

**Proposed<sup>1</sup> Invasive Plants Measures and Rationale**  
**for**  
**Nootka Region**

May 2005

ORIGINAL SIGNED & SEALED

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May 11, 2005

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<sup>1</sup> This document is background information for Forest Stewardship Plans (FSPs) in the Nootka operating region (Nootka Region) of Western Forest Products Inc. and is not part of these FSPs. It is not legally binding on the Licensee. The concepts outlined herein are the basis for the measures proposed in FSPs.

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## Summary

Government legislation for invasive plants is intended to:

**“...prevent the introduction or spread of invasive plants...”** (FRPA section 47, FPPR section 17).

Invasive plants are those “...prescribed in the *Invasive Plants Regulation*” (B.C. Reg. 18/2004) and FSP Licensees are to specify measures to prevent introduction and spread where “...the introduction or spread is likely to be the result of the person’s forest practices.” The Licensees’ forest practices are possible vectors for introduction and spread of certain species, but are unlikely to be the major factors. In most cases introduction vectors and responsibilities are not easily discernable.

Scotch Broom is the most significant of the listed species occurring within the plan area. Where established locally in the CWHvm biogeoclimatic subzone it does not appear as invasive as observed elsewhere, notably in the CWHxm. Cost-effective strategies to slow or prevent the spread of Scotch Broom have proven elusive in other jurisdictions.

Prevention of introductions of aggressive species that may be more adaptable to maritime climates are perhaps of greater concern than Scotch Broom. Listed examples may include Giant and Japanese Knotweeds. Monitoring for these and other listed species, or other aggressive but unlisted species, is a primary objective.

Generally, the majority of the listed invasive plants are either not present or where present are less vigorous, competitive, or detrimental than they are in other, drier parts of Vancouver Island and British Columbia. Although not extensively surveyed, currently listed invasive plants are not thought to be seriously threatening forest plant communities or other native ecological niches within the area of this FSP. There are no range lands covered by this FSP.

The measures suggested below are aimed at only the listed invasive plants that are likely to be of significance if introduced or spread within the FSP area. The proposed measures for inclusion in the FSP are:

FDU	Measures
All	<p data-bbox="407 262 792 296"><u>Prevention through Education</u></p> <p data-bbox="407 327 841 361">Within 6 months of plan approval:</p> <ul data-bbox="453 401 1377 499" style="list-style-type: none"> <li data-bbox="453 401 1377 499">• hot links to websites providing information on weeds and invasive plants will be posted by <a href="http://www.westernforest.com">www.westernforest.com</a> and be available to other Licensees, employees, local residents, or others.</li> </ul> <p data-bbox="407 533 857 567">Within 12 months of plan approval:</p> <ul data-bbox="453 604 1398 873" style="list-style-type: none"> <li data-bbox="453 604 1398 667">• Licensee employees working within the plan area will be notified of internet sites providing information about weeds and invasive plants.</li> <li data-bbox="453 674 1398 804">• educational leaflets, brochures, or videos designed to increase public awareness of invasive plants that are provided by government or other agencies will be distributed to Licensee employees working within the plan area and to new employees thereafter.</li> <li data-bbox="453 810 1398 873">• Licensees will provide training in the recognition of listed invasive plant species to Forestry and Engineering field staff.</li> </ul> <p data-bbox="407 907 799 940"><u>Prevention through Avoidance</u></p> <p data-bbox="407 974 857 1008">Within 24 months of plan approval:</p> <ul data-bbox="453 1045 1398 1314" style="list-style-type: none"> <li data-bbox="453 1045 1398 1176">• seed sources used for revegetation mixtures are to meet standards for reclamation set out in Canada's <i>Seeds Regulations</i> and where equally effective and available at similar cost, are to contain native grasses.</li> <li data-bbox="453 1182 1398 1314">• where moderate- or high-hazard listed invasive plants such as Scotch Broom are established within 100m thereof, recently exposed mineral soils along roadsides are to be seeded as climatic and soil conditions allow within two growing-season<sup>2</sup>-months of disturbance.</li> </ul> <p data-bbox="407 1348 732 1381"><u>Inventory and Monitoring</u></p> <p data-bbox="407 1415 857 1449">Within 24 months of plan approval:</p> <ul data-bbox="453 1486 1398 1816" style="list-style-type: none"> <li data-bbox="453 1486 1398 1650">• Develop protocols for silviculture surveys and inspections of roads under permit to facilitate early detection of introductions or significant spreading of listed invasive plants with particular focus on moderate- and high-hazard species such as Scotch Broom and Japanese/Giant Knotweed.</li> <li data-bbox="453 1656 1398 1719">• Report detections of previously-unknown listed invasive plant species to MoF.</li> <li data-bbox="453 1726 1398 1816">• For facilities managed by each Licensee, annually inspect recreation sites, employee parking areas, and the shop yard where equipment and vehicles are cleaned and parked.</li> </ul>

<sup>2</sup> growing season defined as April to September inclusive.

	<ul style="list-style-type: none"> <li>• Licensees are to annually inspect illegal yard disposal sites in the vicinity of communities closest to their office location.</li> <li>• Maintain mapping of known occurrences of listed invasive plant species.</li> </ul> <p><u>Early Eradication</u></p> <p>Within 36 months of plan approval:</p> <ul style="list-style-type: none"> <li>• Where a new introduction of a listed invasive plant, or a satellite introduction of Scotch Broom, Japanese/Giant Knotweed, or another moderate- or high-hazard listed invasive plant is detected greater than 5 km from a known occurrence, Licensees will at their own expense, cut or pull up to 20 plants or stems at the point of detection. Further eradication or control measures will be undertaken if fully funded externally by government or other agencies.</li> </ul> <p><u>Continuing Control</u></p> <p>Within 36 months of plan approval:</p> <ul style="list-style-type: none"> <li>• the Licensee will identify gravel pits for road construction and maintenance from which gravel is expected to be transported to locations where Scotch Broom is not present within 1 km. The Licensee will annually cut or pull Scotch Broom in these gravel sources prior to seed set to suppress build-up of seeds in source gravel.</li> <li>• where moderate to high hazard invasive plants such as Scotch Broom are established within 100m of or in clearcuts, the Licensee will reforest within 18 months of harvest completion to encourage early crown closure by native trees.</li> </ul>
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## Introduction

The establishment of non-native species is causing concern among conservationists and ecologists around the world. Although these introductions are often innocuous, in some cases they have proven disastrous. Common examples are the introduction of rabbits to Australia, in BC rangeland the introduction of knapweed, and in BC forestry the introduction of western white pine blister rust.

