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Forest Assessment Report
Innis Arden Reserve
Shoreline, Washington



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Table of Contents

Introduction..... 2

Forest Stewardship Vision 2

Purpose of Plan, Land Owners Objectives and Goals 2

Property Description 2

Resource Category I. Soils..... 3

Resource Category II. Water Resources 4

Resource Category III. Forest Inventory 5

Resource Category IV. Forest Health/ Invasive Species/Wildfire..... 6

Resource Category V. Roads and Trails 8

Resource Category VI. Wildlife 10

Resource Category VII. Protection of Special Resources 10

Resource Category VIII. Aesthetics & Recreation 10

Tree Risk Management 10

Forest Management Considerations..... 11

Forest Management Recommendations 12

Summary of Forest Management Recommendation Priorities 12

SUPPLEMENTAL MATERIALS

- COVER TYPE MAP - ORTHOPHOTO
- COVER TYPE MAP - TOPOGRAPHY
- ENHANCING WILDLIFE ON PRIVATE WOODLANDS BULLETIN
- BLACKBERRY CONTROL
- IVY CONTROL
- SCOT’S BROOM CONTROL
- OLD MAN’S BEARD CONTROL

Introduction

This report identifies current forest health conditions and invasive species concerns. The plan is written to provide the King Conservation District with baseline information for the future development of a Forest Stewardship Program on the property.

Forest Stewardship Vision

The landowner recognizes the multiple values that this urban forested property provides. A forested property of this size within an urban area is rare and warrants protection. Maintaining and enhancing the property's forest resources benefits surrounding properties, the local community, and the overall environment.

Purpose of Plan, Land Owners Objectives and Goals

The purpose of this report or plan is to identify current forest conditions and considerations for management over time. The landowner's primary objective is to manage the property as a forest preserve.

Landowner goals include maintaining and improving forest health, slope stability, wildlife habitat, maintaining and encouraging a diversity of native trees, shrubs and plants, monitoring and treating invasive species, and protecting sensitive areas. The improvement of overall forest health for enhanced capacity to clean and filter storm water runoff and improve water quality in the urban watershed, which will ultimately provide cool and clean water for salmon habitat.

This forest stewardship plan provides a description of the resources found on the ownership and summarizes management considerations for the future. The plan should be periodically updated and may be amended to reflect the state of the forest resources, current knowledge and understanding of natural resources, as well as changing landowner goals.

Property Description

The property comprises one tax parcel (3586501150) totaling roughly 23 acres. The property is accessible from the north via the end off of 15th AVE NW, adjacent to the residence at 17717 15th AVE NW. There is also an entry point off of 14th AVE NW. See the provided maps in the supplemental materials section.

The property has primarily a west aspect. Slopes are gentle to steep ranging between 10% and 970%. Elevation above sea level is approximately 30 feet on the west side rising to roughly 260 at the top (northeast corner) adjacent to 14th AVE NW.

The forest is an uneven-aged mixed species forest. Species composition is comprised primarily of big leaf maple and red alder, with minor components of western red cedar, western hemlock, black cottonwood and Pacific madrone. The Douglas-fir and Pacific madrone are confined to the northwest corner of the property only, near the grassy bluff.

The extent of understory development is generally low to moderately dense. Understory native shrub species on the property include primarily sword fern, Indian plum, vine maple, salmonberry, and trailing or creeping blackberry.

Resource Category I. Soils

There is no recorded soil survey data for the subject area. When the majority of lands across King County were surveyed in 1973, this area was not included for whatever reasons. Based on adjacent surveys, it is assumed the soils are likely the Alderwood-Everett gravelly sandy loams found on 25% to 70% slopes.

Alderwood soils are moderately well drained and moderately deep over a hardpan. They are formed in glacial till. Elevation of near sea level to 550'. Permeability is moderately rapid above the hardpan and very slow through it. Available water capacity is low. Effective rooting depth is usually 20" to 40". Runoff is rapid and the hazard for soil erosion is high. Springs or seep areas are common.

The Everett soils are deep, somewhat excessively drained soils on terraces and outwash plains, formed in glacial outwash. Elevation is near sea level to 500'. Permeability is rapid. Available water capacity is low. Effective rooting depth can be up to 60" or more. Runoff is rapid and the hazard for soil erosion is moderate.

Commonly found tree species include mostly Douglas-fir; with lesser but potentially moderate components of western hemlock, western red cedar, and red alder. Common forest understory plants include salal, Oregon grape, red huckleberry, bracken fern, and sword fern.

Soils across the site appear fairly stable. One small area of recent mass wasting was observed during the site inspection, pictured below. Its location is shown on the maps in the supplemental materials section of this report.



Area below small recent slide – jack-straw alder trees



There has been a long history of small landslides or mass wasting on the property. This is evident by openings within the forest where the ground has moved in the past and mixed age classes of pioneer red alder trees.

The Douglas-fir 50-year site index is 111. This means that from the time a tree is planted or naturally seeds in, on average it will grow to a height of roughly 111 by the time it is 50 years of age. The soils are very productive for growing trees. Seedling mortality can be a problem due to the high temperature and low moisture content during the growing season.

Resource Category II. Water Resources

The property lies adjacent to Puget Sound. The BNSF rail Right-of-Way is located between the subject property and Puget Sound, along the west perimeter.

A stream exists along the properties north perimeter (Coyote Creek). There is no known perennial water source above. This stream channel carries primarily storm water runoff from surrounding developed areas. Minor typical erosion of the stream bank was noted.

There are several rivulets or small streams across the property. Many of these likely developed from seeps after a mass wasting or small slide event.

There is a mapped wetland in the northwest portion of the property. This area contains many rivulets and seeps but no real wetland vegetation. Because of slope, it would not be considered a typical wetland feature.

The concrete culvert beneath the old road grade/trail is still functioning. Two sections have come apart on the lower side as indicated in the picture below.



Resource Category III. Forest Inventory

The forest cover is basically comprised of one type. Ortho-photo and topographic cover type maps are located in the supplemental materials section. It is primarily a deciduous type, comprised of red alder and big leaf maple. There is a minor to moderate component of coniferous species scattered throughout. Species include western red cedar, western hemlock and grand fir. Douglas-fir and Pacific madrone are found only in the northwest portion of the property around the grassy bluff.



The type is uneven-aged. Trees range in age from young saplings to 80 to 90 years of age. Stand structure is patchy due to past mass wasting events. Several large openings (up to ½ acre) exist with very little tree cover. The dominant or older trees are 30” in diameter or more with heights to 120’. There are several areas that contain mature red alder which is in natural decline due to age. This is evident by dying and/or dead tops.

Natural regeneration of trees in the understory is also patchy. Some areas contain moderate numbers of regeneration (+/- 50 trees per acre) while others contain very little (< 10 trees per acre). Natural tree regeneration is primarily big leaf maple and red alder, with minor components of western hemlock, western red cedar and grand fir.

Natural regeneration of cedar sapling in the understory



Understory vegetation density is moderate overall. The lower shrub layer is comprised of swordfern, creeping blackberry, Oregon grape, and bleeding heart. The mid-shrub layer is primarily Indian plum, stinging nettles and salmonberry; and the upper shrub layer is primarily beaked hazelnut.

Resource Category IV. Forest Health/ Invasive Species/Wildfire

The overall state of forest health is fair. No significant forest health concerns were observed. The decline of the alder is simply attributable to age. Alder is a pioneer species, meaning it is fast-growing and short-lived. Typical lifespans in favorable environments are in the order of 60 to 80 years.

The big leaf maple appears to be of fairly good vigor. No obvious signs of crown dieback were observed.

The decay and/or disease pathogens found at the site are native and frequently found in forests across the Puget Sound Region. These pathogens all play a role in forest succession and their presence does not necessarily suggest an unhealthy forest ecosystem.

There is no evidence of significant insect pest infestations on the property. If any number of trees show sign of rapid decline (loss of needles, heavy cone crops, thin crowns, beetle boring holes, etc.) on the property a local professional forester or arborist should be contacted to assess and diagnose possible insect damage. If there are any reported insect infestations in the vicinity, the Washington Department of Natural Resources forest entomologist should be contacted for advice on the latest techniques, to protect from or treat any outbreak that might affect the property. After consultation with the WADNR entomologist, appropriate measures to protect water quality and indigenous wildlife should be implemented based upon the treatment method.

Invasive Plant Species

The presence of non-native invasive species on the property is low to moderate overall. With the exception of small isolated pockets, invasive species are primarily found on the northern portion of the property, see maps. Species include primarily Himalayan blackberry, with a moderate component of English ivy; and lesser minor components of Clematis (Old Man's Beard), English holly, cherry laurel and Scot's broom.

Area of Himalayan blackberry consuming an opening in the forest



Himalayan and evergreen blackberry are European species of blackberry that are highly invasive and difficult to control. Occurrence should be monitored and treated as necessary to limit the site occupancy and spread of these species.

General recommendations for treatment and control of non-native blackberry includes mechanical treatment (mowing) prior to seed set, and or application of herbicides during

periods of active growth. Herbicides containing glyphosate, triclopyr, 2,4-D, and metsulfuron are known to be effective. A preferred measure for treatment holly is removal by pulling the plant from the ground. Repeated cutting can also be effective.

English ivy is also difficult to eradicate and control. Although labor intensive, manual pulling of ivy is the most effective method. Spraying is not very effective due to the thick waxy coating on the leaves that prevents the uptake of the herbicide into the plant.

Consult the King County Noxious Weed Control Program for information regarding the control of these exotic invasive species at <http://www.kingcounty.gov/environment/animals-and-plants/noxious-weeds.aspx>. This web page provides a list of species along with species profiles (including identification and control methods) in PDF format. Control fact sheets are included in the supplemental materials section for the dominant species on the property.

Animal Damage

No significant signs of animal damage was observed on the property. Animal damage is not a concern on the property.

Wildfire Risk

The current wildfire risk on the property is low. Trees are moderately stocked overall with very low levels of ground fuels. Under normal weather conditions, the risk of fire spreading through the forest is very low.

The threat of forest fire in 'West-side' forests is becoming increasingly higher. Drier than normal conditions over the last several years have dramatically increased this threat. All management activities should consider this risk and precautions taken to minimize the risk of fire.

Resource Category V. Roads and Trails

There is an old road grade that begins at the dead end at 15th AVE NW at the north end. It crosses the stream and then goes west, across the lower slope of the property to the south end. This old road grade has been converted to a hiking trail. Its approximate location is shown on the maps in the supplemental materials section.

A significant amount of work was involved in developing this trail. Several sets of steps were constructed as well as boardwalks over wet areas. This trail provides good access to the majority of the property. The trail is primarily a native surface trail. Some gravel was hauled in at some places, likely when the steps were constructed, as pictured below.

Example of trail



There has been significant erosion of the trail in a few places, one example is pictured below where the steps have been undermined by soil erosion and possibly ground movement. This is adjacent to the recent slide area.



Some areas of the trail are hazardous due to the erosion. Soils are very slick and undermined steps create a tripping hazard.

Resource Category VI. Wildlife

The forest provides valuable wildlife habitat to the area. It is a refuge for mammals such as blacktail deer, bobcats, and other smaller mammals such as red squirrels, raccoons, opossums and mountain beaver.

Snags on the property are important habitat components for various bird species that feed on insects and nest in cavities. Snags should be retained unless they pose a danger to human life or a structure.

The Woodland Workbook “Enhancing Wildlife Habitat on Private Woodlands”, 2002 is included in the supplemental materials section for your use. This publication provides valuable information pertaining to site specific applications to increase wildlife use.

Resource Category VII. Protection of Special Resources

The writer of this plan is unaware of any historic or pre-historic cultural resources on the property.

High conservation value forests are forests of recognized importance due to their environmental, social, biodiversity or landscape values; or their connection with the landowner. An area of relic old growth may be considered a high conservation value forest.

