MULTNOMAH
COUNTY

Integrated Vegetation Management Plan
For Right-of-Ways

November 2023

Transportation Division
Department of Community Services
Multnomah County

I. INTRODUCTION

The Integrated Vegetation Management Plan for Right-of-Ways (IVM) addresses safety, aesthetic, and environmental considerations related to roadside vegetation management.

The IVM is designed to provide a safe road system free of sight-hindering brush and limbs, to maintain adequate drainage and pollution control in drainage systems, and to control noxious or invasive weeds. Public safety and integrity of public facilities will be maintained, but with careful evaluation of impacts of disturbance to the environment.

Native vegetation provides important ecological functions in upland, wetland, and streamside areas. Maintaining and supporting desirable vegetation in sensitive areas is an important objective of the IVM, in addition to controlling unwanted vegetation throughout the right-of-way (ROW). The IVM combines different methods for vegetation control in an effective and efficient strategy towards this end.

The Maintenance Program of Multnomah County's Transportation Division (in cooperation with the Bridge section) is responsible for maintaining 269 miles of roads, 26 vehicular bridges and 2 pedestrian bridges in four services districts (Figure 1). One Environmental Specialty Crew focuses on maintaining the municipal stormwater system, vegetation management, and litter control across districts.

- District 1 – West Multnomah County
- District 2 – Unincorporated pockets in and near Portland
- District 4 – County owned roads within Fairview, Troutdale, and Wood Village and surrounding areas
- District 5 – East Multnomah County

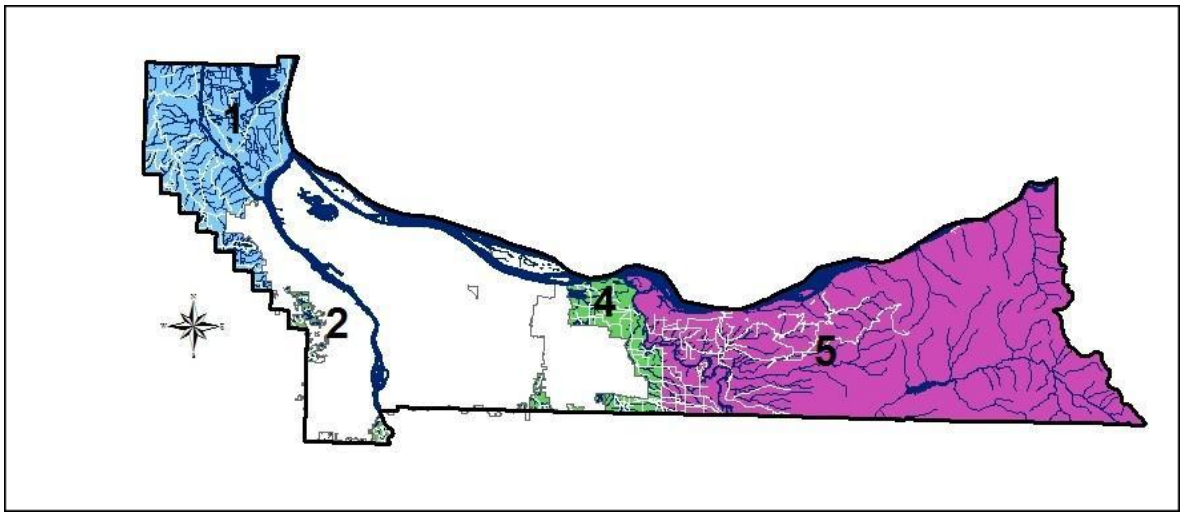

Figure 1. Map of the County road maintenance districts.

Plan Goals

The basic premise of the IVM is to plan and conduct vegetation maintenance activities in a way that discourages or eliminates unwanted vegetation and promotes desirable vegetation. This is achieved in a responsive and efficient manner that keeps roadways safe, while protecting natural resources. Toward this end, the IVM has several goals:

- Develop environmentally sound standards for roadside vegetation management.
- Develop vegetation management strategies that reduce the intensity of maintenance and operational costs.
- Develop an approach which considers a variety of vegetation control measures and minimizes chemical solutions.

Governing Policies, Laws, and Regulations

In addition to Oregon road safety standards set by the Federal Highway Administration and the Oregon Department of Transportation, the IVM Program takes into consideration the requirements set out by federal, state and local regulation and policy for environmental protection. These include:

- Water quality standards - NPDES and TMDLs (Clean Water Act)
- Drinking water standards (Safe Drinking Water Act)
- Impacts to Federally-protected species (Endangered Species Act)
- Protection of rare or sensitive plants (Columbia Gorge National Scenic Area requirements)
- Multnomah Toxic Reduction Plan

Interjurisdictional Coordination

Road Maintenance staffs a position to coordinate vegetation management internally among road maintenance staff, and with Interjurisdictional partners. The Vegetation Management Specialist maintains a commercial pesticide applicator license, and manages the daily activities of the Road Maintenance vegetation program, including herbicide application, staff training, and weed identification.

Multnomah County is a partner of the Clackamas, Clark, Multnomah, and Washington County ("Four County") Cooperative Weed Management Area (CWMA) through a memorandum of understanding. This is a program of the Northwest Weed Management Partnership, an informal multi-agency network of cooperators that includes several local, state and non-profit groups. The work of this group is the principle Interjurisdictional effort to identify, map, and control harmful invasive weeds in the region. The CWMA objectives are:

1. Manage the CWMA through information sharing and relationship building.
2. Inventory and assess weeds using mapping and risk assessment methodology.
3. Conduct outreach to raise awareness about weeds among the wider public.
4. Sponsor effective and innovative weed control projects using best management practices and restoration techniques.

