OREGON STATE UNIVERSITY EXTENSION SERVICE

LAND STEWARD PROGRAM | RURAL RESOURCE GUIDELINES

FORESTS AND WOODLANDS:
Protecting an Ecosystem

Max Bennett, Don Goheen and Jack Duggan

New and inexperienced landowners often wonder what they should do with their woodland, and the possibilities are numerous. There is no one right way to manage a forest, no single recipe to follow. Much depends on your particular interests, goals and objectives. For example, you could emphasize wildlife, timber production or recreation — or you could work to restore the forest to a previous condition. You could manage for all of these goals.

Regardless of your objectives, your choice to follow these management guidelines protects water quality, reduces weed infestations, maintains soil productivity, reduces the threat of fire and promotes forest health. In a nutshell, you are protecting the forest ecosystem and preserving options for future generations.

When we talk about forests and woodlands, we are referring to an area of trees and associated vegetation of any size — from a backyard woodlot to a tract of several hundred acres or more. Though specifics vary, these concepts apply to a wide range of forests and woodlands, from oak woodlands to mixed conifer forests.

Protect water quality

Forests produce high-quality water due to the outstanding filtering provided by woodland vegetation and soils. Many communities, such as those in Ashland and Medford, rely on water quality from forest watersheds. Protecting water quality is one of the most important public benefits that private forests can provide.

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Photo: Amy Grotta © Oregon State University

Figure 5. This Hyla Woods stand, pictured in 2017, shows understory trees of varying sizes and some retained overstory

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3 EASY STEPS

Use this document to evaluate and improve your own forest or woodland

1. Read *Forests and Woodlands: Protecting an Ecosystem.*
2. Use Worksheet 1: Resource assessment for forests and woodlands, page 9, to assess the condition of your resource.
3. Use Worksheet 2: Management activity assessment for forests and woodlands, page 12, to assess your current management practices and identify areas for improvement.

If you have questions, contact your local Extension office, Soil and Water Conservation District, watershed council, Oregon Department of Fish and Wildlife office, the Oregon Department of Forestry or other local resources.

About the Rural Resource Guidelines

This is one of a series developed for private landowners with little or no technical background by the Land Steward program of Oregon State University's Southern Oregon Research and Extension Center. This guide covers general terms and helps users assess resources and manage property in a responsible manner. This guide was developed for use in Jackson and Josephine counties, but many of the practices are applicable to other areas.

Photo: Amy Grotta © Oregon State University

Figure 5. This Hyla Woods stand, pictured in 2017, shows understory trees of varying sizes and some retained overstory trees in the background. Pictured are Pam and Ben Hayes.

One of the main ways to protect water is to control the amount of sediment entering the watershed. While a little bit of sediment in streams is natural, excessive and chronic sediment harms fish, their spawning beds, and domestic water supplies.

Sediment is probably the biggest water pollutant on forest lands.

These best practices can help keep sediment to a minimum:

- **Maintain a forested buffer** along streams to filter out sediment and other pollutants that might otherwise enter waterways. See *Streams and Riparian Areas: Clean Water, Healthy Habitat,* EM 9244, *catalog.extension.oregonstate.edu/em9244,* for more specifics on riparian buffers.
- **Avoid using heavy equipment** in streambeds or near streams. When roads and skid trails are located within riparian zones or along streams, it is easy for runoff from the road to enter the stream itself, resulting in water pollution.
- **Locate roads and skid trails away from the riparian zone** and minimize the number of stream crossings to reduce the risk of water pollution.
- **Install and maintain water bars,** drainage dips, and other water control structures to reduce runoff on roads, diverting sediment before it enters the stream.
- **Adequately size culverts for storm flows.** The Oregon Forest Practices Act requires all culverts in newly constructed forest roads to be able to pass a 50-year storm flow (flow expected in a major, once-in-50-years storm). This can be surprisingly large. Where feasible, favor bridges over culverts.
- **Maintain adequate tree cover** to reduce runoff and erosion. Harvesting and other disturbances aren't bad, but disturbed areas should be quickly replanted. This vegetation — along with uncompacted, porous forest soil — helps facilitate the safe capture, storage and release of precipitation in the form of streamflow.
- **Monitor roads, skid trails and disturbed areas** periodically for runoff and erosion. It is easiest to spot problems during rainy periods.
- **Restore any eroding areas** by planting, seeding, installing check dams, etc.
- **Follow the label** on herbicides and fertilizers. Avoid applying these products on windy or rainy days or near bodies of water. The product could drift or run off into surface water.