Given the degree of development around this fragmented piece of native second-growth forest, many may consider this forest as ‘High Conservation Value’.

Resource Category VIII. Aesthetics & Recreation

Landowner goals are to maintain a healthy forest which is critical to aesthetics. Because of topography, the property is highly visible from Puget Sound and areas to the west.

The property is used primarily by local residents for recreational purposes due to access and parking limitations. Recreational activities are primarily hiking and nature viewing.

Tree Risk Management

Several recent tree failures were noted during the site inspection. These likely occurred last winter during one of many strong wind events that hit this area. Several trees had fallen onto the trail. Because the trail receives such little use, proactively removing dead or dying trees adjacent to it would not be practical.

There is a large big leaf maple tree adjacent to the trail that recently split apart. One of the failed stems is hung up in an adjacent tree. When the failed stem eventually breaks away from the main trunk, there is a high likelihood that the falling section will hit the trail. In order to maintain risks at acceptable levels, the hung-up section should be brought down.



No other high-risk concerns were observed at the site.

Forest Management Considerations

Long-term forest health and slope stability can be enhanced or improved by the planting or establishment of native coniferous species. As the pioneer alder naturally declines and dies out, there are few trees in the understory to take their place. These areas will eventually be consumed by brush, primarily salmonberry and non-native blackberry.

Shade tolerant trees species such as western red cedar, Sitka spruce and western hemlock seedlings should be established in the smaller openings within the forest to eventually take the place of the over-story hardwood trees. In larger openings within the forest where the exposure to sunlight is good, Douglas-fir, western white pine grand fir are recommended. The establishment of native conifers at the site will provide many long-term benefits. These would include improving slope stability, maintaining the uneven-aged stand structure, increasing species diversity and wildlife habitat, and increasing canopy coverage to eventually smother out the non-native blackberry.

Cedar seedlings may need to be protected if deer browse becomes a problem. This is done by protecting the top leader until it reaches a height of roughly five feet, which is above the browse height. A flex tube can be placed over the seedling and held in place by a bamboo pole; or, seedlings can be treated with a product called 'Seadust' in the spring and fall to prevent deer browse.

Forest Management Recommendations

A priority should be to establish or plant a mix of native coniferous trees across the property in openings within the forest. Many of these openings are small mass wasting areas where soils have slid in the past. The use of mechanical brush cutters can be employed to clear out brush to create planting locations. Planting locations or circles should be cleared to a radius of at least six feet in diameter. Coniferous trees should be spaced 16' to 20' apart to allow them to develop full crowns, good form and sound structure.

The planted trees will need to be periodically maintained. Seedlings shall be kept in a 'free-to-grow' condition. A seedling that is taller than the adjacent vegetation is considered 'free-to-grow'. The brush may need to be periodically cut back until trees reach a height where they are no longer in danger of being over-topped by brush.

In the northern portion of the property close to the trail, there are a few small isolated infestations of highly invasive species – Scot's broom and *Clematis vitalba* or Old Man's Beard. These should be a priority to eradicate before they are allowed to increase in density. See the fact sheets in the supplemental materials section for best management practices control measures.

Himalayan blackberry is common in the north end and found in small isolated areas in the south end. As resources allow, eradication and control is recommended.

There are some places on the trail where conditions are hazardous. The compacted soils are slick and maintaining good footing is difficult. In a few areas, previously constructed steps have been exposed by soil erosion. Trail improvements are recommended to reduce the risk of injury to property users and reduce soil erosion or erosion of trail.

Summary of Forest Management Recommendation Priorities

- Remove the hung-up failed portion of the split big leaf maple tree adjacent to the trail in the north end to abate hazard. Leave trunk as habitat snag.
- Increase number of coniferous trees. Prepare 6' radius planting locations by eradicating blackberry, and then establish appropriate coniferous species to eventually replace the hardwood over-story and shade out and kill invasive blackberry.
- Eradicate the small isolated Scot's broom and *Clematis* infestations in north end of property adjacent to trail
- Periodically maintain plantings
- Trail improvements to decrease risks and reduce soil erosion



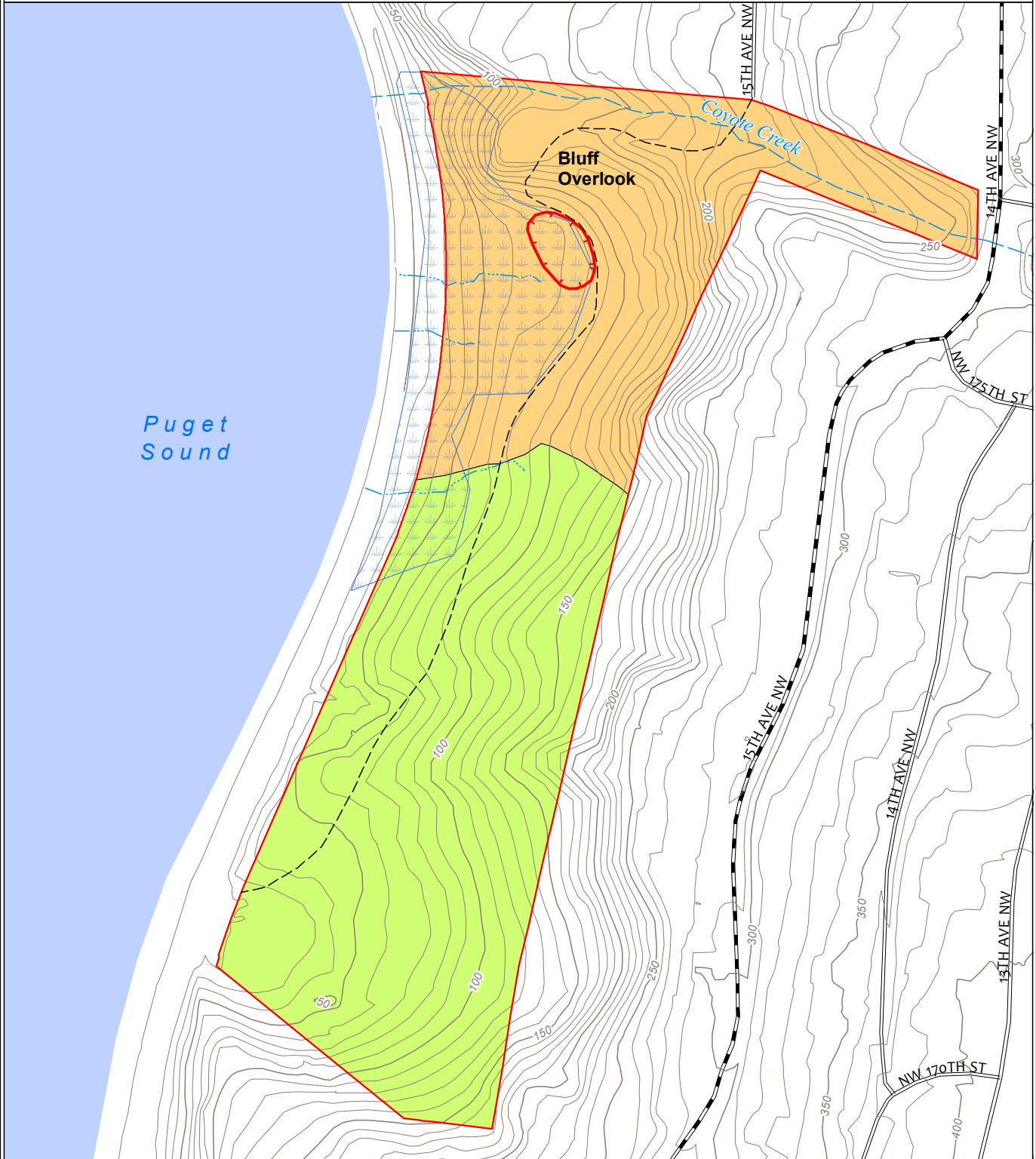
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

1 inch = 275 feet
 0 275 Feet

Map date: 7/27/2016



Cover Type		State Water Type	
1 (22.9 ac)	High invasive cover	Np: Perennial Non-fish	
Foot trail	Moderate invasive cover	Not Typed	
	Low invasive cover		
	Recent slide area		



1 inch = 275 feet

0 275 Feet



Map date: 7/27/2016



Cover Type

1 (22.9 ac)

Foot trail

High invasive cover

Moderate invasive cover

Low invasive cover

Recent slide area

Wetland

10' contour

50' contour

Np: Perennial Non-fish Habitat

Not typed stream

Enhancing Wildlife on Private Woodlands

D.S. deCalesta

Contents

What is enhancement?	2
<i>How do we get enhancement?</i>	2
Enhancing habitat	2
<i>Habitat diversity</i>	2
<i>Habitat quantity</i>	2
<i>Habitat placement</i>	3
<i>Special requirements</i>	4
Constraints on enhancement	4
<i>Conifer damage</i>	4
<i>Conflicts with timber production</i>	5
<i>Neighbors</i>	6
Matching what you want with what you've got	6
<i>What wildlife do you want?</i>	6
<i>What habitat(s) do you have?</i>	7
<i>Make a plan</i>	7
<i>Where to go for help</i>	7
For more information	8

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Wildlife is an integral part of woodlands. Where there are forests, meadows, and streams, there is wildlife. Wildlife means many things to people, but for purposes of our discussion we'll divide it into three basic categories. The most common category is *game*—birds and mammals that one hunts for recreation, fur, and food.

Another category is *pest animals*—those that damage conifer seedlings, seeds, and in some cases larger trees.

A third category, a catch-all, is *nongame species*. This includes songbirds, reptiles, amphibians, and other animals that are neither hunted nor do they cause problems. Rather, they are observed by birdwatchers, photographers, hikers, and others enjoying outdoor recreation. Rare or endangered species such as the bald eagle and spotted owl usually are included in this category.

One of the directing forces behind managing natural resources, particularly on small areas such as woodlots, is the benefit received. What sort of benefit(s) can you expect from investing time and money in wildlife?

If you're a hunter managing for game, your benefit would be harvesting more and/or bigger (i.e., trophy) animals. Also, perhaps, if your acreage is sufficiently large (600+ acres, or approximately 1 square mile), you might profit from leasing the right to hunt on your land. If you're a birdwatcher, your objective is to spot more birds and/or more bird species.

This publication discusses managing game and nongame wildlife in order to increase people's use of them. Pest wildlife is discussed only to the extent that land management for game and nongame species does not lead to increased pest damage. Controlling pest animal damage to conifers is covered in *Understanding and Controlling Deer Damage in Young Plantations*, EC 1201, and *Controlling Pocket Gopher Damage to Conifer Seedlings*, EC 1255 (see page 8).

Whether you manage land for game, nongame, or pest species, the objective is to increase, decrease, or maintain numbers of wildlife. Increased use of wildlife usually necessitates increasing numbers or quality of wildlife available for use, which is known as *wildlife enhancement*.



What is enhancement?

Enhancing wildlife populations means causing an increase in number and/or quality of animals within those populations. The objective might be, for example, to produce more deer or quail, to have more trophy-class animals, or to increase diversity (the number of species).

How do we get enhancement?

All wildlife species are products of their environment or habitat. Each species has specific habitat requirements that are different from those of other species. The habitat provides basic life requirements including food, protection from enemies and weather, and a place to rear young.

As the *amount* of specific habitats and the *diversity* of habitats increases, diversity and numbers of wildlife species on a given piece of land also increase. So, the question “How do you enhance wildlife species?” can be rephrased as “How do you enhance habitat?”

Enhancement must provide for year-round wildlife needs. For some species, such as deer and elk in eastern Oregon, quality and quantity of some habitat elements vary seasonally. The quality and quantity of forage in summer and fall determine the amount of fat animals store in preparation for the tough winter.