The Vegetation Management Specialist participates regularly in the CWMA, and works on local weed projects with the neighboring jurisdictions including the City of Portland, Clean Water Services, several neighborhood groups, Soil & Water Conservation Districts, the Nature Conservancy and other members of the CWMA.

II. RIGHT-OF WAY MAINTENANCE ZONES

County rights-of-way are divided into several zones for the purpose of assigning management objectives, maintenance needs and thresholds for triggering vegetation maintenance actions (Figure 2). Noxious weed species are controlled throughout all zones. Not all zones occur on every road.

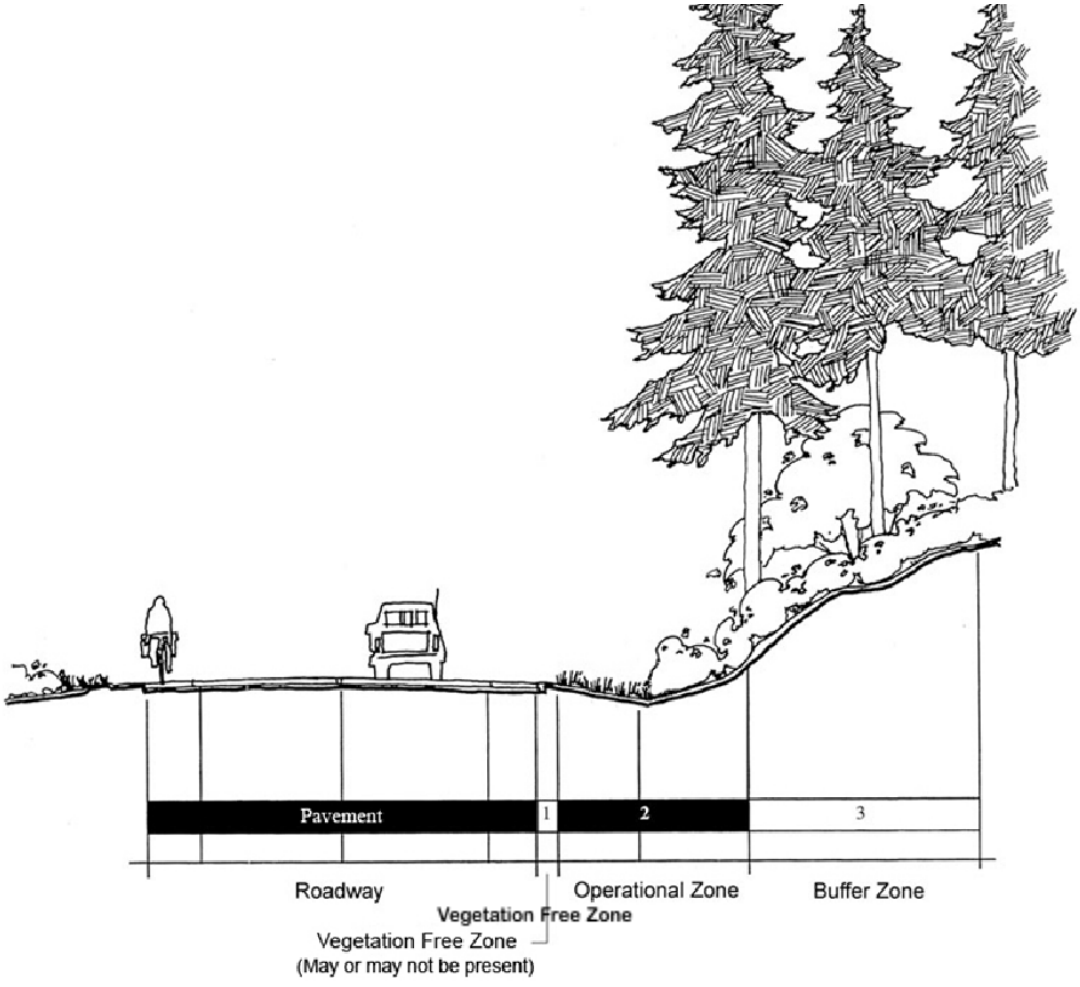

Figure 2. Right-of-way maintenance zones.

Vegetation Free Zone (Zone 1)

Zone 1 is kept free of vegetation to provide for key maintenance, operational, safety, and pavement and guardrail preservation needs. The zone may be as wide as necessary to meet operational needs. A Vegetation-Free Zone is typically maintained with the application of herbicides.

Objectives:

- Provide for surface drainage.
- Prevent pavement breakup by plants.
- Provide for visibility and maintenance of roadside hardware.
- Prevent fire starts.
- Prevent buildup of sand and windblown debris at pavement edge.

Corrective action levels:

- Vegetation height on shoulders exceeds 12 inches
- Preventative action may be taken when vegetation first appears on the shoulders.
- Vegetation mat on shoulders is impeding drainage of road surface or roadbed.

Operational Zone (Zone 2)

Zone 2 extends from the edge of Zone 1 or the pavement edge (if a Zone 1 is not present) to a width necessary to provide for safe errant vehicular recovery, maintain sight distance at corners and intersections, and provide for other operational, safety, and environmental functions. Zone 2 is typically maintained by mowing a single pass adjacent to the pavement and through selective removal of unwanted trees and brush beyond the mowing strip.

