Keep Your Home Safe From Wildfire!

Defensible Space & Wildland Fuels Reduction Maintenance Guide

OSU Oregon State University

Southern Oregon Research and Extension Center

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FIREWISE COMMUNITIES

Under the Firewise Communities/USA Recognition Program, neighbors work with neighbors to improve their wildfire readiness by reducing the wildfire risks around their communities.
Visit http://firewise.org

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OREGON DEPARTMENT OF FORESTRY

FIRE ADAPTED COMMUNITIES

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About This Guide

To survive a wildfire, property owners need to manage the land surrounding their homes and communities effectively. Defensible space is the first line of defense against wildfire. It involves reducing flammable vegetation around the home. Removing fuels in the wildland fuel reduction zone beyond the defensible space can reduce the speed and intensity of an oncoming wildfire. But if these areas aren't regularly maintained, they lose their effectiveness. Plants grow back, and flammable vegetation needs to be routinely removed and disposed of properly. This guide provides tips on how to create and **maintain** defensible space and wildland fuels treatments around your property.

Remember, it's your responsibility to maintain your defensible space and fuels treatments.

Create Defensible Space…

Your house is a fuel in a fire-prone environment. To help your home survive a wildfire, create a defensible space between your home and its surroundings by 100 feet or more. Defensible space allows room for firefighters to safely defend your home from a wildfire, while breaking up pathways for fire that can lead to home ignition.

Two important steps in creating defensible space are:

- Landscape with fire-resistant plants
- Reduce flammable vegetation and other fuels around the home

Defensible space – "Lean, Clean, and Green."

Also, take steps to make the home itself more resistant to fire, such as:

- Screen attic and foundation vents to prevent entry of burning embers
- Use fire-resistant roofing, siding, and decking
- Screen undersides of decks to keep out embers
- Remove leaves and pine needles from gutters

For many more tips on home fire protection strategies, see the **Before Wildfire Strikes! A Guide for Homeowners and Communities**. OSU Extension EM9131.

…And Maintain It!

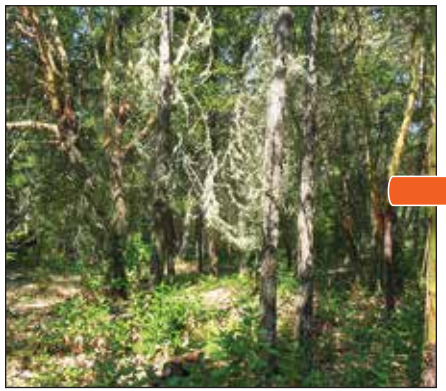
Defensible space and wildland fuel treatments must be regularly maintained to remain effective. Vegetation grows back! Fresh-cut madrone and oak trees re-sprout rapidly after cutting, and shrubs like manzanita and poison oak often shoot up in cleared areas along with invasive weeds such as blackberries and Scotch broom. All this brush quickly becomes new fuel for a wildfire.

Meanwhile, small trees and bushes die, limbs die back, and dead material begins to accumulate on the ground, on roofs and in gutters. Without on-going attention to regrowth of vegetation and accumulating dead materials, the home protection benefits of defensible space will soon be lost. However, the good news is that most maintenance tasks can be easily accomplished by the average homeowner, and don't require a lot of time or money.

Regular Maintenance is Very Important

After fuels reduction treatment, the ground is almost bare.

After 8 years, the area has been taken over by trees and brush.



One year after fuels treatment, the madrone has already re-sprouted.

Seven years later, the forest is filled with a "sea" of madrone sprouts, which could serve as a fuel ladder, carrying a fire from ground to the tree canopy.

Defensible Space

Wildland Fuels Reduction Maintenance: WHAT AND WHERE

For more information visit http://firewise.org

Outer defensible space: This area extends from the 30 foot "Lean, Clean and Green" area out to at least 100 feet, and up to 200 feet on steeper slopes with thicker vegetation. It usually lies beyond the residential landscape and often consists of naturally occurring plants, such as conifer and hardwood trees, brush, weeds, and grass.

