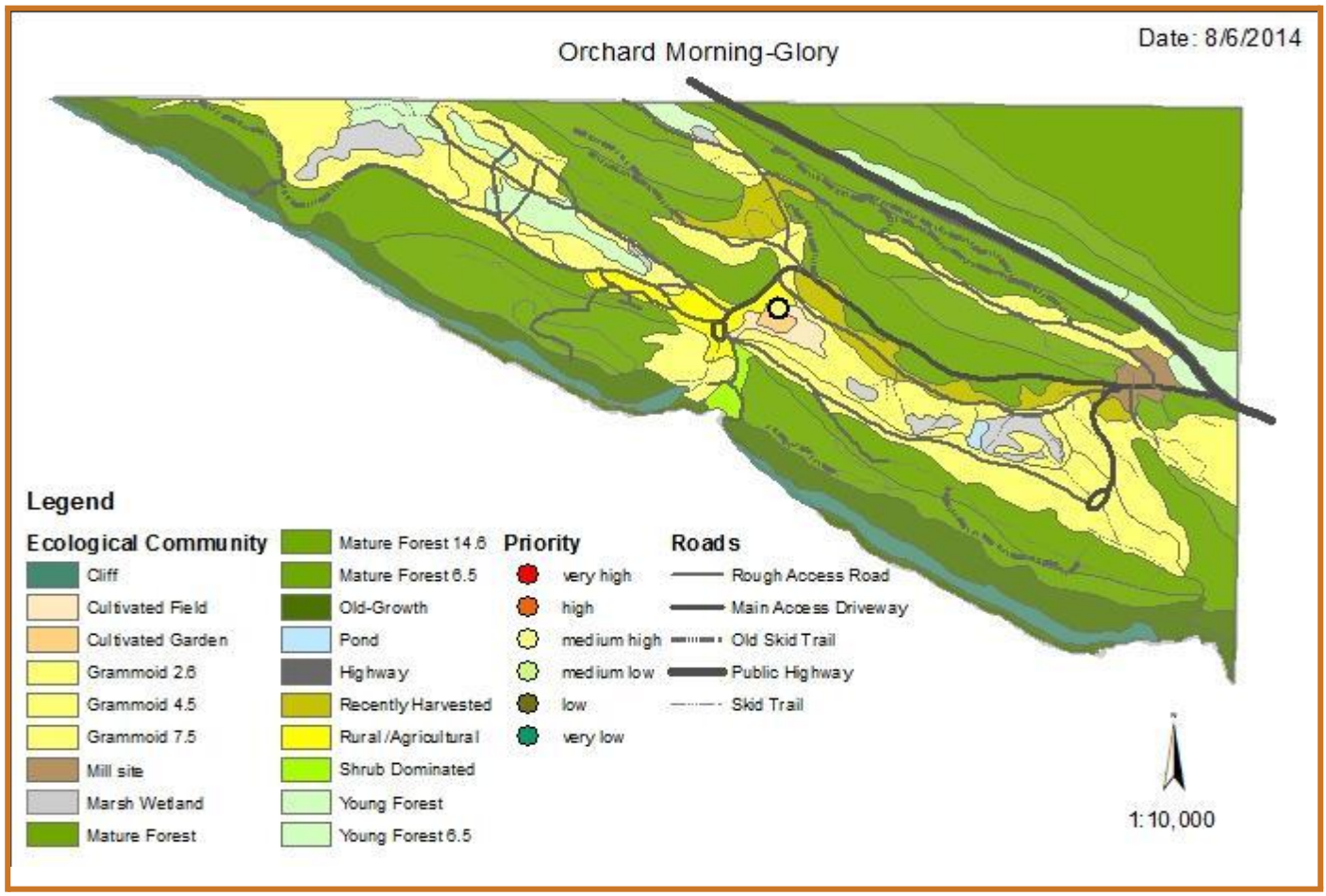
- Disturbed areas
- Open areas
- Introduced from Eurasia

Ecological Threat

- Takes over and kills other plants by twining around them

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Cover morning glory, starving it of light for 1 year. Sheep and cattle graze and remove the foliage, and thus the source of photosynthates for the perennial root system, the weed will be controlled in the longer term (I.D. Black, South Australian Research and Development Institute, cabi, 2012)	New plants can grow from small rhizome pieces, so do not dig. Above-ground stems are able to produce new roots where they touch the ground.	-	Remove seedlings before they produce seeds. As bindweed can resprout from cuttings put into city provided yard recycling bins as the waste is taken to a commercial composting operation. (King County, 2007)	Fragments of roots as small as 5 cm can regenerate (Swan and Chancellor, 1976). Therefore, if cultivation is to be used to successfully control the weed, it has to be frequent and thorough during the time that stems emerge. Minimum of two seasons are necessary for a satisfactory outcome.

Note: Orchard morning-glory was not mapped in 2021 because it was not detected during the 2021 surveys. However, after completing the surveys, it was found in the same location as shown in the map from 2014 (below).



Crataegus monogyna (Common Hawthorn)

Description

- Medium – tall shrub
- Short thorns
- White flowers, red fruit

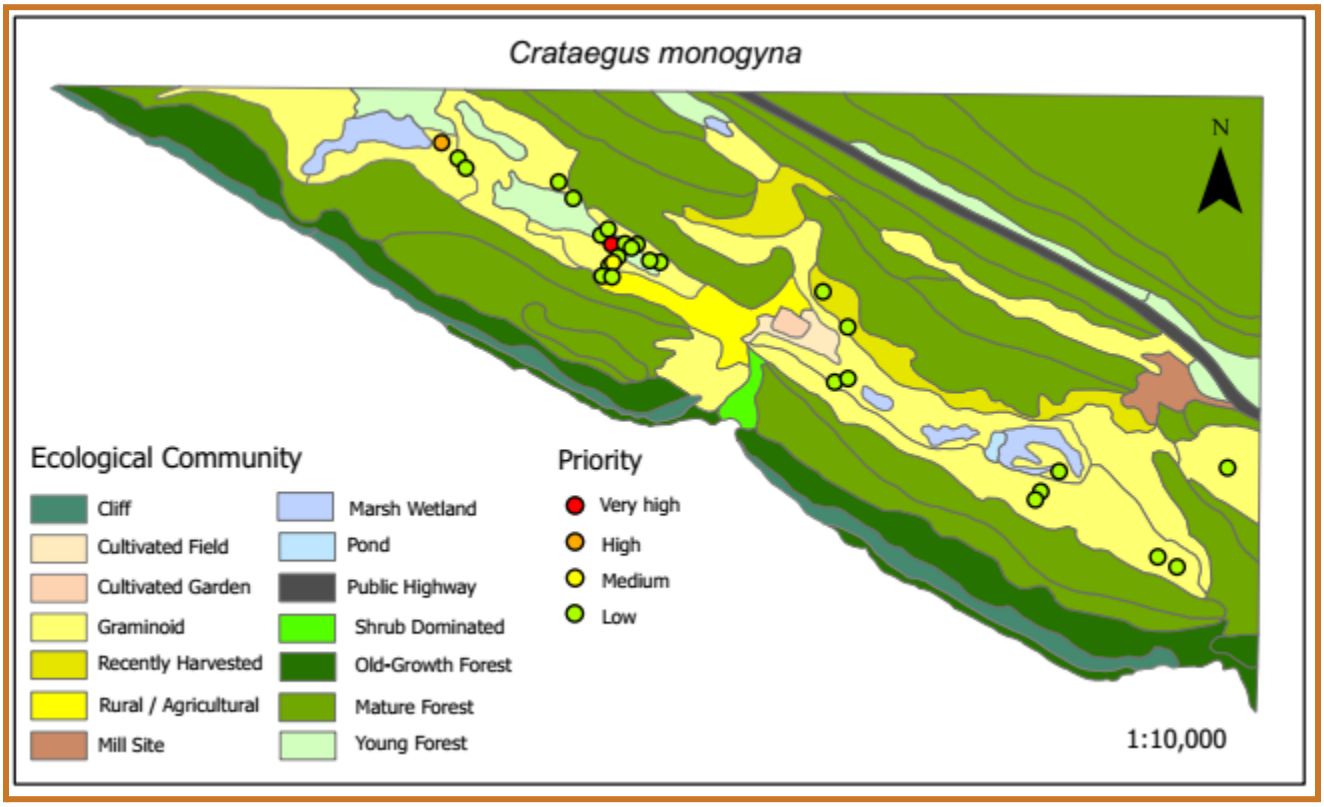
Habitat

- Moist to mesic disturbed areas
- Lowland zone

Ecological Threat

- Dense growth forms thickets inhibiting wildlife
- Can alter understory structure

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Hand-pull or dig-out seedlings and juveniles. Larger plants can be cut at the base in early summer prior to fruiting. The cut surface can be treated with herbicide or burned.	Plant reproduces from berries, so removal should occur prior to fruiting.	Wear gloves and protective clothes to avoid thorns.	Remove from site so plant does not re-sprout from cuttings.	


