CALIFORNIA FOREST STEWARDSHIP PROGRAM

Forestland Steward

SUMMER 2011

Silviculture: the science & the art

Inside

Silviculture is at the very heart of forest management. The name comes from *silva* (forest) and *culture* (to grow). It is the branch of forestry concerned with the cultivation, or management, of the forest.

Silviculture is an intricate combination of science and art, merging such disciplines as tree biology, forest ecology, site dynamics, economics, and technology with creativity, intuition, and even some prophecy. A lot of experience and good powers of observation are also required.

The practice of silviculture has changed quite a bit over the years. Originally, it was focused on timber production: "The ultimate goal of all silvicultural work is to secure on a given area a high production of valuable material, in order that the owner may secure the largest possible returns in the long run" (Graves 1911).

Today, the definition has expanded to include other forest resources and ecosystem services: "Silvicultural practice consists of the various treatments that may be applied to forest stands to maintain and enhance their utility for any purpose" (Smith 1989) and "Silviculture also ensures the long-term continuity of essential ecologic functions, and the health and productivity of forested ecosystems" (Nyland 2002).

While silvicultural goals may have changed, the techniques remain largely the same: cutting, thinning, planting, burning. However, these same basic tools and techniques can lead to very different results on the ground.

In this issue we try to cover this highly complex topic in just a handful of pages…it can't be done. What we can do here is give you a smattering of vocabulary and some general concepts, and hope that you find it a useful introduction to a lifetime of learning about the intricacies of managing your forest.

Forestland Steward

Forestland Steward is a joint project of the CA Dept of Forestry and Fire Protection (CAL FIRE), Placer County Resource Conservation District, UC Cooperative Extension, and USDA Forest Service to provide information on the stewardship of private forestlands in California.

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Silviculture 101: a quick overview

There's no getting around it—it takes a lot of knowledge to manage a forest. Since every forest is different and every landowner's goals unique, there are no cookbook answers. To create the forest you want requires that you learn some basic forestry principles and understand how they apply to your specific forest.

Your site

Your forest exists within certain physical parameters. It has an elevation, slope, aspect, soil characteristics, climate, etc. These create the canvas upon which your forest grows. You can't change these factors very easily so your forest management choices are limited by its site characteristics. Your site determines what is possible for your forest.

How did we get here?

In addition to the physical canvas, your site has a history. This includes all of the past management practices, disturbances large and small, and other occurrences that made the forest what it is. This is another factor you can't change. The starting point for your management activities is the forest you see today.

Building blocks

A forest is composed of many individual species: trees, shrubs, herbs, lichen, fungi, birds, mammals, etc. These are the building blocks that make up your forest.

However, the forest is more than just a collection of species. Over many eons the individual species in a forest have adapted to living together as a community. Each has a role to play—a niche—and the various species interact with one another in numerous ways.

When we talk about silviculture we are primarily concerned with the trees, but remember that the trees grow in the context of a greater forest community.

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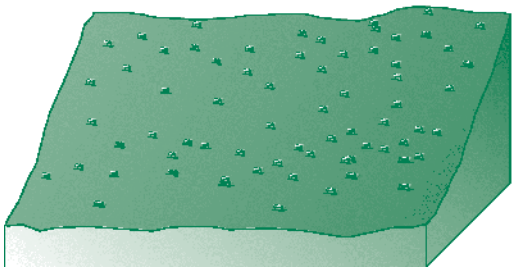
Silvics—how does your forest grow?

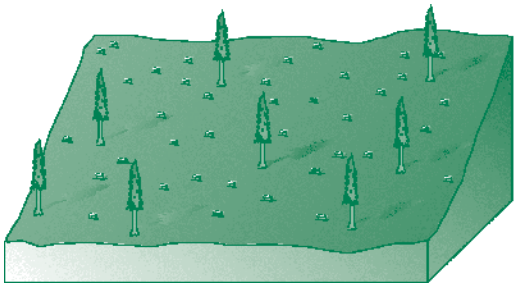
Silvics is the science of how trees grow. Silvicultural systems use an understanding of silvics to manipulate vegetation and shape a forest stand (an area of forest that is similar and managed as a unit) through its entire lifetime.

Each tree species has its own needs and tolerances—for light, water, temperature, nutrients, and other requirements. These tolerances determine where a species can live, and how well it can thrive at that site.

Some trees are shade tolerant. These species can grow in the shadow of other trees. Others are shade intolerant and require more light to grow or thrive. They are successful when a disturbance opens up the forest canopy to allow more light in to the forest floor.



