
Appendix 6

Invasive Plant Management Plan

**Planting Criteria and
Recommended Native Tree and
Shrub Species for Restoration
and Enhancement of Fish and
Wildlife Habitat” (BC Ministry of
Environment, Lands and Parks,
July 1998)**

INVASIVE PLANT MANAGEMENT PLAN

The term “invasive plant” refers to any invasive alien plant species that has the potential to pose undesirable or detrimental impacts to undisturbed native ecosystems. Invasive plants have the capacity to establish quickly and easily on disturbed sites through prolific seed production, aggressive rooting structures, and through broad ecological amplitude. This often results in a loss of biodiversity and poses a threat to species at risk in British Columbia. Of particular susceptibility are drier coastal ecosystems and wetland communities such as those found at Eagle ridge bluffs and the Larsen Creek watershed. Specific species of concern in this area include Giant Hogweed (*Heracleum mantegazzianum*), English Ivy (*Hedera helix*), Himalayan Blackberry (*Holodiscus discolor*), Scotch Broom (*Cytisus scoparius*), English Holly (*Ilex aquifolium*), and Butterfly Bush (*Buddleia davidii*).

Invasive species are spread through various pathways such as recreation users, wildlife (especially birds and ungulates), land clearing activities (soil disturbance), and infected nursery plant stock. The following steps will be taken to reduce the potential of the spread of invasive species in DB1.

PRE-CONSTRUCTION

Preliminary Eradication

The 25m zone adjacent to the highway Right-of-Way will be surveyed by the Environmental Field Coordinator for the presence of invasive plant species. Should any be found they will be removed and disposed in a manner acceptable to the Environmental Manager or Environmental Coordinator.

CONSTRUCTION

Prevention of Introductions

The first step of successful management will be to prevent the establishment of invasive species in newly disturbed areas. This will be achieved by the immediate stabilization of disturbed soils by locally produced hog fuel and the prescription of planting plans that utilize locally successful native plant species.

Early Detection

This second step will be achieved by project personnel conducting routine invasive species surveys. At this time a plan will be developed that demonstrates how plants can be effectively and successfully eradicated from the area.

Rapid Response

Invasive species will be removed according to guidelines specific to individual invasive species of concern.

POST CONSTRUCTION

Restoration

The final step will be to restore the area to pre-disturbance conditions as soon as construction is complete. This will reduce the chance of invasive species establishing in the newly exposed area.

Monitoring

Once the area is replanted it will be continually monitored by project personnel. Monitoring will be routine in the early phases and will taper off to monthly surveys throughout the remainder of the project.

SPECIES OF CONCERN

GIANT HOGWEED

Description/Ecology

The Giant Hogweed is a large plant that prefers moist soil and partial shade. It thrives in ravines, wooded open spaces, ditches, newly disturbed areas, and along railway tracks. The plants reach 2.5 to 4.5 metres when in flower with stout, hollow stems that are 5 to 10 centimetres in diameter. The large blossom consists of numerous white flowers clustered in an umbrella-shaped head that is more than 0.75 metres across. The sap of the Giant Hogweed causes a skin reaction that may cause redness, swelling, heat and irritation. Exposure of the affected area to sunlight increases this phototoxic reaction.

Prescribed Treatment

Mature plants can be removed manually if at least the first 5 to 10 centimetres of the central root is dug up. Younger plants are more resilient than mature infestations with hundreds of seedlings. They may break off when being pulled from compacted soils which ultimately leaves the root to continue to grow. Often the plants are found populating steeper slopes and stream banks, which may become an erosion hazard when winter dieback occurs and exposes soils.

ENGLISH IVY

Description/Ecology

English ivy is a highly successful invader that thrives in mild climates. Ivy often forms thick mats of vegetation that smother low-growing native plants and

climbs up tree trunks forming a dense cover. The weight of the vines and leaves make the tree more vulnerable to breaking or toppling over in windstorms. Rampant ivy growth can also weaken or kill a tree by reducing its exposure to light and thus limiting its ability to photosynthesize. English ivy grows quickly (up to 4 metres per year) and is spread primarily by birds that eat its seeds.