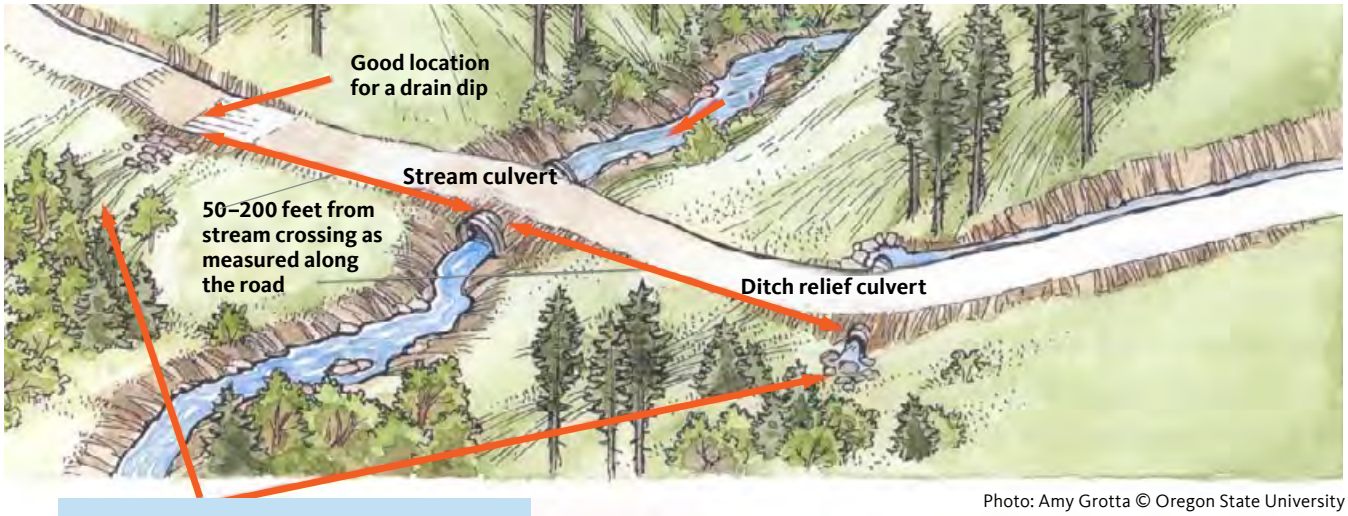

Photo: Amy Grotta © Oregon State University

Figure 5. This Hyla Woods stand, pictured in 2017, shows understory trees of varying sizes and some retained overstory trees in the background. Pictured are Pam and Ben Hayes.

Keep soils healthy

- **Minimize soil disturbance, compaction and displacement.** Undisturbed forest soils consist of about 50% pore space. This space allows for gas exchange with the atmosphere and the infiltration and temporary storage of rainwater and snowmelt. Heavy equipment compacts soils, reducing infiltration and gas exchange. This can reduce plant growth and increase surface water runoff, causing erosion.
- **Confine heavy equipment to roads** and designated skid trails where feasible.
- **Quickly replant bare or disturbed areas** to minimize erosion.
- **Balance the retention of organic matter** with fire hazard concerns.

Trees and other vegetation take up nutrients from the soil and recycle them through the decomposition of needles, leaves and twigs that fall to the ground. Most of a site's nutrient "bank" is contained in the organic matter found in the topsoil itself, not the vegetation. Nutrients are added primarily through the breakdown of rock layers and inputs from nitrogen-fixing vegetation, such as alder trees.