Crataegus monogyna
N
Ecological Community
Cliff
Cultivated Field
Cultivated Garden
Graminoid
Recently Harvested
Rural / Agricultural
Mill Site
Marsh Wetland
Pond
Public Highway
Shrub Dominated
Old-Growth Forest
Mature Forest
Young Forest
Priority
Very high
High
Medium
Low
1:10,000

Cytisus scoparius (Scotch Broom)


Brian Klinkenberg
E-Flora BC

Description

- spindly, deciduous shrub
- up to 3m tall
- angled branches
- small, alternate leaves with 3 leaflets
- bright-yellow, sometimes partly red pea-like flowers
- black, hairy pods

Habitat

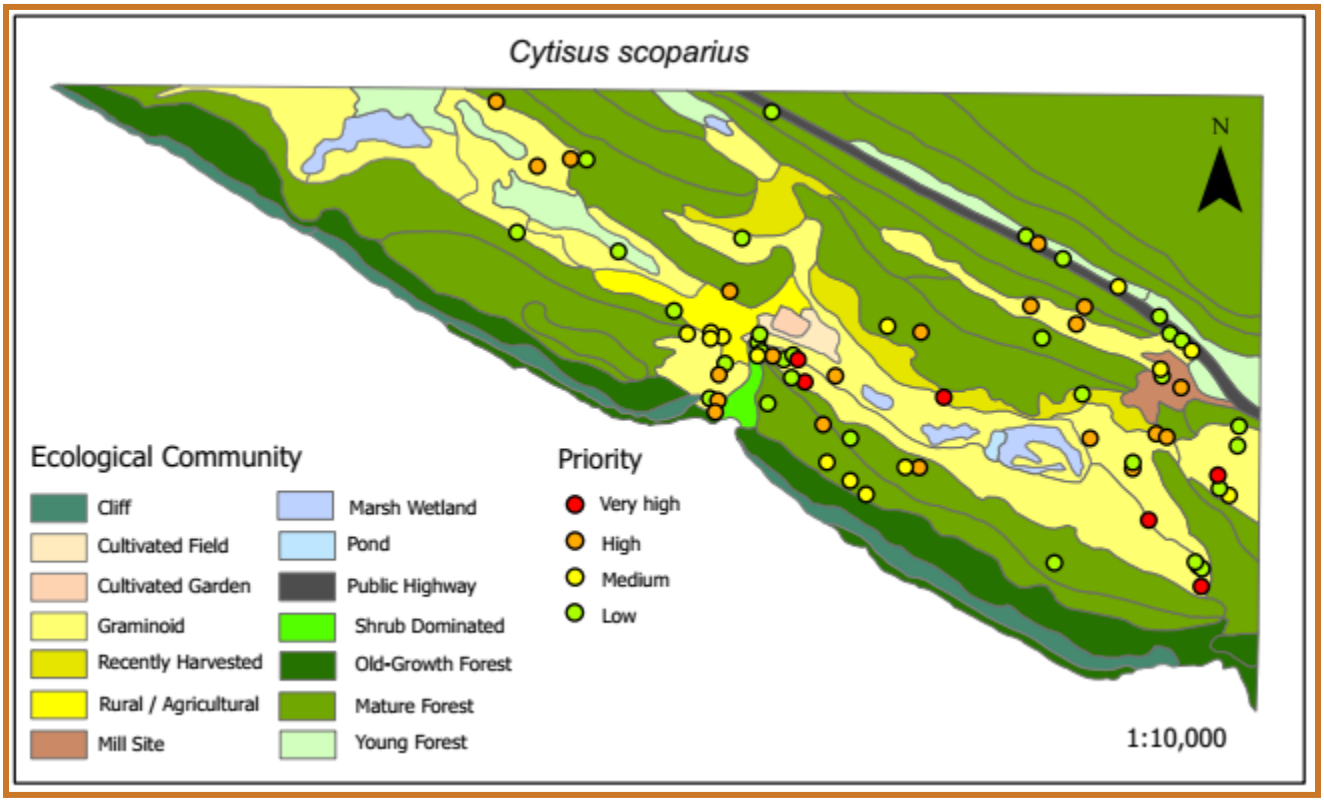
- open
- dry
- rocky
- often disturbed areas
- introduced from Europe

Ecological Threat

- spreads aggressively, creating monocultures
- can grow very dense, overwhelming and killing native plants
- limits regeneration of native plants
- fire hazard
- impenetrable to most wildlife
- fixes nitrogen in soil, giving advantage to other non-native weeds
- seeds remain viable in the ground at least 30 years

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Remove while flowering but before seeding (May-June). Pull small seedlings Cut larger plants at base or below ground height with loppers.	Do not leave plant material where native plants do or may grow, only pile under conifers where there is no ground vegetation.	Plant contains toxins, do not ingest.	Pile under conifers. If seeds are present, dry, burn and transport ashes offsite.	Establish competitive shrubbery (native berries, Oregon grape, alder) for shade and nitrogen competition.

Note: we did not map scotch broom along the MLC cliffs (“old-growth forest” and “cliff” ecological communities) because we clear those areas of broom every year. The only occurances of broom in “old-growth forest” and “cliff” ecological communities are in inaccessible locations on cliffs.



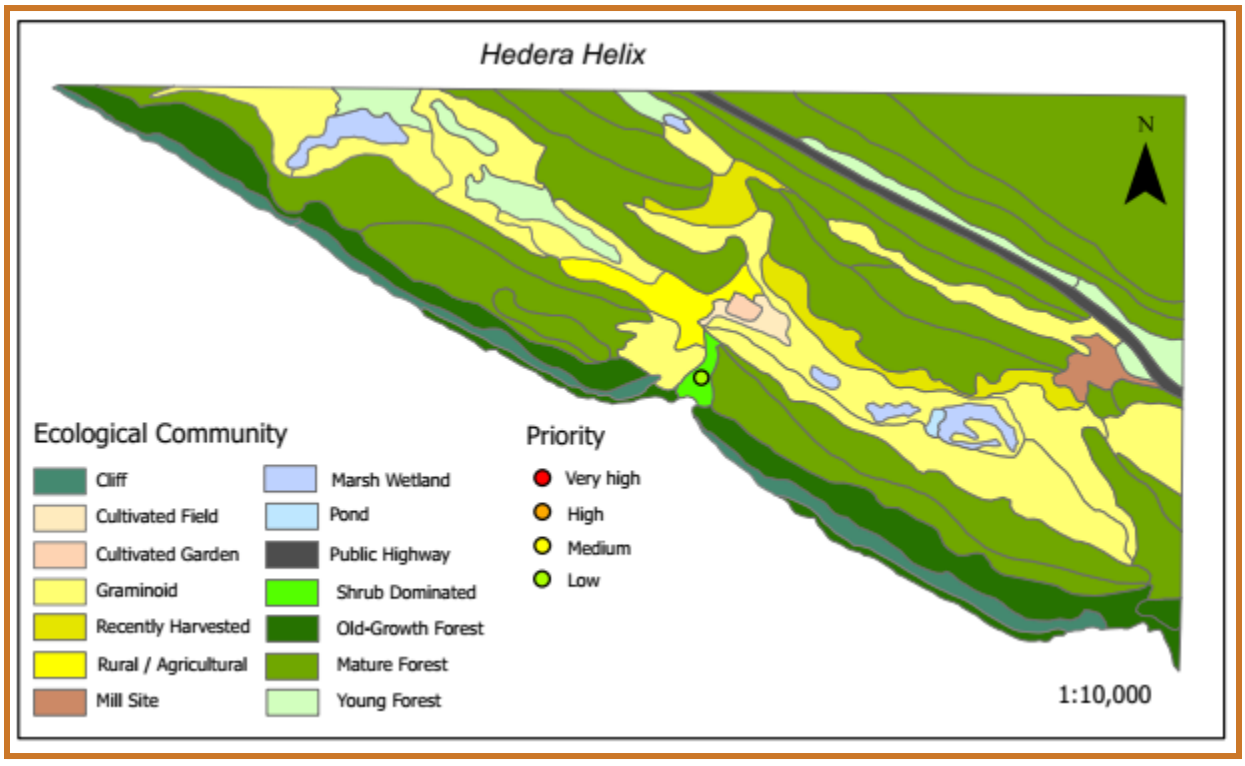
Hedera helix (English Ivy)

Description
- evergreen, climbing shrub

Habitat
- Moist to mesic disturbed areas
- Forest

Ecological Threat
- Shades out other plants
- Quick-growing and easily outcompetes other plants
- Suppresses host tree

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Hand-pull or dig-out plants.	Plant can spread vegetatively when juvenile and by seed after maturity.	Wear gloves and protective clothing because sap can irritate skin.	Remove all material from site.	Mulch site.