Invasive plants have been variously defined by different authors, but commonly the term refers to non-native flowering plants that are aggressive and out compete or eliminate endemic species. Often these species are adapted to utilize disturbances and they have been introduced without the herbivorous species and diseases that keep them in check in their home ranges. However, even some native species, given the right conditions, can assume invasive habits.

It is also important to note that not all introduced species are invasive at all locations, nor in all habitats. Most are not. Some invasive plant species become naturalized and are no longer thought of as “invasive”. In fact, few endemic species are likely to have evolved *in situ*. Most endemic species were themselves invaders at some – probably many – times in their evolution, having colonized an unoccupied ecological niche or having displaced one or several species from an existing species complex. For example, pollen studies suggest that western redcedar - now an important component of local forests and First Nations culture - was not a substantial component of northern Vancouver Island forests until only a few millennia ago when it “rapidly” became a significant component of forest cover.

The enactment of the *Forest and Range Practices Act* in 2002 introduced the concept of invasive plants and “measures” for their control to the Province of B.C., including the coast.

## Legislation

There are a number of Provincial statutes covering weeds and invasive plants in British Columbia. These include:

Forest and Range Practices Act:

<http://www.for.gov.bc.ca/tasb/legsregs/frpa/frpa/frpatoc.htm>

Forest Planning and Practices Regulation:

<http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm>

Invasive Plants Regulation:

<http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/invplants/ipr.htm>

Weed Control Act:

[http://www.qp.gov.bc.ca/statreg/stat/W/96487\\_01.htm](http://www.qp.gov.bc.ca/statreg/stat/W/96487_01.htm)

Weed Control Regulation:

[http://www.qp.gov.bc.ca/statreg/reg/W/66\\_85.htm](http://www.qp.gov.bc.ca/statreg/reg/W/66_85.htm)

Notably, Section 17 of FPPR requires that:

*For the purpose of section 47 [invasive plants] of the Act, a person who prepares a forest stewardship plan must specify measures in the plan to prevent the introduction or spread of species of plants prescribed in the Invasive Plants Regulation, if the introduction or spread is likely to be the result of the person's forest practices.*

There are number of difficulties associated with and arising from the legislation and the interpretation thereof.

The most significant shortcoming is that the legislation does not recognize that the invasiveness of plants can vary with climate and habitat availability and that the severity

of ecological and economic impacts may be very different in different parts of the Province. Although the earlier *Weed Control Regulation* recognizes regional differences, the newer Invasive Plant Regulation prescribes a Province-wide list of invasive species and the *Forest and Range Practices Act* requires that “measures” be prescribed for each of them, even where they are not noxious or otherwise problematic. Many of the listed invasive plants are noxious or invasive in range and agriculture settings but are of much lesser significance in coastal working forests.

Secondly, the coastal forest industry and forest practices in general are largely not responsible for the introduction or spread of many of the listed species. Clearly the management of invasive plants is everybody’s business, and the coastal forest industry needs to do its part in managing invasive species. However any actions the forest industry undertakes will be futile if other, significantly more important players are not acting in concert. The industry cannot bear the bulk of the financial burden for invasive species management on the coast, and given that the general public and the construction of public infrastructures are probably the most significant vectors for the introduction and spread of invasive plants, this is clearly where the bulk of the financial burden should be.

## **Plant Species with Invasive Habits**

The regulations specify a long list of invasive plants. Some of these plants are already present in the vicinity of communities in the Region, and others could survive and become invasive if established. There are other plants with invasive habits that are present but not listed. These species are listed in the Table below as well. Provincial and Regional noxious weeds as defined by the Provincial Weed Regulation are largely range or agriculture related and thus are not specifically included herein unless they are expected to pose a significant risk within the Nootka Region.

## Table 1. Plant Species with Invasive Habits

### Known occurrence(s) within FSP area

#### Listed

Bull Thistle (*Cirsium vulgare*)  
Canada Thistle (*Cirsium arvense*)  
St. John's Wort (*Hypericum perforatum*)  
Common Tansy<sup>3</sup> (*Tanacetum vulgare*)  
Oxeye Daisy (*Chrysanthemum leucanthemum*)  
Scotch Broom (*Cytisus scoparius*)  
Japanese Knotweed<sup>4</sup> (*Polygonum cuspidatum*)

#### Others

Himalayan blackberry (*Rubus discolor*)  
Cut-leaved blackberry (*Rubus laciniatus*)

### Potential invaders to FSP area

#### Listed

Anchusa (*Anchusa officinalis*)  
Baby's Breath (*Gypsophila paniculata*)  
Black Knapweed (*Centaurea nigra*)  
Blueweed (*Echium vulgare*)  
Brown Knapweed (*Centaurea jacea*)  
Common Burdock\* (*Arctium minus*)  
Dalmation Toadflax (*Linaria dalmatica*)  
Diffuse Knapweed (*Centaurea diffusa*)  
Field Scabious (*Knautia arvensis*)  
Giant Knotweed\* (*Polygonum sachalinense*)  
Gorse\* (*Ulex europaeus*)  
Hoary Alyssum (*Berteroa incana*)  
Hoary Cress (*Cardaria draba*)  
Hound's-tongue (*Cynoglossum officinale*)  
Leafy Spurge (*Euphorbia esula*)  
Marsh Thistle\* (*Cirsium palustre*)  
Meadow Hawkweed (*Hieracium pilosella*)  
Meadow Knapweed\* (*Centaurea pratensis*)  
Nodding Thistle (*Carduus nutans*)

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<sup>3</sup> one location noted along Zeballos Main, taxonomy unconfirmed

<sup>4</sup> one location known near Zeballos septic field, probably originating from dumped yard waste.

\* asterisks represent species for which a preliminary review of autecology and current distribution suggests establishment within the FSP area is of higher likelihood than the other listed species. Some may already be present and if so would be detected as surveying progresses.