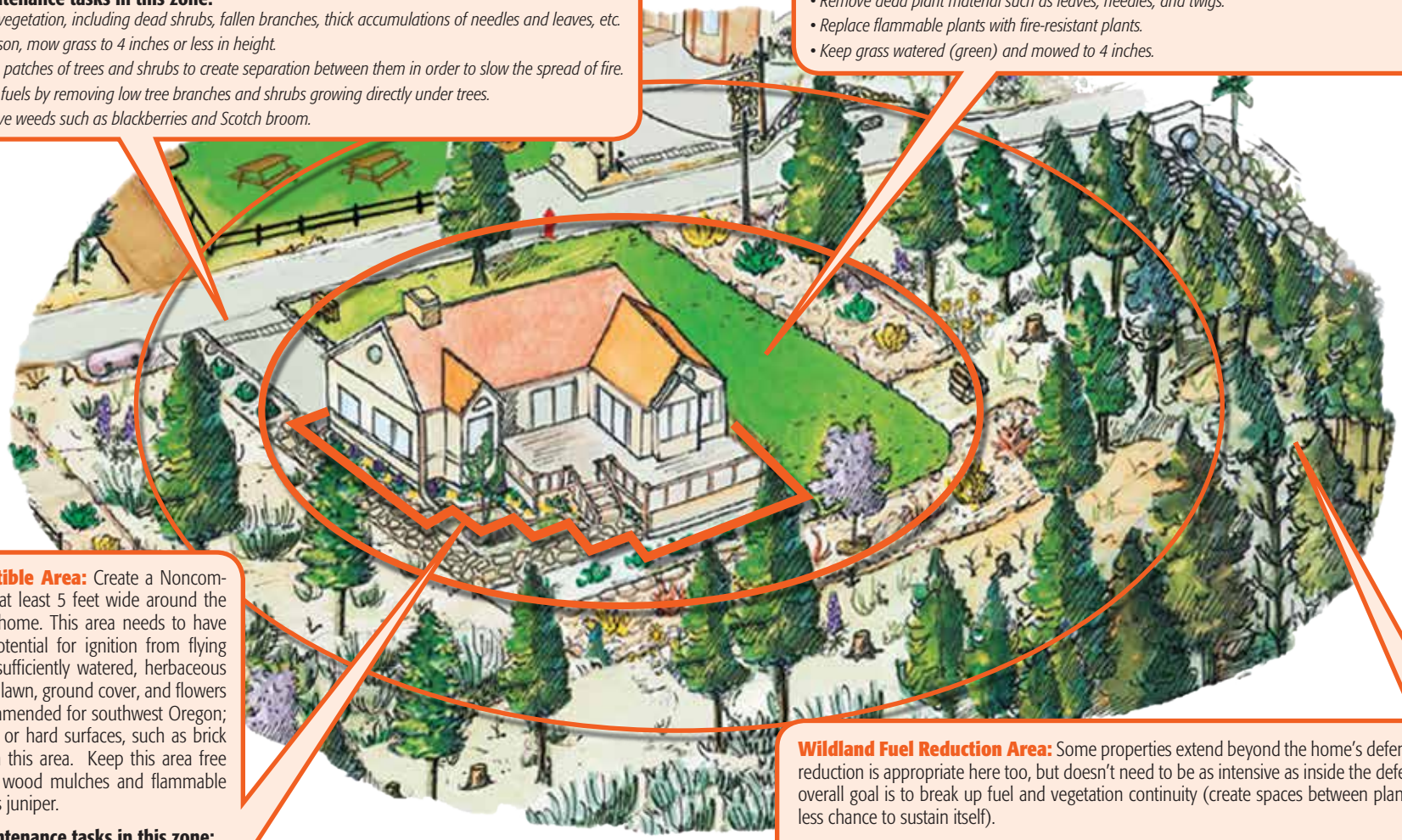
Routine maintenance tasks in this zone:

- *Remove dead vegetation, including dead shrubs, fallen branches, thick accumulations of needles and leaves, etc.*
- *Before fire season, mow grass to 4 inches or less in height.*
- *Thin out dense patches of trees and shrubs to create separation between them in order to slow the spread of fire.*
- *Reduce ladder fuels by removing low tree branches and shrubs growing directly under trees.*
- *Remove invasive weeds such as blackberries and Scotch broom.*

Lean, Clean, and Green Area: The portion of your property at least 30 feet from the home, should be a Lean, Clean, and Green area. Lean means that fire-prone, flammable vegetation is discouraged within 30 feet of the house, and any vegetation is maintained at a low density. Clean means there is no accumulation of dead vegetation or flammable debris within the area. Green denotes that plants located within this area are kept healthy, green, and sufficiently watered during fire season. For most homeowners, the "Lean, Clean, and Green Area" is the residential landscape. This area often has irrigation, contains ornamental plants, and is routinely maintained.

Routine maintenance tasks in this zone:

- *Trim back fire-resistant shrubs annually.*
- *Limb up mature trees to at least 10 feet.*
- *Remove dead plant material such as leaves, needles, and twigs.*
- *Replace flammable plants with fire-resistant plants.*
- *Keep grass watered (green) and mowed to 4 inches.*



Noncombustible Area: Create a Noncombustible Area at least 5 feet wide around the base of your home. This area needs to have a very low potential for ignition from flying embers. Use sufficiently watered, herbaceous plants such as lawn, ground cover, and flowers that are recommended for southwest Oregon; rock mulches; or hard surfaces, such as brick and pavers, in this area. Keep this area free of woodpiles, wood mulches and flammable shrubs such as juniper.

Routine maintenance tasks in this zone:

- *Remove any dead plant material that has accumulated such as leaves, needles, and twigs.*
- *Keep gutters and roofs cleaned of debris.*
- *Make sure any overhanging limbs are trimmed back at least 10 feet or more from the roof.*

Wildland Fuel Reduction Area: Some properties extend beyond the home's defensible space. Fuels reduction is appropriate here too, but doesn't need to be as intensive as inside the defensible space. The overall goal is to break up fuel and vegetation continuity (create spaces between plants so that fire has less chance to sustain itself).

Routine maintenance tasks in this zone:

- *Thin out dense patches of trees and shrubs to create separation between them.*
- *Reduce heavy accumulations of woody material (dead branches and twigs, slash, etc.)*
- *It's acceptable to leave some brush patches, downed logs, and dead trees for habitat and soil benefits OUTSIDE of your defensible space.*

Seasonal Guide: Winter Tasks

Winter is often the best time to thin, prune and trim back vegetation and dispose of woody material and vegetation. Here are some important winter maintenance tasks in your defensible space:

Thin out overly dense patches of trees and shrubs. Retain larger, healthier trees; remove all dead or dying trees and some of the less vigorous or suppressed trees in your defensible space and wildland fuel reduction zones. Thinning increases separation between tree crowns which helps to reduce tree-to-tree spread of fire. Healthy, well-spaced trees are also more fire-resistant and less susceptible to insects and disease.