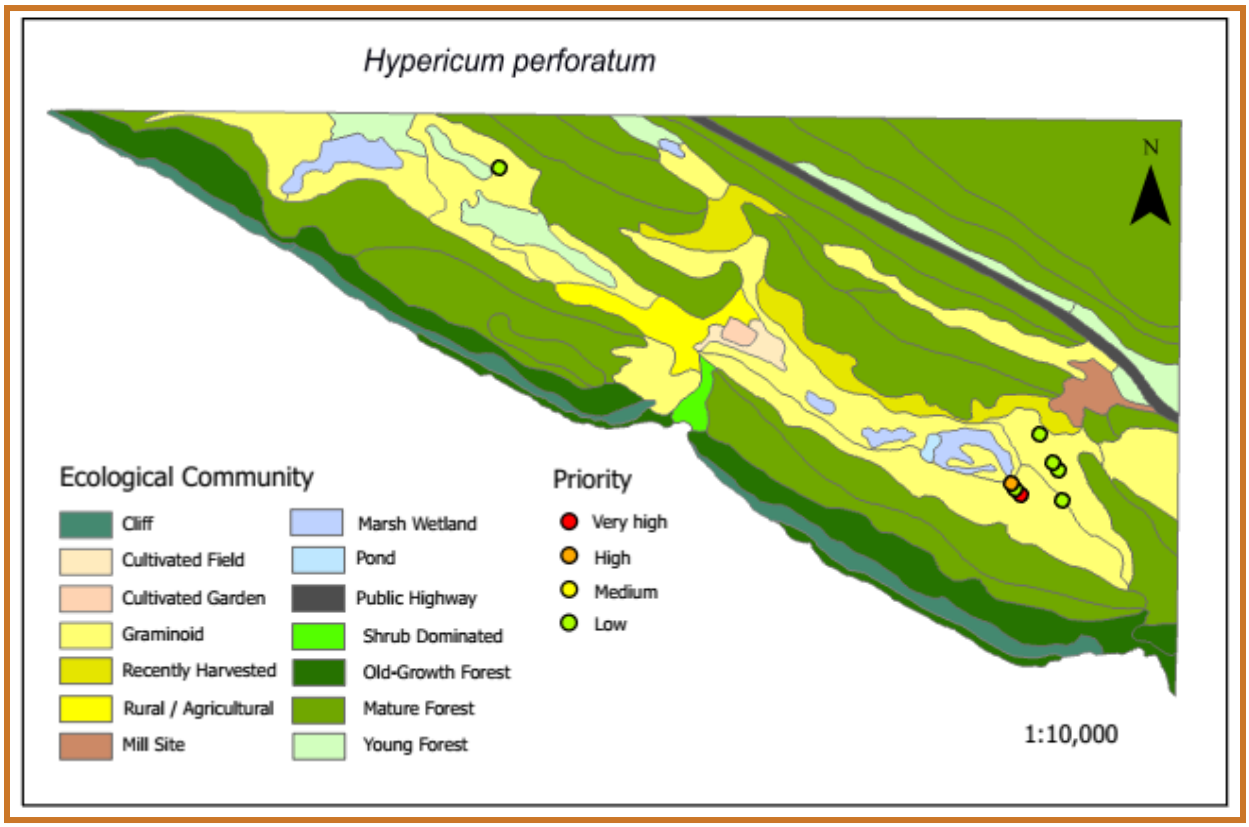
Hypericum perforatum (St. John's Wort)

Description
- Perennial herb

Habitat
- Mesic to dry
- Roadsides and disturbed areas

Ecological Threat
- Spreads rapidly

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Repeated hand-pulling for small infestation sites.	Spreads through rhizomes, above-ground stems, and seeds.		Remove from site to avoid re-rooting from cuttings.	



Ilex aquifolium (English holly)

Description

- Perennial
- Shrub to small tree, branched
- Shiny, smooth, evergreen leaves with teeth
- White flowers and round red berries
- Reproduces by seed or cutting

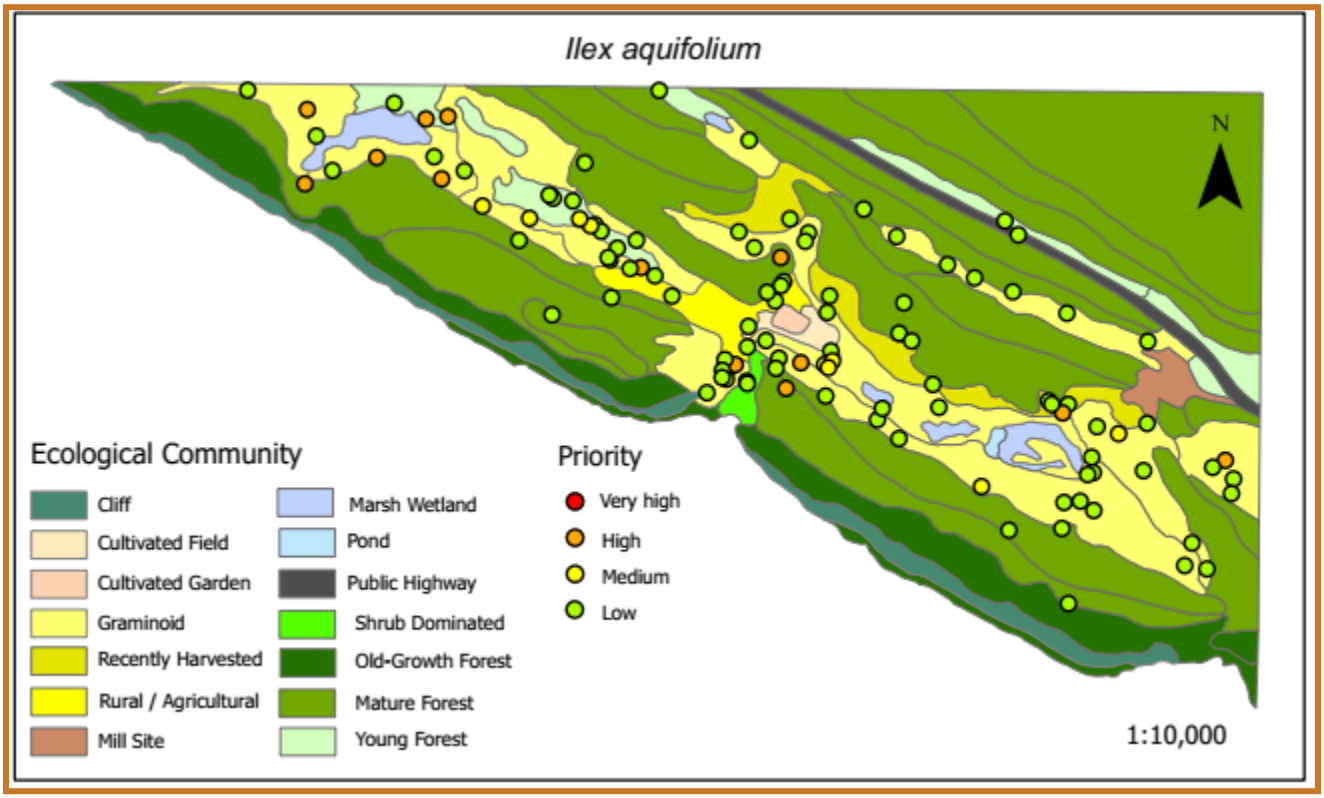
Habitat

- Lowland forest and disturbed areas

Ecological Threat

- Introduced from Europe
- Can become abundant and shade out native species

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Remove before berries form to prevent further spread through seeds. Small plants can be pulled with minimal soil disturbance. Large trees should be cut at ground level before berries form.	-	-	Compost if there are no berries yet (Saanich Garden Waste Disposal).	Continue monitoring and cut back re-growth.