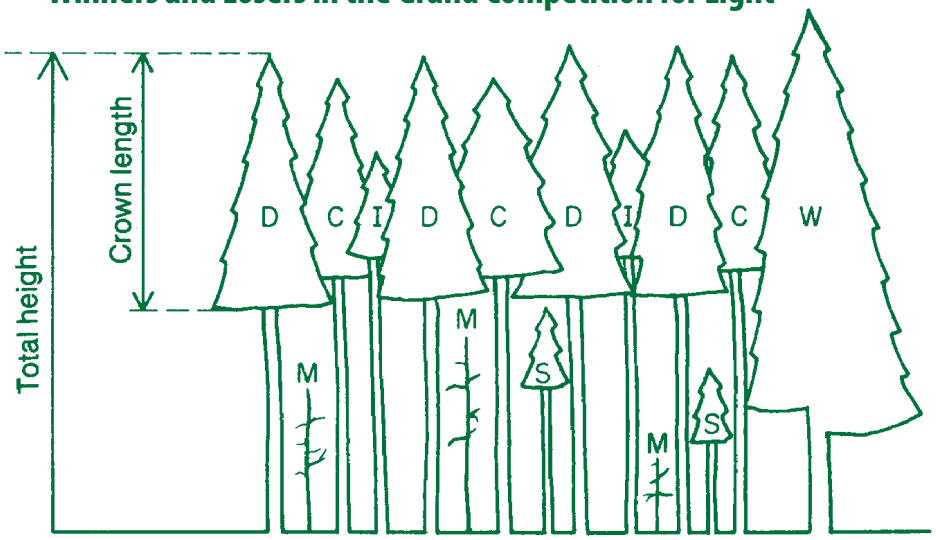
***Clearcuts** allow the forest to regenerate an even-aged stand usually planted soon after harvest.*



***Seed tree** cuts are clearcuts with a few trees left to regenerate the new forest.*

Competition for light, space, and water plays an important role in forest dynamics and some trees are more successful than others in this competition (*see illustration to the right*). Silviculture controls and manipulates these dynamics by removing trees and plants to release favored trees from competition.

Winners and Losers in the Grand Competition for Light



D = Dominant; C = Codominant; I = Intermediate; S = Suppressed; M = Mortality; W = Wolf Tree

Dominants receive full sunlight from above; larger than average trees in stand (*Big Winners*)
Codominants form general level of crown cover; receive full sunlight from above but relatively less on the sides (*Winners*)
Intermediates are shorter than Dominants and Codominants, but extend into general canopy; receive very little light from above; have small crown and generally crowded (*Losers*)
Suppressed trees have crowns entirely below the general canopy and receive no direct light (*Big Losers*)
Wolf Trees have full crowns on all sides and make excellent wildlife trees.

Silviculture mimics the chaos of living systems

The classic model of forest succession begins with a clean slate of bare ground. Pioneer sun-loving herbaceous plants are the first to establish there. These are eventually replaced by shrubs, then fast growing shade-intolerant trees, and finally the climax forest of shade tolerant trees triumphs.

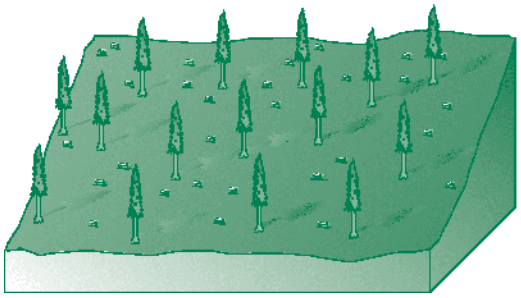
However, in the real world, this orderly sequence encounters frequent setbacks and variations. Disturbances of all kinds and sizes—insects, fire, disease, windthrow—change the succession pattern. Disturbance is vital to ecosystem function: it uncovers bare ground so seedlings can become established, contributes to biodiversity, and alters the forest structure. The cumulative history of disturbances creates the chaotic mosaic of habitats that we see in a typical natural forest.

Disturbance is a natural and inevitable process in any forest. It is the model for much of silviculture, which uses disturbance in the form of harvesting and other practices to manipulate forest structure, species composition, and age classes to meet specific goals and objectives.

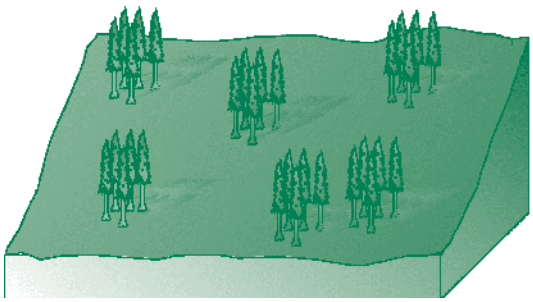
Traditional silviculture

Silvicultural systems are generally divided into two major categories: even-aged and uneven-aged.

Even-aged stands are created using clearcuts that remove everything to allow the forest to start anew. Generally, clearcuts are followed immediately by replanting, resulting in a new forest of trees that are all the same age. Clearcuts are the most efficient way to harvest timber and



***Shelterwood** cuts are similar to seed tree systems, but more trees are left to provide shelter for shade tolerant species.*



***Group retention** is a clearcut that leaves small groups of trees for wildlife habitat.*

Common trees of the Sierra mixed-conifer forest listed from most shade intolerant (requires sun) to most shade tolerant:

- Ponderosa Pine
- Jeffrey Pine
- Sugar Pine
- Douglas-fir
- Incense Cedar
- White/Red Fir

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at the same time open up the forest floor to light for shade-intolerant species like pines. Clearcuts are also used to renew degraded forests, to change species composition of a stand, and for other purposes. In California, clearcuts are limited to a maximum of 20 acres.