Objectives:

- Maintain a hazard free vehicle recovery zone
- Provide sight distance for passing and stopping
- Provide sight distance at intersections
- Prevent erosion with vegetation
- Maintain hydraulic capacity of ditches
- Control invasive or noxious weeds
- Accommodate utilities
- Preserve and conserve native plants and wildflowers

Corrective action levels:

- Invasive weeds on the right of way are in the bolting or flowering stage.
- Vegetation in ditches begins to impede flow of water.
- Vegetation around guardrails, signs and culverts inhibits access for maintenance.

Transition/Buffer Zone (Zone 3)

In areas with sufficient right-of-way width, a Buffer or Transition Zone extends from Zone 2 to the right-of-way line to provide a buffer or transitional area between the roadway facility and adjacent land uses. This area is maintained selectively, and to the greatest degree possible as a self-sustaining plant community, to minimize erosion as well as the growth of weeds and undesirable trees and brush.

Objectives:

- Blend and/or screen adjacent surroundings.
- Maintain low growing vegetation on non-drivable shoulders and ditch line to ROW back slope.
- Control weeds.
- Remove hazard trees.
- Manage trees to reduce shading in areas prone to roadway icing.
- Prevent erosion.
- Maintain and enhance visual quality.
- Preserve wetlands and wildlife habitat.
- Accommodate utilities.
- Preserve and conserve native plants and wildflowers.
- Provide vegetated buffers to reduce sediment and chemicals from adjacent private land.

Corrective action levels:

- Vegetation on back slopes or cut banks is sufficiently tall to obstruct or nearly obstruct line of sight on corners and at intersections, or to obstruct road signs.
- Preventative action may be taken if tall growing species become visible in the buffer zone.

Special Maintenance Areas

<u>Restricted Activity Areas (RAZ)</u>

The County Maintenance program has defined Restricted Activity Zones (RAZ) in the Routine Maintenance and Operations Manual (RMOM). A RAZ is an area adjacent to natural streams, rivers, and wetlands where extra protective measures are needed. An area is designated as a RAZ if the routine road maintenance activities have a potential of impacting a waterway. The RAZ typically will extend one hundred fifty (150) feet either side of a stream or wetland; however the actual distance of a particular RAZ from a stream varies depending on the site conditions. The RAZ is delineated in County mapping and work order systems.

Special vegetation management considerations for the RAZ are given in the RMOM, including best management practices (BMP) for mowing, brushing, and hazard tree removal. The County does not spray non-aquatic approved herbicides within the RAZ, except using hand spraying to control noxious or invasive weeds.

Stormwater Water Treatment facilities

The County maintains vegetated stormwater treatment facilities. No herbicides are used at stormwater treatment facilities. Vegetation selection is designed by the Engineering section.

Owner-Maintained Right-of-Way Program areas

Owners of property adjacent to Multnomah County's right-of-way can request that their frontage not receive herbicide and/or mechanical treatment as part of the County's prescriptive maintenance program. The owners who wish to maintain their ROW frontage are required to meet current County road standards. Properties in the RAZ are notified of special restrictions if any apply.

The Owner Maintain program requires a contract with the County. The owner must submit an Owner Maintain Permit Agreement, and maintain their ROW frontage according to the conditions of the agreement. The Agreement can be modified to meet site specific conditions at the discretion of the Vegetation Specialist and Maintenance Supervisor.

III. VEGETATION MANAGEMENT METHODS

Multnomah County employs four principal methods to meet vegetation management goals: 1) Mechanical; 2) Biological; 3) Cultural; and 4) Chemical methods.

Multnomah County Best Management Practices for Vegetation Management focus on minimizing the disturbance to native vegetation and maintaining ground cover to prevent erosion. When possible and practical, Multnomah County will control vegetation through mechanical, biological, and cultural means before using chemical methods.

Mechanical Methods

Mechanical methods offer efficient short-term removal of vegetation in the ROW. All manner of heavy equipment and hand tools are used in the following activities:

> Mowing – includes the use of drop down mowers and tractors, and push or walk-behind mowers, to maintain safety sight distances and visual clearance of sign controls, and to maintain a pleasing roadside for roadway users.
>
> Brush mowing – involves the removal of vegetation along rural and urban roadsides using tractor-powered flail or rotary brush cutters to maintain safety sight distance as well as visual clearance of traffic control signs, to maintain safety "clear zones"

Hand-brushing and pruning – includes the selective removal of encroaching or overhanging vegetation. Manual work is a good alternative for sensitive areas or removing problem weeds, however, the labor intensity and time are factors for the use of this method.

Biological Methods

Insects and other natural predators can be used to control the noxious weed or unwanted vegetation. Predators usually come from the invasive plant's native habitat and are available commercially. Once established, they may support their own growth and expansion. They may attack different parts of plants at different times, but eventually may decrease seed production and growth rate. One or more biological control agents can be used at a time on a weed species. Biological control measures will be primarily led by the Oregon Department of Agriculture (ODA).

Cultural Methods

Cultural methods incorporate the use of native plant materials to meet objectives. By enhancing desirable plants through revegetation, shading, weed exclusion, or mulching, these plants can eventually out-compete or resist undesirable vegetation.

Chemical Methods

Chemical control methods are effective to stunt growth, thin vegetation and/or eliminate unwanted vegetation within a designated area. Herbicides may require multiple applications for hardy weed species. Chemical control of noxious weeds works best if used in conjunction with other control methods. Choice of herbicide depends on type of weeds, proximity to water, and season. An ODA pesticide applicator license is required to apply herbicides in most right of way situations.