Orange Hawkweed\* (*Hieracium aurantiacum*)  
Perennial pepperweed (*Lepidium latifolium*)  
Plumeless Thistle (*Carduus acanthoides*)  
Puncture Vine (*Tribulus terrestris*)  
Purple Loosestrife\* (*Lythrum salicaria*)  
Rush Skeletonweed (*Chordrilla juncea*)  
Russian Knapweed (*Acroptilon repens*)  
Scentless Chamomile\* (*Matricaria maritima*)  
Scotch Thistle (*Onopordum acanthium*)  
Spotted Knapweed\* (*Centaurea maculosa*)  
Suphur Cinquefoil (*Potentilla recta*)  
Tansy Ragwort\* (*Senecio jacobaea*)  
Teasel (*Dipsacus fullonum*)  
Yellow Iris (*Iris pseudacorus*)  
Yellow Starthistle (*Centaurea solstitialis*)  
Yellow Toadflax (*Linaria vulgaris*)

#### Others

English Ivy<sup>5</sup> (*Hedera helix*)

## Hazard Rankings

An ecological assessment for the FSP area is needed to define vulnerable habitats and native plant communities. The next step would be to consider the current presence or proximity of listed invasive plants, their autecological adaptations that would allow them to thrive or dominate in specific habitats, the availability of those habitats, and the economic and ecological impacts of incursion. An integration of these factors would allow an assessment of the hazard posed by each listed invasive plant in the FSP area and lead to a local species hazard ranking. With resources scant, a focussed and multi-stakeholder approach would lead to the best results.

Preliminary estimates of species hazard for invasive and unlisted aggressive plants for the area of the FSP are presented in Table 2.

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<sup>5</sup> present within gardens at Zeballos and one naturalized clone occupies 30 m<sup>2</sup> outside the FSP area at Fair Harbour Recreation Site.

**Table 2. Hazard Assessment for Plants with Invasive Habits**

<b>High</b>	<b>Moderate</b>	<b>Low</b>
None.	Scotch Broom Japanese Knotwood Giant Knotwood Purple Loosestrife Gorse Himalayan Blackberry <sup>‡</sup> English Ivy <sup>‡</sup>	Anchusa Baby's Breath Black Knapweed Blueweed Brown Knapweed Bull Thistle Canada Thistle Common Burdock* Common Tansy* Cut-leaved blackberry <sup>‡</sup> Dalmation Toadflax Diffuse Knapweed Field Scabious Hoary Alyssum Hoary Cress Hound's-tongue Leafy Spurge Marsh Thistle* Meadow Hawkweed Meadow Knapweed* Nodding Thistle Orange Hawkweed* Perrenial Pepperweed Plumeless Thistle Puncture Vine Rush Skeletonweed Russian Knapweed Scentless Chamomile* Scotch Thistle Spotted Knapweed* St. John's-wort Suphur Cinquefoil Tansy Ragwort* Teasel Yellow Iris Yellow Starthistle Yellow Toadflax

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<sup>‡</sup> not listed by *Invasive Species Regulation*. No requirement to specify measures for this plant.

\* asterisks represent species for which a preliminary review of autecology and current distribution suggests establishment within the FSP area is of higher likelihood than the other listed species. Some may already be present and if so will be detected as surveying progresses.

## Species Characteristics, Rank and Strategy Rationale

The following species are present within the FSP area or are present elsewhere on Vancouver Island and therefore have the highest probability of being introduced to the Nootka Region. The latter would be the initial focus of prevention, detection, and early eradication efforts. For the species already present the focus would be to slow the rate of spread or eradication where feasible and beneficial. Other species identified in Table 2 are considered less likely to become established by way of their geographic separation or other factors, but nevertheless the possibility does exist.

### Bull Thistle

Hazard: Low. not a major concern in coastal areas; no range or pastureland so impact likely slight in Nootka Region.

Likelihood: present throughout B.C., observed along roads within FSP area.

Vectors: wind, soil initially?

Autecology: biennial; shade intolerant; a wide range of soil types in dry to moist habitats that include roadsides, cultivated fields, pastures, logged forestland; a transient species, appearing in recent clear-cuts or disturbed areas; seed viability <4 years.

Control: prevent establishment; hand pulling; overtopping with trees; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; prompt reseeding of disturbed soils; use certified seed for revegetation; detection surveys; pulling before seed set, monitor

### Canada Thistle

Hazard: not a major concern in coastal areas; no range or pastureland so impact likely slight in Nootka Region.

Likelihood: present throughout B.C., observed along roads in Zeballos vicinity.

Vectors: wind, soil initially?, reclamation seed?

Autecology: perennial; single sex plants and clumps; vegetative reproduction via spreading rhizomes; somewhat shade intolerant; disturbed areas, roadsides and riparian areas; wide ecological amplitude; seed viability <4 years.

Control: prevent establishment; hand pulling overtopping with trees; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; prompt reseeding of disturbed soils; use certified seed for revegetation; detection surveys; pulling before seed set, monitor.

Summary: this plant appears widespread and significant impacts are not readily apparent. Most measures to control would be expensive and ineffective.

### Common Burdock

Hazard: Low. Not considered a major concern in south coastal areas; no grasslands so impact likely slight in Nootka Region.

Likelihood: is present on Vancouver Island.

Vectors: seed readily sticks to animals and clothing

Autecology: biennial; intolerant of cultivation; shade intolerant; disturbed areas, roadsides and riparian areas with moist, fertile soils; wide ecological amplitude; seed viability <4 years.

Control: prevent establishment; hand pulling prior to seed set; overtopping with trees; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; prompt reseeding of disturbed soils; use certified seed for revegetation; detection surveys; pulling before seed set, monitor.

Summary: significant impacts are not anticipated but ongoing monitoring and early eradication where detected may be feasible.

### Common Tansey

Hazard: Low. Not considered a major concern in coastal areas; no range or pastureland so impact likely less in Nootka Region.

Likelihood: present on Vancouver Island, possibly observed at Zeballos but taxonomy uncertain.

Vectors: unknown

Autecology: perennial; shade intolerant; disturbed roadsides, pastures and streambanks; prefers fertile well-drained soils; vegetative reproduction from rhizomes

Control: prevent establishment; hand pulling; overtopping with trees; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys; prompt revegetation; pulling before seed set, monitor.

Summary: significant impacts are not anticipated but ongoing monitoring and early eradication where detected may be feasible.

### English Ivy

Hazard: Moderate. May slowly smother or displace native vegetation. Is causing significant damage in some areas of the coast and clones established at Fair Harbour and within the Village of Tahsis appear invasive in nature.

Likelihood: present on Vancouver Island and observed in Zeballos gardens, at Fair Harbour outside FSP area, and a significant infestation within the Village of Tahsis.

Vectors: widely used in landscaping; vegetative reproduction

Autecology: perennial; shade tolerant; adaptable to many adverse conditions

Control: prevent establishment;  
Potential Strategies (recognizing impacts, cost, effectiveness, feasibility):  
awareness; detection surveys; control very difficult once established;  
monitor  
Summary: Public education and ongoing monitoring of sites where dumping of  
yard waste is likely will be effective strategies.