Seed tree or shelterwood systems are a variation of even-age silviculture, where a few trees per acre are left in an otherwise clearcut area to regenerate the stand. These trees are often removed after the new forest is established.

Uneven-aged stands are those with two or more age classes. The uneven-aged structure is maintained with group or single-tree selection harvests.

Group selection is a system where trees are harvested in small groups that are 0.25 to 2.5 acres in size.

Single tree selection removes trees one at a time. This disrupts the forest structure the least, but is much more difficult to do without damaging nearby trees. Single tree selection usually does not provide openings large enough to benefit shade-intolerant species.

All timber selection types are considered more or less analogous to natural phenomena. Clearcuts mimic large disturbances like stand-replacing fires, group selection mimics smaller fires or windthrow, and single-tree selection mimics loss of individual trees from disease or other mortality factors. However, it is important to realize that these silvicultural activities are not completely equivalent to, and don't provide all the ecosystem benefits of, their natural counterparts.

A note on the no-management option

The no-management approach is a viable approach to forest management. It even has a name: Passive Management. This approach assumes that you can let nature take its course to result in a more natural forest.

What is missing from this assumption is the fact that our California forests are totally unnatural. They have been highly modified by human practices: historical logging, fire suppression, urbanization, and other activities. We do not have natural forests.

Many of our California forests are overly dense, stressed, and unhealthy. They are prone to disease and at risk of wildfire. Even if you are not interested in harvesting timber it is important to consider managing your forest to achieve a healthier, more natural forest for its ecosystem services: wildlife habitat, aesthetics, clean water, carbon sequestration, and other vital amenities provided by forests.

Intermediate treatments

Intermediate treatments involve removing competing vegetation, such as shrubs and grass, and thinning trees to accelerate growth in the remaining trees. These treatments are undertaken to help improve the growth, quality, composition, and vigor of the stand.

Mix it up

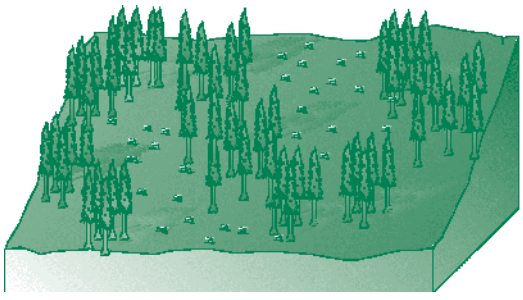
You are not limited to one silvicultural system on your property. Often, a blend of treatments is prescribed to meet landowner goals. In addition, it may take a series of silvicultural treatments to achieve your goals. The forest reached its present condition over a long period of time with multiple disturbances. You shouldn't expect to fix it all in one step.

The art of silviculture

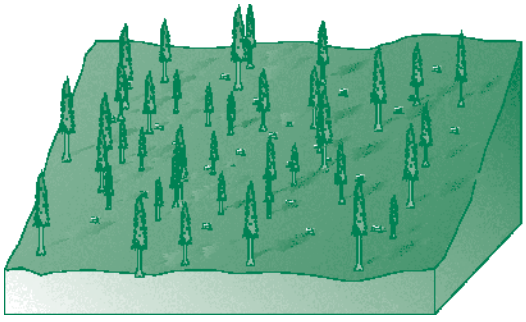
How do you take the same silvicultural systems and treatments and use them to accomplish many diverse goals on a wide range of forests and sites? That is where the art of silviculture comes in.

Foresters and land managers develop this art over time. It includes an ability to "see" into the future, to visualize what the forest of today will become in the future and what changes are needed to move it toward the desired condition. It is an intuition about the forest, based on knowing the site and the trees intimately, and observing how they respond in different circumstances. It is the creativity to see new possibilities and the flexibility to change direction when necessary. None of these abilities can be taught, but they can be developed through experience and observation, trial and error.

The "art" of silviculture includes an ability to "see" into the future, to visualize what the forest of today will become in the future.



***Group selection** removes groups of trees leaving an uneven-aged forest.*



***Single tree selection** removes individual trees.*

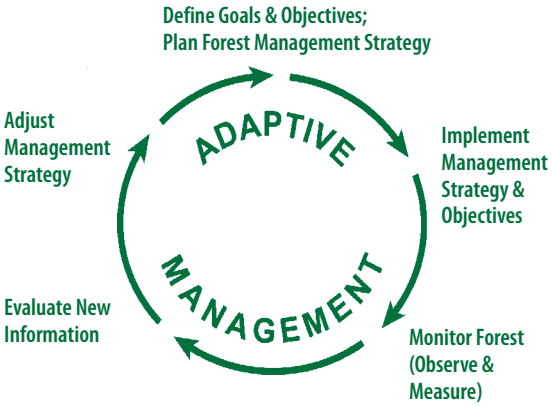
Management decisions will shape the future

The silvicultural systems you choose and the management decisions you make are determined by your goals and objectives. For example, even-aged stands have a simplified structure that may be efficient for timber production but for many other objectives, such as wildlife and aesthetic values, a more complex forest structure is desirable. The choices you make will have profound consequences on the future forest.