Ilex aquifolium
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Ecological Community
Cliff
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Graminoid
Recently Harvested
Rural / Agricultural
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Pond
Public Highway
Shrub Dominated
Old-Growth Forest
Mature Forest
Young Forest
Priority
Very high
High
Medium
Low
1:10,000

Iris pseudacorus (Yellow Flag Iris)

Description

- Perennial
- Thick root
- Showy yellow flowers (erect petals, narrow at middle)
- Simple stem
- 50-150cm tall
- long thin leaves
- poisonous to grazing animals
- spreads by seed and rhizome pieces dispersed in water

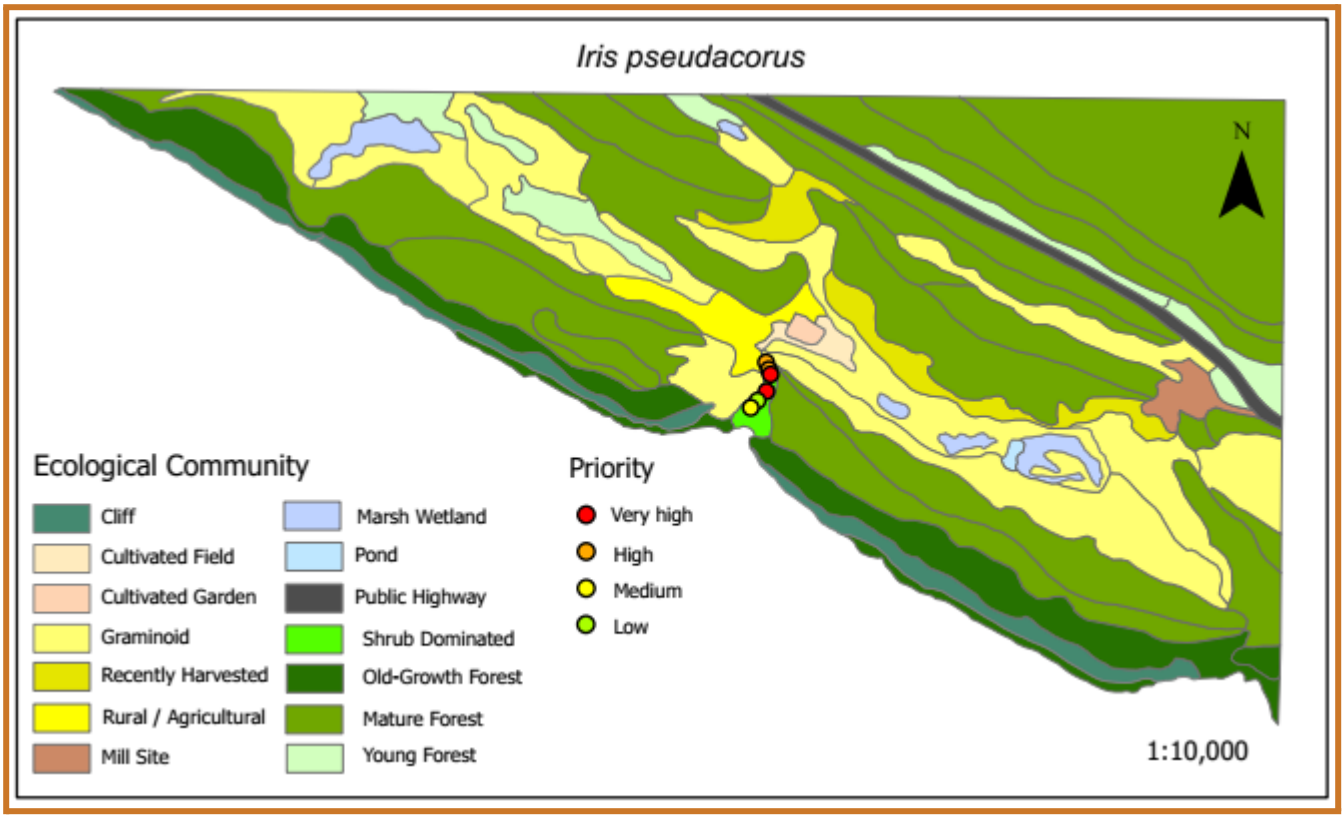
Habitat

- moist ditches, sloughs, marshy meadows, streambanks

Ecological threat

- introduced from Europe
- fast-growing
- fast-spreading
- outcompetes native wetland plants
- alters river areas, making them drier

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Remove all flowers and seed heads to prevent further spread through seeds. Remove recently sprouted seedlings in July. Dig up and remove entire plant taking care to get the entire root.	Begin work upstream and progressively work downstream, to avoid spreading the plant through seed and rhizome to an already cleared area. Ensure removal of the entire root. Remaining root pieces will cause the species to reproduce. Do not compost plants as this will result in their further spread.	Wear gloves as all parts of plant are poisonous and can cause vomiting and diarrhea. Poisonous to grazing animals.	Burn plants in proper bonfire. The District of Saanich recommends putting plants in garbage bags and taking them to the Hartland dump.	Monitor for re-growth and remove new plants as they appear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Jacobaea vulgaris (Tansy Ragwort)

Description

- Short-lived perennial
- Yellow flowerheads, daisy-like appearance
- Can be confused with common tansy

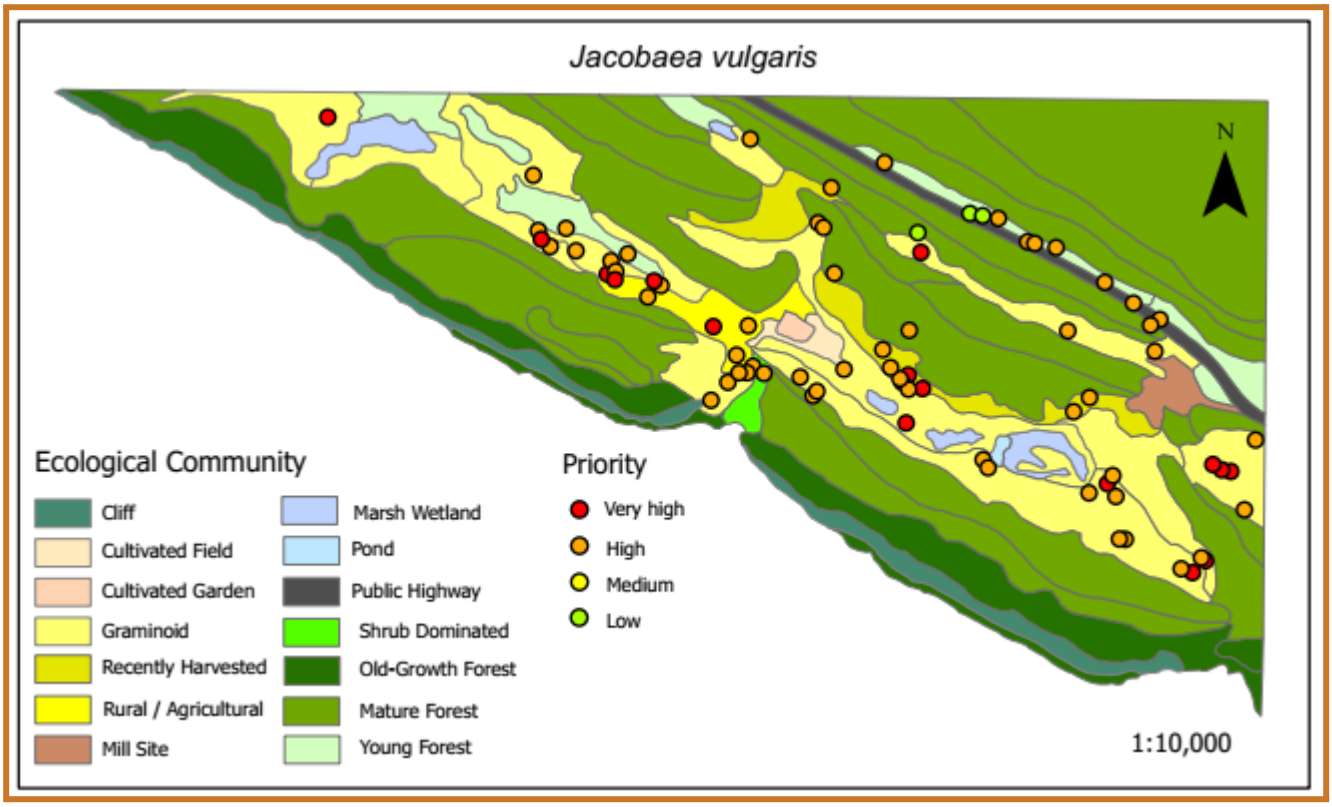
Habitat

- Open, disturbed sites
- Roadsides
- Fields

Ecological Threat

- Toxic plant to humans and livestock
- Displaces native grassland vegetation

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Hand-pull entire plant including roots in spring/summer before flowering. Treat areas repeatedly.	Reproduces by seed and occasionally vegetation.		Remove from site to avoid ingestion or re-sprouting.	