### Giant Knotweed

Hazard: Moderate. May colonize roadsides and cutblocks. Can form dense  
impenetrable thickets and displace native plant communities.  
Likelihood: present on Vancouver Island with many establishments in Campbell  
River and observed at one location near Zeballos between dryland debris  
disposal site and community septic field.  
Vectors: soil transportation as plant is vegetatively spread by root parts. Plant  
parts may float downstream and colonize streambanks.  
Autecology: perennial; partially shade tolerant; roadside and moist areas such as  
streambanks;  
Control: prevent establishment; overtopping with trees; herbicides effective  
Potential Strategies (recognizing impacts, cost, effectiveness, feasibility):  
awareness; detection surveys; control very difficult once established;  
monitor  
Summary: Public education and ongoing monitoring of sites where dumping of  
yard waste is likely will be effective strategies.

### Gorse

Hazard: Moderate. May impede reforestation of drier sites.  
Likelihood: not currently observed, but well established elsewhere on Vancouver  
Island.  
Vectors: primarily soil transport associated with recreationists, gardeners, tires  
(4X4), grader, brush cutter, excavators  
Autecology: perennial; shade intolerant; dry, open, sandy or rocky clearings, old  
fields, cut banks, coastal bluffs, logged areas, flood plains, roadsides, and  
rights-of-way; sands to clays; requires mineral soil for successful  
germination; adapted to low fertility; seed viability up to 40 years.  
Control: eradication practically impossible (seed banking, resprouting, herbicide  
resistant); overtopping with trees  
Potential Strategies (recognizing impacts, cost, effectiveness, feasibility):  
awareness; detection surveys for and eradication of initial introduction and  
satellite infestations; monitor; suppress seeding at gravel sources,  
equipment operators' SOP  
Summary: monitoring and early eradication critical to prevent introduction.

## Himalayan and Cut-leaved Blackberries

Hazard: Moderate. May colonize cut-blocks after harvesting and roadsides. Can form dense impenetrable thickets and exclude trees. Himalayan the more aggressive blackberry.

Likelihood: present on Vancouver Island. Both species present in Zeballos vicinity.

Vectors: ingestion and defecation by humans, bears, birds, and other animals; gardeners

Autecology: perennial; some shade tolerance; tolerant of a wide variety of soil types and elevations but not dry sites; versatile reproduction strategies including selfing and vegetative methods; seed viability prolonged.

Control: prevent establishment; hand pulling young seedlings; overtopping with trees; some herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys; monitor; prompt reforestation to crown closure.

Summary: eradication of small satellite infestations may slow, but not eliminate, spread. Prompt reforestation and promotion of crown closure by native trees may gradually reduce or eliminate local clumps.

## Japanese Knotweed

Hazard: Moderate. May colonize roadsides and cutblocks. Can form dense impenetrable thickets and displace native plant communities.

Likelihood: present on Vancouver Island and well established at Campbell River.

Vectors: soil movement as is vegetatively spread by root parts. Plant parts may float downstream and colonize streambanks.

Autecology: perennial; partially shade tolerant; roadside and moist areas such as streambanks; vegetatively forms single sex clones so seed production may not occur if no pollinator nearby.

Control: prevent establishment; overtopping with trees; herbicides effective.

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys; control very difficult once established; monitor spread.

Summary: avoid introductions through detection surveys and spot eradication. Monitor existing location for spread. Avoid soil removal or transport from this site.

### Marsh Thistle

Hazard: Low. Colonizes cut-blocks after harvesting and forms dense stands that compete with tree seedlings. Tall, persistent stems can cause snow press and other forms of mechanical injury to tree seedlings. May displace native vegetation. The most common vectors are unlikely to transport this species to the Nootka Region directly.

Likelihood: sporadically present on Vancouver Island

Vectors: wind and water, possible ingestion by birds

Autecology: biennial; shade intolerant; moist-to-wet openings, including pastures, bog and fen communities, cut-blocks, and roadsides. Grows in a range of soil types, including forest floor and even gravel, provided seepage is present; seed viability <4 years.

Control: prevent establishment; hand pulling overtopping with trees; herbicides effective but restricted.

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys; pulling before seed set, monitor.

Summary: probability of introduction somewhat lower than others, but avoid introduction through detection surveys and spot eradication.

### Meadow Knapweed

Hazard: Low. No range or pastureland and this plant apparently prefers low rainfall climates so impact is likely less in Nootka Region.

Likelihood: present on Vancouver Island

Vectors: unknown

Autecology: perennial; shade intolerant; not known to establish in undisturbed natural plant communities. Typically, it grows on roadsides and disturbed areas; seed banking up to several years.

Control: prevent establishment; prompt reseeding; hand pulling; overtopping with trees; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; prompt revegetation; detection surveys; pulling before seed set, monitor.

Summary: impact likely slight; use detection surveys and spot eradicate if occasional detection.

### Orange Hawkweed

Hazard: Low. Not considered a major concern in coastal BC; no range or pastureland so impact likely slight in Nootka Region.

Likelihood: occurs throughout British Columbia

Vectors: spread primarily by recreationists, pack animals, and hay; not widely dispersed by wind

Autecology: perennial; vegetative reproduction from stolons and rhizomes; shade intolerant; meadows, clearings, roadsides, and disturbed sites. It appears best adapted to well drained, coarse-textured soils

Control: prevent establishment; hand pulling; overtopping with trees; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; prompt reseeding of disturbed soils; detection surveys; pulling before seed set if found.

Summary: impact likely slight; use detection surveys and spot eradicate if occasional detection

### Oxeye Daisy

Hazard: Low. No range or pastureland so impact likely slight in Nootka Region.

Likelihood: present on Vancouver Island, widely distributed in Zeballos area

Vectors: unknown

Autecology: short-lived perennial; vegetative reproduction from roots; shade intolerant; disturbed roadsides and landings; nutrient-poor, dry to moist soils; seed banking up to 3+ years

Control: prevent establishment; hand pulling; overtopping with trees; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; prompt reseeding of disturbed soils; detection surveys; pulling before seed set, monitor

Summary: impact seems slight in Nootka Region. Considering existing widespread distribution and this plant's apparent ease of dispersal, control activities are not feasible. Monitor distribution.

### Purple Loosestrife

Hazard: Moderate. As communities are at tidewater, probability of spread by water to upstream wetlands from garden introductions would be modest.