Can't predict the future from the past

Forests are dynamic systems that don't always respond as expected. Now, in addition to the standard uncertainty we expect from living systems, we also live in a time of changing climate. Studies suggest that California overall will become warmer and drier with less precipitation, earlier snowmelt, less available water, longer fire seasons, more intense wildfires, and changes in plant and animal communities.

This will challenge all of our assumptions as we may not be able to predict future results based on past experiences. Trees in your forest, with their longevity beyond a human lifetime, will exist under these new conditions. How do you factor this uncertainty into your forest management?



Adaptive Management

Adaptive management is one approach for dealing with uncertainty. It requires clear goals, an understanding of alternatives, observation and monitoring, and the ability to adapt management decisions to new information. It is a critically important tool when decisions have to be made in uncertain circumstances.

Much of forest management is experimental. You need to build in the ability to revisit your actions and change course—to adapt—when circumstances warrant.

Your vision, your plan

A forest management (or stewardship) plan is your roadmap to the forest of your dreams. It helps you decide where you want to go, then helps you figure out how to get there.

A clearly articulated long-term plan is crucial to any kind of effective management of your forest. It lays out your desired outcome for the forest and then the concrete steps needed to achieve them. This will be invaluable when you work with professionals, such as foresters and loggers, to implement management activities on the ground.

As you work on your management plan you will learn a lot about your property, its history, and its potential. It will help you define what you want your forest to be and what is actually possible within the physical constraints of your site.

It is important to put your management plan down on paper. That way you can share it with others—your family, your forester, other professionals, and future generations. In some cases a plan is mandatory, for example if you want to apply for a cost-share grant or get a bank loan.

Your plan can be as simple or as comprehensive as you want it to be. However, every management plan ***must*** include goals and objectives. These are the guiding principles for all your forest activities.

1. Start by identifying your goals. Goals are general statements that communicate your vision for your property. One of your goals, for example, might be to make your property more fire safe, another might be to increase habitat diversity for wildlife, and a third to generate income.
2. Prioritize your goals. Which are most important or need to be addressed first?
3. Define your objectives. While goals are the general vision, objectives are the concrete steps you need to take to reach those goals. For example, if your goal is to increase your forest's resilience to fire, an objective might be to implement a prescribed burn. Objectives should be very specific, stating times and quantities. E.g., "treat 12 acres of forest by Fall 2012."

Your management plan is not a legal document; it is for your own information. However, it should be a living document. Plan to revisit it each year to see how you are progressing and revise it as necessary.

An excellent outline for your forest management plan can be found in the *Forest Stewardship Series 18: Stewardship Objectives and Planning* at http://anrcatalog.ucdavis.edu/pdf/8248.pdf. This publication will walk you through the entire process. In addition, it contains a table of possible goals and objectives to help you think about what you want to do with your forest.

There is money available to help you develop a forest management plan in consultation with a Registered Professional Forester (RPF). For more information, see funding article on page 12 or contact your local CAL FIRE Forestry Assistant Specialist (see the current list at http://www.fire.ca.gov/resource_mgt/downloads/ForestAdvisorList.pdf).

The art of marking the forest

Start with the current condition of your forest and try to visualize what you want it to look like in the future. How do you get from here to there?

Shaping the forest to meet your goals and objectives—whether they be fire safety, wildlife habitat, timber production, aesthetics, resilience, or a combination of goals—generally requires cutting some trees. Which trees you choose to cut and which you leave is arguably the most important decision in forest management. These choices will define your future forest.

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Leave tree markings.

Which trees you choose to cut and which you leave is arguably the most important activity in forest management.

Tree marking is a management tool used to identify the trees slated for removal or retention. Like other aspects of silviculture, marking has elements of both science and art. The science is the part you learn in school: tree biology, stand ecology, calculating basal area, etc. The art component involves a bit of flair that includes creativity, intuition, vision, and experience.

A marking plan, called a prescription, is written specifically for a stand. The prescription takes into account, first of all, the objectives of the harvest and then other factors such as stand history, species composition, site quality, size distribution, spacing, disturbance concerns, stocking/basal area, fire regime, wildlife requirement, economic interests, and regulations.

Marking is a demanding job. The marker is constantly assessing trees, evaluating the environment, noting species, observing vigor and disease, making value judgments, and weighing priorities—all the while keeping in mind the desired outcome: the future stand that will evolve from the trees that remain.

Usually, marking is done using paint applied in specific colors that tell the loggers what to do. Trees can be marked for either cutting or leaving; there are pros and cons of each method. Cut tree marking is more efficient for small acreages while leave tree marking is better for dense stands of small trees.