If forage is not plentiful and of high quality on summer ranges, the animals might starve on winter ranges where food typically is of low quality and quantity. Also, if deer and elk are not in prime condition in fall, they might not breed, and fawn and calf crops could fail in the spring.

Enhancing habitat

Habitat diversity

Vegetation (trees, shrubs, grasses) provides wildlife habitat. Different species live in different places within this structure. Various birds, such as some warblers, live only in the tops of conifer trees. Here they

find food (insects), build nests, and take shelter from weather and predators. Other species, such as pocket gophers, live underground in grassy meadows.

Some species, such as certain frogs and salamanders, have a special requirement for the riparian zone—the moist, often forested area alongside streams. Most species, however, including deer, quail, and chipping sparrows, require combinations of habitat—meadows and other forest openings to feed in and timber for breeding sites and for protection from weather and predators.

Habitat variety is natural when natural events such as fire, windthrow, and insect and disease attacks open portions of forested areas. These areas usually are revegetated in stages, beginning with grasses, progressing to shrubs, then seedling trees, saplings, mature trees, and finally old-growth trees.

With each successive stage, different combinations of wildlife species likewise appear, persist awhile, and then decline (Figure 1a). The diversity of wildlife species depends on habitat diversity associated with these stages. Providing a diversity of habitats (and thus a diversity of wildlife species) requires a diversity of areas in different stages of vegetative development.

Clearcut logging works like nature in opening forest lands and beginning the progression of vegetative stages, starting with grassy meadows. Reforestation (planting conifer seedlings) and brush control provide other vegetative stages, but the time sequence is shortened (Figure 1b). The last stage, old growth, usually is not attained.

Habitat quantity

Can I grow deer on a 10-acre plot? How many acres does a covey of quail require? What quantities of habitat support viable, reproducing populations of wildlife species? The diversity and abundance of wildlife populations that a given parcel of land supports are directly related to the amount and kinds of land available.

Table 1 (page 5) gives minimum space requirements of representative species. Deer require a minimum of 30 acres per animal of combined forest lands and openings.

Quail require a minimum of 5 to 10 acres per bird of open meadows, with brushy

areas interspersed within the meadows and adjacent forest lands. Songbirds, such as chipping sparrows, require about 5 acres per bird, again of open areas adjacent to forested acreage.

The size and timing of timber harvest can be a major tool in simultaneous management of timber and wildlife. Instead of creating large (more than 100 acres) clearcuts in single cuttings, many smaller cuts can be spread over a number of years (40 to 60 acres could be cut every 5 to 7 years). This would even out the flow of dollar returns from timber and the supply of forage and habitat diversity for wildlife. Thinning timber also provides forage and habitat diversity.

Habitat placement

Wildlife species use different habitats to meet different needs (openings for food, forested areas for cover). These different habitats must be close enough to each other that wildlife can move readily from one to the other with minimal exposure to predation and weather. Wildlife species with small home ranges (songbirds, quail, grouse, rabbits, and deer and elk in western Oregon) must have these different habitats close together (mere hundreds of feet for quail and rabbits and usually less than 0.25 mile for deer and elk).

Problems may arise in eastern Oregon with animals such as deer and elk. They

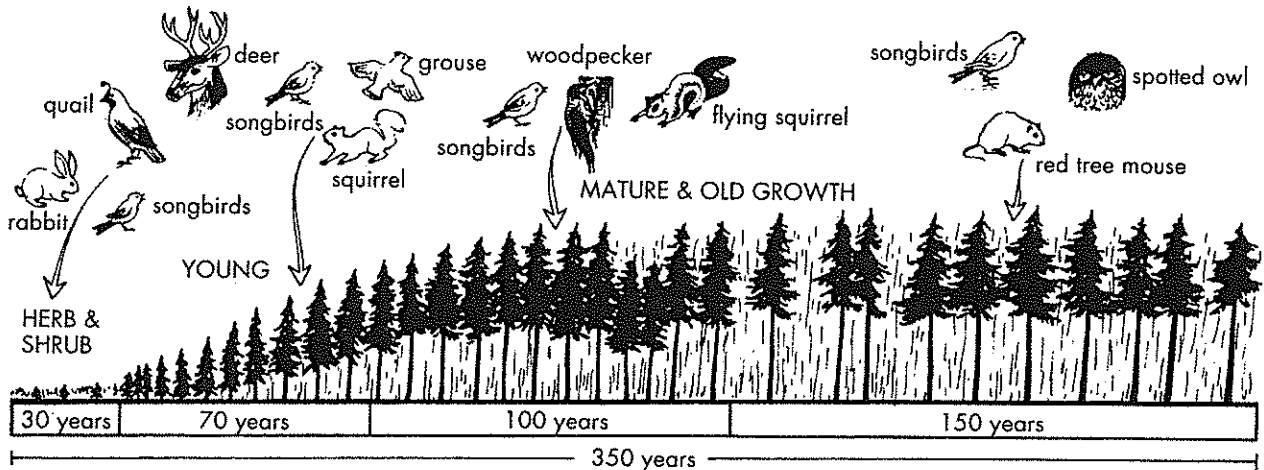


Figure 1a.—Wildlife species that live in a natural, unmanaged forest.

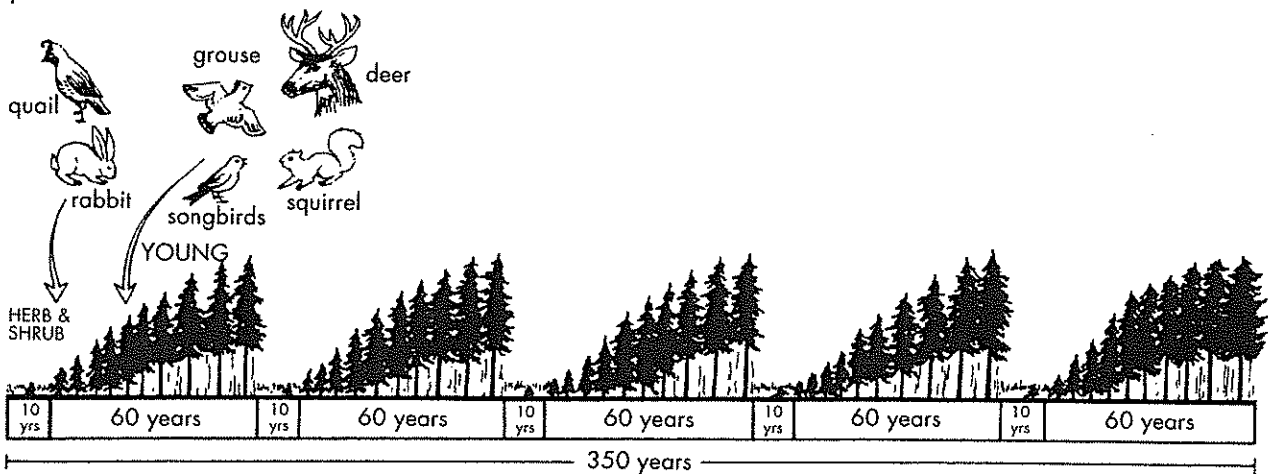


Figure 1b.—Wildlife species that live in a managed forest.

have seasonal habitats that are miles apart—summer range at higher elevations in mountain meadows, winter range down on sagebrush flats. Preserving migration corridors used for traveling to and from such seasonal ranges is another habitat requirement. If these migrating animals have to cross many logging roads, they are exposed to hunters and vehicles.

Deer and elk might be hunted when they are on summer range, on winter range, or traveling on migration corridors. If your property includes only one of these seasonally used habitats, your management of these animals could be influenced by management on land over which you have no control.

Enhancement doesn't stop at merely providing amounts, diversity, and habitat placement. Wildlife have additional habitat needs, primarily food and breeding places, that you can manage and thus indirectly influence wildlife numbers and well-being.

Special requirements

Managing forest lands for timber production generally provides a variety of habitats. However, practices such as brush control and snag removal alter or remove special habitats of some wildlife species. In some cases, one management practice can provide multiple habitat requirements, such as food and cover, for several species.

Leaving a few standing snags and allowing logs to remain on the ground provide nesting sites (cavities in snags) and a food source (insects that burrow into decaying wood) for birds. Slash often is removed from clearcut sites, usually by burning. Small amounts of this slash instead could be piled for quail and rabbits to use as protective cover, breeding sites, and food sources (berries and leaves).

Other management practices might provide for only a single need of wildlife. The rapid establishment of conifer seedlings on forested openings (clearcuts, small meadows, etc.) within 3 to 10 years greatly shortens the time that these areas would otherwise provide forage for deer (7 to 25 years). One way to provide additional forage for deer in the shortened time span is to plant forage on parts of clearcuts. Deer

especially like grass and legume seedlings. Quail, grouse, and rabbits also will take advantage of this additional food source.

You can't always maintain snags and other dead standing trees as nesting sites for cavity-nesting birds and mammals such as flying squirrels. However, you can build nest boxes for bluebirds, other songbirds, squirrels, and wood ducks and place the boxes in appropriate locations as an alternative to natural nest sites.

The key to providing special requirements is to identify those animals you wish to enhance, determine whether they have special requirements that current management does not provide and, if so, implement those activities that will benefit the desired populations.

Constraints on enhancement

One manages forest lands for a variety of reasons—for timber production and recreation as well as for wildlife. The manner of management on neighboring private or public lands can influence wildlife on your land. You must account for these factors in your management plan to avoid conflicts and to increase wildlife abundance.

Conifer damage

Game such as deer and elk can damage conifer seedlings. Managing habitat to enhance populations of these animals should not increase amounts of damage. However, habitat enhancement could increase populations of some animals to a level where they deplete normal food sources and begin to damage conifers.

Planting forage crops for deer might increase populations of pest species such as mice; they girdle conifer seedlings and can cause significant economic loss. Building brush piles provides food and cover for quail and rabbits; however, if you have too many brush piles close to conifer seedlings and not much forage available in winter, you could find the rabbits cause significant damage to the seedlings.

Table 1.—Habitat requirements of representative wildlife species.

Wildlife group	Representative species	Required habitats and acreages	Special habitat requirements
Meadow wildlife	California quail, brush rabbit, meadowlark	Open areas with grasses and forbs; some shrubs (15 acres)	Brush piles essential (one per 2 acres)
Meadow/forest	Deer, elk	Openings (50 acres); closed canopy (15+ years old); conifers (150 acres)	Migration corridors between seasonal ranges
	Chipmunk	Opening (15 acres); second-growth timber (15 acres)	
	Junco, bluebird	Opening (5 acres); second-growth timber (5 acres)	Snags with nest cavities
Young forest	Red squirrel	Mixture of 15- to 75-year-old conifer trees; understory of grasses, forbs (100 acres)	Cone-bearing trees for food
	Ruffed grouse	50-50 mixture of conifers and alder (15 acres)	Moist streamside
	MacGillivray's warbler	Mixture of 15- to 75-year-old conifers (15 acres)	
Mature forest wildlife	Flying squirrel	Conifers 75+ years old (100 acres); understory with forbs, small shrubs	Nest cavities in older trees (100+ years old)
	Spotted owl	Conifers 100+ years old (400 acres)	
	Pileated woodpecker	Conifers 100+ years old (100 acres)	Conifer snags; minimum 20 inches diameter at breast height (dbh) for nest trees
Riparian wildlife	Salamanders, frogs, snakes	Moist, streamside vegetation with closed canopy (0.25 to 2 acres); flowing streams	
Large predators	Bobcat, bear, coyote, goshawk	Mixtures of closed canopy with openings (300 to 1,500 acres)	Large (more than 15 inches dbh) trees for nesting or denning

Conflicts with timber production

Often the primary product on forest lands is timber. In some cases, increasing habitat for wildlife will reduce the yield of timber products. Keeping meadows open to produce deer forage precludes producing timber for market. Maintaining stands of old-growth forest for species such as spotted owls and pileated woodpeckers

prevents the short-term rotation (50 to 80 years) required to maximize timber production on forest lands.