Jacobaea vulgaris
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Old-Growth Forest
Mature Forest
Young Forest
Priority
Very high
High
Medium
Low
1:10,000

Phalaris arundinacea (Reed Canary Grass)

Description

- Perennial grass
- Blooms in late spring
- Seeds present from spring-summer

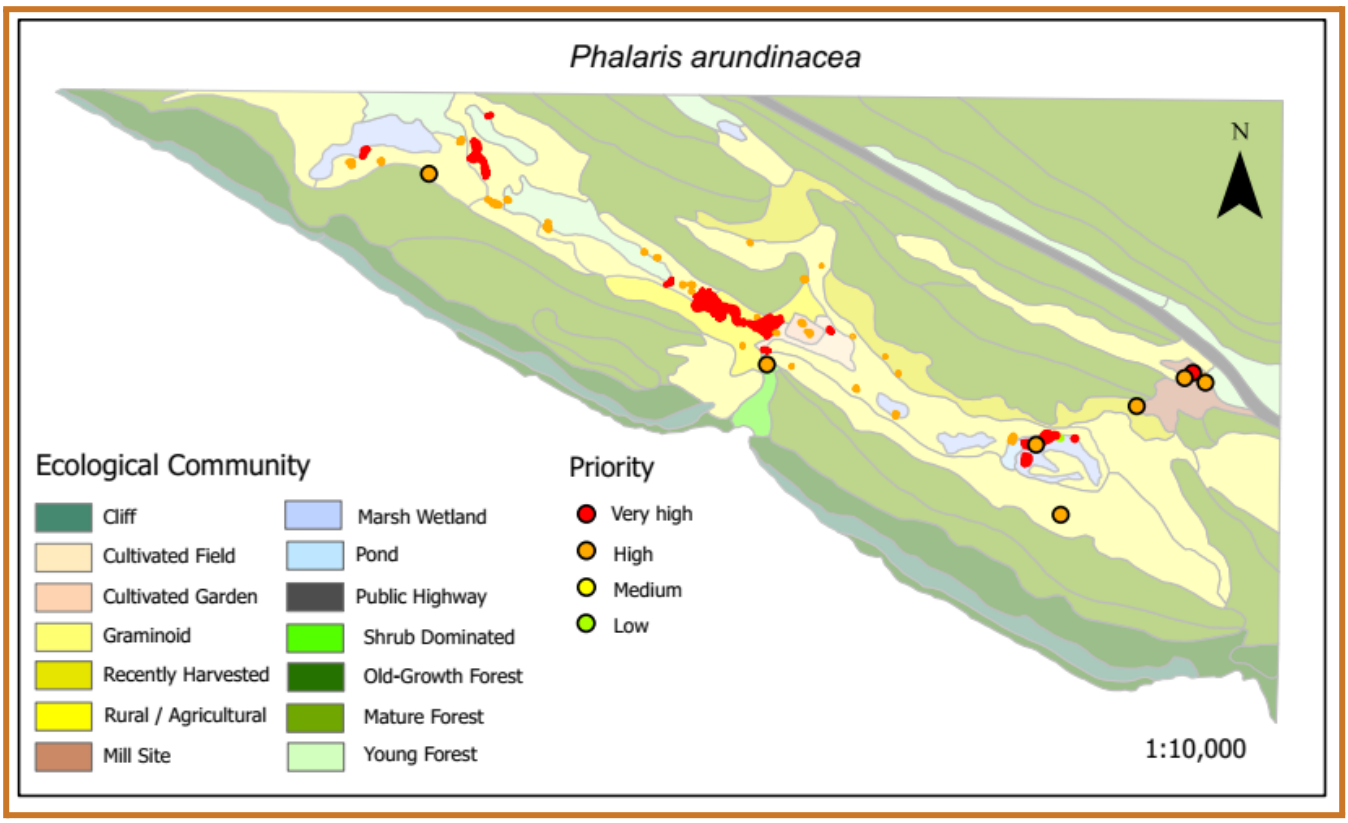
Habitat

- Ditches, riparian areas, wet meadows

Ecological Threat

- Seeds disperse easily
- Plant can survive in drought conditions
- Outcompetes native plants
- Provides little food for wildlife

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Dig-up full root wads and dispose. Solarization (baking) can be used for small, dense patches. Cover patch with several layers of cardboard and 4-6 inches of wood mulch. Herbicide can be used for removal.	Very difficult to control because of persistent rhizome system.		Remove from site, as rhizomes in contact with moist ground can develop new roots.	Plant fast-growing shrubs or trees that will shade-out reed canary grass. Repeated treatments usually necessary.


Phalaris arundinacea
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Rubus armeniacus (Himalayan Blackberry)


Lisa Ott, 2014

Description

- medium to tall shrub
- thicket forming
- stem 5-15mm diameter
- alternate, palmately compound leaves
- 5 leaflets on first year canes
- usually 3 leaflets on flowering canes
- egg-shaped, double-saw-toothed leaves, pointed at tip
- prickly leafstalks and mid-veins
- clusters or white flowers
- Roots can reach 90 cm in depth

Habitat

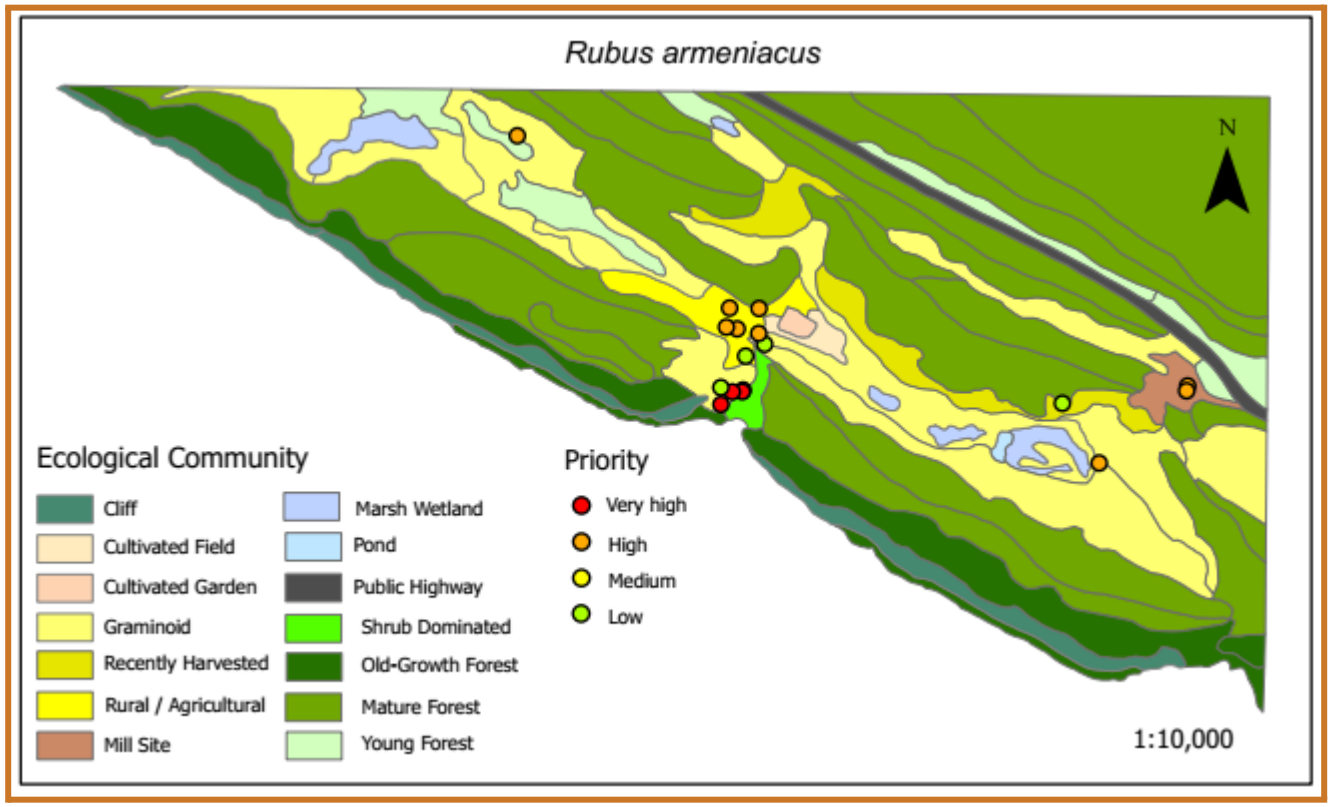
- moist soil
- ditches
- roadsides
- open or disturbed areas
- lowland sites
- Introduced from Western Europe

Ecological Threat

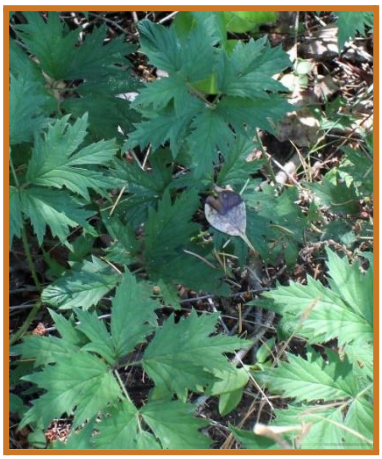
- seeds stay viable for several years in soil
- outcompetes native shrubs and can prevent establishment of shade intolerant trees such as Douglas fir

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Remove before seeds are produced. Remove above ground portion of plant by cutting when plant is flowering but before seeds have been produced. Dig out roots.	Cutting back plant encourages branching and root formation. Until removal is possible, harvest berries to prevent further spread of seeds, cover plants so avoid sunlight induced seeding, or allow goats to browse to remove cover.	Stems have thorns.	Leave onsite on rocks or tarp to prevent vegetative reproduction from cuttings Feed through chipper and use as mulch	Immediately seed area with native grasses Monitor and repeat treatment over multiple years if necessary. Plant trees for shade, to make it harder for blackberry to grow back and to prevent

Claw mattock can be used to pull out plants. If roots cannot be dug out the same year as cutting canes, maintain cut area by allowing goats to graze.	Removal of larger areas though bulldozer or backhoe is possible but roots may re-sprout if not thoroughly removed. Seeds are viable for several years in soil.		Burn at time of removal or following spring (Saanich Garden Waste Disposal).	seedling development.