Prescribed Treatment:

Heavy infestations of English ivy are difficult to eliminate so it is imperative to detect its presence at its early stages. The first priority is to remove ivy from standing live trees. All vines should be cut in a complete strip around the trunk to break away smaller stems from the trunk (without damaging the tree's bark). Ivy growing on the ground can be removed by pulling vines and digging roots from the soil. Most ivy re-growth occurs from roots left in the soil but cut stems and leaves can also regenerate. Ivy berries contain seeds that will readily sprout.

HIMALAYAN BLACKBERRY

Description/Ecology

Himalayan blackberry is a widespread and aggressive invasive plant that can quickly turn naturally open areas into dense thickets of impenetrable brambles. Blackberry thickets suppress growth of native vegetation through shading and build up of heavy loads of leaf litter and dead stems. Himalayan blackberry spreads by its roots and canes and is widely dispersed via berry-eating birds.

Prescribed Treatment

Himalayan blackberry should be removed before it becomes established in an area. The canes must be pulled from the ground before they produce berries, and canes that are cut as the plant is producing flowers are least likely to re-sprout. Roots should be removed to reduce the opportunity of re-germination.

SCOTCH BROOM

Description/Ecology:

Scotch broom is an aggressive invader in open or disturbed ecosystems. Broom is successful because it fixes its own nitrogen, is drought and cold tolerant, and builds up a long-lived 'seed bank' in the soil. Scotch broom quickly fills in open areas, forming dense stands and choking out native species.

Prescribed Treatment

Scotch broom should be removed beginning in late summer before its seedpods begin to open. Removal at this time will stop the addition of new seeds to the soil and may have the advantage of killing drought-stressed plants. Broom cut

during wetter months can survive to re-sprout the following season. If the soil is moist and the stems are small broom plants can be pulled easily from the ground by hand. Larger plants should be cut below the root crown. When removing Scotch broom, avoid disturbing the soil which may stimulate dormant broom seeds to sprout.

ENGLISH HOLLY

Description/Ecology:

Holly out competes native vegetation for light, nutrients and water. It spreads through suckering from the roots and sprouts where branches touch the ground.

Prescribed Treatment

Holly should be removed while it is still young and not yet producing berries. Young plants should be pulled from moist soil, or cut in dry soil conditions. Mature trees and saplings should be cutting below the root crown. As with other invasive shrubs or trees, the cut stumps must be monitored for signs of re-sprouting. Holly spreads by seed dispersal so berries should be collected before disposal. Cut holly should be stockpiled on tarps prior to removal from the worksite.

BUTTERFLY BUSH

Description/Ecology:

Butterfly bush impedes the reproduction and growth of native vegetation, prevents access to water courses and forms blockages provoking erosion of banks disturbed areas, natural forest, riparian zones, and wetlands.

Prescribed Treatment

To achieve total removal ground cover of a non-invasive species must be established immediately to prevent the re-occurrence of Butterfly bush.

PLANTING CRITERIA AND RECOMMENDED NATIVE TREE AND SHRUB SPECIES FOR RESTORATION AND ENHANCEMENT OF FISH AND WILDLIFE HABITAT

Deciduous Trees

Botanical Name	Common Name	Mature Height (m)	Best Growth Conditions ¹
<i>Acer circinatum</i>	vine maple	to 7	m-w
<i>Acer glabrum</i> var. <i>douglasii</i>	Douglas maple	to 10	d-m
<i>Acer macrophyllum</i>	broadleaf maple	to 35	d-m
<i>Alnus rubra</i>	red alder	to 25	m
<i>Betula papyrifera</i> var. <i>commutata</i>	western white birch	to 30	m-w
◆ <i>Crataegus douglasii</i>	black hawthorn	to 10	m
◆ <i>Malus fusca</i>	Pacific crabapple	2-12	m-w
<i>Populus balsamifera</i> or <i>P. trichocarpa</i>	black cottonwood	to 50	m-w
◆ <i>Prunus emarginata</i>	bitter cherry	2-15	m
<i>Rhamnus purshiana</i>	casacara	to 10	d-w
<i>Salix lucida</i> ssp. <i>lasiandra</i>	Pacific willow	to 12	w
◆ <i>Sorbus aucuparia</i> ²	European mountain ash		