Maximizing diversity of wildlife species requires maximizing diversity and location of habitat sites. Altering vegetation to maximize diversity will lower production of timber on forest lands.

Neighbors

Forest management on neighboring land (private and public) could influence the wildlife on your land. If your habitat is an island of deer management surrounded by land with few deer—such as a large clearcut—few deer and elk will move in, and the population that’s already on your land will have to sustain itself.

On the other hand, if the neighboring land is managed for deer and elk as well as for other forest resources, you might be providing an attractive area that will draw additional animals from neighboring lands. The influx could overwhelm your ability to

keep the population low enough to prevent damage to your seedlings.

Matching what you want with what you’ve got

In any enhancement program, you must match desired wildlife with available habitat(s). The first step is to determine what sort of wildlife you desire.

What wildlife do you want?

Usually, if wildlife is to be managed, it most likely will be for you and your friends, with recreation and food as the chief values. Perhaps you wish to emphasize game. In most cases, leasing or selling hunting rights requires large acreages (600+ acres) to provide sufficient numbers of deer, rabbit, quail, and grouse. There is competition from federal lands (U.S. Forest Service and U.S. Bureau of Land Management), where anyone can hunt without charge and probably can find more variety and larger numbers of game animals than on a small, private ownership.

The required habitats for game animals are meadows and young forests (Table 1). This requires that you retain open grassy meadows with little emphasis on older and mature forests, which do not provide for optimum numbers of the primary game species. Note also that you will need fairly large acreages, especially for deer—an expected annual harvest of two to five deer from your land will require at least 100 acres.

If you want other uses of wildlife, such as birdwatching, you should increase habitat diversity. This means providing the full range of habitats, beginning with open meadows,

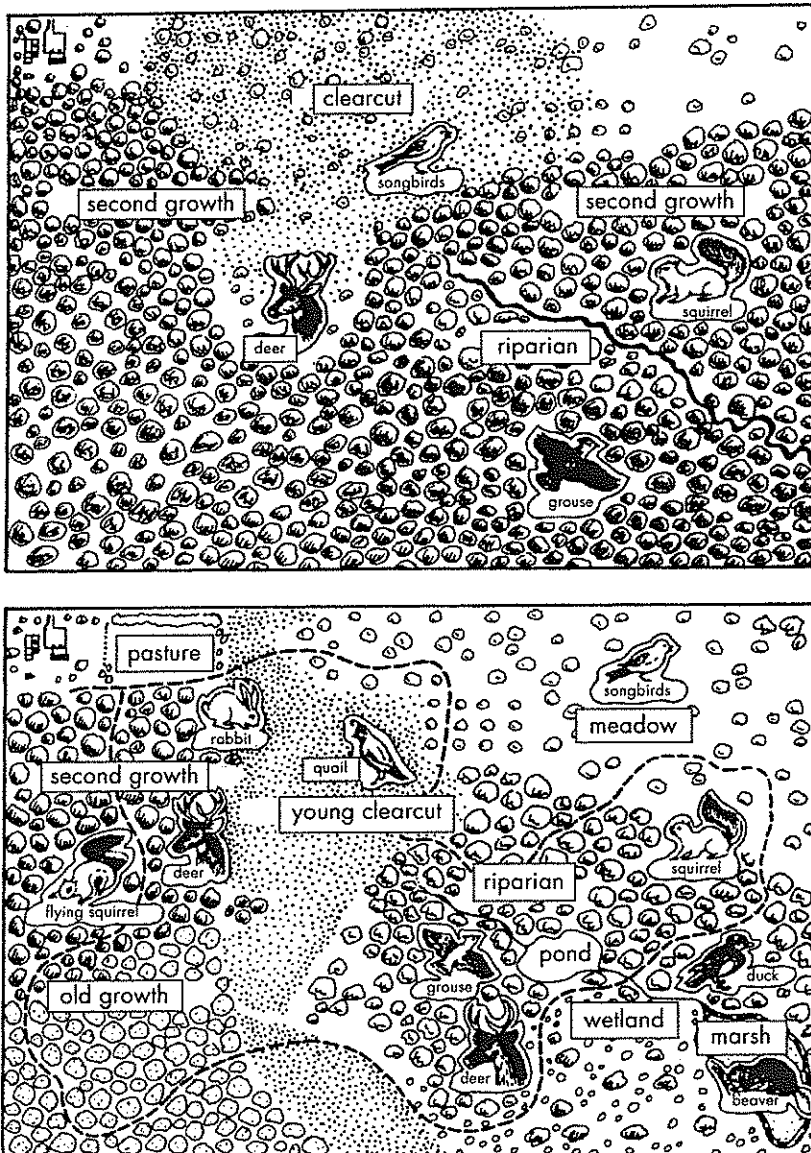


Figure 2.—(top) Wildlife-habitat associations on an undeveloped woodlot and (bottom) on a developed woodlot.

progressing through regeneration, and ending with mature forests.

As for a private game reserve, selling the privilege to observe wildlife on your land will not bring in much money—public lands are available for this.

The best approach is to design habitat improvements around silvicultural practices. The variety of species and numbers of individual species may be less than ideal, but small unused areas, riparian zones, steep slopes, and other areas where timber production cannot be maximized will provide many of the requirements you need for a diversified habitat.

What habitat(s) do you have?

When you decide what kinds of wildlife you want, identify the habitats required and check them against what is available.

Assess the diversity of habitats and acreage of each as well as the habitats of neighboring parcels of land. If the species you want match the type and amount of habitat available, the situation is ideal. If the matchup is not good, you must decide whether to manipulate the habitat to increase species diversity or to increase the number of animals—or perhaps both.

To do this properly, an inventory of your property is essential. Make a sketch of your land with the various habitats roughed out, including acreages. Then list the wildlife species that each type of habitat favors.

Draw habitats that would result from vegetation enhancement and list the wildlife that these modified habitats would favor (Figure 2).

Make a plan

If you intend to enhance vegetation to provide a greater variety of habitats for wildlife, you must make a plan for the desired changes. The plan should include the location and acreage of habitat you desire to manipulate, the expected cost of the enhancement, and provisions for special habitat requirements not provided by typical vegetation manipulation. Table 2 gives an example of such a plan.

Where to go for help

A number of public agencies and private groups in Oregon can provide assistance. The Oregon State University Extension Service has publications that describe how to provide special habitat needs such as nest boxes. The Oregon Department of Fish and Wildlife has information on preferred habitats of wildlife, and the USDA Natural Resources Conservation Service provides help with habitat manipulation. The Audubon Society is an excellent source of information on providing for special needs of songbirds; most large towns have an Audubon Society chapter.

Table 2.—Sample habitat enhancement plan.

Wildlife species	Habitat enhancement and acreages	Provision for special requirements
Deer, elk	Provide openings in forest (20 to 50 acres each); harvest standing timber; suppress tree and shrub regeneration.	Seed 5- to 10-acre patches in meadows with grass-legume mix.
Rabbits, quail	Provide permanent openings (15 acres) and one to two brush piles per acre.	
Songbirds	Maintain a good mixture of meadows, second growth, and old growth (5 to 10 acres for each habitat).	Establish nest boxes; establish a system of trails through all habitats for bird watching.

For more information

OSU Extension publications are available from:

Publication Orders
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Oregon State University
422 Kerr Administration
Corvallis, OR 97331-2119
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You can view our Publications & Videos catalog and many of our publications on the Web at <http://eesc.oregonstate.edu>

Bennett, M. *Ecosystem Management: Opportunities and Implications for Woodland Owners*, EC 1469 (Corvallis: Oregon State University, 1996). \$1.25

DeYoe, D., D. deCalesta, and W. Schaap. *Understanding and Controlling Deer Damage in Young Plantations*, EC 1201 (Corvallis: Oregon State University, reprinted 1999). \$2.00

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Edge, W.D. *Managing Wildlife Habitats in Forested Ecosystems*, EC 1470 (Corvallis: Oregon State University, reprinted 1998). \$2.00

Other publications

The "Peterson Field Guide" series for birds, mammals, animal tracks, trees and shrubs, reptiles and amphibians, insects, and bird nests (Boston: Houghton Mifflin).

deCalesta, D. and M.S. Deusen. *Woodland Fish and Wildlife*. 1988. This series includes a number of separate publications. Order from Washington State University, 1-800-723-1763 or via the Web at <http://pubs.wsu.edu>, then "forestry," then "wildlife and fish."

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The Woodland Workbook is a collection of publications prepared by the Oregon State University Extension Service for owners and managers of private, nonindustrial woodlands. Information has long-range and day-to-day value for anyone interested in wise management, conservation, and use of woodland properties. The Workbook is organized in sections in a 3-ring binder with tabbed dividers for each section. To order, and to get a current list of titles and prices, inquire at the OSU Extension Service office that serves your county.

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King County

Department of Natural Resources and Parks
Water and Land Resources Division
Noxious Weed Control Program
206-296-0290 TTY Relay: 711

BEST MANAGEMENT PRACTICES **Evergreen blackberry (*Rubus laciniatus*)** **and Himalayan blackberry (*Rubus discolor*** **syn. *Rubus armeniacus*)**

Legal Status in King County: Not listed, no legal requirement for controlling obnoxious weeds. The County Weed Board recognizes these plants are invasive and is collecting information and providing education on control. The Board encourages and recommends control and containment of existing populations and discourages new plantings.

BACKGROUND INFORMATION

Impacts and History

- Highly invasive and can be found throughout King County.
- Can be very difficult to control.
- Out competes native understory vegetation and prevents the establishment of desirable native shade intolerant trees such as Pacific Madrone, Douglas Fir and Western White Pine.
- Can limit movement of large animals when forming large impenetrable thickets.

Description

- **Himalayan blackberry** is a robust, sprawling perennial with stems having large stiff thorns.
 - Main canes up to 10 feet long with trailing canes reaching up to 40 feet.
 - Trailing canes typically take root at the tips.
 - Leaves are large, round to oblong and toothed typically come in sets of three (trailing canes) or five (main stems).
 - Individual canes can reach a density of 520 canes per square meter.
 - Flowers are white to pink about one inch in diameter and borne in clusters of about 5 to 20.
 - Develops edible black fruit that clings to the center core when picked.
-
- **Evergreen blackberry** is a robust trailing evergreen shrub that grows into impenetrable thickets.
 - Ribbed reddish stems up to 10 feet in length with large curved thorns.
 - Young canes arch as they grow longer that eventually reach the ground rooting at the nodes.
 - Palmately compound leaves with 3 to 5 deeply lacerated leaflets.
 - Flowers are white to pink about one inch in diameter borne in clusters.
 - Develops edible black fruit that clings to the center core when picked.



Himalayan blackberry



© 2005 Virginia Tech
Evergreen blackberry

Habitat

- Blackberry can be found in a myriad of habitats such as vacant lands, pastures, forest plantations, roadsides, creek gullies, river flats, riparian areas, fence lines, and right-of-way corridors.
- Does not grow well in wetland areas, will grow if cane tip roots.

Reproduction and Spread

- Reproduces vegetatively by root and stem fragments, and by seed.
- Plants begin flowering in spring with fruit ripening in midsummer to early august.
- Daughter plants can form where canes touch the ground.
- Seeds can remain viable in the soil for several years.

Local Distribution

Found throughout King County.

CONTROL INFORMATION

Integrated Pest Management

- The preferred approach for weed control is Integrated Pest Management (IPM). IPM involves selecting from a range of possible control methods to match the management requirements of each specific site. The goal is to maximize effective control and to minimize negative environmental, economic and social impacts.
- Use a multifaceted and adaptive approach. Select control methods which reflect the available time, funding, and labor of the participants, the land use goals, and the values of the community and landowners. Management will require dedication over a number of years, and should allow for flexibility in method as appropriate.