Rubus laciniatus (Evergreen Blackberry)



Description

- medium to tall shrub
- 3-10cm stem diameter
- hooked prickles
- alternate evergreen leaves
- pinkish or white flowers

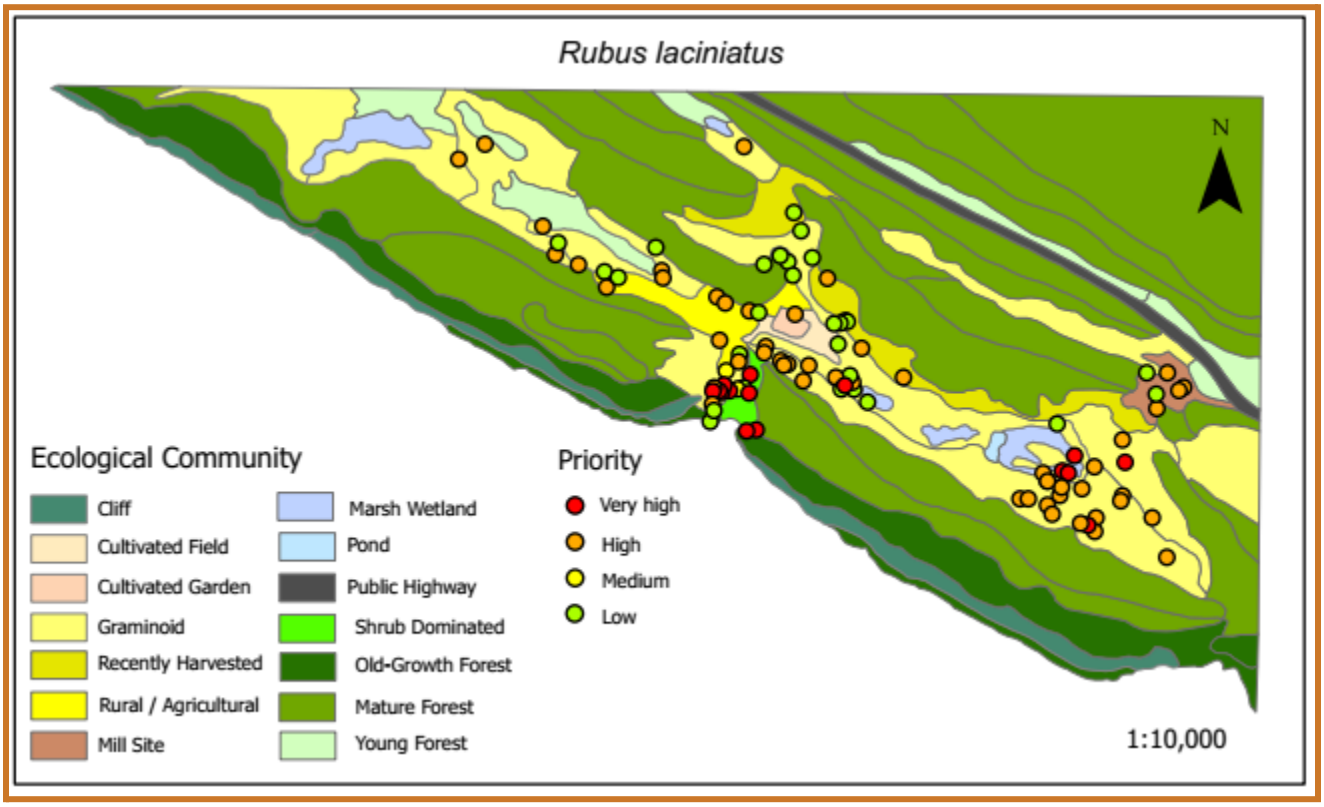
Habitat

- moist, disturbed areas
- shade intolerant

Ecological Threat

- may hinder natural regeneration and establishment of shade-intolerant conifers
- less aggressive than Himalayan blackberry

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Until removal is possible, harvest berries to prevent further spread of seeds. Remove above ground portion of plant. Pull or dig out roots depending on size of plant. Goats browsing berries, roots and canes will reduce cover in the short term.	Minimize soil disturbance. Work first in least infested areas, moving towards more heavily infested areas. Do not remove big pales which offer bird habitat during nesting season (King County, 2010).	Stems have thorns.	Leave onsite on rocks or tarp to prevent vegetative re-growth from cuttings and to avoid smothering native plants. Burn at time of removal or following spring.	If removing dense patches, area should be replanted with native plants and mulched.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Young Forest
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High
Medium
Low
1:10,000

Rosa rubiginosa (Sweet-Briar)

Description

- Vigorous, thorny shrub with white or pink flowers

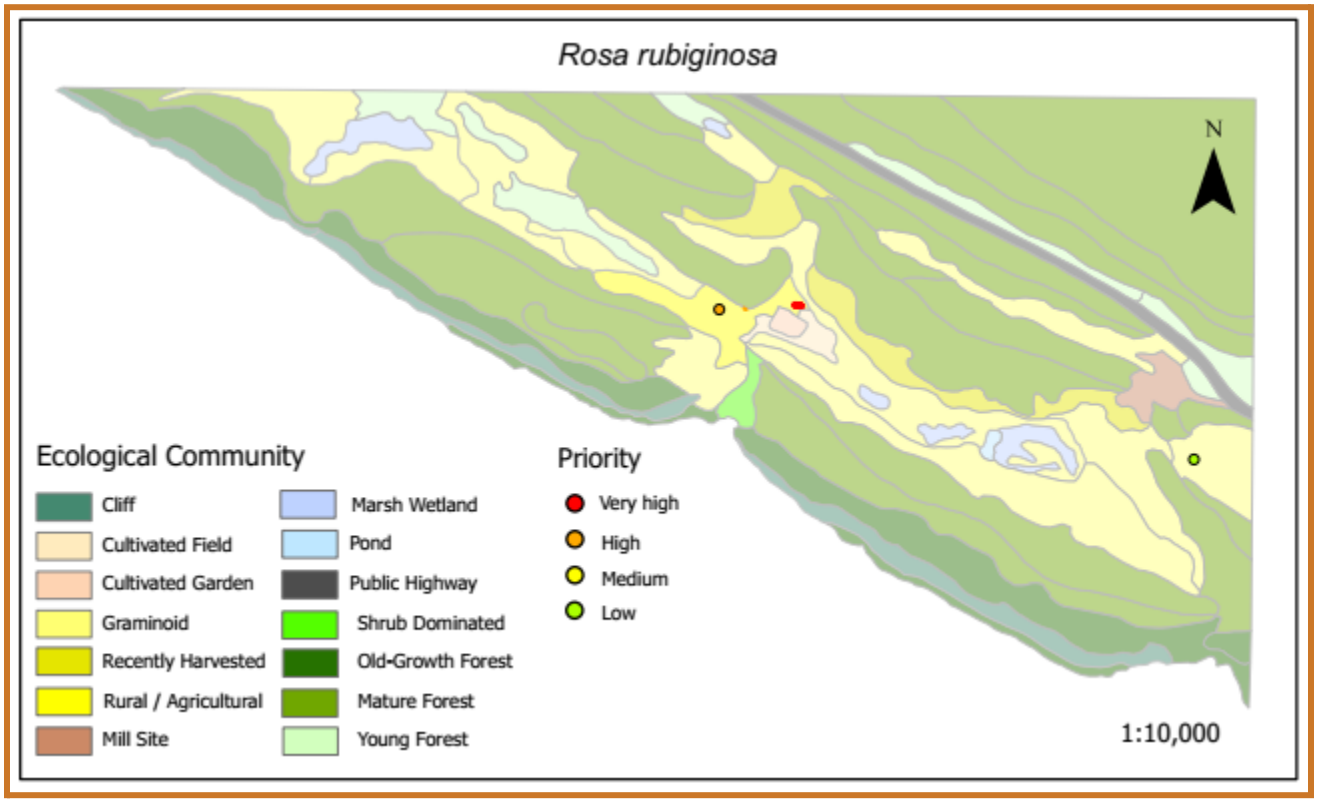
Habitat

- Adapted to all soil types
- Not shade tolerant

Ecological Threat

- Spreads quickly through seed dispersal
- Can displace native vegetation
- Impacts the composition of native ecosystems

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Remove plant including roots by digging or excavation. Remove plant prior to fruiting. Repeated treatment of sprouts is necessary.	Spread by fruit-eating birds and insects.	Be mindful of thorns on plant during removal.	If plant is removed with rosehips present, material should be removed from site.	Plant quick-growing shrubs and trees to shade-out any re-growth.