IV. VEGETATION MANAGEMENT STRATEGY

Selecting Optimal Strategies

Maintenance considers a multi-faceted approach to reduce or eliminate undesirable vegetation. Strategies in each ROW maintenance zone consider the following factors when selecting the combination of control methods:

- Least hazardous to human health
- Minimal impact to non-target organisms
- Least damaging to the natural functions
- Best preserves desirable vegetation
- Most likely to produce permanent reduction of undesirable species
- Ability to carry out effectively
- Cost effectiveness in the short and long term

Management strategies

The following matrix describes the management strategy for the three maintenance zones in the ROW (Table 1). These prescriptive strategies are used County-wide as resources are available to meet the functional objectives for each zone.

The Integrated Pest Management Guide for Common Weeds from the Northwest Weed Management Partnership is used for treatment strategies for particular weeds of regional concern (Appendix A).

Adequate staff and equipment resources are needed to implement the management strategy and meet the functional objectives for each of the management areas. Resources are balanced with maintenance needs through annual work planning, however, limitations on those resources or unexpected maintenance needs (e.g., emergencies, extreme weather events, landslides) may not allow functional objectives to be met in all areas.

Vegetation maintenance is managed adaptively by establishing priority areas or projects, or by shifting strategies so that the IVM is aligned with the mission of the Transportation Division:

> *"To manage and preserve the County Road infrastructure, and provide a safe and efficient transportation system that supports economic and community vitality*."

Priorities are given to high-use roadways, problem areas, and sensitive areas as determined by the Maintenance Supervisors. Strategies are monitored and evaluated to ensure effective, efficient and responsive implementation, as discussed below.

V. HERBICIDE SELECTION AND USE

Herbicides are efficient and effective tools for vegetation management and weed control. However, the County recognizes there may be potential impacts to health and the environment, and the reduction of herbicide use is desired wherever possible. Maintenance uses herbicides two ways:

- to maintain the vegetation-free zone at the edge of the pavement where necessary and to maintain vegetation free areas around signposts and other fixtures in the ROW
- to selectively control and eliminate undesirable plants

Herbicide Selection and Use

Multnomah County only uses herbicides that are registered by the Environmental Protection Agency (EPA) and the Oregon Department of Agriculture (ODA). All new chemicals used by the County are vetted through the New Chemical Review Process (Administrative Procedure RSK-21). This process allows review of the use, storage and toxicity of chemicals, to ensure that the least hazardous product sufficient for the intended use is identified. The Northwest Weed Management Partnership identifies herbicides effective for selected noxious weeds in the IPM Guide to common weeds (Appendix A).

Table 1. Vegetation management strategies for right-of-way maintenance zones.

	Management Method			
	Mechanical	***Chemical***	***Biological***	***Cultural***
Zone 1: Vegetation Free	Not usually considered in this zone.	Application of a combination post- and pre-emergent blanket spray in April, May or June. September or October application of post-and pre-emergent herbicides can help reduce spring growth.	Not usually considered in this zone.	Not usually considered in this zone.
Zone 2: Operational	One pass with a tractor-mounted mower is used to clear the area just beyond the shoulder. Hand operated equipment is used to clear vegetation around culvert openings, utility poles, signposts and other fixtures in the operational zone Manual and heavy equipment are used to remove hazard or potential problem trees and shrubs	Broadcast sprays of selective herbicides are used to target invasive or non-desirable weeds while leaving grasses intact. Spot spraying with backpacks and pickup mounted tanks target specific weeds while leaving neighboring vegetation unharmed.	Biological alternatives are considered for use in this zone. We monitor for favorable predators and do not interfere if they are working. Monitor what ODA is doing, as they are the main users of biological controls in the ROW.	Re-seed/replant for erosion control after regrading where vegetation can grow. Time of year, extent of disturbance, and sensitivity of habitat are major considerations for planting.
Zone 3: Transition/ Buffer	Manual and heavy equipment are used to remove hazard or potential problem trees and shrubs.	Spot spraying with backpacks and pickup mounted tanks target specific weeds while leaving neighboring vegetation unharmed	Same as above	Consider seeding/planting for erosion control after regrading for slides/washouts.

Restricted Activity Zones (RAZ)	Mowing near streams and wetlands as identified in the RMOM,	No chemicals as used in the RAZ except hand spraying for noxious weeds	Same as above	Consider seeding/planting after disturbance.

Herbicides are applied in accordance with the standards set forth by the Oregon Department of Agriculture, the product's label, and the guidance in this plan.

The selection of an herbicide includes the consideration of the following factors:

- Weed or plant species
    - Grasses
    - Broadleaf plants
    - Woody plants
    - Brush (less than 10 feet tall)
    - Trees (over 10 feet tall)
- Location of weed species
- Length of control
- Type of herbicide (selective or nonselective)
- Mode of action (contact or translocation)
- Weather (rain, air and road temperatures, wind direction and speed)
- Soil conditions
- Adjacent vegetation and land use
- Designated sensitive areas (Restricted Activity Zones as defined in the Routine Road Maintenance and Operations Manual)
- New Chemical Review Process (RSK-21)

Personnel Training

Multnomah County Transportation personnel who apply pesticides will be licensed by the Oregon Department of Agriculture and follow the rules set out in the Oregon Pesticide Control Law (ORS 634*).*

Oregon Department of Agriculture Recertification - The Oregon Department of Agriculture has passed legislation that requires 40 hours of Department of Agriculture approved courses every 5 years in order to recertify State of Oregon Pesticide Licenses. This legislation also states that a maximum of 15 credits shall be accredited in any given year.