Planning Considerations

- Plan your control effort including: 1) surveying of the area thoroughly for blackberry, 2) setting priorities for control, 3) selecting the best control method(s) for the site conditions and regulatory compliance issues and 4) monitoring the success of control and implementing follow up control as necessary.
- In unincorporated King County outside of wetlands, aquatic areas, wildlife network areas and their buffers, a Clearing and Grading permit is not required to clear areas of blackberry if: 1) the annual area to be cleared is less than 7000 square feet or 2) if the clearing is conducted in accordance with an approved Forest Management Plan, Farm Management Plan or Rural Stewardship Plan. Within wetlands, aquatic areas, wildlife network areas and their buffers, Clearing and Grading permits are not required if the area to be cleared is less than 7000 square feet and clearing is conducted in accordance with one of the stewardship plans mentioned above or is removed by hand labor. Clearing in excess of these limits will

require a permit, however there will be no cost for this permit provided control practices defined in this BMP and the King County Noxious Weed Regulatory Guidelines are followed.

- Control practices in critical areas should be selected to minimize soil disturbance. Any disturbed areas need to be stabilized to control erosion and sediment deposition. Refer to the King County Surface Design Manual for further information about sediment and erosion control practices. Minimizing disturbance also avoids creating more opportunities for germination of blackberry and other weeds.
- Generally work first in least infested areas, moving towards more heavily infested areas.
- Ensure habitat protection by targeting only blackberry and preserving all native and beneficial vegetation.

Early Detection and Prevention

- Blackberry is easily identifiable throughout the year.
- Manually control new infestations as early as possible .
- Monitor the control site and remove any plants returning from root fragments

Manual

- Hand pull the stem close to the ground and uproot the root ball. This method is most effective with first year plants.
- Manual control works best after rain or in loose soils where the canes are suppressed because the blackberries are growing in a forest understory.
- Digging up root crowns and major side roots is slow but will control blackberry and is effective on small infestations.
- Using a claw mattock or pulaski/mattock is also effective.
- Recheck work area because large root fragments left can re-sprout.
- If removing dense patches, area should be replanted with native plants and mulched, or reseeded with a suitable grass.
- Hand pulling and the use of hand mechanical tools of up to seven thousand square feet annually is allowable without a permit in unincorporated King County, including all critical areas and buffers.

Mechanical

- Mowing, including the use of riding mowers and tractor mounted mowers, can be very effective in controlling blackberries but also may harm desirable plants present.
- Mowing should not be used where soils are highly susceptible to compaction or erosion, or where soils are very wet.
- Several cuttings a year over several years are necessary to exhaust the roots of their reserve food supply.
- If only one cutting is done per year, cut when the plants begin to flower. If no follow-up is done, the blackberry may re-sprout from the root crown at a greater density, and could overgrow any vegetation planted.

- Cultivation in agricultural areas utilizing cultivation machinery can be effective in controlling blackberry either alone or in conjunction with mowing but is not selective and may require specific sediment and erosion control measures (see Control of Large Infestations/Monocultures).

Biological

Biological control is the deliberate introduction of insects, mammals or other organisms which adversely affect the target weed species. Biological control is generally most effective when used in conjunction with other control techniques. Biological control methods that may assist in blackberry control include the use of goats and chickens as follows:

- Goats and pigs may be effective on clearing or controlling blackberry re-growth from a year to four years old. On mature stands, goats tend to only strip leaves off of the canes. Animals may prefer alternative forage available, so reduce opportunities for selective browsing. Grazing must be continuous or else regrowth will occur. Care needs to be taken to fence off or protect any native or other valuable vegetation. The King Conservation District can provide further information of the use and management of goats for weed control.
- Chickens can potentially decrease the seed bank in blackberry cleared areas by grazing on the seeds.

Chemical

- Herbicides should only be applied at the rates and for the site conditions and/or land usage specified on the label. **Follow all label directions.**
- Herbicide specified in these guidelines may be used in accordance with Federal and State Law in critical areas and their buffers with certain restrictions. Refer to the **King County Noxious Weed Regulatory Guidelines** for a summary of current Federal, State and local restrictions and regulatory compliance issues.
- For control of large infestations, herbicide use may be effective, either alone or in combination with mowing. Infested areas should not be mowed until after the herbicide has had a chance to work and weeds are brown and dead.
- For several years following treatment, monitor areas for new plants germinating from the seed bank, or any missed plants.

Specific Herbicide Information

Herbicides are generally described here by the active ingredient. Many commercial formulations are available containing a specific active ingredient. References to product names are as an example only, and other equally, or more effective commercial products may be available.

Glyphosate: can effectively control blackberry. Treatment with glyphosate needs to be combined with effective re-vegetation of the site to prevent re-invasion by undesirable vegetation and to control erosion. Glyphosate is most effective on blackberry in September to October when canes are actively growing and after berries have formed. Fall treatments should be conducted before the first frost.

Selective Broadleaf Herbicides (such as triclopyr, 2,4-D and metsulfuron): most effective when blackberry is growing in a grassy area. Read the label of the product you are using to determine the optimal time to spray. Re-treatment the following year may be necessary to control any returning plants. Continue to monitor for new plants for several years after the initial treatment and following any disturbance to the soil such as tilling or construction. **NOTE: Certain additional restrictions apply for products containing 2,4-D and Triclopyr BEE (e. g. Garlon 4, Crossbow). Refer to the King County Noxious Weed Regulatory Guidelines for more details.**

Selective herbicides that are effective on blackberry include metsulfuron (e.g. Escort, Cimarron, Ally), triclopyr ester (e.g. Garlon 4) or triclopyr amine (e.g. Garlon 3A) and a combination treatment of triclopyr and 2,4-D (e.g. Crossbow).

Metsulfuron should be applied to fully leafed-out blackberry before fall leaf coloration. Good coverage is essential to achieve control.

Triclopyr (amine and ester) and triclopyr + 2,4-D should be applied when actively growing. Foliage must be thoroughly wetted with herbicide.

2,4-D can harm certain grasses, alfalfa, clover and other legumes. The addition of a suitable surfactant may improve the control results.

The mention of a specific product brand name in this document is not, and should not be construed as an endorsement or as a recommendation for the use of that product. Chemical control options may differ for private, commercial and government agency users. For questions about herbicide use, contact the King County Noxious Weed Control Program at 206-296-0290.

SUMMARY OF BEST MANAGEMENT PRACTICES

Small Infestations in Native and/or Desirable Vegetation

- Properly identify targeted blackberries
- Mark all desirable vegetation around control area, ensuring that no native plants are removed.
- Small infestations of less than 200 square feet can be effectively and relatively easily hand-pulled or dug up. Isolated plants should be removed in order to prevent them from infesting a larger area.

- Cut above ground portion of blackberry with loppers or pruners. Dig up or pull the remaining root ball.
- Pull or dig up the plants when the soil is wet.
- Replace any divots created when removing the plants to lessen the amount of disturbed soil.
- Apply appropriate herbicide with wick wiper or by spot spray to the cut stumps to minimize off target injury.
- Monitor site throughout growing season and remove any new plants.
- If using an herbicide in a grassy area, use a selective herbicide to avoid injury to the grass.

Large Infestations/Monocultures

- Properly identify invasive blackberries.
- Mark all native vegetation in and around the control area, ensuring that no native plants are removed.
- Mow down the blackberry with weed-eaters, brush mowers or machetes.
- Following mowing, either dig up the root-ball if labor is available or treat re-sprouting blackberry regrowth with an appropriate herbicide (See the Chemical section of this BMP).
- Mechanical cultivation is also an option for controlling invasive blackberries in agricultural areas. After initially mowing down the above ground vegetation, deep cultivation of the land can control root balls if done multiple times. Yearly spot control of returning seedlings or re-growth will likely be necessary.
- For large areas, it may be more cost-effective to apply herbicide to the mature blackberry plants and then mow the dead canes.
- When large dense areas of blackberry are removed, the bare areas created need to be stabilized and re-vegetated with native or non-invasive vegetation to prevent erosion and re-invasion of blackberries and other weeds (refer to the King County Surface Water Design Manual or equivalent for incorporated areas). Ensure that a high standard of blackberry control has been achieved prior to revegetating the site.
- If a non-selective herbicide is used in grassy areas, the area needs to be re-seeded to prevent reinvasion by weeds.
- Infested areas will require follow-up management lasting for several years to control plants re-growing from the seed bank and rhizomes.

Riparian and Aquatic Area Control Issues

- Focus on manual removal for small infestations if possible. Follow procedures listed above.
- For larger areas where herbicide use is warranted, apply with a wick wiper or spot spray using low pressure and large droplet size.
- Blackberry shrubs can be found growing along wetland margins but are typically daughter plants off of a main cane. Control can be achieved by cutting the canes down to the ground. The roots can not withstand the anaerobic soil conditions without the supporting canes.
- Pay particular attention to regulatory compliance issues for aquatic areas described in the King County Noxious Weed Regulatory Guidelines.

Road Rights-of-Way Control Issues

- Manually remove infestations if possible.
- If plants are in grassy areas, use a selective broadleaf herbicide; if controlled with a non-selective herbicide, re-seed after control is completed.
- An effective mowing program can control blackberries along a Right of Way. Any blackberries remaining outside the mowed area will quickly re-invade the cleared areas.
- Spot spray blackberries with glyphosate in areas with no desirable vegetation.

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English ivy - *Hedera helix*

English ivy (*Hedera helix*) and Irish ivy (*H. hibernica* or *H. helix hibernica*) are very similar plants in the Ginseng family (*Araliaceae*), and both are referred to as English ivy in this bulletin.

THE IMPACTS

When English ivy escapes from landscaped plantings it often establishes and spreads in shaded forested lands or natural areas. There it can impact all three zones of a deciduous or conifer plant community – the forest floor, the shrub layer and the canopy.



English ivy climbing a mature tree

- English ivy reaches the tree canopy and shades out deciduous foliage during summer months, suppressing the host tree.
- Dense ivy cover deprives the bark of normal contact with air and microorganisms.
- English ivy adds substantial weight to a tree. The estimated weight of ivy removed from a tree in Olympic National Park was 2100 lbs.
- Mature trees covered with ivy are top-heavy and more likely to blow down.
- Thick ivy mats can accelerate rot and deteriorate structures.



Thick ivy mats smother understory plants and tree seedlings

- English ivy changes the natural succession patterns of forests.
- Ivy limits understory regeneration by blocking sunlight and shading out plants.
- The fast-growing ivy competes for water and nutrients.
- The shallow mat-like root system make it a poor choice for erosion control, and contributes to erosion in some cases.
- Provides hiding areas for rats and other vermin.

IVY CULTIVARS

More than 400 different English ivy cultivars vary in leaf shape, size, color and growth form. While many cultivars are sold as ornamental plants, recent research indicates that several cultivars are invasive and should be avoided as landscape plants in the Pacific Northwest.

Four cultivars of English ivy were added to the 2002 Washington State Noxious Weed List as Class C weeds.

They are: *Hedera helix* 'Baltica';
H. helix 'Pittsburgh';
H. helix 'Star' and
H. hibernica 'Hibernica'

WHAT IS A WEEDY CULTIVAR?

- English ivy is invasive when growing in areas where it was not planted.
- It is invasive when thick mats or vines inadvertently cover plants, trees or structures.
- It is invasive when producing flowers and seeds and rapidly spreading on its own.



King County

Department of Natural Resources and Parks
 Water and Land Resources Division
 Noxious Weed Control Program

WHAT IS ENGLISH IVY?

This woody, evergreen perennial grows as a vine (climbing or creeping) or as a shrub. English ivy can photosynthesize year-round, and is capable of growth for 9 to 10 months of the year. Older vines can grow over 90 feet long with stems reaching one foot in diameter. English ivy is long-lived with reports of one plant over 400 years old.