Marks should be visible from all sides with another mark at the base—the stump mark—to verify after harvest that the correct trees were cut or retained.

There is no correct way to mark and each marker will choose different trees to cut or leave. Prescriptions are usually written to allow this flexibility, by defining the objectives and giving measurable guidelines, such as spacing, basal area, species composition, density, etc. Much of the actual decisionmaking is left to the judgment of the marker.

Which trees should be marked? It depends on your objectives. Generally, the unhealthy and deformed trees are marked for removal to improve the health of the stand. However, some trees once considered "defective" are now recognized as necessary to wildlife. It is important to retain snags and other trees with wildlife features.

Avoid highgrading, that is, removing the best and biggest trees from the forest. Highgrading was a common practice in the past and resulted in degraded forests.

Keep in mind that it's not about what you're cutting, it's about what you're leaving. The trees you leave will be there for decades, if not centuries, to become your future forest.

—many thanks to Ryan Tompkins, USFS

© Mark Andre

An example of marking guidelines

How do you decide which trees to leave and which to cut?

Guideline Objectives: These marking guidelines will be used to identify and designate trees to be retained and removed. The spirit of these marking guidelines is to: 1) reduce hazardous fuels within the Wildlife Urban Interface (WUI) Zone and 2) maintain and enhance retention and growth of black oak for wildlife habitat and to promote heterogeneity of forest vegetation.

Synopsis of the Silvicultural Prescription for Mechanical Thinning Treatments: Timber harvesting will focus on the removal of suppressed, intermediate, and codominant conifers that may act as ladder fuels or compete with dominant and codominant black oaks. Components of the silvicultural prescription include: 1) thinning from below to reduce ladder and canopy fuels, and to reduce overall stand density, and 2) releasing black oaks from competition with conifers. This silvicultural prescription will be implemented with the intent to leave an average of 30% to 40% canopy cover within the treatment units.

Tree Designation for Mechanical Thinning Treatments: Implementation of the silvicultural prescription will be accomplished through LEAVE TREE MARKING—marking those trees which should NOT be harvested. Leave trees must be painted with PINK paint with a horizontal mark at or within 1 foot above dbh (diameter at breast height) and two stump marks. The horizontal mark at dbh shall be a continuous band no less than 1 inch and no greater than 2 inches wide, and be visible from all directions and from at least 50 feet away. At least 2 stump marks shall be placed in the furrows of the bark at ground level on the uphill and downhill of the tree. The minimum stump mark dimension should be 4 inches by 4 inches or easily visible from a distance of 30 feet.

Prescription Objectives for Mechanical Thinning Treatments: In general, thin from below targeting ladder fuels; then thin codominants to achieve crown spacing with an emphasis on creating space around dominant and codominant black oaks. The objective is to reduce the vertical continuity of surface, ladder, and canopy fuels (low thinning), and to reduce the horizontal continuity of canopy (crown spacing). Crowns in the residual stand should be spaced at a distance that reduces crown competition between residual black oak trees and conifers and reduces the potential for crown fire spread. This spacing should be achieved by leaving clumps of the largest fire-tolerant trees with a network of intermingled openings between the clumps.

Order of Priority: Apply the following prescription criteria in the priority they are shown. The higher priority criteria take precedence over the next higher criteria.

1. **Diameter Limits:** Retain all live trees 30.0 inches dbh and greater. Retain ALL living black oaks ≥ 6.0 inches dbh. Retain all oak snags great than 5 feet in height or 10 inches dbh.
2. **Basal Area and Upper Diameter Limit:** Retain appropriate levels of basal area retention as described above. Retain approximately 80 to 100 square feet of basal area.
3. **Crown Position:** Dominant and codominant trees will have precedence as leave trees.
4. **Leave Tree Spacing:** Leave tree spacing shall be measured on a triangular spacing basis. The largest dominant and codominant trees shall have priority as leave trees. Thin conifers of equivalent or subordinate size surrounding healthy vigorous black oak > 10" dbh. Trees larger than 10 to 12 inches in diameter at breast height that are growing closely together or in clumps that cannot be cut without damage to the desired leave tree shall be considered as one tree and either cut or left as a clump. Leave tree spacing may vary up to 25% to allow for selection of trees with the best growth, form, and vigor.
5. **Disease Damage:** Give preference to retain conifer trees exhibiting the healthiest live crowns and straightest trunks that are free from disease and damage, while removing trees that display signs of the following damage: (a) true fir with live crowns <40% and/or other conifers with live crowns <30%, (b) sugar pine with blister rust, (c) dead tops, (d) dwarf mistletoe on the trunk or in the upper 1/2 of the crown, (e) mechanical damage, forked boles, crooks, broken tops.
6. **Leave Tree Species Preference:** Utilize the following species preference for leave trees in order to promote shade intolerants: Black Oak>>sugar pine > ponderosa pine > Douglas-fir > red fir > incense cedar > white fir, while maintaining a mixture of all species where present. Retain all healthy sugar pine (not infected with blister rust) that are not competing with other larger sugar pine at the desired spacing. Retain all black oak > 6 inches dbh.