Rosa rubiginosa
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Old-Growth Forest
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High
Medium
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Tanacetum vulgare (Common Tansy)

Description

- Perennial herb
- Alternate fern-like leaves
- Numerous yellow flowerheads
- Can be confused with St. John's Wort

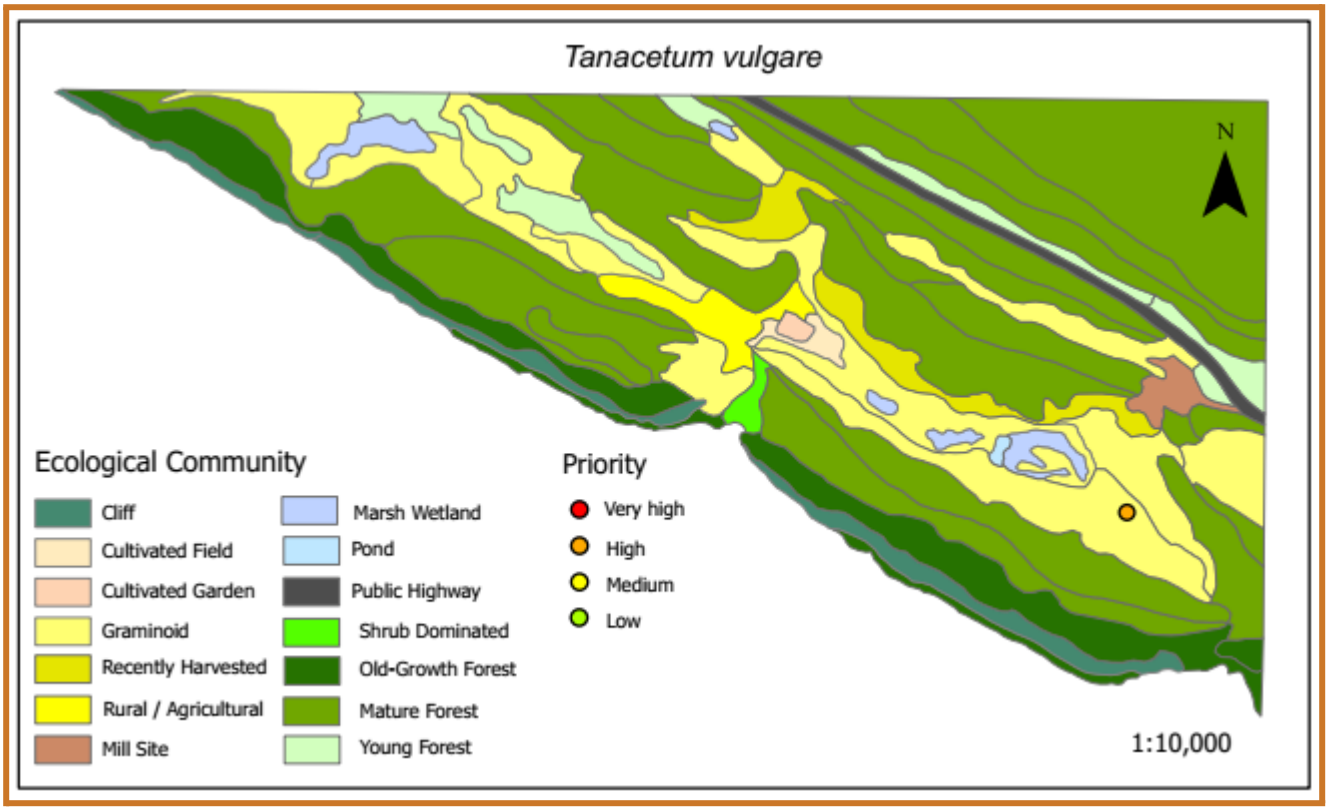
Habitat

- Mesic to dry areas
- Roadsides. disturbed areas, fields

Ecological Threat

- Can form dense thickets out-competing native vegetation
- Plant can be toxic in large quantities

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Small patches can be removed by hand. Remove all roots to avoid re-sprouting.	Spreads easily by seeds and rhizomes		Remove all plant parts from site to avoid re-spouting.	Monitor re-growth. Re-plant in large removal areas.


Tanacetum vulgare
N
Ecological Community
Cliff
Cultivated Field
Cultivated Garden
Graminoid
Recently Harvested
Rural / Agricultural
Mill Site
Marsh Wetland
Pond
Public Highway
Shrub Dominated
Old-Growth Forest
Mature Forest
Young Forest
Priority
Very high
High
Medium
Low
1:10,000

Vinca minor/major (Periwinkle)

Description

- trailing
- freely rooting
- spreading stems
- egg-shaped-lanceolate leaves
- pale bluish-purple flowers

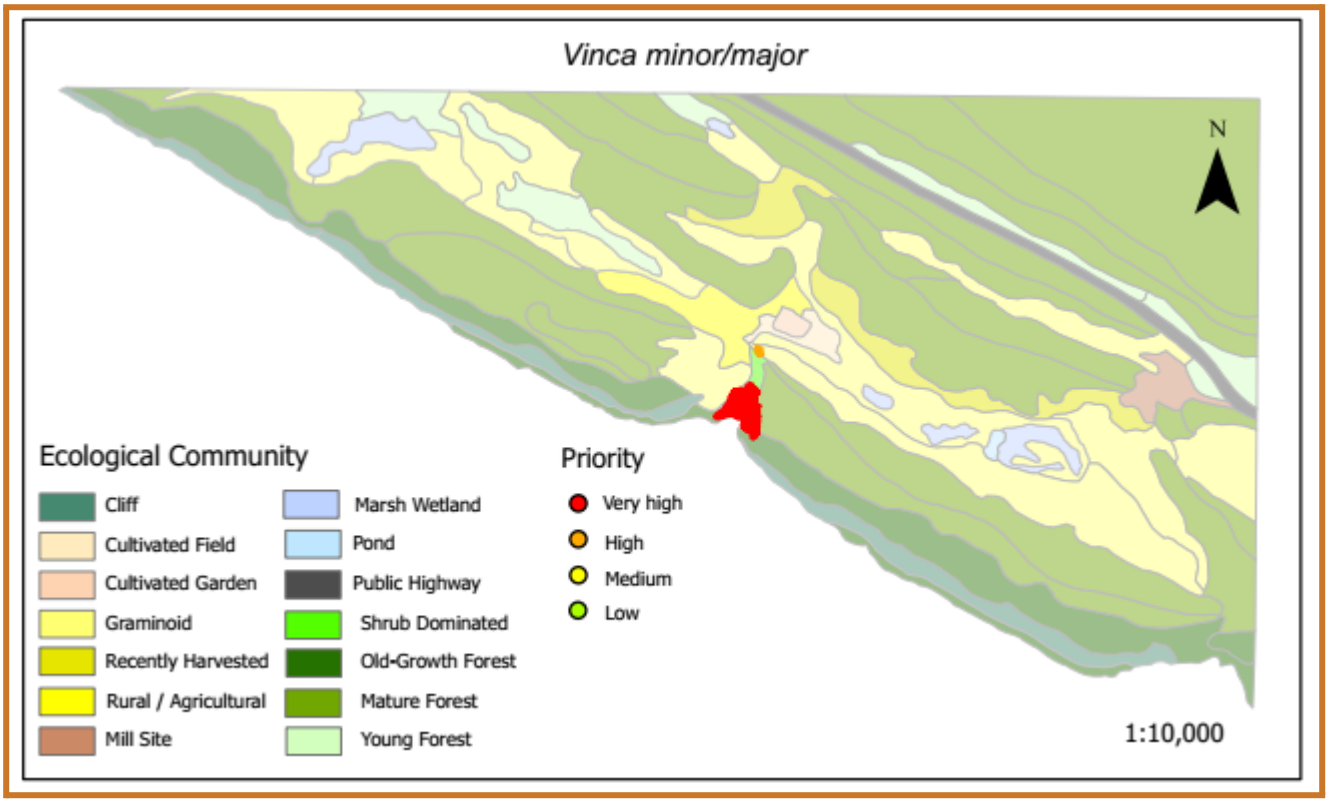
Habitat

- introduced from Europe as ornamental garden plant
- deep shade-sun
- moist soil with partial sun