Coniferous Trees

Botanical Name	Common Name	Mature Height (m)	Best Growth Conditions ¹
<i>Picea sitchensis</i>	Sitka spruce	up to 70	m
<i>Pinus monticola</i>	western white pine	to 40	m-d
<i>Pseudotsuga menziesii</i>	Douglas-fir	to 70	d
<i>Thuja plicata</i>	western red cedar	to 60	m-w
<i>Tsuga heterophylla</i>	western hemlock	to 60	d-w

- d = dry, m = moist, w = wet
 - European mountain ash is not native but is naturalized
- ◆ denotes fruit-bearing species

Shrubs

Botanical Name	Common Name	Mature Height (m)	Best Growth Conditions ¹
<i>Alnus crispa ssp. Sinuata</i>	Sitka alder	1-5	m
◆ <i>Amelanchier alnifolia</i>	saskatoon	1-5	d-m
◆ <i>Cornus sericea</i> or <i>C. stolonifera</i>	red-osier dogwood	1-6	m
◆ <i>Corylus cornuta var. californica</i>	beaked hazelnut	1-4	m
<i>Holodiscus discolor</i>	oceanspray	to 4	d-m
<i>Physocarpus capitatus</i>	Pacific ninebark	to 4	w
◆ <i>Prunus virginiana</i>	choke cherry	1-4	d
◆ <i>Rosa nutkana</i>	Nootka rose	to 3	d-m
◆ <i>Rosa gymnocarpa</i>	baldhip or dwarf rose	to 1.5	d-m
◆ <i>Rubus parviflorus</i>	thimbleberry	0.5-3	m
◆ <i>Rubus spectabilis</i>	salmonberry	to 4	m-w
<i>Salix hookeriana</i>	Hooker's willow	to 6	w
<i>Salix lucida spp. Lasiandra</i>	Pacific willow	to 12	w
<i>Salix scouleriana</i>	Scouler's willow	2-12	m
<i>Salix sitchensis</i>	Sitka willow	1-8	m-w
◆ <i>Sambucus caerulea</i> or <i>S. glauca</i>	blue elderberry	-	d-m
◆ <i>Sambucus racemosa var. arborescens</i>	red elderberry	to 6	m
◆ <i>Sorbus sitchensis</i>	Sitka mountain ash	1-4	m
◆ <i>Symphoricarpos albus</i>	snowberry	0.5-2	d-m
◆ <i>Vaccinium parvifolium</i>	red huckleberry	to 4	m

1. d = dry, m = moist, w = wet
◆ denotes fruit-bearing species

Planting Criteria

- All riparian plantings should be based on 1 tree or shrub per 1 square metre density.
- Coniferous trees should comprise not less than 10% nor more than 25% of the tree stock planted.
- All tree/shrub species should be of guaranteed nursery stock.
- The botanical name should be used when ordering stock to ensure that the desired native species is being purchased. Each specimen should be tagged with the botanical name and the tag should be left attached after planting.
- Tree stock should be a minimum of 1.2 metres (4 feet) in height when purchased and planted 1.5 to 2 metres apart.
- Stock planted during the fall (Sept - Oct) and spring (Mar - Apr) has the greatest likelihood of surviving. Regular watering may be required until the plants are established. Additional advice on proper planting procedures should be obtained from the nursery supplying the stock.
- Planting on a given area being enhanced must be successful to an 80% take. If more than 20% die over one year, replanting is required.
- A minimum of 50% of trees and shrubs planted should be fruit-bearing species.

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