Remove flammable brush and weeds from your home's defensible space. Understory brush and weeds can act as ladder fuels - vegetation that allows fire to climb from the ground up into the tree canopy. Remove or prune ladder fuels in winter to early spring.

Prune limbs of mature trees up at least 10 feet above the ground. During the cool winter months a tree's sap production is at its lowest, making winter the best time to prune trees and remove dangerous ladder fuels without injuring the tree. To help protect young saplings from fire, prune limbs from the lower 1/3 of the trunk. Leave the upper 2/3 of the tree with live branches. As the tree gets older and taller, it can be pruned again, raising its crown.

Keep your driveway safe and accessible for large emergency vehicles by pruning back vegetation. A properly maintained driveway is essential for providing a safe access and escape route for your home. Check your driveway each winter for encroaching brush or over-hanging tree limbs. Strive for at least 13.5 feet of vertical clearance and trim brush back 10 feet or more from the edge of the driveway. Also, make sure your address signs can be seen so emergency responders can find you!

WINTER CHECKLIST

Check the following list and mark your progress: ✓

- ☐ *Are any tree limbs overhanging or touching your home's roof, deck, porches, or outbuildings? Prune them back at least 10 feet from these structures.*
- ☐ *Have branches on mature trees lengthened so they droop closer to the ground or into smaller plants? Prune limbs on mature trees so that branches are at least 10 feet above the ground.*
- ☐ *Have tree branches grown out over the top of your driveway? For safe access and egress, always maintain at least 13.5 feet of vertical clearance across the entire width of your driveway.*
- ☐ *Are ladder fuels encroaching on the driveway from the sides? Remove small trees, lower limbs of larger trees and brush to maintain at least 10 feet of horizontal clearance from the edge of the driveway.*
- ☐ *Is your address sign visible? Clear away any vegetation to make your reflective sign clearly visible from all directions both day and night, winter or summer.*
- ☐ *Has previously cut brush grown back into your defensible space? Time to cut it back.*
- ☐ *Have trees or shrubs grown near phone lines, power lines or electric fences? Check and prune them back annually.*
- ☐ *Have young trees or shrubs grown into your defensible space since the last time it was cleared? Create separation between trees and shrubs in your defensible space zone, and remove smaller trees and shrubs growing underneath larger trees.*

Seasonal Guide: Spring/Early Summer Tasks

While winter is often the best time to complete "heavy duty" maintenance tasks, there is a lot you can do in spring prior to fire season, and even during fire season.

Clear all flammable debris from the roof, gutters, and around your home. Tree litter (needles, leaves) on or around your home is highly flammable and easily ignited by airborne burning embers. Check your roof and gutters at least twice annually, fall and spring; remove any flammable debris (Nearby madrone trees, which lose their leaves in early summer, necessitate removal during summer too). Rake leaves and needles away from your home, decks, and outbuildings. Also, screen the underside of your deck. Cover the space under your deck using non-flammable materials such as metal grating, to keep debris and burning embers from collecting and igniting flammable material.

Keep all grass and weeds mowed to less than 4 inches in height. Dry grass and weeds are very hot, flashy fuels that ignite easily and spread quickly. Flames can be 3 times the height of the grass. Mow vegetation near structures, around vehicles, RVs, fences, along roadways, and under power lines. Avoid grass fires by mowing before fire season when grasses are still green. Mowing in the spring will also reduce the chance of weeds maturing and spreading viable seed.

Photo used by Permission, NFPA Firewise Program

Remove highly flammable plants such as juniper and replace with attractive, fire-resistant plants. There are a variety of ground covers, flowers, and even trees and shrubs to choose from! Both native species and ornamentals can be used.

During summer, never store flammable materials near your home. Flammable items such as firewood and even patio furniture are easily ignited by airborne burning embers. Move all firewood piles at least 30 feet away from all structures in the spring. During fire season, patio furniture cushions are especially susceptible to embers and should be stored indoors when not in use.

SPRING CHECKLIST

Check the following list and mark your progress:

- ☐ *Have leaves or pine needles accumulated on your roof, in gutters, on or under decks, or on the ground right next to your home? Time to get out the ladder, leaf blower, or rake!*
- ☐ *Have you moved firewood piles left over from winter at least 30 feet from your home? Cover them if possible.*
- ☐ *Have you replaced flammable groundcover near your home with fire-resistant landscaping?*
- ☐ *Have grasses and weeds grown up tall over the spring? Keep them mowed to 4 inches or less in height.*
- ☐ *Have weeds or grass grown up around electrical fences? Clear all flammable material away from the fence to prevent sparks from igniting a ground fire.*
- ☐ *Is your line tester functioning on your electric fence? Help avoid a grass fire by inspecting the tester and all fence connections often for shorts in the line.*
- ☐ *Are flammable household items such as patio furniture pads, door mats, and mops sitting out on your deck or elsewhere near the home? Cover or move these items inside when our home is unattended or if a wildfire is near.*
- ☐ *Will you be prepared if a fire comes? Make sure you have a family emergency preparedness plan. Discuss home evacuation plans and routes with all family members. Consider pets and livestock. Practice the plan with all family members. See* ***EM 9131 Before Wildfire Strikes!*** *for recommendations.*

Brush and Weed Management

Controlling brush and weeds is an important part of your defensible space and wildland fuels reduction maintenance program. Native shrubs like manzanita and buckbrush are fire-prone and burn hot, particularly when not pruned. Invasive weeds such as Scotch broom and blackberry are also very flammable. Young sprouts grow quickly from the stumps of cut madrone and oak trees. While large, mature oaks and madrones are very resistant to fire, sprouts can quickly become new ladder fuels. This part of the publication provides tips for managing common brush and weed species to reduce the risk of fire to your home and property.