Adventitious roots are formed at the leaf nodes of immature plants, and they help ivy climb by adhering or anchoring to surfaces – they do not penetrate the surface. Ivy tolerates a wide range of light conditions but growth is stimulated by light.

The entire plant contains slightly toxic compounds. Berries and leaves are toxic to people or livestock if eaten in a large quantity. The sap can cause dermatitis and blistering.

Hedera is native to Europe and Asia, and was widely introduced into temperate parts of the world. It has a long history as a garden plant. Introductions to the Pacific Northwest date back to at least the 1890's.

There are two distinct forms and growth stages of English ivy – the juvenile and the mature form.



Leaves of juvenile plants

Juvenile form

- Leaves are deeply 3 to 5 lobed, light green and alternately arranged.
- Young shoots and leaves are hairy.
- Stems produce adventitious roots at the nodes.
- Immature plants do not produce flowers.
- This juvenile stage lasts for about 10 years.



Leaves of a mature plant

Mature form

- Leaves are unlobed, or slightly lobed, dark green and leathery and spirally arranged.
- English ivy matures to produce flowers when it begins to grow vertically.
- Mature plants do not produce adventitious roots.

REPRODUCTION AND DISPERSAL

During the juvenile stage ivy only spreads vegetatively. Any stem fragments in contact with the soil can regenerate growth. Mature plants continue with a slower vegetative spread, but they also produce flowers and spread by seed. Clusters of small greenish-white flowers are usually produced in the fall.



The dark colored drupes (berry-like fruits) mature in the spring.

The fruits are high in fat, and they are available in early spring when food is still scarce. Many birds, including blackbirds, European starlings and American robins, disperse the seeds.

CONTROL REQUIREMENTS

English ivy is a Class C Noxious Weed of Concern in King County - control is strongly encouraged although not currently required. The County Weed Board recommends control and containment of existing populations and discourages new plantings of invasive cultivars. For control requirements in other areas, please contact the county noxious weed control program.



Stop buying and stop planting invasive cultivars.

PREVENTION

When planting an area, consider alternative ground covers. The list includes, but is not limited to, the following native plants: wild strawberries, false lily-of-the-valley, bunchberry, fringe cup, wood sorrell, kinnikinnick, low Oregon grape, and sedges. Please contact local nurseries or native plant societies for more suggestions.

PRIORITIZE YOUR CONTROL PLAN

Consider the amount of ivy to be removed and the site you are working on. Also consider the on-site vegetation you want to keep, the time frame for removal and the labor force. Be persistent with your control plan and with follow-up.

- First remove the vertical growing plants to stop flower production and further spread by seed.
- When working in steep areas, the site needs to be considered for slope and any surface erosion.

MANUAL CONTROL

Even though it is labor intensive, the most effective control method is manual removal. Depending on the site, several other manual control options are also effective.

NOTE: Remove all cut stems from soil contact.

Wear gloves and protective clothing. The sap can cause a reaction in some people.

- Remove flowers or seed heads you can reach.
- Hand pull or dig out accessible plants.
- Mowing is effective in areas that are mowed regularly. Clippings need to be removed.
- Mulching – apply an 8” thick mulch layer. The plants can be cut or removed and then mulched, or a mulch layer can be directly applied on top of plants. This is not an option in steep areas.



Cut the vines or pry them off of trees with the aid of a tool at a comfortable height. This will kill the upper vines, but the lower, rooted plant needs to be removed.

CHEMICAL CONTROL

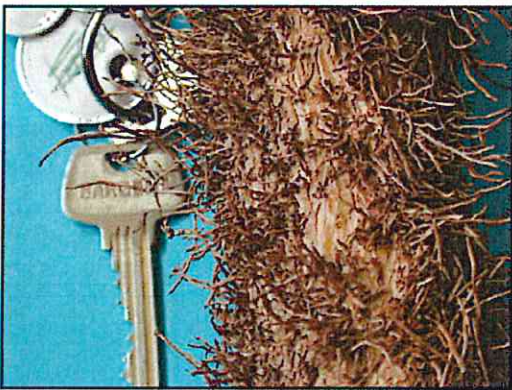
Controlling established English ivy with herbicides is not very successful because of the waxy leaves. There is also a risk to non-target plants from run-off of the waxy leaves. English ivy is considered tolerant of many commonly used herbicides. Some success has been achieved by carefully selecting herbicides and focusing applications on young, actively growing plants. If herbicides are used, make sure that their use is allowed at your site. Certain herbicides can not be used in aquatic areas or their buffers. When using an herbicide follow all label directions. Contact your local noxious weed control program for control guidelines in your area.

DISPOSAL - FOR SMALL AMOUNTS

Remove and dispose as yard waste. Backyard composting is only recommended when the rootlets and the cut stems are dead. Otherwise the ivy stems will root in the other material as it decomposes.

English ivy clippings will break down to 1/5 of its size when left to dry out and die.

- Expose the stems and rootlets to the air for 6 – 7 days until they desiccate.
- Pile the clippings under a covered area, then cover the clippings with a tarp.
- Pack the ivy in black plastic bags and leave in a sunny spot, rotating to heat all the plants.

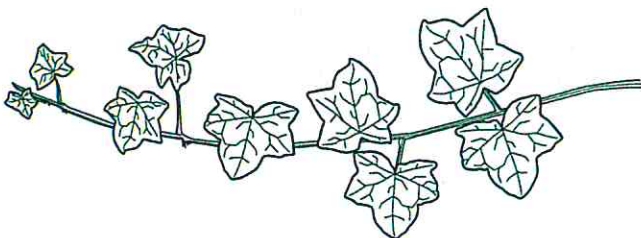


English ivy rootlets from a 4" diameter stem

DISPOSAL - FOR LARGER AMOUNTS

For large projects where the removed ivy can remain on site and out of sight, the cut stems can be balled or stacked on top of itself and left on site. Lift the ivy piles to keep the cut stems and rootlets from soil contact, or regularly turn the clippings to keep exposing the rootlets to the air.

- Pile the ivy and let it dry out or decompose. Cover the piles to speed the process.
- Wrap the pulled vines into medium sized bundles, leave them on site to dry up and die.



For more information please contact:

King County Noxious Weed Control Program

Department of Natural Resources
Water and Land Resources Division
201 S. Jackson St., Suite 600
Seattle, WA 98104
(206) 296-0290
email: noxious.weeds@metrokc.gov
<http://dnr.metrokc.gov/weeds>

Or contact your local county noxious weed program.

References are available from the King County Noxious Weed Control Program.

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Websites:

King County Noxious Weed Control Program:

<http://dnr.metrokc.gov/weeds>

WA State Noxious Weed Program (with links to counties):

<http://www.wa.gov/agr/weedboard>

No Ivy League: <http://www.noivyleague.com/>

Ivy OUT: <http://ivyout.org>

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King County
Department of
Natural Resources and Parks
Water and Land Resources Division
Noxious Weed Control Program

BEST MANAGEMENT PRACTICES

Scotch Broom, Scot's Broom *Cytisus scoparius* Fabaceae

Class B Noxious Weed Designated for Control only in Select Areas

Legal Status in King County: Class B Noxious Weed (non-native species designated for control only in select areas by Washington State law RCW 17.10 and the King County Noxious Weed Control Board). The King County Noxious Weed Control Board requires control on the King County portion of State Route 2 and on Interstate 90 between mile marker 34 and the King-Kittitas County Line. Control is not required for the remainder of the county, but it is recommended where feasible. Control is defined by state law as the prevention of all seed production. State quarantine laws prohibit transporting, buying, selling or offering Scotch broom for sale, or distributing plants, plant parts or seeds.



BACKGROUND INFORMATION

Impacts and History

- Scotch broom displaces native and beneficial plants, causing considerable loss of grassland and open forest habitat.
- Seeds and other plant parts are toxic to humans, horses and livestock.
- Renders rangeland and grasslands worthless.
- Interferes with re-establishment of conifer seedlings on harvested forests.
- Damages western Washington and Oregon prairies by changing the chemical composition of the soil and shading out prairie species.
- Dense stands can impede movement of wildlife.
- Potential fire hazard that can increase the intensity of grassland and forest fires.
- Scotch broom is difficult to eradicate due to substantial and long-lived seed bank.
- Native to the British Isles and central Europe.

Scotch broom was introduced as a garden ornamental in the 1860's. It was planted along roadsides and cut banks to prevent soil erosion and is found throughout most of western Washington, British Columbia, Oregon and California. Also commonly known as Scot's broom.



Description

- Large, yellow-flowered shrub in the legume family with evergreen stems and small, deciduous leaves.
- Grows 6 to 12 feet tall.
- Branches are erect, 5-angled with prominent ridges, and star-shaped in cross-section. Young stems are green. Older branches and trunks are yellowish-brown.
- Flowers are bright yellow, pea-like, sometimes with orange-red markings in the center, and are borne on short stalks in the leaf axils. They are ½ to 1 inch long.
- Leaves are small, oval and be single at the stem ends but are generally in three leaflets.
- Leaves are often dropped during dry summer months or periods of stress. Plants may be leafless for most of the year.
- Seedpods are black or brown, flattened, hairy on the margins, and are 1 to 2 ½ inches long.



Habitat

- Tolerant of a wide range of conditions but grows best in dry, well-drained soils in full sun.
- Seedlings can establish under the canopy of mature plants in full shade.
- It is tolerant of low-nutrient soils and a wide range of soil moisture conditions.
- Scotch broom commonly found in disturbed areas, pastures, agricultural lands, harvested timberlands, roadsides, trails, river banks, parks and vacant lots.

Reproduction and Spread

- Reproduces primarily by seed.
- Peak bloom time is April to June but some flowers may appear sporadically throughout the year.
- Seeds are produced in late summer, germinate in fall and spring.
- When mature, seedpods split and eject seeds up to 20 feet away.
- Seeds are further dispersed by natural forces such as erosion, flowing water, and ants collecting seeds for food, as well as by human disturbance such as road work and other activities.
- A single plant can produce over 10,000 seeds per year.
- Plants typically start producing seeds after three years and usually live about 17 years, but can survive as many as 25 years.
- Seeds can remain viable in soil from 5 to 60 years.



Local Distribution

Scotch broom is widely distributed throughout the King County, especially along freeways, on rivers, in parks, and in disturbed vacant lots and un-maintained pastures.

CONTROL INFORMATION

Integrated Pest Management

- The preferred approach for weed control is Integrated Pest Management (IPM). IPM involves selecting from a range of possible control methods to match the management requirements of each specific site. The goal is to maximize effective control and to minimize negative environmental, economic and social impacts.
- Use a multifaceted and adaptive approach. Select control methods which reflect the available time, funding, and labor of the participants, the land use goals, and the values of the community and landowners. Management will require dedication over a number of years, and should allow for flexibility in method as appropriate.

Planning Considerations

- Survey area for weeds, set priorities and select best control method(s) for the site conditions and regulatory compliance issues (**refer to the King County Noxious Weed Regulatory Guidelines**).
- Think about the long-term health of the site. Re-vegetation with native plants adapted to the site conditions will reduce re-infestation by Scotch broom and other weeds. However, re-vegetation can limit control options since care needs to be taken not to damage young plants. Make sure re-vegetation plan is compatible with broom management activities.
- Always consider the long-term goals for the site and the community.
- Sites that have other beneficial plants present should be controlled at times when the least amount of damage will be done to the desirable plants.
- Small infestations can be effectively pulled or dug up. Isolated plants should be carefully removed in order to stop them from infesting a larger area.
- For larger infestations, the strategy will depend on the land use of the site. In pastures, good grazing practices and management of grass and forage species will greatly improve control of Scotch broom. Specific suggestions are given in the Best Management section.
- Generally work first in least infested areas, moving towards more heavily infested areas.
- Minimize soil disturbance to avoid creating more opportunities for seed germination.
- Be adaptive: If the Scotch broom doesn't respond to one method, try a different method, change the timing or modify the technique.
- Be persistent. Any plants that go to seed will prolong the infestation problem. When plants become mature, they need to be removed or controlled before they go to seed. Most infestations require control work several times a year.
- Combine control methods.
- Pay attention to seasonal timing and to unexpected results. Different methods will bring variable results depending on site conditions, soil, water, competing vegetation, and site disturbance.