Training Commitment - All persons responsible for supervising the Vegetation Management Program, its application and application of herbicides will attend educational classes, seminars and meetings to enhance and upgrade their knowledge of vegetation management, alternatives and the selection and safe application of herbicides.

An effort will be made to seek out alternative vegetation management courses. Those individuals involved in Multnomah County's Vegetation Management Program will enhance their vegetation management techniques by attending the appropriate courses as available.

VI. MONITORING, EVALUATION AND REPORTING

Monitoring and evaluation is an on-going activity and practice. Maintenance crews routinely scan the ROW for hazards posed by vegetation, and opportunities to correct potential hazards from occurring. The public are encouraged to report road vegetation hazards, and in some cases, with public notice, Maintenance may rely on the public to notify the County of such hazards.

The County follows Early Detection and Rapid Response methods for weed control and shares information through the Four County Cooperative Weed Management Area partnership. Identified weeds are reported to ODA and mapped through the Weedmapper program (https://www.oregon.gov/oda/programs/weeds/pages/weedmapper.aspx). Response measures for weed species are coordinated through the partnership following the control methods in Appendix A.

Initial herbicide activity and possible injury to adjacent vegetation can be determined 2 to 4 weeks after application. Total vegetation control treatments can be evaluated after 6 to 8 weeks and observed through the end of the season. Adjustments in rates, products, timing of herbicide applications and even decisions not to apply herbicide should be made based on the objectives for each zone, and changes recorded in the spray log.

Herbicide use reporting

Records of all herbicide applications are required by Oregon law (ORS 634.146). Pesticide operators shall prepare and maintain records on forms approved by the State Department of Agriculture. Records include:

- Property owner
- Location of the land or property on which the pesticide was applied
- Date and time of application
- Pesticide supplier
- trade name and the strength of such pesticides
- amount or concentration
- The specific property, crop or crops to which the pesticide was applied
- Equipment, device or apparatus used
- Names of the pesticide applicator or pesticide trainees

The record retention is three years from the date of application of pesticides, shall be available during business hours for review and inspection by the department.

Vegetation Management related injury and property damage documentation.

All personal property damage allegedly resulting from Multnomah County employees and / or equipment during roadside vegetation maintenance is and will be documented and handled by Multnomah County's Risk Management.

Appendix A

Integrated Pest Management (IPM) Guide for Common Weeds

Western Invasives Network – Revised March 7, 2015

Disclaimer: This document is a basic guide and assumes no liability toward product efficacy, loss of non-targeted plants, or personal safety issues. Always follow label instructions, wear proper safety gear, and avoid herbicide drift. If in doubt as to control practices, consult a licensed treatment contractor. Please refer to the PNW Weed Management Handbook for specific herbicide recommendations: http://uspest.org/pnw/weeds/.

Species	Mechanical	Chemical	IPM	Notes/Tips
Armenian (Himalayan) Blackberry *Rubus armeniacus* **Evergreen Blackberry** *Rubus discolour* **European Blackberry** *Rubus fruiticosus*	- Mow at least twice a year: June and September. - For small patches, grub roots in the winter through early summer when soil is moist. Be sure to remove root collar. -Other than for the European blackberry, shading is a good long-term non-chemical approach to blackberry control - Repeated mowing or disking can also be effective	-Treat with Crossbow or Garlon 3A in fall, usually in September/October. Garlon 4/Escort combo can be an effective mix and offers a longer treatment window. Glyphosate in the fall, when the first few yellow leaves show up, is also effective, and suitable for wet areas if using aquatic versions. - In mixed stands of blackberries and snowberries (common in riparian areas) you can spray over the top of both in the fall using Garlon 3A and MSO surfactant without any ill effect on snowberries. Silicone/organosilicone spreader surfactant such as Sylgard or Freeway ensure excellent coverage and reduces overall herbicide use; however silicon based surfactants may damage non-target plants.	- Mow in June and allow for regrowth, then spray in fall. - A cut stump treatment works well, and prevents overspray and drift. Cut the stem next to the ground and, using a brush, sponge, or small spray bottle, apply a 50% solution of glyphosate and water immediately to the cut stem.	- A rust that stunts blackberry growth was accidentally introduced to the U.S. and is active in SW Oregon. Its impact appears to be dependent on local climate (dry weather is not conducive to the rust). (New data suggests multiple species of blackberry in NW, with rust only effective on 2 or 3) Re-seed area with native grasses, trees, and shrubs. - Be persistent! New vines are always showing up. Graze with goats.
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
Scotch Broom **French Broom** **Portuguese Broom**	- Cutting large plants (stem greater than 1/2 inch) below the crown can be effective without herbicides in Aug. - Sept. when they are stressed from drought - Pull smaller plants (less than 1/2 inch) by hand or with a weed wrench. - Mowing is sometimes done to knock down large Scotch broom patches, but should be avoided when seed pods are ripe. There is a good chance that seeds already on the ground will be spread by mowing.	- If possible, spray Scotch broom before and after bloom, as the flowers intercept the herbicide - Water stress in late summer can cause reduced herbicide effectiveness. - Garlon 3A or 4, glyphosate, and Crossbow are all effective. - Garlon 3A and Milestone mixed are very effective and don't require complete coverage of plant for total control. - Silicone/ organosilicone spreader surfactant such as Sylgard or Freeway ensure	- Mow in early spring. -Treat regrowth in fall or the following spring with Garlon, Milestone VM Plus or Crossbow. - You can also use glyphosate (Round Up) for early fall treatments, though results may be marginal on thicker stems. Application will kill non-target vegetation. - In dry settings, cut stumps often don't need herbicide treatment if they are an inch in diameter or	-- Don't mow Scotch broom when seed pods are ripe. - Pulling large plants with a weed wrench creates ideal growing conditions for seed bank so consider cutting instead. - Seed treatment area heavily with grass to shade out Scotch broom seedlings. - Calibrate sprayer well and watch your rates.