Landscape with fire-resistant plants, & remove flammable plants

Fire-resistant plants are not easily ignited by an ember or flame. They tend to have moist and supple leaves, don't accumulate much dead or dry material within the plant, and have low sap or resin content. Many native shrubs growing in southwest Oregon, as well as many commonly planted ornamental shrubs are relatively fire-resistant. In contrast, highly flammable plants tend to accumulate fine, dry or dead material within the plant, may have loose or papery bark, and often have contain volatile waxes, terpenes or oils in their leaves, twigs and stems.

Examples of flammable shrubs include:

- **Juniper & cypress** (Leyland, Italian, etc.)
- **Scotch broom** (a non-native invasive)
- **Blackberry** (a non-native invasive)
- **Manzanita** (whiteleaf)
- **Buckbrush** (wedgeleaf ceanothus), deerbrush (deerbrush ceanothus)

For more information about fire-resistant plants, see PNW 590 **Fire-Resistant Plants for Home Landscapes.**

Juniper

Wedgeleaf ceanothus (buckbrush)

Within the "Lean, Clean and Green Area"

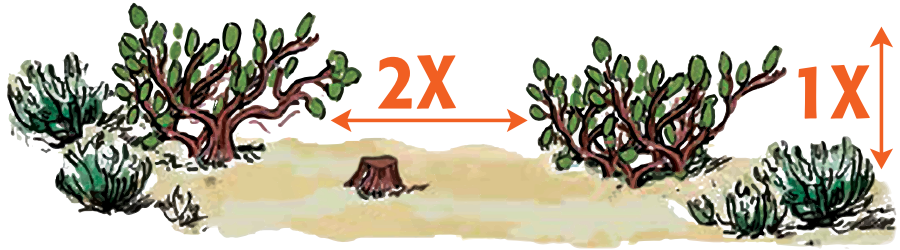
Highly flammable plants such as juniper should be removed when they are within 30 feet of your home, and from a greater distance on steeper slopes. Fire-resistant plants can be located within this 30 foot zone, but these plants should be sufficiently watered and trimmed back, with all dead material (leaves, needles or twigs) routinely removed. Create at least 10 feet of separation between the canopies of individual and small patches of fire-resistant trees and shrubs located within this zone.

Before Maintenance

After Maintenance

Within the Outer Defensible Space & Wildland Fuel Reduction Zone

In this zone, remove invasive plants such as Scotch broom whenever possible. Thin out dense patches of brush and trees. Prune off and dispose of dead, dry material on fire-prone shrubs such as manzanita. Within the defensible space (up to 100-200 feet outward from the home, depending on slope and vegetation), strive for about 10 feet of separation between individual trees canopies or small clumps of trees. Remember that this will be more than 10 feet between tree trunks! Individual shrubs or clumps of shrubs should be separated from other shrubs by at least 2 times the height of the shrub.



Benefits of Brush

It's important to strike a balance between fuels reduction and the benefits of retaining native shrubs (brush). These plants provide food and shelter for many wildlife species, control erosion, provide cover and nutrients to maintain soil health, and can be very attractive to look at, among other benefits. The goal is not to eliminate all such plants from the property, but rather to increase the spacing between them so fire spreads less rapidly and burns less intensely.

Tools and Techniques for Fuels Maintenance

Preventative Management

Most plants grow much faster in full sun, so shade is one of your main allies in reducing the growth of brush. Fuels reduction treatments that decrease the density of trees and remove ladder fuels but which also shade the ground will help reduce the re-growth of young vegetation.

Weed germination can be reduced by covering bare ground with organic materials such as leaves or wood chips. Weed infestations can also be reduced by removing weeds before the seeds disperse.

• Defensible space • Wildland fuels reduction

Typical tools used for pruning, cutting and maintaining.

Pruning

Removing the lower limbs of trees reduces fuel ladders that can convey flames from the ground into the tree canopy. Mature trees can be pruned up to 10 feet or so; younger or smaller trees can also be limbed up, leaving upper two thirds of the tree with a live green crown. *See the For More Information section to learn more.*

Pruning shrubs also reduces the fuel load. The objective is to remove dead twigs, leaves, and other woody material to maintain a shrub that is "lean, clean, and green." Shrubs such as manzanita can be very flammable if in a decadent state, but can be relatively fire-resistant when regularly maintained by pruning.

• Defensible space

Cutting

The objective of cutting back vegetation is to remove excess fuels that could increase fire intensity, or to remove a pathway of fuels that would allow flame or embers to reach your home. Woody vegetation can be cut back to stump or ground level with loppers, chainsaws, or brushcutters. However, most brush species sprout back vigorously after cutting due to well-established root systems. The key is to stay on top of it by performing maintenance annually.

Madrone stump sprouts.

• Defensible space • Wildland fuels reduction

Removal

The objective is to remove both the above-ground fuels as well as the root system, so the plant doesn't re-sprout. Small weeds can often be removed with a spade or similar digging tool. For bigger plants, a weed pulling tool or grubbing hoe may be needed. Note that extensive removal of root systems may result in soil disturbance and erosion, so use caution.

• Defensible space • Wildland fuels reduction

Disposal

Fuels reduction maintenance projects can generate a lot of material – what to do with it? Small logs generated from thinnings can be used for firewood, fencing, and other projects. Smaller woody material can be composted, hauled away, piled and burned, or chipped. **Many wildfires start from escaped burn piles,** so safe burning practices are important. *See the For More Information section to learn more..*

• Defensible space • Wildland fuels reduction

Mechanical

This includes the use of mechanized equipment such as tractor-mounted brush hogs, brush mulchers and other large equipment to mow or masticate (chop up into small fragments) unwanted vegetation. This typically does not remove fuel from the site but rearranges it. Masticated fuel beds tend to burn with lower intensity but may burn for longer periods of time.

