



CALIFORNIA FOREST STEWARDSHIP PROGRAM

Forestland Steward

SPRING 2015

Reforestation: a gift to the future

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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.

CA Forest Stewardship Program

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The ideas contained in this newsletter are meant as general information and opinion, not management prescription.

Consult a Registered Professional Forester or a qualified technical advisor (see page 10) for management advice specific to your needs.



Regenerating the forest

Was your forest burned in a fire or devastated by pests? Did you complete a timber harvest and now want to replant? Are you trying to improve your stand by adding desired species or increasing density? Do you want to make your forest more resilient by increasing heterogeneity? The reasons for undertaking a reforestation project are many and varied.

Healthy forests provide myriad benefits, both to the landowner and society. When a forest is lost to fire or disease, or harvested

for timber, it is important to replace it as soon as possible. In fact, it is a legal requirement to reforest after certain harvest operations.

How do you go about reforesting your property—where do you start, what decisions need to be made, are there funding sources available, who can help? In this issue of *Forestland Steward* we hope to give you enough background to speak the language, ask the right questions, and get started on this complex undertaking.

Reforestation is your gift to the future. The trees you plant may become a forest that will be around for a century or longer. A successful regeneration project can produce a healthy forest with benefits to all. An unsuccessful project is a great waste of time and money.

There is more to reforestation than simply sticking some seedlings in the ground. First you need a plan. Your project should fit within the larger context of your vision and goals for your property. A forest management plan is the best way to create a long-range blueprint for your property (see page 3).

Before you start your reforestation project it is important to have a comprehensive reforestation plan for all aspects of the project, from ordering seeds through monitoring the forest after planting.

You will need to order seedlings a year or two ahead of planting (see page 3). Take special care in choosing seeds and species (see page 5). The site must be well prepped (see page 7), with proper



Reforesting after a fire in the Klamath National Forest.

Photo: US Forest Service

handling of seedlings before and during planting (see pages 8 and 12). Finally, you need to monitor your growing forest to respond to any problems or issues that may arise.

The soil is the foundation of your forest—treat it with respect (see page 6). As you prepare the site for planting, do what you can to keep the soil alive and healthy.

Before you undertake a reforestation project it is necessary to have a comprehensive plan.

Each landowner and forest and site is unique, so there can be no hard and fast instructions on how to do your reforestation project. Even within an individual forest there are variations—microclimates, soils, topographic variability, etc.—that need to be taken into consideration as you plan your project. Your goals and objectives guide the process, and your forest site will determine what is possible. A Registered Professional Forester (RPF) can help with all of this.

A newsletter can only give the barest outline on any topic, and this is a big one. If you follow the links you will find many excellent resources that can help you plan a successful reforestation project (see page 10).

Decisions, decisions...take time to plan

Reforestation isn't a spur-of-the-moment activity. It must be well planned to have a good chance of success. Since seedlings take a year or two to grow, you'll have plenty of time to prepare. But don't relax yet. There are a number of decisions that must be made early on.

Your management plan is your blueprint

If you have a forest management plan you've done the initial groundwork for your reforestation project. Your long-term vision for your land and your personal goals and objectives will guide your planning.

If you haven't yet created your management plan it's time to get started. Cost-share funding is available for you to work with a Registered Professional Forester (RPF) who can help you in defining your goals and desires for your forestland (see *Forestland Steward Winter/Spring 2014*, <http://fire.ca.gov/foreststeward/pdf/news-winspr2014.pdf>).

Reforestation plan

Your management plan is the big picture, but you will also need a reforestation plan that lays out the details for your reforestation project, the steps to be taken, budget, and timeline. Work with your RPF on this.

Natural or artificial regeneration?

Most of the time a forest will regenerate naturally from seed...eventually. Can you wait that long or do you want to help the trees get a head start?

Natural regeneration is much less expensive, but to regenerate a forest from seed requires certain conditions. First of all, an adequate supply of healthy seed must be available. If you are replanting after a big fire there may be few surviving seeds over a large area. Seed is also vulnerable to predators and the weather. When conditions are poor, there may be few healthy seeds to regenerate. Natural regeneration is also unpredictable, with no control over density and species composition. It leaves a lot to chance.

While more expensive, most reforestation projects in California are done by artificial regeneration using seedlings. This method allows the forest to regenerate more quickly, you can choose the species you desire, and you control the density of the stand.