Early Detection and Prevention

- Seedlings are likely to appear in fall or spring, mature plants flower mainly from April to June but flowers may appear sporadically throughout the year.

- Small populations can be pulled or dug but the site should be monitored for several years for plants growing from root fragments and from the seed bank.
- After the control is complete, re-vegetate the site with non-invasive vegetation to compete with broom seedlings, but make sure re-vegetation plan is compatible with follow-up weed control activities.
- Prevent plants from spreading from existing populations by washing vehicles, boots and animals that have been in infested areas.
- If animals are being moved from an infested pasture to an un-infested pasture, if possible first hold them for at least five days so that any seeds pass out of the animals' digestive system.
- Do not purchase or introduce these invasive plants into your yard or landscape. According to state quarantine laws it is illegal to buy or sell Scotch broom, or any of its cultivars.

Manual

- When digging or pulling, make sure to remove as much root as possible so the plant will not re-sprout. This method can be highly labor-intensive and to be fully effective all mature plants in the site need to be pulled so that no new seeds are produced. Both methods are significantly easier when soils are moist.
- Pulling of medium to large plants is much easier with a **Weed Wrench™**, a solid steel tool for pulling woody plants. Several wrenches are available to borrow from the King County Noxious Weed Control Program (206-477-9333).
- Pulling disturbs the soil and creates ideal conditions for broom seed germination so sites will need to be carefully monitored for new growth.
- Cutting can be an effective control method for older plants that are no longer green at the base. If cutting, it is best to cut the plants when they are stressed during the summer drought in late July to August. Cut stems as close to the ground as possible. Monitor for regrowth and cut again. The disadvantage of this method is that plants are typically in seed during the late summer. Cutting may spread the seeds around so try to cut the plants before the seed pods mature.
- Cutting has been shown to be most effective on plants with a stem diameter greater than 2". Younger, smaller diameter plants that are cut should be monitored closely for regrowth.
- Expect the level of control work to be intensive for the first several years due to seed banks, soil disturbance that occurs when pulling or digging, and regrowth of cut plants.



Mechanical

- Mechanical control methods can be used to suppress larger infestations with either manually operated brush cutting tools or tractor mounted mowers.

- Plants should be cut between flowering and seed pod maturation to prevent seed spread. However, cutting at this time may not increase plant mortality. A late summer cutting after the broom has gone to seed can exhaust root reserves and decrease re-sprouting.
- Older plants are less likely to resprout from cut stems (usually about 20 percent over 5 years old will resprout).
- Younger plants are more likely to resprout (about 50 percent).
- Mowing, and other mechanical control techniques alone are generally not as effective as other methods and will either need to be repeated throughout the season or combined with other control methods to prevent re-sprouting, especially with younger plants. Mowing in the spring followed by a fall herbicide application, once plants have re-grown, can be an effective control method.
- Mature plants with a stem diameter of greater than 2" are the most susceptible to mechanical control, and may not require other methods.
- Bulldozing is not a recommended control method. It tends to spread seeds on a site and removes all other vegetation that was competing with the broom.

Biological

- Several biological control insects have been released in Washington State including Scotch broom bruchid (*Bruchidius villosus*), a beetle whose larvae feed on developing seeds, and Scotch broom seed weevils (*Exapion fuscirostre* or *Apion fuscirostre*). Results are still tentative for both controls in King County. *E. fuscirostre* is very widespread in King County and *B. villosus* is established at several locations.
- One research study from Oregon found that *E. fuscirostre* attacked 40-60% of pods and that of those pods attacked, 85% of the seeds were destroyed. In California, seed production was reduced by 60%.
- Initial findings from research on *B. villosus* ongoing in Oregon (where the beetle is relatively new) show that 10-25% of seedpods have been attacked. In North Carolina, where the beetle has been established for many years, more than 80% seed reduction is reported.
- A gall-causing mite, believed to be *Aceria genistae*, has recently appeared in King County, however it is not an approved bio-control and should not be spread. Research is ongoing to determine whether this mite should be approved as a biocontrol agent for Scotch broom.
- Takes many years for biological control insect population to be large enough to impact the infestation (usually at least 5-7 years, possibly longer).
- Regular and sustained grazing by goats can reduce broom infestations in some cases. If confined, Angora and Spanish goats will graze the tops of young plants, preventing plant development and depleting root reserves. Goats are likely to be most effective when used to clear one to four year old plants or re-growth, rather than the initial clearing of dense, mature stands.

Chemical

- Herbicides should only be applied at the rates and for the site conditions and/or land usage specified on the label. **Follow all label directions.**

- For your personal safety, at a minimum, wear gloves, long sleeves and pants, closed toe shoes, and appropriate eye protection. Follow label directions for any additional personal protection equipment needed.
- For herbicide use in critical areas and their buffers, certain restrictions apply depending on the site and jurisdiction. In unincorporated King County, refer to the **King County Noxious Weed Regulatory Guidelines** for a summary of current restrictions and regulatory compliance issues. Elsewhere, check with the local jurisdiction.
- For control of large infestations on roadsides and other non-pasture areas, herbicide use may be necessary.
- The best time to use foliar spray on broom is in the spring and again in the fall when plants are actively growing. Basal bark and other non-foliar treatments can be performed any time of the year depending on the herbicide used.
- **Infested areas should not be mowed or cut after an herbicide application until herbicide has had a chance to move throughout the plant.**
- Re-treatment the following year is necessary to control late-germinating plants. Continue to monitor for new plants for at least ten years after the initial treatment and following any disturbance to the soil such as tilling or construction.

Application Methods

- Foliar spraying requires a thorough wetting of the actively growing plant parts.
- Basal bark and cut stump application are also effective with triclopyr ester and 2,4-D but these are fairly labor-intensive methods. Wiping concentrated herbicide on a recently cut stump (within moments of cutting) involves more time than foliar spraying but is more target-specific and will damage fewer nearby plants.
- There are tractor-driven booms that wipe on herbicide. This may be particularly effective on young (2 year old) plants that can not be controlled by cutting due to resprouting but are high enough above other plants to allow wiping only the Scotch broom plants.

Specific Herbicide Information

Glyphosate (e.g. Aquamaster, Roundup): can effectively control Scotch broom. Apply to actively growing plants in spring. Addition of a surfactant will improve results. Glyphosate is non-selective and will damage grass and other vegetation it comes into contact with. Treatment with glyphosate needs to be combined with effective re-vegetation of the site to prevent broom seedlings from re-infesting the area. Re-treatment the following year is necessary to control late-germinating plants.

Triclopyr (e.g. Garlon 3A, Garlon 4, Crossbow): apply any time Scotch broom is actively growing. Foliage must be thoroughly wet. With Garlon 3A it is important to use a high volume of water (see PNW Weed Management Handbook for more information). Will not injure most grasses. Retaining the grass will help reduce the germination of Scotch broom seeds in the soil. Garlon 4 and Crossbow can be used for basal bark applications any time of year. **NOTE: Make sure to follow all grazing and harvesting restrictions described on the product label.**

The mention of a specific product brand name in this document is not, and should not be construed as an endorsement or as a recommendation for the use of that product. Chemical control options may differ for

private, commercial and government agency users. For questions about herbicide use, contact the King County Noxious Weed Control Program at 206-477-9333.

SUMMARY OF BEST MANAGEMENT PRACTICES

Small Infestations in Native and/or Desirable Vegetation

- Dig or pull up plants by hand when soil is moist (fall through spring). This method is very effective on seedlings and smaller plants up to 1" in diameter.
- Replace any divots created when removing the plants to lessen the amount of disturbed soil.
- Apply appropriate herbicide by spot spraying to minimize off target injury.
- Monitor site throughout growing season and remove any new plants.
- If using an herbicide in a grassy area, use a selective herbicide to avoid injury to the grass.
- Do not leave bare soil, use heavy mulch or replant to help compete with broom seedlings. This is especially important if small evergreen trees are being grown.
- Shade makes broom grow more slowly, so competitive plantings will improve long term management of broom populations.

Large Infestations in Grassy Areas

- Mowing multiple times per season for several seasons can keep broom from setting seed, but is unlikely to kill all of the broom, especially young plants.
- Mature plants of 2" plus diameter can generally be controlled by cutting the plant at the base between flowering and seed set (late July – August), but this may not work in all cases.
- Large infestations can be effectively controlled with herbicides. (See the Chemical section of this BMP).
- Smaller amounts of herbicide will be needed if plants are first cut or mowed as there will be less plant matter to treat. However, plants need to be actively growing when sprayed.
- Eradication of Scotch broom with a single herbicide application is unlikely. Typically it takes several applications, over the course of a few years, to reduce a large infestation to a level that is manageable by other means.
- Suppression of large infestations of broom with a selective herbicide can greatly increase grass production, which in turn increases the suppression of the broom.
- Promote healthy grassy areas by seeding and fertilizing. Use a mix of grass and clover species to improve resistance to broom. Fertilize according to the soil needs.
- Heavily infested areas that are not candidates for other types of control may be managed with bio-control to reduce seed production.

Control in Riparian Areas

- Additional permits may be required for control of infestations in riparian areas. See Noxious Weed Regulatory Guidelines for more information (<http://your.kingcounty.gov/dnrp/library/water-and-land/weeds/BMPs/Noxious-Weed-Control-Regulatory-Guidelines-Rev2014.pdf>).

- When large areas of weeds are removed, the cleared area needs to be replanted with native or non-invasive vegetation and stabilized against erosion. Refer to the King County Surface Water Design Manual for further information about sediment and erosion control practices (<http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx> for information).
- Survey area and document extent of infestation.
- Target only the Scotch broom, retain all native and beneficial plants.
- Focus on manual removal for small infestations if possible.
- Mowing can be effective at killing larger established plants but not younger ones. Mowing must be repeated multiple times over a season to prevent seed set and is not likely to kill plants unless combined with other methods.
- For larger areas where herbicide use is warranted, apply with a wick wiper or spot spray using low pressure and large droplet size or use basal or cut stump methods.
- When large areas of weeds are removed, the cleared area needs to be replanted with native or non-invasive vegetation and stabilized against erosion.
- If a non-selective herbicide is used in grassy areas, the area should be re-seeded to prevent reinvasion by weeds.
- Infested areas will need to incorporate a management plan lasting for several years to control plants germinating from the seed bank.

Control along Road Rights-of-Way

- Pull small infestations if possible.
- Spot spray with glyphosate if weeds are in areas with no desirable grasses.
- If plants are in grassy areas, use a selective broadleaf herbicide; if controlled with a non-selective herbicide, re-seed after control is completed.
- If plants are on a steep slope make sure to re-plant with vegetation of varying root depth to stabilize slopes.

Scotch Broom Disposal Methods

- **Do not put plants with seed pods in compost or yard waste.** Seeds are very tough and long-lived and can contaminate mulch made from compost. Ideally, control activities should be done before plants go to seed to avoid disposal problems.
- Scotch broom can be chipped and left on site, burned (after obtaining appropriate burn permits), or can be disposed of at a King County transfer station.
- Plants without seeds can also be disposed of in household yard waste containers or taken to the city or county transfer station yard waste section.
- If it is not practical to dispose of the broom as recommended above, leave plants with mature seed pods on-site in order to limit spread to new areas.