Ecological Threat

- Competes with native vegetation
- Can create monoculture
- Can interfere with regeneration of trees and shrubs

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Hand removal is labor-intensive but yields good results if careful attention is paid to removing all root nodes and stolons. Continuously dig out roots when ground is wet. Most effective treatment for large infestations is spraying with herbicide, co-occurring native species are likely to be impacted (NatureServe, 2009).	Riparian zones are particularly sensitive. Mowing and cutting tend to result in regrowth. Root fragments greater than a quarter-inch in diameter tend to re-sprout (NatureServe, 2009).			Monitor and dig out re-growth. Plant native species to prevent erosion. Cover with an impermeable membrane.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1:10,000

Non-target species

The following introduced species are not actively managed at DL57, but are removed if they interfere with restoration plantings.

Adolf Ceska, 2010
E-Fora BC

Agrostis capillaris (Colonial Bentgrass)

Description

- Perennial
- Densely tufted or matted
- From rhizomes
- Up to 75 cm tall
- Sheaths smooth
- Blooming period: Mid Summer

Habitats

- Medium to dry
- Open areas
- Introduced from Europe

Ecological Threat

- *A. capillaris* reduces native biodiversity through disease transmission and competition (Global Invasive Species Database, 2001)

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Mechanical removal by hand pulling, plowing, and harrowing can reduce common bent and prevent seeding. This method is most effective in spring or early summer before seed set short rotations with root crops may help reduce the weed.	The use of burning has shown a dramatic increase in growth of *Agrostis capillaris*, (Wilson, 1999). Similarly grazing is not effective due to its low growth form. Grazing can even increase abundance.		Control by manual removal is difficult since broken stolons will often develop roots and regrow. The disturbance to the soil should be as minimal as possible. Removal of the mowing material.	Equipment, clothing, and animals should be checked and cleared for seeds when leaving an infested area. Short rotations with root crops may help reduce the weed (Bond *et al*., 2007).

Anthoxanthum odoratum (Sweet Vernal Grass)

Ryan Batten, 2011
E-Flora BC

Description

- Perennial
- Tufted
- Fibrous roots
- Hollow stems
- 30-60cm tall

Habitat

- medium to dry
- open areas
- introduced from Europe

Ecological Threat

- It reproduces by seeds and can be highly competitive with other grasses, particularly during the spring
- Sweet vernal grass shows a remarkable ability to genetically adapt to different environmental conditions.
- Contains allelopathic chemicals that suppress growth of other plant species.

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Hand pulling individual plants, hand hoeing, mowing, or by using the herbicide Dalapon. Badly infested fields should be plowed and seeded with a cover crop (Muenscher 1955).	Early mowing in the season and before the seeds have matured. Grazing is not known to be a useful control method. Seeds spread in mud on machinery and vehicles, and can adhere to animals and clothing. Wind and water may also spread seed.			Continuing monitoring after the initial removal because of their potentially long seed dormancy in the soil. Annual monitoring and removal must continue until soil seed banks are exhausted

Cirsium arvense (Canada Thistle)

Doug Skilton, 2005
E-Flora BC

Description

- perennial
- deep, wide spreading roots
- thin, leafy stems without spiny wings
- 30cm – 2m tall
- alternate, lance-shaped, irregular lobed, spiny-toothed leaves
- pink-purple flowers with small heads and weak prickles
- feathery fruits with bristles

Habitat

- open, often disturbed areas: crops, pastures, rangelands, roadsides and river banks
- Introduced from Europe

Ecological Threat

- spreads quickly vegetatively and by wind-borne seeds. Each plant can produce 1500 seeds.
- Infests crops, pastures, rangelands, roadsides, and riparian areas.
- Spreads rapidly from rhizomes that give rise to shoots.
- Can form dense patches and virtual monocultures.

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Combination of methods: -tillage and control populations by repeated mowing -biocontrol using gall fly and weevil may be an option (Check with Agriculture and Rural Development Alberta, 2001)	Make sure insects used in biocontrol will only attack targeted plants and not native vegetation. Keep soil disturbance to a minimum to avoid further spreading plant.		If flowers or seed are present, debris should be bagged and removed from the site or else burned since seed will continue to mature within flower heads left onsite.	Reseed with native vegetation Use clean seed, purchase clean feed, cover grain trucks, clean equipment and monitor fence lines or roadsides for invasions.

Cirsium vulgare (Bull Thistle)

Gordon Neish, 2009
E-Flora BC

Description

- perennial
- larger head than Canada Thistle
- reproduces only by seeds
- purple flowers
- spiny-winged stems
- erect, branched stems
- deep, fleshy taproot
- hairy stems
- leaves: spiny above, sparsely grey-wooly below

Habitat

- open, medium to dry areas
- introduced from Europe

Ecological Threat

- troublesome weed in crops, competitive advantage as it grows in different habitats

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Close cutting or cutting twice per season and dug up roots with a shovel. Cut plants with a sharp shovel at 1-2 inches below the soil surface prior to flowering. If only one cutting a year is possible, cut when plants are in bud for best results. (Department of Natural Resources and Parks, King County, 2013)	Avoid fire which can create conditions that are favorable for bull thistle establishment such as an open canopy and areas of bare soil Mowed thistles will produce new branches from basal buds		Flowering stems should be collected and destroyed to keep them from forming viable seed	Do not leave cut stems of flowering bull thistle on the ground because they are likely to form viable seed after they are cut. Prevention of seeding and taking care not to spread seeds are key to preventing

Digitalis purpurea (Common Foxglove)

Jim Riley, 2007
E-Flora BC

Description

- biennial herb
- erect, leafy stem
- tube shaped pink-purple flowers with interior spots
- poisonous

Habitat

- disturbed, open areas
- introduced from Europe

Ecological Threat

- lethal to animals consuming small amounts of fresh or dried material .
- colonizes areas of soil disturbance, forming dense patches that displace natural vegetation (California Invasive Plant Council, 1997)

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Hand pulling of stalks is effective. In spring, while soils are moist, stalks and root masses are easily pulled from the ground.	If flower stalks are cut back before seeds ripen, the plant can bloom again in mid- to late summer. Above-ground treatments such as clipping and mowing may be counter-productive.	Poisonous, do not ingest or get in eyes.	Remove and destroy pulled material from the site (flower stalks left on site will continue to mature and release thousands of seeds). Careful: Smoke from burning leaves is toxic and has caused injury to workers on control projects (California Invasive Plant Council, 1997).	Control efforts are required for at least five years.

Holcus lanatus (Common Velvetgrass)

Description

- perennial
- tufted grass from fibrous roots
- erect stems
- 50-100cm tall
- velvety-hairy, grayish blades

Habitat

- Shade intolerant
- Disturbed sites
- Moist to dry
- Introduced from Europe

Ecological Threat

- common weed of crops and pasture
- limits the installation and development of native plants (Garry Oak Ecosystems Recovery Team, 2003)

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Not resistant to treading and obliterated by puddling and trampling Intensive mowing or grazing suppresses the establishment and spread. Regular grazing keeps it in a vegetative and palatable condition. Burning, ploughing and a lack of irrigation reduce the relative abundance.	Minimize soil disturbance when hand-pulling. Mowing too early or too late can cause velvet-grass to increase. Burning increases Common Velvetgrass in open ecosystems Isolated plants should be tackled immediately, prior to them building up into small colonies.		Remove mowing material as seeds can resprout	Seeds are spread in contaminated grass seed, mud, and animal manure, and by attaching themselves to clothing or the fur of animals. (Garry Oak Ecosystems Recovery Team, 2003)

Silene coronaria (Rose Campion)

Description

- grey-woolly perennial
- usually branched stem-base
- lance-shaped, opposite leaves
- fuchsia flowers
- 40- 100cm tall
- propagates by seed

Habitat

- roadsides and other disturbed areas
- full sun to partial shade
- introduced from Europe as garden ornamental

Ecological Threats

- Rose Campion are all common garden plants that have invaded natural ecosystems and compete with native plant species

Removal	Ecological Precautions	Safety	Disposal Methods	Post-Removal
Pull when in bloom but before seeding.				

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