Likelihood: present on southern and eastern Vancouver Island

Vectors: primarily gardeners; downstream transport by water

Autecology: perennial; partially shade tolerant; wetlands and streambanks; vegetative reproduction from plant parts; seed banking up to 20 years

Control: prevent establishment; hand pulling; herbicides effective but restricted

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): public awareness; detection surveys; monitor

Summary: employee education and watch for introductions, particularly around communities. Unlikely to be associated with forest practices so forest industry measures not practical or effective.

## Scentsless Chamomile

Hazard: Low. No cropland so impact likely slight in Nootka Region.

Likelihood: present throughout BC.

Vectors: water; contaminated seed; equipment.

Autecology: annual/biennial; shade intolerant; heavy soils around shorelines and watercourses; flooding areas.

Control: prevent establishment; hand pulling; overtopping with trees; herbicides effective.

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; prompt reseeding of disturbed soils; detection surveys; pulling before seed set, monitor.

Summary: As impact is slight, detection surveys and eradication of occasional introductions.

## Scotch Broom

Hazard: Moderate. May impede reforestation of drier sites.

Likelihood: already present, but not as invasive as on east side of Vancouver Island in CWHvm and vh. Is more aggressive and invasive in the vicinity of Gold River in the CWHxm and is well established in spots along Highway 28 and the access road to the golf course and WFP shop/office.

Vectors: primarily soil transport associated with recreationists, gardeners, tires (4X4), grader, brush cutter, excavators

Autecology: perennial; shade intolerant; disturbed, drier sites; requires exposed mineral soil for successful germination; even on exposed sand and gravel in the Zeballos area (CWHvm subzone) broom has not yet dominated these disturbed sites suggesting that climatic factors including thicker forest floors and less exposed mineral soil may be hindering its success; although well established along certain roads in the CWHxm, as yet has not caused any problems in regenerating cutblocks in the general vicinity; seed banking for 50+ years

Control: eradication effectively impossible (seed banking, resprouting, herbicide resistant); overtopping with trees

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys for and eradication of satellite infestations; monitor; suppress seeding at gravel sources, equipment cleaning SOP.

Summary: although apparently less aggressive than elsewhere, undertake detection surveys; eradicate satellite plants; reduce seed bank at gravel sources by cutting/pulling in advance of seed set and avoid transport of seeds in soil or gravel to uninfected locales; monitor spread.

### Spotted Knapweed

Hazard: Low. no range or pastureland and apparently prefers low rainfall climates so impact likely less in Nootka Region.

Likelihood: present on Vancouver Island.

Vectors: primarily vehicle undercarriages transporting plant parts

Autecology: biennial or perennial; shade intolerant; roadsides and disturbed areas with well-drained, light-to coarse-textured soils; seed banking up to 8 years.

Control: prevent establishment; prompt reseeding; hand pulling; overtopping with trees; herbicides effective.

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys; pulling before seed set, monitor.

Summary: impact likely slight; use detection surveys and spot eradicate if occasional detection.

### St. John's-wort

Hazard: favoured soils uncommon so impact likely less in Nootka Region.

Likelihood: present on Vancouver Island in scattered pockets, observed along roads in Zeballos area.

Vectors: primarily herb gardeners; locally wild animals, pets, recreationists as gelatinous seed coat adheres readily

Autecology: perennial; may reproduce vegetatively from root parts; shade intolerant; roadsides and disturbed areas with dry, gravelly or sandy soils; seed banking up to 10 years

Control: prevent establishment; prompt reseeding; overtopping with trees or other vegetation; herbicides effective

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys; monitor

Summary: not likely associated with forest practices and impact likely slight; use detection surveys particularly near recreation sites and communities and spot eradicate if occasional detection.

### Tansey Ragwort

Hazard: Low. No range or pastureland so impact likely less in Nootka Region.

Likelihood: present on southern Vancouver Island

Vectors: primarily wind; secondarily recreationists, gardeners, tires, road equipment.

Autecology: biennial; shade intolerant; disturbed roadsides and clearcuts; seed dormancy up to 5 years and banking up to 20 years.

Control: prevent establishment; hand pulling; overtopping with trees; herbicides effective.

Potential Strategies (recognizing impacts, cost, effectiveness, feasibility): awareness; detection surveys; pulling before seed set, monitor.

Summary: Low likely impact so detection surveys and spot eradication should be sufficient.

## **Rationale and Potential Standard Operating Procedures**

### ***General Strategies and Operating Protocols***

#### **Awareness**

Travelling humans, among them the employees of the Licensees, engaged in the everyday things that humans do are the primary carriers of exotic and invasive plant seeds and parts. Employees and contractors of the Licensees can introduce invasive plants through recreational pursuits including gardening, hiking, camping, fishing, hunting, 4-wheel driving, mountain biking, picking berries, and even walking the dog; and at work can move soil containing seeds and plant parts on shoes, clothing, vehicles, and machinery and could pass certain seeds in feces. Almost all of these modes of transporting invasive and other plant propagules are beyond the practical control of Licensees.

The Licensees' most effective contribution to controlling the introduction and spread of exotic plants is by educating employees with respect to the impact of invasive species and the modes of transport of seeds and plant parts. To that end the Licensees could promote awareness by distributing information paid for and provided by government or other agencies including brochures, leaflets, Internet links, and videos to employees and contractors; by facilitating public lectures or tours for local residents; and by assisting government with installation or maintenance of educational signage at key locations.

#### **Training**

As the list of invasive plants is a long one, it is impractical to expect the general public or most Licensee employees to recognize more than a few species. However Licensee environmental, forestry and engineering personnel typically do have some educational background in taxonomy and with training could recognize many more of the listed plants. As well these folks travel the FSP area extensively and would be the most likely to encounter and promptly identify listed and other invasive plant species. A

half-day seminar would provide basic training and could be backed up with identification guides, photos, and other information.

## **Detection surveys**

With most introductions of invasive species, the only real hope for eradication is to accomplish it very soon after the initial introduction. With each passing generation, the probability of eradicating an introduced invasive plant progressively declines.

Early detection is the last line of defence in preventing the permanent establishment of an invasive plant. To that end regular detection surveys are an important component of any invasive plant strategy. Thorough, systematic, and regular early detection surveys are impractical in the context of a large area like the area covered by an FSP, and are beyond the resources of a typical Licensee. Therefore early detection surveys must be focused where the risk is greatest. In general this is where human activity is greatest and would include recreational features, primary roads accessing communities, marshalling and parking areas, landfills, and the places where the public tends to dump yard waste. Introductions at most of these sites would not meet the test of “...*likely to be the result of the person's forest practices.*” Nevertheless, these sites are the most likely points for introductions and once established there, invasive plants would spread to areas subject to forest practices, and eventually could be further spread by the forest practices themselves. Although Licensees do not have a legal or moral obligation to detect or control infestations at locations unaffected by forest practices or on areas beyond their tenures, they do have a vested interest in preventing introductions at these locations. Hence the Licensees will, where they have legal access rights and the area involved is small, undertake detection surveys of high risk locations in the vicinity of their operations.