—from Plumas National Forest

What makes an old coast redwood forest?

Gregory A. Giusti, UC Forest Advisor

What is so unusual about an old coast redwood forest that sets it apart from most of the redwood forests we see today?

Certainly, big trees are one component that is hard to miss, but the range of sizes can be quite variable, from trees under 10 inches to behemoths measuring over 100 inches dbh (diameter at breast height).

Hardwoods are another vital component of older forests, but how many are commonly found?

Old forests may contain several tons of "arboreal soils" found in the canopy capable of supporting both plant and animals hundreds of feet off the forest floor.

Old redwood trees have branches (or trunks) known as "reiterative," meaning "repeating itself," that come off an existing branch or trunk and provide highly unusual shapes and structure used by both plants and animals.

What are the components of an older forest and what do they tell us? Specifically, large trees, broken tops, fire scars, trunk hollows, diminished light to the forest floor, minimum number of non-conifers, reiterative branches, and canopy soils with epiphytic plants are a function of time + chaotic events. Wind, fire, disease, insects, shade, landslides, and time all play a role in shaping how an old forest develops. These may be difficult to mimic.

What can we as forest managers hope to accomplish? Certainly, silviculture can play a role in the early stages of putting a particular piece of property on a pathway toward regaining some aspects of an older forest.

Silviculture, through partial cutting or thinning, can begin a process of moving stump sprouts to single trees, aid in accelerating growth by spacing the trees, maintaining shade, and addressing existing imbalances of hardwood:conifer species ratios. Identifying this management pathway also provides direction to future forest managers who can maintain similar management goals while adjusting to unforeseen occurrences.

Can achieving older forest characteristics in coastal redwood forests be accomplished in one human lifetime? No. It's a journey. We can only address the physical aspects of composition in the near term and select the pathway that can provide opportunities for future management actions plus time to create the intricate structure found in older forests.

© Stephen Sillett; see www.humboldt.edu/redwoods/photos/redwood.php

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© Glenn Franco Simmons

PHOTOS: ***[top right]*** *Reiterative trunks growing off the same limb.* ***[bottom right]*** *Communities of epiphytes (plants that grow on other plants but are not parasitic) develop on areas of redwood trees where canopy soil accumulates. Here, a Sitka spruce, evergreen huckleberry, and other species live 176 feet high on the broken top of a reiterative trunk.* ***[below]*** *Goosepens are the hollow cavities often found in redwoods. These areas, generally created by fire or decay, may be quite large. Early settlers kept geese in them, and they can shelter many other animals, including bears.*

Using silvicultural techniques to restore an old growth redwood forest

The Arcata Community Forest is on the fast track to an old growth condition.

This redwood forest was thoroughly logged in the 1880s and now provides a host of amenities to the community, including timber. And all the while the forest continues to increase in volume and structural complexity.

Silvicultural methods shape the emerging old-growth forest. The City Forester, Mark Andre, is responsible for achieving the primary goal of restoring old-growth structure.

"Silviculture provides a wide range of ways to manage a forest. After a while, with experience in a forest type, you develop an intuition.

"A forester is trained to look long-term, beyond the human lifetime. You can't predict 30 to 40 years into the future—you learn, monitor, adjust, and make changes."

Speeding up old growth involves opening up the canopy through selection and thinning to increase light penetration. There is a lot to consider. Andre describes his approach:

"I decide which tree can come out without smashing others or shattering. Second growth redwood grows in clumps so we thin the clumps to give more space and allow the remaining trees to accelerate growth."

Wildlife habitat is another important objective for the forest. Trees with large limbs and cavities, and wolf trees, are retained as wildlife trees. "We used to take out imperfect or different trees, now we look at them as features."

Each forest type is different; you need to know your site. The primary natural disturbance in redwood forests—unlike mixed-conifer and most other California forests—is not fire or insect damage, but rather blowdown. When marking trees to be retained, Andre determines which tree has the best chance of surviving if exposed to more wind force.

On drier sites it is necessary to avoid introducing too much sunlight to prevent shock to the trees. Thinning is done in stages to allow the stand to adjust to the new conditions. When thinning is implemented over a 3 to 5 year period, the trees respond by expanding their crown and roots, becoming more windfirm.

In addition, the forester has to manage for the capabilities and machinery of the operators in the area. "A prescription is no good if the operators can't pull it off."

Andre's advice? "Keep your options open. Things change and markets emerge. In the 1960s no one wanted second growth redwood. Having balance and flexibility allows you to participate in a market uptick."

He emphasizes that silviculture is about more than maximizing profit. "Biodiversity is a good thing for forests and for society. You can have both good economic return and a healthy forest to pass on. What's good for the forest is good for the long-term bottom line."

"What's good for the forest is good for the long-term bottom line."