Severe wildfire is one of the main ways nutrients can be lost from the site, so fuels and fire risk reduction promote soil conservation. When slash is added to the forest floor after thinning, allow it to decay and return nutrients to the soil.

But this organic material also represents a fire hazard. Decomposition could take years and even decades in a dry climate. Balance retention of some organic matter for long-term soil health with the elevated fire hazard it poses.

Photo: Amy Grotta © Oregon State University

Figure 5. This Hyla Woods stand, pictured in 2017, shows understory trees of varying sizes and some retained overstory trees in the background. Pictured are Pam and Ben Hayes.

Seek advice specific to your site to strike this balance.

Manage invasive weeds

Invasive or noxious weeds compete with and displace native plants. Prevention is the best way to keep invasive weeds to a minimum.

- **Keep out dirty vehicles and equipment.** Alternatively, wash vehicles before entry and require contractors to do the same. Try not to import seed-contaminated fill dirt or road gravel. Clean the dirt off boots when they have been used off site.
- **Periodically monitor** your woodland for noxious weeds. Skid trails, roads (especially cut and fill slopes), burned areas, logged areas and other disturbed areas are more likely to harbor new weed populations than the undisturbed forest. Monitor at different times of year; some evergreen weeds are more visible in winter.

Photo: Max Bennett, © Oregon State University

This stand just below a home site was thinned by removing small-diameter trees to reduce the fire hazard and improve tree health. Some dense patches of trees, including smaller trees, were left to provide habitat and visual screening.

- **Practice integrated pest management.** Where weeds are detected, attempt to control or eradicate them using IPM. This strategy combines an array of pest control methods to achieve the best results with the least disruption to the environment. Use pesticides only under strict circumstances that minimize risk.
- **Consult the *Pacific Northwest Weed Management Handbook*,** *pnwhandbooks.org/weed,* for more information on weed management.

Reduce the threat of fire

- **Learn your local fire restrictions.** Contact your local Oregon Department of Forestry office for more information on fire season, restrictions and closures.
- **Make your forest resistant to fire.** A fire-resistant forest is one that can survive a wildfire with some scorched ground but with most of the overstory trees intact. Follow these steps to create a fire-resistant forest:
  - **Minimize and reduce the continuity** of high-risk surface fuels. For example, landowners should treat excess slash.
  - **Reduce ladder fuels** by thinning and pruning.
  - **Break up crown continuity** by creating openings in the trees.

Photos: Ed Reilly

The same site before, top, and after, bottom, a treatment to reduce the fire hazard and improve the health of the remaining oaks and pines. Most brush and small-diameter trees were removed; some patches of brush were retained for habitat.

- **Retain larger trees** and favor more fire-resistant species, such as ponderosa pine. On larger properties, it's difficult to treat every acre, so focus fuel-reduction treatments in strategic locations, such as ridgelines and above and below access roads. See other publications in this series in the OSU Extension Catalog, *catalog.extension.oregonstate.edu,* for additional information.
- **Maintain access roads.** Access roads facilitate quick detection and suppression of fire. Remove dense vegetation encroaching on or overhanging the road. Design and maintain access roads that meet fire suppression vehicle standards. Where possible, maintain two ways to exit your property.

Promote tree and stand health

- **Assess the condition of your forest or woodland.** Conduct a forest inventory. Get to know the character, topography and soil conditions of your property and the composition and structure of the trees and shrubs.
- **Match tree species to site conditions;** plant and thin to favor best-suited species. Feature drought-tolerant trees (pines, oaks, madrones) on dry ridgetops, areas of shallow soils, and south and west aspects. Include a bigger mix of less drought-tolerant species (Douglas-fir, true firs, incense cedar) on east, and especially, north aspects.
- **Thin excessively dense stands or patches.** Determine stand density. If the forest is overly dense, thin the stand or portions of it to desired levels. Treat thinning slash by burning, chipping or removing it.
- **When thinning, retain vigorous, high-quality trees of desired species.** When choosing "leave" trees in a thinning operation, select trees with healthy foliage that appears full.
- **Provide lots of growing space** around pines, oaks, and other shade-intolerant species. Provide especially wide spacing around pine leave trees. Where hardwoods are selected for retention, ensure that crowns are open to the sun and unlikely to be overtopped by other retained trees before the next thinning.