A cost effective way for Licensees to initiate detection surveys could be to incorporate procedures into existing silviculture survey and road inspection protocols. These surveys, although they do not focus on the high risk sites discussed above, would provide very good coverage of areas recently subjected to a forest practice. As well the personnel involved would become much more aware of the issue and thus more apt to detect invasive plants at higher risk sites during or after working hours.

## **Early Eradication**

For invasive plants that are already established within the FSP area, detection surveys can also perform an important monitoring function.

Even though an invasive plant may be established within the FSP area at certain locations, further incursions may be prevented or slowed by detection and eradication of satellite establishment points radiating from core infestations. Again, Licensees do not have the obligation or the resources to take on a large eradication program at their own expense, but can commit to voluntarily eradicating early stage satellite infestations where only a few plants are involved. Hence a strategy commitment would be to control seeding and further spread by pulling or cutting up to 20 plants or stems of moderate- to high-risk species as they are detected. Appropriate government agencies would be notified at this point.

Although Licensees may agree to organize and carry out larger eradication efforts, costs would need to be reimbursed by government or other organizations.

The same strategy is also applicable to, and even more important for, a response to any initial introduction of an invasive plant to the FSP area.

For the purposes of defining how many plants is the limit for abandoning initial eradication attempts and for when a new infestation is a leap-frogging satellite versus normal progressive outward spread, rather arbitrary values are suggested for compliance purposes.

Twenty plants is an arbitrary number thought to be a reasonable and responsible compromise between simply notifying the government of an invasive plant's presence and cost-effectively and promptly taking action using the personnel making the initial observation. Twenty plants could be easily demonstrated for compliance purposes by tying the plants eradicated into a bundle and leaving the bundle at the site to mark the location for follow-up. If the plants have set seed they would need to be bagged and burned, and alternatively documentation or a photograph on file could prove compliance. Clearly 20 stems is a minimum and Licensees would instruct employees to eradicate many more than this number if the eradication is likely to succeed.

Again the arbitrary distance of 5 km is suggested for compliance purposes. Clearly Licensee employees are not going to waste time measuring the distance from the satellite to the source, they will just get on with the eradication attempt using an estimated 1-2 km rule-of-thumb.

## **Mapping**

Attempts at immediate eradication after detection are not likely to successfully eradicate initial or satellite infestations unless the eradication effort prevented seeding, re-sprouting, and/or removed and killed underground plant parts. Often seeds will remain dormant but viable for many years, sometimes decades, in the soil. Clearly follow-up surveys and treatments will be needed. Hence the Licensees' strategy could be to commit to map the location of initial detections, to record the species, eradication method and date, and to notify the MoF of any new detections. For introduction or spread that is not clearly the result of a forest practice of a Licensee, the Licensee could voluntarily carry out follow-up surveys and/or treatments that can be implemented incidentally while carrying out normal business practices. If costs exceed the goodwill of the Licensee, the Licensee may continue eradication efforts only if a system to reimburse the Licensee is established. Even where introduction or spread clearly is the result of a forest practice, the Licensee cannot bear the burden for further eradication and control costs, particularly where measures set out in an FSP have been followed or the initial introduction was before the Invasive Plant Regulation was enacted.

Mapping may be maintained electronically and the locations of invasive plants will be recorded with enough detail and at a scale appropriate to allow follow-up surveyors to confirm that either the plant remains or has been successfully eradicated. Where available, GPS would be useful for this purpose. Each survey or treatment will recommend, reflecting the results of the previous treatment and the autecology of the plant, the target date for a return visit, if any. After several years of surveying, GIS analysis may prove useful in plotting the rate of spread of invasive plants and in identifying higher risk areas for further spread.

## ***Vectors Potentially Associated with Forest Practices***

There are a number of vectors associated with human activities which could result in transport of invasive plants to or within the FSP area. Some of these vectors may be associated with forest practices to varying degrees but are probably of less significance than the same vectors associated with the activities of the general public. Forest practices are less likely to be the source of new introductions but may be more of a factor in the spread of invasive plants within a local area once they are already well established.

Primary vectors are:

- Intentional movements of propagules

Home gardeners and the horticultural industry have been responsible for many initial introductions of invasive plants and are far more significant in this regard than all forest practices combined. Agriculture practices may contribute to the introduction or spread of invasive species but there is no agriculture occurring within the FSP area.

In terms of forest practices that intentionally introduce plant propagules, revegetation of disturbed soils with grasses and legumes is a potential vector. Some plants may have been introduced into the FSP area as components of, or more likely as contaminants of, seed mixtures used for revegetation. More recently some Licensees have funded research to identify and improve nursery culture of native grasses so that seed mixes can be converted from agricultural grasses to coastal endemic species.

In the meantime the Licensees' strategy could be to commit to using seed mixes that do not include mixture components listed as invasive and to use component seed lots certified to have low levels of contamination by potentially noxious weeds. Typically this would be seeds certified to standards set out for reclamation in *Canadian Seeds Regulations* (<http://www.canlii.org/ca/regu/crc1400/whole.html>; <http://laws.justice.gc.ca/en/S-8/C.R.C.-c.1400/172987.html>). For operational purposes it is recommended that practitioners require seed companies to supply "Common #1 Forage Mixture" or better and that mixes in total contain less than 2 seeds per 25g for each of the invasive species identified earlier as moderate or high hazard for the Nootka Region.

- Unintentional movements of propagules

Some invasive plants have been introduced unintentionally. Certainly once an invasive species is established, unintentional movements are a significant mechanism for spread and will complement an invasive plant's inherent dispersal mechanisms. Movement of soil is probably the most significant of the unintentional mechanisms and once again home gardeners are primarily responsible.

With respect to forest practices, tracked and rubber-tired equipment involved in the various phases of forest harvesting and management are capable of inadvertently moving small amounts of soil that may have become lodged in the machinery, particularly undercarriages.