© Mark Andre

Windthrow is common in redwood forests. This type of disturbance opens up gaps in the forest canopy that allow light to reach the forest floor.

© Michael McDowall, City of Arcata

Resources

Helpful references related to silviculture

New Forestry Website

UC Cooperative Extension Forestry has a new website with a vast amount of information, resources, publications, and ideas about how to steward forestland in California. Check it out at http://ucanr.org/sites/forestry/

California Forest Practices Rules 2011
This is a necessary reference book for your library. The 355-page document contains the rules and regulations that govern forest activities in California. There is a whole section and more on silvicultural methods. http://www.fire.ca.gov/resource_mgt/downloads/2011_FP_Rulebook_with_Diagrams_with_Tech_Rule_No_1.pdf

UC Extension's Forest Stewardship Series covers a range of topics to help forest landowners manage their lands. Find the whole series at http://anrcatalog.ucdavis.edu/pdf/8323.pdf. The following are related to silviculture:

- **Forest Vegetation Management**
  http://anrcatalog.ucdavis.edu/pdf/8236.pdf
- **Tree Growth and Competition**
  http://anrcatalog.ucdavis.edu/pdf/8235.pdf
- **Forest Regeneration**
  http://anrcatalog.ucdavis.edu/pdf/8237.pdf
- **Forest Ecology**
  http://anrcatalog.ucdavis.edu/pdf/8233.pdf
- **Forest History**
  http://anrcatalog.ucdavis.edu/pdf/8234.pdf
- **Stewardship Objectives and Planning**
  http://anrcatalog.ucdavis.edu/pdf/8248.pdf

Silvics of North America. This is a comprehensive guide to the habitat and life history of North American trees.

- Volume I: Conifers (http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm)
- Volume II: Hardwoods (http://www.na.fs.fed.us/pubs/silvics_manual/volume_2/vol2_Table_of_contents.htm)

An Ecosystem Management Strategy for Sierran Mixed-conifer Forests. By North et al. 2009. Gen. Tech. Rep. PSW-GTR-220. Albany, CA: USDA Forest Service, Pacific Southwest Research Station. 49 pp. http://www.fs.fed.us/psw/publications/documents/psw_gtr220/psw_gtr220.pdf

This technical report has created a lot of interest and also some controversy. It was written specifically for the mixed-conifer forest and provides a conceptual framework for heterogeneity in the forest.

Technical Assistance

Many agencies are available to provide technical assistance, referrals, information, education, land management plan assistance, and advice.

California Stewardship Helpline
1-800-738-TREE; ncsaf@mcn.org

California Dept of Forestry & Fire Protection
Forest Landowner Assistance Programs
Jeffrey Calvert; jeff.calvert@fire.ca.gov

Forestry Assistance Specialists
Guy Anderson (Mariposa/Madera/Merced) 209-966-3622 x218
Jan Bray (Calaveras) 209-754-3831
Herb Bunt (Glenn, Shasta, Tehama, Trinity, Redding) 530-224-1420
Jill Butler (Santa Rosa) 707-576-2935
Ed Crans (Placer/Yuba/Nevada) 530-889-0111 x128
Damon Denman (Siskiyou) 530-842-3516
Adam Frese (Tuolumne) 209-532-7429 x109
Ivan Houser (Lassen) 530-257-4171
Mary Huggins (S. Lake Tahoe) 530-541-1989
Ken Kendrick (Butte) 530-872-6334
Al Klem (Plumas) 530-283-1792
Patrick McDaniel (El Dorado) 530-647-5288
Jonathan Pangburn (San Benito/Monterey) 831-333-2600
Alan Peters (San Luis Obispo) 805-543-4244
Jim Robbins (Fortuna) 707-726-1258
Tom Sandelin (Fresno/King) 559-243-4136
Tom Tinsley and/or Patrick McDaniel (Amador) 530-647-5200

California Association of RCDs
916-447-7237; staff@carcd.org

California Dept of Fish & Game
Tina Bartlett
916-653-9834; tbartlett@dfg.ca.gov

U.C. Cooperative Extension Forest Advisors
Mike De Lasaux, Plumas-Sierra Counties
530-283-6125; mjdelasaux@ucdavis.edu
Greg Giusti, Mendocino-Lake Counties
707-463-4495; gagiusti@ucdavis.edu
Susie Kocher, El Dorado County
530-542-2571; sdkocher@ucdavis.edu
Rick Standiford, Specialist
510-643-5428; standifo@berkeley.edu
Bill Stewart, Specialist
510-643-3130, billstewart@berkeley.edu
Yana Valachovic, Humboldt-Del Norte Counties
707-445-7351; yvala@ucdavis.edu

USDA Forest Service
Janice Gauthier
707-562-8875; jgauthier@fs.fed.us

Calendar

August 4, 11, 18, 25
Webinar: Balancing Fuel Treatment with Wildlife and Sensitive Plant Considerations
Time & Location: 2–4 pm at a computer near you
Sponsors: Northern CA Society of American Foresters and UC Cooperative Extension
Contact: rrharris2464@sbcglobal.net or 707-678-3504
Register: http://ucanr.org/fuelwildlifeplantwebinarregister
Website: http://ucanr.org/fuelwildlifeplantwebinar