Timber harvesting

Though many woodland owners don't manage primarily for timber production, timber harvests can generate income from a property. They also can improve forest health, reduce fire risks and create new wildlife habitat.

In a commercial thinning, some trees in a stand are removed in order to favor the growth of the remaining trees.

In a patch cut or clearcut harvest, most or all trees in an area are cut. This approach creates favorable conditions for tree species that grow best in full sun.

There are many other harvest methods, and each has important implications for future tree regeneration and growth and development of habitat.

Photos from left to right: Bill Schaupp, U.S. Forest Service; Chris Schnepf, University of Idaho, Bugwood.org; Max Bennett, © Oregon State University

Indicators of tree health issues include dead and dying branches, left, or tree crowns that show sparse or off-color foliage, center. Compare the tree at left to the tree at right. Tree in right photo has healthy crown.

Photo: Stephen Fitzgerald, © Oregon State University

Timber harvests can generate income, or they can be used to improve forest health, create new habitat and reduce fire risk.

- **Match the harvest method to your objectives** and become familiar with the implications of the harvest for the future development of the forest.
- **Learn the Oregon Forest Practices Act requirements** on timber harvesting. Numerous rules govern notification, post-harvest reforestation, roads and stream crossings, slash abatement, wildlife tree retention, and riparian buffer zones.
- **File a notification of operations prior to harvest.** The Oregon Department of Forestry issues notifications. Depending on the type and location of the operation and proximity to streams and wildlife habitat, you may need a written plan.
- **Consider working with a consulting forester** to help prepare for and manage the timber sale and harvest. A consultant can help choose a harvest method to meet your objectives, determine timber volumes and values, mark boundaries and timber to be cut, find a buyer, locate a logger, and manage the harvesting operation, among other tasks.
- **Find a reputable logger and use a contract.** Check references and ask to view other jobs the logger has completed.

The practices described in these guidelines all relate to timber harvesting, especially those related to protecting water quality through the proper design, location and maintenance of roads, road drainage and stream crossings.

Reforestation

- **Choose species adapted to your site and match them to site conditions.** Make sure the seedlings are from the correct seed zone and elevation, so that they will be genetically adapted to the site. Consult seed zone maps; most nurseries can help you make the right match.
- **Keep seedlings cool** and make sure the roots stay moist. Many reforestation failures trace back to poor handling and planting techniques.
- **Plant in winter** when seedlings are dormant and soils are moist.
- **Remove competing vegetation.** Shrubs and grass can quickly overwhelm planted seedlings. Weed prior to planting and maintain a weed-free area within 3 to 5 feet of the seedling through at least the first summer.

Maintain and improve wildlife habitat

- **Inventory the property** for habitat characteristics and keep records of wildlife observations.
- **Develop desirable habitat for the species you want to foster.** If you want to support a variety of wildlife, promote a diverse forest composition and structure in part or all of your stand. This will maximize the number of habitat niches and make more food, water, and cover available. See other publications in this series in the OSU Extension Catalog, *catalog.extension.oregonstate.edu,* for more information.
- **Favor a variety of tree species** when thinning, including some of different sizes. Vary the spacing from place to place. Maintain some dense, unthinned clumps. Create openings and edges of varying sizes. Feature shrubs, herbs and grasses.
- **Retain hardwood where possible.** Consider favoring large oaks as "leave trees." Oak habitat is particularly rich in species.
- **Look at the big picture.** While habitat diversity is generally desirable, consider the surrounding area and whether your property may provide special habitats not found in the vicinity. On a landscape scale, your biggest contribution to overall habitat diversity might be favoring one particular type of forest or habitat (oak woodland or riparian hardwoods, for example), rather than trying to maximize habitat diversity on your individual parcel. Also, consider how your property might serve as a corridor between adjacent habitats and what could be done to maintain connectivity.
- **Leave some dead wood.** Dead wood is a critical source of food and shelter for many species, from woodpeckers to small mammals.
- **Maintain some snags** (especially those over 10 inches in diameter at chest height) in places where they will not interfere with other management objectives.
- **Maintain some live trees** (especially hardwoods) with evidence of decay.
- **Leave large down wood** (logs greater than 10 inches in diameter at the small end).
- **Leave a few slash piles** at strategic locations in the forest.