	- Biocontrol seed beetles and weevils, may provide a measure of control by feeding on seeds. They are readily available and widespread. Collect and release in April to May.	excellent coverage and reduces overall herbicide use Be careful of surrounding vegetation!	bigger. Late summer cutting below crown is advised.	Early season mowing typically results in dense, multi-stemmed regrowth; great for spraying
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
Pasture Weeds (broad-leaf weeds in grass pasturage) Includes: tansy ragwort, teasel, thistles, dock, St. John's wort, *et al*)	- IMPORTANT: Mow before seed formation. - Except for Canada thistle, hand digging or pulling is feasible for small infestations. - Cut and bag all seed heads, and burn or dispose of them to prevent spread of seeds.	- IMPORTANT: Spring application is critical. Apply herbicides BEFORE plants flower. - The following herbicides are effective: 2, 4-D, Weedmaster, Garlon 3A, Curtail, Opensight, Stinger, and Milestone. - Stinger and Curtail are effective on Canada thistle when plants are short (less that 6") to full height. Glyphosate is only effective when plants are in late bud to flower stage or on fall regrowth. - If you want to save clover, use MCPA. All others will eliminate clovers.	- Introduce goats with other grazers. Goats prefer broad leaved plants. Don't over graze. - If you miss spring spray time, you can mow in early summer and spray in the fall. This approach works well for Canada thistle and tansy. - Keep pasture grass competitive by maintaining high fertility.	- There may be a biocontrol agent already present! - No tansy ragwort biocontrols? Don't panic - the bugs will come! Biocontrol agents cycle with the plant population and will become more abundant and effective as tansy becomes more abundant. - Cut, bag and dispose of tansy ragwort and teasel seed heads. Don't use manure derived from clopyralid treated pasture or hay in gardens or organic operations. These compounds persist in the manure.
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
English Ivy	- Protect trees and prevent seed production by cutting vines around tree trunks. Clear ivy three feet out from the base of the tree. - Using rakes and shovels vines can be pulled and rolled down a slope like a carpet. - Goats and sheep LOVE ivy, and can be used to clear areas prior to pulling of the roots.	-The current hot ticket: 4% Accord Concentrate (glyphosate)] + 2% Garlon 3A (triclopyr amine) + 2% Competitor (modified vegetable oil (MSO) surfactant. 25% glyphosate or triclopyr for cut stump - If possible, apply during dry periods in late winter or early spring before native plants leaf out or emerge. - You will not notice effects until weeks, if not months later, so be patient!	- Cut ivy away from trees and apply foliar herbicide treatment to leaves on the ground. - Cut ivy trunks back to ground and paint or spot spray them with Garlon. Weed whacking and applying herbicide to new growth can also be effective.	- If you do nothing else, keep ivy out of the trees to keep seed production lower. - Cut the climbing vines, taking a good chunk out of them so they don't grow back together. This also ensures you don't miss any of the small vines that might be mixed in hidden in the larger ones.

Species	Mechanical	Chemical	IPM	Notes/Tips
Parking lot weeds (puncture vine, prostrate knotweed, *et al*)	- Burn 'em out - apply early season flaming. - Hand pull large weeds early in season before seed set. - Apply fresh gravel on a regular basis.	- A wide range of herbicide products can be used to initially control the vegetation. Pre-emergent herbicides that are effective, products containing: oryzalin, benefin, or trifluralin will provide partial control of germinating seeds. These must be applied prior to germination (late winter to mid-spring). Post emergent), products containing 2,4-D, glyphosate, and Dicamba are effective on puncture vine, especially when small.	- Pull/hoe when you can; if things get away from you, apply herbicides. - Smothering with fresh gravel over a residual treatment helps sustain longer control.	- Control early and monitor it often as seasonal annuals sprout at different times of the year and new species are introduced.
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
False Brome	. - Mowing can be used to remove/deplete annual seed production Optimal mowing for this purpose is June (plants will still flower when mowed earlier). - Hand pulling small patches is best in April and early May. -Mulching with clean, weed free straw works well to suppress false brome for at least two years	- Broadcast application of a glyphosate-based herbicide such as Roundup, is effective in mid May through fall. - OSU field trials suggest tank mixing glyphosate (2%) with a preemergent herbicide such as Surflan (3.3%) applied in October. This kills mature plants AND stops seeds from germinating. - Apply herbicides in fall after first rains, as that is when the plants start growing again	- To reduce the amount of herbicide used, mow for several years to eliminate soil seed bank. Then treat with herbicide. Also, burning followed by spot-spraying after the grass resprouts can minimize the amount of herbicide needed - You can also mow in June, and then treat with Roundup in the fall.	- False brome is spreading fast. Slow the spread by making sure clothing and equipment are free of seeds before you leave an infested site. - Put up informational signs at trailheads to urge hikers to clean clothes, pets, and OHVs.
Species	**Mechanical/Manual**	**Chemical**	**IPM**	**Notes/Tips**
Garlic Mustard	- Mowing is not an effective control because plants will still bolt and seed - Mowing spreads garlic mustard seed like wildfire - do not mow when seed pods are present (May - Sept.) - Hand pulling is easiest during early bolt (2nd year). Difficult during rosette stage (first year) except for small patches	Most important time to spray is in early spring (typically early April-late May) during bolting or early flowering. Rosettes can be sprayed in early fall after rain events end summer dormancy but before leaves begin to fall from trees and cover garlic mustard plants Rosettes can also be sprayed in late winter, but this is only effective after winter dormancy ends.	Combination of spring herbicide application followed by hand pulling is very effective. Spray bolting and early flowering plants in early spring (typically early April-late May). Revisit sprayed sites in early June (once seeds are formed and spraying has become ineffective) to hand	Ideally, this plant should be addressed 3 times yearly, spring application, hand pulling, fall application Multiple years are needed to exhaust seed bank, which can last up to 8 years. Spray before the