August 10
California Board of Forestry Meeting
Location: Sacramento
Contact: 916-653-8007
Website: http://www.bof.fire.ca.gov/

August 10
California Fire Safe Council Board Meeting
Location: Wildland Fire Training & Conference Center, 3237 Peacekeeper Way, McClellan, CA
Website: http://www.firesafecouncil.org/

September 12
Last Chance Fuels Treatment Field Trip
Location: Foresthill, CA
RSVP: Kim Ingram, kcingram@ucdavis.edu
Website: http://snamp.cnr.berkeley.edu/events/

September 14
California Board of Forestry Meeting
Location: Sacramento
Contact: 916-653-8007
Website: http://www.bof.fire.ca.gov/

October 12
California Board of Forestry Meeting
Location: Sacramento
Contact: 916-653-8007
Website: http://www.bof.fire.ca.gov/

October 13
Sugar Pine Fuels Treatment Field Trip
Location: Oakhurst, CA
RSVP: Anne Lombardo, amlombardo@ucdavis.edu
Website: http://snamp.cnr.berkeley.edu/events/

October 27
SNAMP Annual Meeting
Location: TBD
Website: http://snamp.cnr.berkeley.edu/events/oct-27-2011-snamp-annual-meeting

November 9
California Board of Forestry Meeting
Location: Sacramento
Contact: 916-653-8007
Website: http://www.bof.fire.ca.gov/

Oak Woodland Management Webinar

The live webinar is over but the learning continues. Thanks to some very fancy technology you can now find out all you need to know about managing oak woodlands from the comfort of your own computer.

The series is presented in 4 sections with PowerPoint presentations and lectures from some of the best experts in the field:

- Overview of Oak Rangelands—importance of management; oak woodland overview; wildlife & biodiversity; goals; resource assessment
- Oak Rangeland Management—livestock and grazing management; recreational income; erosion control and water quality; forest products
- Sustaining Oak Rangelands—Regeneration and restoration; silviculture and stand management; fire; open space values.
- Developing Plans & Sources of Assistance—general questions; finding a consultant; sources of cost-share assistance

Access the webinar at http://ucanr.org/sites/oak_range/Oak_Webinars/. You should also visit the new UC Oak Woodland Management website at http://ucanr.org/sites/oak_range/. Sign up for their mailing list, follow the Oak Conservation Blog, and download numerous free publications.

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Fill out this box and send it to CAL FIRE, Forestry Assistance, P.O. Box 944246, Sacramento, CA 94244-2460. Fax: (916) 653-8957; email: jeff.calvert@fire.ca.gov
For address changes, please send this box or contact Jeff Calvert via e-mail, standard mail, or fax…be sure to reference Forestland Steward newsletter.

NOTE: A limited number of extra printed copies of this newsetter may be available. If you wish to receive one or more, please send your shipping information and the number of copies needed to jeff.calvert@fire.ca.gov or mail your request directly.

CAL FIRE & Placer County RCD
Forest Stewardship Program
c/o P.O. Box 162644
Sacramento, CA 95816

ADDRESS SERVICE REQUESTED

Good news!

It looks like this will be a good year for getting work done on your forest. A significant amount of money is currently available for forest improvement projects.

While the exact distribution hasn't yet been determined, CAL FIRE (California Department of Forestry and Fire Protection) has funds to assist forest landowners through CFIP (California Forest Improvement Program) and Proposition 40. In addition, NRCS (Natural Resource Conservation Service) has EQIP (Environmental Quality Incentives Program), WHIP (Wildlife Habitat Incentives Program) with an emphasis on fish, and HFRP (Healthy Forest Reserve Program).

There is money to help you prepare a new forest management plan or revise an old one with the help of a RPF (see page 5). Cost-share money can be used for fuels reduction and related projects, including pre-commercial thinning, pruning, slash reduction, fuel breaks, as well as restoration, roads, rehabilitation after fire, and more.

Best of all, you don't have to figure it out alone. CAL FIRE and NRCS are working together to facilitate funding and make the process easy for landowners.

Start by contacting the Forestry Assistant Specialist (FAS) at your local CAL FIRE unit. The FAS can help you figure out what kind of assistance you need and how to get it. The current FAS list can be found at http://www.fire.ca.gov/resource_mgt/downloads/ForestAdvisorList.pdf .

Usal Redwood Forest receives conservation easement award

Update to our Community Forest Issue (Winter 2011): On July 26, 2011, the Wildlife Conservation Board awarded $19.5 million to The Conservation Fund to purchase a working forest conservation easement on Usal Redwood Forest in Mendocino County. This conservation easement will protect the more than 49,000-acre redwood/Douglas-fir forest from ever being subdivided. When completed, this will be the largest single conservation easement in the State of California. Congratulations to all who worked so long and hard to make this happen!