Follow the rules

The Oregon Forest Practices Act governs forestry operations such as commercial timber harvesting, road-building, reforestation, precommercial thinning, chemical applications and prescribed burning.

Photo: U.S. Fish and Wildlife Service

The American marten, or pine marten, is found in Oregon's high forests.

Photos: Rachel Werling, © Oregon State University

Western fence, or blue-belly, lizard found in a coniferous forest near Applegate, Oregon.

Coyote pup near Butte Falls, Oregon. The coyote den was located in a downed log.

Photo: Ken Bevis, Washington Department of Natural Resources

Dead wood is a critical source of shelter for many species. Leave a few slash piles at strategic locations.

If you are undertaking a forestry operation, follow the guidelines laid out in the Forest Practices Act. Submit a notification of operations to the Oregon Department of Forestry before you start. A notification is required when:

- Using power-driven machinery on your property.
- Harvesting a small patch of timber and selling the logs.
- Applying herbicide on forest lands.
- Completing a fuels-reduction project that generates slash.
- Building a road across a stream to access a timber stand on the other side.
- Converting a forested area to another land use.

Learn more about the forest practices act from the Oregon Department of Forestry or the Oregon Forest Resources Institute. Get to know your Oregon Department of Forestry stewardship forester, especially if you are contemplating a forestry operation.

References

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Worksheet 1: Resource assessment for forests and woodlands

Use this checklist of characteristics to assess the current condition of your forest or woodland. Use extra paper if necessary.	Yes	No	Not sure	N/A
Species mix				
Conifer forest (conifers >70% of trees)				
Mix of conifers and hardwoods				
Hardwood forest (hardwoods >70% of trees)				
Oak woodland				
Mix of trees and brush				
Other				
List the main tree species	1.			
	2.			
	3.			
	4.			
	5.			
	6.			
Aspect				
Slopes face SE to W				
Slopes face NW to E				
Aspect is flat				
Terrain				
Terrain is mostly steep (35% slopes or greater)				
Terrain is mostly flat or with moderate slopes				
Terrain is varied				
Access				
I can access most of the property via roads, skid trails or trails				
I can't currently access some parts of my property				
Are any of the following potential CONCERNS present?				
Soils				
Bare areas of soil on more than 10% of ground				
Evidence of recent soil erosion (surface, rills, gullies, etc.)				
Excessive soil compaction (more than 10% of area compacted)				
Roads/water quality				
Roads or skid trails are steep and eroding				
Culverts undersized and prone to plugging up				
Roads cross streams in many places				
Roads or ditches drain directly to streams				
Streams				
Streams have no tree buffer, are directly exposed to the sun				

Worksheet 1: Resource assessment for forests and woodlands

Use this checklist of characteristics to assess the current condition of your forest or woodland. Use extra paper if necessary.	Yes	No	Not sure	N/A
Invasive weeds				
Numerous noxious or invasive weeds present				
Wildfire risk				
Excessive slash or ground fuels present				
Excessive ladder fuels present				
Tree density is high; tree crowns overlap				
Tree health				
Tree density is very high; tree crowns overlap				
A lot of trees have died recently				
Trees show evidence of recent branch or top dieback				
Many trees have low vigor (poor crown ratios)				
Forest diversity/wildlife				
Forest lacks undergrowth				
There are few large dead trees, or snags, or downed logs				
Are any of the following HEALTHY CONDITIONS present?				
Soils				
Soils are deep, uncompacted, have cover of duff and litter				
Roads/water quality				
Roads/skid trails have good drainage, are not eroded				
Roads do not drain sediment directly to creeks				
Streams				
Streams run clear except during storms				
Streams have adequate buffers of trees and other vegetation				
Invasive weeds				
Property is largely free of invasive weeds				
Wildfire risk				
Large, fire-resistant trees are present				
Surface and ladder fuels are light or discontinuous				
Tree health				
Larger, dominant trees have adequate (>1/3) live crown ratios				
The forest is diverse: there is a mix of tree species, sizes and ages				
The forest is not overly dense				
Recent mortality is scattered or confined to a few small areas				
Forest diversity/wildlife				
Dead wood (snags and downed logs) is abundant				
Brush patches and other habitat features present				
Signs of current wildlife use				