Brush mulcher in action.

• Wildland fuels reduction

Chemical

Herbicides can be used to control brush and weeds. In most cases, the amount needed for effective control is very small; more is not better. Always follow the label directions. Herbicides can be applied using a backpack or hand-held sprayer. Dead plants are fuel, so they should be removed after the herbicide has taken effect.

• Defensible space • Wildland fuels reduction

Grazing

Grazing by cattle, sheep, and goats can reduce fuel loads. Cattle keep down grass and other herbaceous vegetation; goats and sheep browse woody plants. Goats and sheep will mostly eat the leaves and green twigs or stems and some woody material. With enough browsing pressure they can do a good job of keeping down the brush but this requires intensive management such as temporary fencing, water, and predator control.

• Wildland fuels reduction

Prescribed Burning

Prescribed underburning can be a very effective brush and fuels maintenance method. This technique involves controlled use of low intensity fire that removes vegetation and woody debris close to the ground. While effective, liability and escape potential make this a very risky strategy on private lands, particularly around homes.

• Wildland fuels reduction

Biological

Uses natural enemies such as predatory insect to control weeds. These methods can be helpful for reducing weed populations but typically are not available to most homeowners.

• Wildland fuels reduction

Plant Management Guides

While all plants can burn under the right conditions, the following pages contain information about how to identify and manage plant species that can be especially problematic in fire-prone areas in southwestern Oregon, including Scotch broom, Himalayan blackberry, manzanita, oak and madrone. Poision oak is also covered. While not a serious fuels issue, poison oak is a common annoyance in woody areas surrounding the home.

Invasive Species

Invasive species such as Scotch broom and Himalayan blackberry are plants that have been introduced to the local area, and due to a lack of native enemies have been able to thrive and spread. Not only are these plants highly flammable and quick spreading, they pose ecological problems when they out-compete native vegetation. **The objective with invasive species is to eradicate them or substantially reduce them whenever possible.**

Native Brush

Most native brush species are relatively low in flammability because they tend to have moist and supple leaves, don't accumulate much dead or dry material within the plant, and have low sap or resin content. However, some species, such as manzanita and "buckbrush" (wedgeleaf ceanothus) can pose more of a fire hazard due to their tendency to accumulate dead and dry material within the plant.

Native shrubs, especially more flammable species, are not recommended for the 30 foot "lean, clean, and green" zone surrounding the homesite. In the outer defensible space (30-100+ feet) it is not necessary to remove all native brush, but property owners should regularly maintain and thin such species to break up fuel continuity. In the wildland fuels reduction zone, breaking up large brushfields will help reduce the spread and intensity of fire.

Hardwood trees

Compared to conifers, most hardwood tree species have thin bark and are more easily top-killed in a fire. Unlike most conifers, however, they sprout back very quickly after fire or cutting. Because of their high foliage moisture content and other characteristics, hardwoods are generally less flammable than conifers. Larger, mature hardwood trees are relatively fire resistant and usually well-suited for both defensible space and wildland fuels reduction areas. Oaks in particular have thicker bark and are less likely to be killed by light surface fires than madrone and other hardwood species. However, small hardwood seedlings or saplings, or hardwood trees that have been cut and have re-sprouted, can serve as ladder fuels. In this case, young sprouts can be cut back to stump level. An effective practice is to remove all but one or two of the most dominant stems, which will encourage the dominant sprout to grow into a mature, fire-resistant tree. Sometimes it's better not to cut the tree in the first place, to avoid the need for sprout maintenance.

For More Information

Before Wildfire Strikes! A Handbook for Homeowners and Communities in Southwest Oregon. Oregon State University Extension Service EM 9131.

Fire-resistant Plants for Home Landscapes. PNW 590.

Reducing Fire Risk on Your Forest Property. A Pacific Northwest Extension Publication. PNW 618. October 2010.

A Land Manager's Guide for Creating Fire-Resistant Forests. Oregon State University Extension Service. EM 9087.

Reducing Hazardous Fuels on Woodland Properties: Mechanical Fuels Reduction. Oregon State University Extension Service. EC 1575-E.

Reducing Hazardous Fuels on Woodland Properties: Pruning. Oregon State University Extension Service. EC 1576-E.

Reducing Hazardous Fuels on Woodland Properties: Thinning. Oregon State University Extension Service. EC 1573-E.

Reducing Hazardous Fuels on Woodland Properties: Disposing of Woody Material. Oregon State University Extension Service. EC 1574-E.

Links to these publications can be found at:
http://extension.oregonstate.edu/sorec/wildfire-publications

For information on vegetation and weed management:

Pacific Northwest Weed Management handbook http://pnwhandbooks.org/weed/
UC Davis Pest Management http://www.ipm.ucdavis.edu/PMG/menu.homegarden.html

Herbicide use for vegetation management

Some homeowners and landowners may wish to use herbicides to control Scotch broom, Himalayan blackberry, oak and madrone, manzanita, poison oak, and other vegetation commonly found in fire-prone areas in southwestern Oregon. For general guidelines and information about safe application methods, see the PNW Weed Management Handbook referenced above. Information and links can also be found at http://extension.oregonstate.edu/sorec/forestryvegetation.