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Old Man's Beard

Clematis vitalba
Ranunculaceae

Class C Noxious Weed
Control Recommended

Legal Status in King County: Old man's beard is a Class C noxious weed according to Washington State Noxious Weed Law, RCW 17.10 (non-native species that can be designated for control based on local priorities). The State Weed Board has not designated this species for control in King County. The King County Weed Control Board recommends control of this species where feasible, but does not require it.

BACKGROUND INFORMATION

Impacts and History

- Old man's beard smothers trees, causing them to weaken, then to collapse.
- Fast growing, new shoots can grow at least 6 feet per year, older plants 30 feet per year.
- Reduces biodiversity in the understory by blocking light and out-competing native plants and tree seedlings.
- Increases fire hazards.
- Toxic if ingested and causes severe dermatological reactions in some people.
- Native to Europe, Africa and southwest Asia.
- Ornamental escapee in Washington, first introduced to San Juan County in 1904.
- Was introduced to New Zealand in 1922, had spread by 1935 and is now considered naturalized and very difficult to control there.



Description

- Deciduous woody climbing vine, that can grow up to 65 feet long and can also act as a ground cover in absence of trees to climb.
- Pinnate compound leaves with five leaflets, smooth to lobed.
- Flowers with creamy white petal-like sepals, no actual petals, and both male and female parts on same flower.



- Seeds are gray achenes with long, feathery appendages, giving them a fluffy appearance.
- Cascading vines covered with fluffy gray seed clusters give this plant the common name old man's beard.
- Young vines have six longitudinal ridges. Older vines have shredded bark.
- The leaf stalks wrap around other plants, or its own vine, enabling it to climb.
- Can be confused with *Clematis ligusticifolia*, a native of eastern Washington. They have similar looking leaves and flowers, but *C. vitalba* has flowers with both male and female parts and *C. ligusticifolia* has flowers with either male or female parts, not both. Also, *C. ligusticifolia* leaflets are more coarsely toothed and tend to be narrower. *C. vitalba* is found mostly west of the Cascades and *C. ligusticifolia* is mostly east of the Cascades.
- Cotyledons of old man's beard seedlings are elliptic or ovate and palmately veined.
- Old man's beard has a taproot that can reach several yards long.



Habitat

- Disturbed land on forest edges and in wooded areas with partial sun.
- Prefers to have roots shaded but will grow rapidly in full sun.

Reproduction and Spread

- Can self-pollinate or be pollinated by wind or insects.
- Seeds can be produced on vines after one to three years of growth.
- 100,000 seeds produced per plant and seeds are viable as long as five years in the soil.
- Seeds can be spread by water, wind, humans and animals.
- Also spreads by vegetative fragments and rooting at nodes

Local Distribution

Old Man's Beard can be found throughout western Washington. In King County, this plant is especially widespread in Seattle and in the Snoqualmie Valley.

CONTROL INFORMATION

Integrated Pest Management

- The preferred approach for weed control is Integrated Pest Management (IPM). IPM involves selecting from a range of possible control methods to match the management requirements of each specific site. The goal is to maximize effective control and to minimize negative environmental, economic and social impacts.
- Use a multifaceted and adaptive approach. Select control methods which reflect the available time, funding, and labor of the participants, the land use goals, and the values of the community and landowners. Management will require dedication over a number of years, and should allow for flexibility in method as appropriate.

Planning Considerations

- Survey area for weeds, set priorities and select best control method(s) for the site conditions and regulatory compliance issues (**refer to the King County Noxious Weed Regulatory Guidelines**).
- Control practices in critical areas should be selected to minimize soil disturbance or efforts should be taken to mitigate or reduce impacts of disturbance. Any disturbed areas need to be stabilized to control erosion and sediment deposition. Refer to the King County Surface Design Manual for further information about sediment and erosion control practices (call 206-296-6519 or go to <http://kingcounty.gov/wlr/Dss/Manual.htm> for more information). Minimizing disturbance also avoids creating more opportunities for germination of old man's beard and other weeds.
- Generally work first in least infested areas, moving towards more heavily infested areas.
- Properly dispose of all parts of the plant (see Disposal Methods section below).
- Old man's beard produces seeds in the fall, so control should be done earlier to prevent seed production.

Early Detection and Prevention

- Monitor for old man's beard especially in un-maintained wooded urban open spaces and vacant lots. Look for new patches along edges of forested areas, especially where known infestations are nearby, such as in Seattle or the Snoqualmie Valley area.
- Plants are easiest to spot in the summer or fall when flowering or in seed.
- Make sure not to plant this species; check the Latin name carefully when planting a species or variety of *Clematis* and avoid all cultivars of *Clematis vitalba*.
- Old man's beard seedlings generally don't grow in closed canopy woodlands (especially conifer forests), so protecting shrub and understory vegetation in closed canopy woodlands from clearing can help prevent the establishment of seedlings.

Manual Control

- Cut vines on trees or fences at about waist height, follow the vine back to the root and dig it out. Upper vines can be left on the trees since they will die back, or can be removed if it is safe and feasible to do so. Make sure remaining vines are not touching the ground because old man's beard can form roots at stem nodes.
- Vines growing along the ground should be dug up and removed.
- Pull small plants and seedlings when the soil is damp during winter or spring.
- Although plants can be dug up year round, it is ideal to do so during the winter, when most plants are dormant, to minimize disturbance to the surrounding vegetation.

Mechanical Control

- Cutting alone is not effective for controlling old man's beard. Cutting can stimulate plant growth, spread plant parts and will require multiple visits per growing season.
- Any kind of mechanical control (mowing or lopping) should be followed by digging out the roots or herbicide application on the cut stems or the re-growth (see below). Old man's beard will readily re-sprout.
- Seeds are easily dispersed by the wind and on equipment, so make sure to do any cutting before the seeds form.
- Stems can be suspended above ground and allowed to dry out, as long as the ends are not touching the ground. See Disposal Methods section below for more information.

Chemical Control

- For large infestations or where access is difficult, chemical control will be more cost-effective and will generally have less impact on soil stability than manual removal (when the slopes are unstable) or on sensitive tree roots that are in the infested area.
- **Precautions:**
 - Herbicides should only be applied at the rates and for the site conditions and/or land usage specified on the label of the product being used. **Follow all label directions.**
 - For herbicide use in critical areas and their buffers, certain restrictions apply depending on the site and jurisdiction. In unincorporated King County, refer to the **King County Noxious Weed Regulatory Guidelines** for a summary of current restrictions and regulatory compliance issues. Elsewhere, check with the local jurisdiction.
 - For your personal safety, at a minimum wear gloves, long sleeves, long pants, closed toe shoes, and appropriate eye protection. Follow label directions for any additional personal protection equipment needed.
- For best results and least impact to surrounding vegetation, spray the leaves and stems of actively growing plants in the spring before stem elongation. If control is conducted later in the year after stem elongation, carefully cut the plants down to the ground, wait a couple of weeks or so, and then spray the re-growth.
- Apply herbicide on warm days when winds are low. Check label for specific information on temperature, wind and rain guidelines.

- The “cut stump treatment” works as well. Cut the vine with a horizontal cut close to the ground and at about waist height, then apply herbicide to both cut ends, following the product label for this method (you will generally use concentrated or only partly diluted product, but the exact rates vary by product).
- Sprayed plants should not be removed or cut back until after the herbicide has had a chance to work and the plant is brown and dead.

Specific Herbicide Information

- **Glyphosate** (e.g., Roundup Pro, Aquamaster, any many other products) can be sprayed on the leaves of actively growing plants. It is most effective on new growth in the spring after cutting back to waist height in the winter, or it can be applied undiluted to freshly cut stems from late spring to fall. Follow the product label’s rate recommendations for brush and vine control.
- **Triclopyr**, amine formulation (e.g. Brush-B-Gon, Garlon 3A, Renovate), can be applied to foliage and stems any time old man’s beard is actively growing. Triclopyr can also be used on freshly cut stems when the plant is actively growing, except in early spring (see label for concentration to use for this method, typically a 50% solution mixed with water).

The mention of a specific product brand name in this document is not, and should not be construed as an endorsement or as a recommendation for the use of that product. Chemical control options may differ for private, commercial and government agency users. **For questions about herbicide use, contact the King County Noxious Weed Control Program at 206-296-0290.**

Biological Control

- There are two biological control agents that were released in New Zealand in 1996 and have been successful at impacting existing populations. One is a leaf mining insect, *Phytomyza vitalba*, the other a fungus, *Phoma clematidina*. These species have not been approved for release in the United States, as they may attack other *Clematis* species.

SUMMARY OF BEST MANAGEMENT PRACTICES

Small Infestations in Native and/or Desirable Vegetation

- Plants can be removed by following vines to the roots and digging them up. Any remaining vines in the trees should be cut far enough up so they do not touch the ground (cut stems will re-root if they reach the soil).
- Do not leave holes or bare dirt areas when removing the plants (fill back in with removed soil/plant material or apply mulch afterwards). This will reduce germination of weed seeds left in the soil and minimize erosion.
- When digging is not feasible or will create problems on unstable slopes or other difficult sites, spot spray carefully with an appropriate herbicide to minimize off target injury or

use the cut stem method described above. See Chemical Control section for more information.

- Monitor site throughout growing season and remove any new plants.

Large Infestations/Monocultures

- Large infestations can be controlled with herbicides (See the Chemical Control section above) or, for best results, use a combination of herbicide, cutting, and digging.
- Survey area and document extent of infestation. Develop a plan based on your ability to do follow-up control and any necessary re-planting or other stabilizing of cleared areas.
- Clear vines from trees and shrubs first, then dig up or spray the remaining vines between the cleared trees, gradually linking smaller cleared areas to form larger ones.
- Repeated removal of seedlings will gradually reduce the seedbank. However, suckers will re-sprout from roots until they are removed or effectively controlled with herbicide.
- Plan on monitoring and following up for at least five years to control plants germinating from the seed bank, surviving the herbicide treatment or digging, and blowing in from nearby infested areas.

Control in Riparian Areas

- Additional permits may be required for control of infestations in riparian areas. See the Noxious Weed Regulatory Guidelines for more information or contact your local jurisdiction.
- In some cases, the cleared area will need to be replanted with native or non-invasive vegetation and stabilized against erosion. See the King County Surface Water Design Manual for further information about sediment and erosion control practices (<http://www.kingcounty.gov/environment/waterandland/stormwater/documents/surface-water-design-manual> or call 206-296-6519).
- Focus on manual removal for small infestations if possible.
- For larger areas where herbicide use is warranted, spray using low pressure and large droplet size or apply with a wick wiper to prevent drift. If there is a likelihood that herbicide could enter a water body or wetland, obtain necessary permits and make sure only licensed aquatic applicators apply approved aquatic herbicides and surfactants.

Control Along Road Rights-of-Way

- Dig up small infestations if possible.
- Spot spray with a systemic herbicide (see Chemical Section above for recommendations).
- In grassy areas, use a selective broadleaf herbicide such as triclopyr; if controlled with a non-selective herbicide, such as glyphosate, re-seed after control is completed.

Disposal Methods

- Non-flowering stems can be suspended above ground or piled on tarps and left to dry out, as long as the stems are not touching the ground. Stems can also be burned or chipped. After drying or chipping, stems can be disposed of on site, taken to a transfer station or put in yard waste containers.

- Stems with flowers and/or rootballs should be collected, contained in bags or a covered load, and removed to a landfill or to a composting facility where heat will be sustained for sufficient time and at high enough temperatures to destroy plant tissues.
- Do not leave stems and root balls on the ground because plant material can form roots and start to grow again. If plant material is left on site, the area should be monitored for re-growth, especially if stems have flowers, seeds or roots.
- Disposed plant material should be kept well away from waterways, shorelines, roads and un-infested areas.

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