Road construction equipment may transport ballast or end haul materials containing propagules but generally only for short distances. In this case a rather arbitrary limit of 1000m is suggested, in that if Scotch Broom is already present within that distance along a road, it is likely to spread that distance within a few years via other vectors anyway. If a Licensee knows that gravel from a particular pit is likely to be transported to uninfested locations, it is recommended that control of broom plants at the source be maintained to reduce the seed bank in the source gravel. Newly blasted quarried materials are of lower risk than other materials and measures are therefore not warranted.

Production of tree seedlings for reforestation involves movement of soil from nurseries to planting site by way of the growing medium. This activity is considered very low risk as soil is sterilized at the nursery before use and airborne weeds that may establish in individual tree plugs are removed during cultivation and finally at packing.

Cutting, removal, and disposal of invasive plants from locations where they are established is likely a significant mechanism for spreading invasive plants. The disposal of yard waste by home gardeners is a prime example and is no doubt responsible for the introduction of invasive plants into un-infested areas. Public awareness is of prime importance in this respect. In terms of forest practices road maintenance, particularly brush cutting, has potential to spread invasive plants. However debris is generally disposed of in situ.

Some invasive plants produce sticky or burred seed coats that are designed to facilitate hitchhiking with unsuspecting animals, humans, or their pets. Forest practices will not exacerbate this threat except to the extent that workers may wear clothing that has been worn earlier at infested areas. Government officials or upper management travelling from outside the FSP are particularly apt to be carrying these kinds of alien seeds.

Some seeds are adapted to be transported to new locations by ingestion and subsequent defecation elsewhere. For example bears and birds are likely responsible for satellite introductions of Himalayan and cut-leafed blackberries. Humans, including workers, may be carriers as well.

## Indirect Soil Translocation

One concern that may lead to introductions is the transport of tracked machinery that may be harbouring soil carrying the vegetative or seed propagules of an invasive plant. However the risk of introductions via this method is less than one might imagine, as relatively few tracked machines are moving from infested areas outside the FSP area into the FSP area. Most logging equipment stays within a Licensee's operating area and only rarely are machines moved great distances to/from other operating areas. As well, most tracked logging machinery moves between new harvest blocks. Typically harvesting is of old or mature growth forest where invasive plants have not colonized.

Of course there are exceptions. These activities do carry some risk, albeit a small one, and these activities need to be managed in proportion to the magnitude of the risk.

To address the possibility of soil being transported into the FSP area, increasing the awareness of machine operators and their foremen is likely the best preventative strategy and the basis for the Licensee strategy in this FSP. Operators in-the-know can take steps to reduce the amount of soil that may be trapped in tracks and elsewhere. The Licensee may also consider developing a Standard Operating Procedure (SOP) for machine operators and could require that tracked machinery entering the FSP area from an infested worksite be washed or otherwise cleaned at the point of origin, or at a designated wash site that is routinely monitored for invasive plant seedlings and germinants. Likewise, tracked machines working on eradicating infestations within the FSP area may need to be cleaned before moving to un-infested worksites.

Rubber-tired vehicles and machinery are highly mobile and in that sense may move propagules greater distances. However under most conditions, less soil is trapped in the treads and fenders than in tracked machines so in that sense risk is reduced. Again operator awareness is key and care to minimize the amount of soil moved will go a long way to reduce the likelihood of transporting invasive plants.

The basis for a machine operator's invasive plant SOP could include the preliminary risk evaluations and preventative measures for each machine set out in Table 3.

**Table 3. Considerations for Machine Operator's Standard Operating Procedure**

Tracked	
Grapple yarder	Low risk. Not likely to be working in infested areas. If moving from second growth or old firebreaks where moderate or high hazard invasive plants such as Scotch Broom are established to old growth or 2 <sup>nd</sup> growth free of these invasive plants, clean tracks at infested site or wash at designated location.
Hoe forwarder	Low risk. Not likely to be working in infested areas. If moving from second growth or old firebreaks where moderate or high hazard invasive plants such as Scotch Broom are established to old growth or 2 <sup>nd</sup> growth free of these invasive plants, clean tracks at infested site or wash at designated location. Utilize puncheon to reduce contact with infested soils.
Hydraulic loader	Low risk. Not likely to be working in infested areas. If moving from second growth or old firebreaks where moderate or high hazard invasive plants such as Scotch Broom are established to old growth or 2 <sup>nd</sup> growth free of these invasive plants, clean tracks at infested site or wash at designated location.
Excavator	Low risk if building new road. Higher risk if doing road maintenance in infested areas. If moving from a site infested with moderate to high hazard invasive species such as Scotch Broom to an un-infested site, clean tracks and bucket on site or wash at designated location.
Cat	Low risk if surfacing new road. No action necessary. Otherwise, if moving from a site infested with moderate to high hazard invasive species such as Scotch Broom to an un-infested site, clean tracks and blade on site or wash at designated location.
Drill	Very low risk. Measures not needed.
Rubber-Tired	
Gravel truck	Low risk unless muddy conditions. If muddy conditions and moving through or from locations infested with moderate to high hazard invasive plants such as Scotch broom to un-infested locations, clean box and tires after completing projects involving infested soil.
Grader	Low risk unless muddy conditions and moving through or from locations infested with moderate to high hazard invasive plants to un-infested locations. Reduce one-direction run length along infested roadsides and remove loose soil and mud before moving to un-infested areas.

Log truck	Low risk as confined to centre running surface of roadways. Remove mud periodically at designated wash stations.
Lowbed	Low-moderate risk as travels widely within operating area and soil from transported equipment may be deposited on deck. Consider origin, destination and risk of transported machinery and clean as appropriate. Otherwise remove mud periodically at designated wash stations.
Crew transport	Low risk as generally travelling well-defined, repeated routes and low surface area to capture soil and mud. Wash periodically at designated wash stations.
Supervisor's vehicle	Low to moderate risk as low surface area but travels repeatedly throughout operating area. Be aware of infested locations and wash periodically at designated wash stations. If used after hours for transporting soil or yard waste, clean or wash after use at point of waste origin or designated wash site.
Brush cutter	Moderate risk as may travel widely if a contractor. Remove plant parts from cutting head before moving from infested roadsides to un-infested roads. During seed dispersal times, as far as practical avoid disturbing lone broom or gorse plants and thoroughly clean brushing head or other equipment parts that may harbour seeds. When seed dispersal is not occurring, and particularly after spring bud burst, attempt to cut broom and gorse plants even if cutting is not necessary to improve visibility. Avoid brushing Japanese or Giant Knotweed.

## Suppressing Invasive Plants Through Forest Practices

Although there are exceptions, a key advantage in preventing or reducing spread is that the vast majority of invasive plants are shade intolerant, needing full sun to germinate and survive. Foresters can utilize this characteristic to advantage in two ways.