	- Multiple years are needed to exhaust seed bank - Pull at base to avoid breaking stem - All pulled plants must be bagged and removed. Do NOT put pulled plants into composting facilities!	Garlic mustard often dies back in the winter so you must wait until the great majority of plants have re-sprouted. Rosette treatments at the height of summer may be least effective due to summer dormancy Triclopyr and Glyphosate are effective at 2-2.5%. Garlon 3A will not kill grasses. Surfactants increase efficacy of herbicide treatments. Escort is also effective. Milestone doesn't appear to be an effective herbicide for garlic mustard.	pull any plants that were missed or bolted after spraying. Pulled plants must be bagged and removed from the site. Revisit sites if possible after initial pull and be prepared to repeat pulling if smaller or later growing plants bolt. Fall rosette treatments can also be added to this IPM method as directed in Chemical section of this document.	plant goes to seed! Once seed passes early seed set (milk into dough stage) it will still be viable if sprayed. Consider impact of crews – clean boots, clothing, and machinery before moving from areas with garlic mustard plants/seed into uninfested areas!
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
Yellow Flag Iris	- Not effective on large infestations - Repeated mowing or cutting in early summer before seeds mature may contain/kill by depleting energy after <u>many years</u> of intensive mowing. - Small infestations may be pulled or dug out. All rhizomes must be removed. Incomplete removal may enhance spread of plant. - Cutting and covering with landscape fabric or durable tarps moderately successful. - Bag and dispose of mature seed heads and bulbs to reduce spread.	Habitat (aquatic approved imazapyr) and Rodeo (glyphosate labeled for aquatic usage) at the following ratio: Habitat at 1% and Rodeo at 1.5%, with seed oil added to the mix.	- Very small infestations can be dug; dispose of plants and rhizomes in landfill or dry and burn. - Contain existing colonies by suppression and prevention of seed spread.	- Do not compost any parts of plant. - If using a herbicide use a surfactant to get maximum product penetration. - Resins in leaves and rhizome can cause skin irritation, wear hand protection when handling. - Applications of aquatic imazapyr products require a licensed applicator with an aquatic endorsement.
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
Spurge Laurel	- Hand pull small plants. - Larger plants can be pulled with a weed wrench or similar tool. All of the root should be removed to avoid re-growth from root sprouts. - After pulling, area should	- Cut plants can sprout from suckers, so it is advisable to apply herbicide to stems immediately following cutting. - Triclopyr has been shown to be effective. Please refer to the <u>PNW Weed Management Handbook</u> for	- Public education. . - Treat small infestations by pulling. - Cut larger plants close to ground and spray cut stump.	- Note: there are irritating toxins in the sap, fruit and leaves that can cause blindness.. <u>Wear gloves and other protective clothing when removing or cutting</u>.

	be monitored for new seedlings. - More cost effective to use mechanical methods for large populations. Plants up to three years old can be controlled by cutting the plant close to the ground. Older plants should be cut below the soil line to minimize re-sprouting.	specific herbicide recommendations.		
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
Shining Geranium **Herb Robert**	- Hand-weed or torch isolated plants or small populations before they are in seed. - Cover with sheet mulch for at least two growing - Heavy mulch (wood debris, chips, etc.) about 3 inches thick has worked well to suppress the plants. - Mowing or weed eating prevents plants from producing seed. It must be done frequently, as plants will continually produce flowers from early spring until late fall.	- Plants can be sprayed before flowering (late March through April) with either a broadleaf herbicide (if growing with desirable grasses) or with a non-selective herbicide. Glyphosate or Imazapyr at 1% with Li700 surfactant. .	-Public education, plant and seed available at nurseries and on internet. Public education, plant and seed available at nurseries and on internet.	- Clean boots, tools, vehicles and pets after visiting parks, forests or other areas where there are populations of Herb Robert. - Dispose plants that have been weeded in the trash
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
Knotweeds (Japanese, Bohemian giant, Himalayan)	- Mowing or cutting alone is not recommended as it typically encourages the knotweed roots to spread outward. - Digging is very labor intensive, generally causes more harm than good, and should only be reserved for very small patches in upland areas.	- IMPORTANT: Don't spray glyphosate in early summer. Spray from onset of flowering through Sept. but before first frost. - Injection tools can be effective for small infestations and are best used on stems with diameter > ¾". 3ml is the generally accepted amount Imazapyr offers a larger treatment window starting in mid summer. Coverage is critical. Take care not to spray foliage of non-target shrubs and trees. - If knotweed is found near water, use herbicides and surfactants approved for riparian use.	-To reduce overall herbicide use, cut patches in June, allow to regrow and spray in September. Dispose any cuttings where they are guaranteed not to resprout! Light deprivation can provide some control on small isolated patches. Care must be taken to maintain coverage and monitor for out runners. -	- Coverage is typically more important than product concentration! Applications should be directed to both top and underside of canopies and stems to ensure complete coverage. Over-the-top treatments miss many smaller stems, resulting in regrowth. Injection can result in more water contamination of adjacent streams than does foliar spray