Use pesticides safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.
- Read the pesticide label–even if you've used the pesticide before. Pesticide labels change often. Precisely follow label instructions (and any other directions you have).
- Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from your pesticide use.

Invasive Weeds

Scotch broom *(Cytisus scoparius)*

Plant Identification and Quick Facts:

- Can grow up to 10 feet tall, average 3-5 feet.
- Yellow flowers bloom between March and June.
- Produces black or brown seed pods with 3-12 seeds.
- One plant can produce 10,000 seeds a year! Seeds remain viable in the soil for many years.
- Oils and resins make it very flammable.
- Invasive species not native to the US.
- **Fuels reduction objective: Eliminate when possible.**

Threats	Management
☑ Fire Hazard	☑ Preventative Management
☑ Habitat Destruction	☑ Hand Treatment
☑ Pet/Livestock Hazard	☐ Mechanical
☑ Toxic To Humans	☑ Chemical
☐ Attracts Rodents	☐ Biological
☑ Quick Spreading	☐ Prescribed Burning
☑ Aesthetics	☐ Grazing

Recommended Tools:

- ***Weed wrench***
  Also known as the "Puller-bear" and "Extratigator" Use the tool grip the stem and pull down to remove the plant, including the root mass.
- ***Spade or Pulaski***
  Dig out plant including the root mass when soils are moist.
- ***Backpack Sprayer***
  Used for applying herbicides. Consult your local extension office or pesticide applicator professional for further information on chemical treatments.

Best Management Practices

Preventative Management

The most effective way to avoid a Scotch broom infestation is to prevent one. Avoid disturbing ground where Scotch broom is a threat. If ground is disturbed, quickly revegetate disturbed areas with fast-growing native vegetation. Shading out Scotch broom with native trees and shrubs can aid in long-term preventative management. Introduced Scotch broom seedlings should be pulled before seeds have developed.

Hand Treatment

Effective for small areas. Individual large plants can be removed using a weed wrench or similar tool. Young plants may be pulled by hand or removed by shovel. Failure to remove the root system will encourage re-sprouting. Pulling may disturb the soil, encouraging seed germination and requiring later retreatment. When possible, begin hand treatments prior to seeding. If seeds have already been produced, wrap seed pods tightly in plastic bags to reduce seed spread during removal.

Young plants will generally re-sprout when cut with hand tools such as loppers. Older plants with a base stem diameter of 2 inches or more and no longer green may be killed if cut in late summer.

Mechanical

Limited effectiveness. Mowing or cutting generally results in re-sprouting. Some older or less vigorous plants may be killed, but new seedlings will germinate, requiring re-treatment.

Chemical

Effective when done correctly. Potential treatments include foliar, cut stump, and basal applications with triclopyr or glyphosate. Dead plants are fuel and should be removed after the herbicide has taken effect. New seedlings may germinate from seed stored in the soil, requiring retreatment.

Biological

Not effective. The broom twig moth and Scotch broom seed beetle have both been introduced and can reduce seed production, however they do not have an impact on established plants.

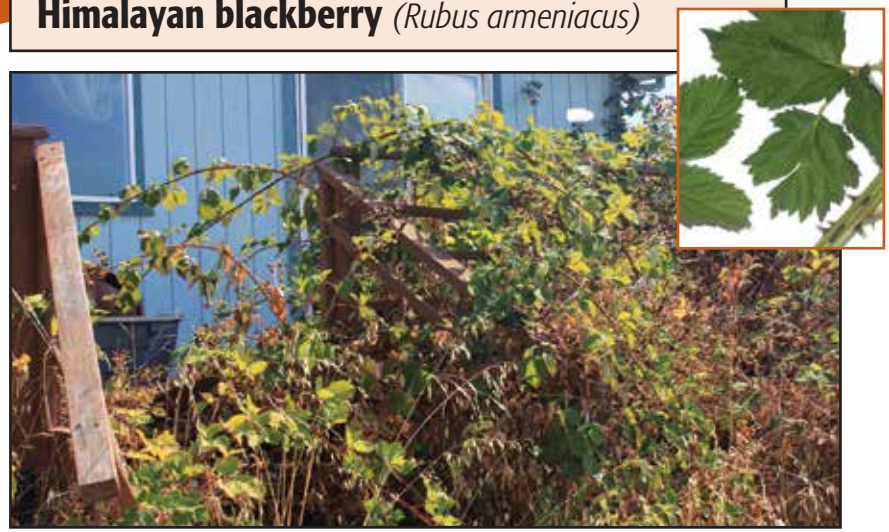
Prescribed Burning

Not recommended. Dangerous. Scotch broom is a flammable plant due to the oils and resins in the bark and leaves.

Grazing

Not recommended. Scotch broom is toxic to livestock in large quantities.

Himalayan blackberry *(Rubus armeniacus)*



Plant Identification and Quick Facts:

- 5 leaflets per leaf; canes have thorns; are ribbed and square in cross-section.
- Thickets often reach 6 feet or more in height; brambles (canes) can grow 3 feet or more in length in one season.
- Spreads via underground burls, runners and tip-rooting from canes; quickly occupies disturbed areas.
- Less vigorous in shade; can't survive in deep shade.
- Flammable due in part to accumulation of dead material in thickets; burns well in winter.
- **Fuels reduction objective: Eliminate when possible.**

Threats	Management
☑ Fire Hazard	☑ Preventative Management
☑ Habitat Destruction	☑ Hand Treatment
☐ Pet/Livestock Hazard	☐ Mechanical
☐ Toxic To Humans	☑ Chemical
☑ Attracts Rodents	☐ Biological
☑ Quick Spreading	☐ Prescribed Burning
☑ Aesthetics	☐ Grazing

Recommended Tools:

- ***Spade/grub hoe***
  Dig out plant including the root mass when soils are moist.
- ***Brush hog***
  Not effective as a stand-alone treatment but can be used with other treatments such as goats or herbicides.
- ***Backpack Sprayer***
  Used for applying herbicides. Consult your local extension office or pesticide applicator professional for further information on chemical treatments.