Firstly, vulnerable, exposed seed beds should be re-vegetated as quickly as possible with pioneering, rapidly-growing, sod-forming - but non-invasive – ground covers. If vegetation is thick enough it can produce enough shade to reduce or prevent germination and where germination occurs can weaken the germinating seedlings of invasive plants so that they are more likely to succumb to other environmental factors. Canada

Bluegrass<sup>6</sup>, Spike Bent Grass, and Red Fescue are possible choices for establishing ground cover.

Therefore, if moderate or high hazard invasive species are established nearby, a recommended strategy is to promptly re-vegetate with non-invasive grasses and/or legumes to suppress germinants, particularly Scotch Broom. Soils disturbed immediately before or during the growing season (effectively April to September on the west coast of Vancouver Island) should be seeded within two months and no later than September. If disturbed in the fall or winter, seeding should be near the start of the next growing season. Hence the strategy is to reseed so that no more than two months of competition-free growing season is available for germinating invasive plant seeds. Clearly the sooner that competing ground cover can be established the better.

In the case of Scotch Broom, seeds are dispersed explosively from pods for distances less than five metres. Without significant secondary movement via soil displacement or transport, the inherent rate of spread is likely relatively slow. Hence eradication alone is likely as effective and less expensive than vegetative ground covers more than 50-100 metres away from existing infestations.

A second strategy is to utilize shading to suppress or eliminate shade intolerant invasive plants that are already established. Closing canopies of coniferous or even deciduous trees can suppress seed and vegetative production in invasive plants. In some cases dense conifer canopies in the stem exclusion phase can eliminate understorey entirely. Therefore prompt reforestation to establish good tree stocking levels can be an effective strategy to suppress or even eliminate undesirable plants, including invasive species. This strategy is however not a panacea and if invasive plants become well established in the post-clearcut phase they may effectively suppress conifers and prevent establishment of adequate stocking. The operative word is “prompt” reforestation. Target and even minimum stocking densities typically prescribed for forest management purposes, should be adequate to suppress or even eliminate intolerant invasive plants, if reasonably uniform in distribution.

Where tree rotations are relatively short, species producing seeds with extended viability such as Scotch Broom, may not be eliminated by maintaining closed canopies for only a few decades. Consider extending rotation ages in these circumstances and if feasible during the closed canopy stage, control roadside or other broom to reduce the size and viability of the seed bank in nearby stands.

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<sup>6</sup> This species is thought to be a naturalized alien species and it may adopt invasive characteristics in some situations.

## Resources

For further information the reader and forest practitioners are directed to the following sources. Much of the summarized material herein was derived from these publications.

Forest Practices Branch – Invasive Plants Program

<http://www.for.gov.bc.ca/hfp/noxious/introduc.htm>

Invasive Plant Strategy for British Columbia (Fraser Basin Council):

[http://www.fraserbasin.bc.ca/news/documents/invasive\\_plant\\_strategy04.pdf](http://www.fraserbasin.bc.ca/news/documents/invasive_plant_strategy04.pdf)

WeedsBC: <http://www.weedsbc.ca/>

weed profiles: <http://www.weedsbc.ca/browse.html>

Guide to Weeds in BC: <http://www.weedsbc.ca/pdf/GuidetoWeeds.pdf>

Noxious weeds list: [http://www.weedsbc.ca/pdf/Noxious\\_Weed\\_List.pdf](http://www.weedsbc.ca/pdf/Noxious_Weed_List.pdf)

Invasive plants of SW BC:

[http://www.shim.bc.ca/invasivespecies/\\_private/index.htm](http://www.shim.bc.ca/invasivespecies/_private/index.htm)

Field Guide to noxious and other selected weeds of BC:

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

FEIS plant lists: <http://www.fs.fed.us/database/feis/plants/>

Photos:

<http://dnr.metrokc.gov/wlr/lands/weeds/weedid.htm>

<http://tncweeds.ucdavis.edu/photos.html>

English ivy:

[http://www.hcs.ohio-state.edu/hcs/TMI/Plantlist/he\\_helix.html](http://www.hcs.ohio-state.edu/hcs/TMI/Plantlist/he_helix.html)

<http://dnr.metrokc.gov/wlr/lands/weeds/pdf/english-ivy-control.pdf>

Gorse:

[http://www.weedsbc.ca/weed\\_desc/gorse.html](http://www.weedsbc.ca/weed_desc/gorse.html)

<http://dnr.metrokc.gov/wlr/lands/weeds/gorse.htm>

<http://dnr.metrokc.gov/wlr/lands/weeds/pdf/gorse-control.pdf>

<http://www.efn.org/~ipmpa/Noxgorse.html>

Himalayan blackberries:

<http://svinet2.fs.fed.us/database/feis/plants/shrub/rublac/>

<http://www.fs.fed.us/database/feis/plants/shrub/rubdis/index.html>

Knotweeds:

<http://website.lineone.net/~f.lyczynska/secondary/Ev/kw2.htm>

<http://www.agf.gov.bc.ca/cropprot/jknotweed.htm>  
[http://www.nwcb.wa.gov/weed\\_info/gknotweed.html](http://www.nwcb.wa.gov/weed_info/gknotweed.html)  
[http://dnr.metrokc.gov/wlr/lands/weeds/japanese\\_knotweed.pdf](http://dnr.metrokc.gov/wlr/lands/weeds/japanese_knotweed.pdf)  
<http://www.invasivespecies.gov/profiles/japktwd.shtml>

Oxeye daisy:

[http://www.weedsbc.ca/weed\\_desc/oxeye.html](http://www.weedsbc.ca/weed_desc/oxeye.html)  
<http://www.agf.gov.bc.ca/cropprot/weedguid/oxeyed.htm>  
<http://dnr.metrokc.gov/wlr/lands/weeds/oxdaisy.htm>

Scotch Broom:

[http://www.pfc.forestry.ca/biodiversity/broom\\_e.html](http://www.pfc.forestry.ca/biodiversity/broom_e.html)  
<http://www.agf.gov.bc.ca/cropprot/weedguid/scotchbroom.htm>  
<http://dnr.metrokc.gov/wlr/lands/weeds/sctbrm.htm>  
<http://dnr.metrokc.gov/wlr/lands/weeds/pdf/scotch-spanish-broom-control.pdf>  
<http://www.invasivespecies.gov/profiles/scotchbrm.shtml>  
<http://www.efn.org/~jpmpa/Noxbroom.html>