Species	Mechanical	Chemical	IPM	Notes/Tips
Tree of Heaven (*Ailanthus altissima)*	Cutting alone is usually counter-productive because Ailanthus responds by producing large numbers of stump sprouts and root suckers.	The most effective method of Ailanthus control seems to be through the use of herbicides, which may be applied as a foliar (to the leaves), basal bark, cut stump, or hack and squirt treatment. Triclopyr (Garlon 3A) or over the counter Bayer Brush Killer (Triclopyr amine 8%)	A combination of complementary control methods may be helpful for rapid and effective control of tree-of-heaven. Some examples include bigleaf maple (acer macrophyllum) Oregon white oak (*Quercus garryana)*, and ponderosa pine (*Pinus ponderosa)*.	Young seedlings may be pulled or dug up, preferably when soil is moist. Care must be taken to remove the entire plant including all roots and fragments.
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
Meadow Knapweed	- Digging plants is effective for small areas - Disking or roto-tilling can control infestations, but established plants can survive if root fragments remain.	- May until flowering is best (before seed set) but could be treated any time during active growing season glyphosate 2-5%+ non-ionic surfactant ¼ -- ½ % 2,4-D 2 % + clopyralid ¼ -- ½ %+ non-ionic or MSO/silicon blend ¼ -- ½ % aminopyralid (7 oz product / ac)+ non-ionic or MSO/silicon blend (1-2 qt/100 gal)	- There are several insects that reduce plant biomass or seed production - An integrated management plan that includes selective herbicides and biological control may show the greatest effectiveness for removal of meadow knapweed.	
Species	**Mechanical**	**Chemical**	**IPM**	**Notes/Tips**
English Hawthorn	Pull small plants (1" diameter) when soil conditions allow. Mowing plants is effective for suppression only. Plants that have been repeatedly mowed tend to have a larger root system, decreasing success with pulling later. Cutting and then cross-hatching the stump with an axe or power saw to promote drying out of the stump. Girdling plants is typically not effective; plants resprout from the lateral root system.	Glyphosate (Round up) painting cut stems of plants larger than 1" diameter in mid-late summer/dry season. . Cut stump treatment using Garlon at 30% Garlon mixed with oil carrier. Basal bark spray all around the base of the tree using a 1-5% mixture with water. August is a good time to spray the resprouts.		Resprouting is the biggest challenge, so a well-timed integrated mechanical plus herbicide program is advised Resprouting from stem or lateral roots is almost a given, regardless of the method you choose. Seed bank along fence rows may be a problem. Plan for multiple years of treatment (e.g., 3 years of spot spraying to control resprouts and new plants).

Important Notes:

PREVENTION

Weed prevention is first element of successful management. Take care not to spread invasive plant seeds and materials as you work or recreate.

- Clean boots and tools, and dog companions before and after working at a weedy site.
- Increase awareness of vectors by installing informational signs and boot brushes at trailheads to urge hikers to clean clothes, pets, and OHVs.
- Dispose of noxious weed material properly. Dry and/or burn pulled or cut plant material. Dry the plant material on a tarp or plastic barrier to prevent soil contact with roots.

WEED CONTROL ESSENTIALS

- Always read and understand the entire label before using any herbicide and surfactant. Wear recommended Personal Protective Equipment and mix herbicides in a safe environment.
- ALWAYS follow the recommended rates on the herbicide labels. More is not always better. Determine if lower rate on the recommended range of rates on the label will be effective for your site.
- Include spill prevention and preparation of a spill kit and appropriate contact numbers as part of your work habit
- Review plant treatment timing to ensure your control efforts are effective for your method and the type of herbicide you choose.
- Sustain your work. Reseed and revegetate the area appropriately to help suppress undesirables. Keep an eye on the perimeter of your site. What surrounds your area is likely to move in. Make sure that any planting materials/mulch are weed free.
- A surfactant and indicator dye will help with control and efficacy. Note regarding surfactants: Just as with herbicides, read label directions! Some surfactants are appropriate for use with certain herbicides but not others. Also, if using a surfactant on or near water, read label directions to see if the surfactant you are using is approved for aquatic environments.
- Glyphosate-based products, such as Roundup and Rodeo are non-selective -- they will kill all green plants!
- Herbicides typically work best when applied on temperate (~ 60 - 72 degrees) non-windy days followed by 12 hours of no rain. If temps are cooler and/or there has been limited rainfall, the effects of herbicide application will take longer to become apparent.
- Plant material disposal: Completely dry and/or burn pulled or cut plant material. Dry the plant material on a tarp or plastic barrier to prevent soil contact with roots.
- With all herbicides, when you apply them is as important as how you apply them.

Please consider songbirds and pollinator species when doing weed treatments! Some excellent information can be found at these links:

Protecting nesting song and migratory birds: http://www.portlandoregon.gov/bes/index.cfm?a=322164

Reducing Bee Poisoning from Pesticides: https://catalog.extension.oregonstate.edu/files/project/pdf/pnw591.pdf