Best Management Practices

Preventative Management

Himalayan blackberry is aggressive and quickly occupies cleared or disturbed areas. Don't delay in planting or seeding such sites with fast-growing native vegetation before new blackberry starts get established. Maintaining heavy shade reduces the vigor of existing plants and prevents new plants from getting established.

Hand Treatment

Effective for small patches. A spade, Pulaski, grub hoe or similar tool can be used to uproot blackberry plants. The more of the root system that is removed, the less re-sprouting there will be. This is hard work. Grubbing blackberry plants will disturb the soil, encouraging germination of other weeds, so it's easy to replace one weed problem with another. To minimize this, maintain organic matter on the soil surface to reduce weed germination (as long as it doesn't pose a fuel hazard) and/or replace with fast-growing native vegetation.

Mechanical

Not effective as a stand-alone treatment. Cutting and mowing of blackberry usually will not eliminate the plants because they re-sprout vigorously from their well-established root system. If they are cut down to ground level frequently (several times a season) over several years, they may be depleted. Mowing produces a heavy mulch which can help suppress other weeds.

Chemical

Very effective when done correctly. Often combined with mowing. Suitable herbicides include glyphosate and triclopyr. Timing is important. Dead plants are fuel and should be removed after the herbicide has taken effect.

Biological

A blackberry rust is present in Oregon and has been reducing the cover of plants in some areas, especially in coastal Oregon.

Prescribed Burning

Not recommended. Blackberry burns well but re-sprouts vigorously after fire.

Grazing

Partially effective. Goats will eat blackberry leaves and green canes, and limited amounts of dry woody material. They are most effective at suppressing re-sprouting blackberry that has been cut or mowed. Over time, they can reduce and even eliminate patches of blackberry. Goats require supervision and maintenance. They will also eat desirable native vegetation.

Manzanita *(Arctostaphylos spp.)*

Plant Identification and Quick Facts:

- SW Oregon hosts several species; whiteleaf is most common (Arctostaphylos viscida).
- Can grow up to 10 feet tall, average 3-5 feet.
- Drought tolerant; Prefers open areas and full sun.
- Branches regularly die off.
- Some species re-sprout after cutting; whiteleaf does not. Produces lots of seed which remain viable in the soil for many years.
- **Fuels reduction objective: Within the defensible space, keep individual plants well trimmed back, with no dead material. Separate plants. Within the wildland fuels reduction zone, break up contiguous brushfields, retain manzanita patches.**

Threats	Management
☑ Fire Hazard	☑ Preventative Management
☐ Habitat Destruction	☑ Hand Treatment
☐ Pet/Livestock Hazard	☑ Mechanical
☐ Toxic To Humans	☑ Chemical
☑ Attracts Rodents	☐ Biological
☐ Quick Spreading	☐ Prescribed Burning
☑ Aesthetics	☑ Grazing

Recommended Tools:

- ***Chainsaw or brushcutter***
  Cut low to the ground to reduce stem hazards.
- ***Shovel/grub hoe***
  Dig out plant including the root mass when soils are moist.
- ***Brush mower/mulcher***
  Grinds or shreds into small pieces, suitable for wildland areas.

Best Management Practices

Preventative Management

Manzanita does not grow as well in the shade. Planting or maintaining trees to shade out an area is an effective long term strategy to reduce establishment of new manzanita plants.

Hand Treatment

Effective, but retreatment may be required. Dead branches can be removed with hand-saws, loppers or chainsaws. To remove small plants, use a shovel or grub hoe in moist soils. This is labor intensive. A brushcutter will efficiently mow down many small plants. For larger plants, use a chainsaw to cut to a low stump. Whiteleaf manzanita does not sprout back; however, many other manzanita species do. While hand treatments are effective at removing and killing plants, new manzanita plants regenerate rapidly from seed stored in the soil. An area cleared of manzanita can be re-occupied by young plants in a few years.

Mechanical

Effective, but retreatment may be required. A variety of machinery, including walk-behind mowers, brush mulchers mounted on skid-steers, and excavator-mounted slashbusters have been used to masticate (shred into small pieces) manzanita and thin out dense brushfields. This equipment is suited to large projects but not defensible space treatments.

Chemical

Triclopyr with oil carrier applied as a basal spray can be effective. Dead plants are fuels and should be be removed after the herbicide has taken effect. New seedlings may germinate from seed stored in soil, requiring retreatment.

Biological

Not effective. Deer may browse and provide limited suppression of manzanita plants, particularly young growth, but this is not an effective fuels reduction strategy.

Prescribed Burning

Not recommended. For reasons described above, this method is not well suited to most private parcels. Burning kills mature plants, but young plants germinate readily in recently burned areas.

Grazing

Partially effective. Cattle and sheep are not recommended. Goats can be used to suppress manzanita and other woody brush. They are more inclined to browse younger sprouts than older plants; therefore, are most effective on re-sprouts or young plants that grow back following an initial hand or mechanical treatment.