Review your responses to Worksheet 1: Resource Assessment for Forest and Woodlands. Use extra paper as necessary. **Are there areas of CONCERN or that require improvement? List the most important ones below.**	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Review HEALTHY conditions present. List the most significant ones below.	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Review the items marked "not sure" on Worksheet 1. List topics to investigate further.	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Worksheet 2: Management activity assessment for forests and woodlands

Use the checklist of management practices below to identify activities you incorporate in your forest and woodlands management. Use extra paper as necessary.	Already present	Completed	Need to do	Consider	Not applicable
Protect water quality					
Maintain a forested buffer around streams, including seasonal streams					
Avoid using heavy equipment in streambeds and riparian zones					
As much as possible, keep roads and skid trails away from streamside areas					
Design, construct and maintain roads/trails to minimize runoff and sedimentation					
Minimize stream crossings and size culverts for peak flows					
If using herbicides, follow the label; avoid drift into water					
Maintain adequate tree, shrub, herbaceous cover					
Periodically monitor roads, skid trails and disturbed areas for runoff and erosion					
Restore eroding areas by planting, seeding, installing check dams, etc.					
Keep soils healthy					
Minimize soil disturbance, compaction and displacement in management activities					
Keep heavy equipment on roads and predesignated skid trails					
Reforest/revegetate disturbed areas as quickly as possible					
Balance retention of litterfall and slash for nutrition with fire concerns					
Prevent and manage invasive weeds					
Monitor occurrence of noxious weeds; focus on roadsides and disturbed areas					
Manage/eradicate noxious weeds using appropriate integrated pest management methods					
Prevent new weed introductions via vehicles, equipment and contaminated material					
Reduce the threat of fire					
Design/maintain access roads to meet fire suppression vehicle					
Minimize and reduce continuity of high-risk surface fuels; treat excess slash					
Reduce ladder fuels by thinning and pruning					
Break up crown continuity by creating openings in stand					
Where possible, retain larger trees of the most fire-resistant species					
Focus fuels reduction in strategic locations					

Worksheet 2: Management activity assessment for forests and woodlands

Use the checklist of management practices below to identify activities you incorporate in your forest and woodlands management. Use extra paper as necessary.	**Already present**	**Completed**	**Need to do**	**Consider**	**Not applicable**
Maintain healthy trees and forest					
Assess condition of forest/woodland regularly					
Match tree species to site conditions; plant and thin to favor best-suited species					
Thin overly dense stands or patches to appropriate levels					
In thinning, retain vigorous, high-quality trees of desired species					
Provide wider spacing around pines, oaks and other shade-intolerant species					
Reforestation					
Choose site-adapted species of correct seed zone and elevation					
Use proper seedling handling and planting techniques					
Provide adequate site prep and follow-up care to ensure survival and growth					
Maintain and improve wildlife habitat					
Inventory for habitat features; monitor wildlife presence					
Maintain/promote habitat for desired species					
Promote diverse composition and structure. Remember “variety is the spice of life”					
Retain some snags, down logs and decayed trees					
Follow the rules					
Follow Oregon Forest Practices Act regulations regarding forestry operations					
Submit a Notification of Operations prior to forestry operations					

Results

Review the results of Worksheets 1 & 2. Consider any resource concerns and healthy conditions identified in Worksheet 1, and practices that you checked in the “Need to do” and “Consider” columns in Worksheet 2. What are the most important potential follow-up actions? List and briefly describe these below.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.