Poison oak *(Toxicodendron diversilobum)*

Plant Identification and Quick Facts:

- Grows as a vine and in shrub form; may reach 6 feet or more in height; commonly 1-3 feet tall.
- Compound leaves with three leaflets ("leaves of three, let it be").
- Spreads via underground stems; re-sprouts after cutting.
- Contrary to popular opinion, is not considered to be an invasive species.
- **Fuels reduction objective: Compared to the other species mentioned, not a significant fuels or fire concern, but is a major annoyance for many owners.**

Threats	Management
☑ Fire Hazard	☑ Preventative Management
☑ Habitat Destruction	☑ Hand Treatment
☐ Pet/Livestock Hazard	☐ Mechanical
☑ Toxic To Humans	☑ Chemical
☐ Attracts Rodents	☐ Biological
☑ Quick Spreading	☐ Prescribed Burning
☑ Aesthetics	☑ Grazing

Recommended Tools:

- ***Goats***
  Will browse poison oak plants.
- ***Shovel/grub hoe***
  Dig out plant including the root mass when soils are moist.
- ***Backpack Sprayer***
  Used for applying herbicides. Consult your local extension office or pesticide applicator professional for further information on chemical treatments.

Best Management Practices

Preventative Management

Found all over low elevations in southwestern Oregon and difficult to prevent. Growth and regeneration is reduced in heavy shade.

Hand Treatment

Effective for small patches. A spade, Pulaski, grub hoe or similar tool can be used to uproot poison oak plants, but the root system is extensive. Use caution, as the roots and stems also contain the oil that produces the allergic reaction in most people.

Mechanical

Not effective. Cutting and mowing of poison oak usually will not eliminate the plants because they re-sprout vigorously from their well-established root system. If they are cut down to ground level frequently (several times a season) over several years, they may be depleted.

Chemical

Very effective when done correctly. Often combined with mowing. Suitable herbicides include glyphosate and triclopyr. Timing is important. Dead plants are fuel and should be removed after the herbicide has taken effect.

Biological

Not effective. Poison oak is a browse plant for deer and other species.

Prescribed Burning

Not recommended. Poison oak re-sprouts vigorously after fire. Avoid placing poison oak in burn piles; smoke can be very harmful if inhaled.

Grazing

Partially effective. Goats will eat poison oak leaves and green stems. They are most effective with re-sprouting poison oak that has been cut or mowed. Over time, they can reduce and even eliminate patches of poison oak. Goats require supervision and maintenance. They will also eat desirable native vegetation.

Goats will browse woody vegetation like blackberry (pictured here) and poison oak.

Hardwood Resprouts

Madrone *(Arbutus)* and **Oak** *(Quercus)*

Plant Identification and Quick Facts:

- Madrone can grow up to 100 feet tall and 6 feet in diameter, but most are smaller.
- Madrone is evergreen, but sheds older leaves in early summer.
- Madrone has thin bark, resulting in trees being easily top-killed by fire, but re-sprouts vigorously.
- California black oak and Oregon white oak dominant in southwest Oregon forests; both black and white oaks are hardwood trees with deciduous leaves that are shed every autumn.
- **Fuels reduction objective: Promote and maintain large, single stemmed trees. Thin out dense patches of small trees. Cut back re-sprouts; consider "encouraging" 1-2 stems to turn into new trees.**

Threats	Management
☑ Fire Hazard	☑ Preventative Management
☐ Habitat Destruction	☑ Hand Treatment
☐ Pet/Livestock Hazard	☐ Mechanical
☐ Toxic To Humans	☑ Chemical
☐ Attracts Rodents	☐ Biological
☐ Quick Spreading	☑ Prescribed Burning
☑ Aesthetics	☑ Grazing

Recommended Tools:

- ***Loppers***
  Use loppers to cut close to the stump on sprouts.
- ***Brush Cutter***
  Can be used to remove multiple young re-sprouts. Older re-sprouts my be more difficult to remove.
- ***Chainsaw***
  Can be used to cut re-sprouts or thin out dense patches of small trees.

Best Management Practices

Preventative Management

Heavy shade will suppress the growth of oak trees, especially mature trees. Surrounding conifers often shade oaks out, eventually overtopping and killing them. Young oak sprouts are more shade tolerant. To prevent sprouting, leave trees uncut.

Hand Treatment

Effective short term control, but retreatment will be required. Loppers and handsaws may be used to remove re-sprouts. With effort, handsaws may be used to remove dead or dense limbs. Brush cutters are effective at removing small clusters of sprouts and loppers for spot treatments.

To discourage additional re-sprouts, consider removing all but 1-2 dominant sprouts. The dominant sprouts will more easily develop into mature, more fire resistant trees. Chainsaws may be used to fell larger madrone and oak trees, but may result in re-sprout growth that adds ladder fuels to your property.

Mechanical

Not effective. Mechanized equipment is ineffective at removing whole trees and are inefficient at removing young re-sprouts.

Chemical

Effective when done correctly. Frill treatments, where one or more cuts are made in the tree and a small quantity of concentrated herbicide is effective at killing standing trees. Cut stump treatments can reduce or eliminate re-sprouting. Dead plants are fuel and should be removed after the herbicide has taken effect.

Biological

Not effective. Re-sprouts may be browsed by deer but few are killed.

Prescribed Burning

Not recommended. Technically feasible but logistically difficult. Prescribed fire is effective at killing re-sprout with low rates of mortality for large, mature trees, especially thicker-barked oaks. This is usually only an option for large or public landowners.

Grazing

Partially effective. Cattle or sheep are not recommended. Goats may browse oak and madrone stump sprouts, reducing growth. Repeated browsing, like repeated cuttings, may be able to kill the root system.