A caveat is that some species do not require seedlings for successful regeneration. Redwoods, for example, reprod from their stumps. Oaks can be planted from acorns.

Order your seedlings

The first order of business is to contract with a reputable nursery to grow your seedlings. You will need to decide on the species, type, and how many to order.

Where to order?

Growing forest seedlings takes a lot of expertise; each species has its own, very specific, growing requirements. The State Nurseries, which used to grow seedlings on predicted sales, are no longer in operation. Some private nurseries specialize

in forest seedlings, but generally you must contract with them to grow the seedlings you need. In some cases you may have to order significant quantities.

A new option is the partnership between the El Dorado County RCD and the US Forest Service Placerville Nursery (see page 4). This service by the RCD will make it easier for nonindustrial private forest landowners to order the seedlings they need for reforestation and other authorized projects.

Seed zone?

For the best chance of success, the seed source for your seedlings should be well-adapted to the site you are planting. Usually, seed from nearby trees have the best genetic makeup to fit the site (see *Forestland Steward Winter 2013*, <http://fire.ca.gov/foreststeward/pdf/news-winter2013.pdf>).

However, we live in an unusual time with a rapidly changing environment. How will

(continued next page)



Seedlings grown for reforestation.

Photo: US Forest Service Region 5

Not Quite Synonymous

Afforestation—the establishment of a forest or stand in an area where the preceding vegetation or land use was not forest.

Reforestation—the reestablishment of forest cover either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting)—note reforestation usually maintains the same forest type and is done promptly after the previous stand or forest was removed.

Regeneration—the act of renewing tree cover by establishing young trees naturally or artificially—note 1. regeneration usually maintains the same forest type and is done promptly after the previous stand or forest was removed —note 2. regeneration may be artificial (direct seeding or planting) or natural (natural seeding, coppice, or root suckers).

Stand Establishment—the initiation of tree cover, either by afforestation, reforestation, or regeneration.

—from the *Dictionary of Forestry* <http://www.dictionaryofforestry.org/>

Reforestation Seedling Distribution Project

New seedling source for small forest landowners



Photo: USFS Region 5, Creative Commons License

Containers of seedlings growing under shade cloth at the Placerville Nursery.

Due to the large fires, insect damage, and disease that have recently ravaged California forests, there is a huge need for seedlings. Unfortunately, the State Nurseries, which used to grow a wide variety of species for all areas of the state, are no longer in operation. Private nurseries are unable to keep up with the demand. This has created a large backlog and limited the ability of landowners to reforest their properties.

We are happy to report that a solution is now in place. The El Dorado County & Georgetown Divide Resource Conservation District (RCD) is working with the US Forest Service Placerville Nursery to grow seedlings for private forest landowners. The beauty of this arrangement is that, although the Placerville Nursery cannot sell seedlings directly to landowners, they are allowed to sell to a public agency like the RCD. The RCD can sell to the public.

All seedlings will be grown and distributed on a contract basis. This means that landowners must order the seedlings ahead of time to arrange for the nursery to grow them. Seedlings purchased through the RCD can only be used for specified purposes, including “establishing forests, woodlots, windbreaks, and wildlife areas throughout the state of California.”

When you put in your order, the nursery will look for appropriate seed for your property and needs. All seedlings are grown from native or approved seed sources, including the State Seed Bank (*see page 5*). If seed is not available, the RCD will contact you and offer possible alternatives. A 40% partial payment is due upon ordering, with the balance due at the time of pick up or delivery.

The RCD will collect orders and send them to the nursery by October 15 for sugar pine and December 15 for all other species. Landowners will be notified when the seedlings are ready for pick up or delivery.

trees, which can live for centuries, fare in the future environment? And what will that future environment be? There is a great deal of research and discussion going on about this. There are no definitive answers at this time but you may want to follow the discussions (*see presentations on this by John Helms and Mark Schwartz at <http://ucanr.edu/sites/forestry/Webinars/Reforestation/>*).

Species?

Which species should you plant? Your decision will depend not only on your goals, but also on the site. Even within a single forest there are a variety of microsites that may be best suited for particular species. Your RPF can suggest species that will help you achieve your goals and envision what the forest might look like in a few decades.

Resilience is the ability to bounce back quickly after a disturbance. With wildfires and pest outbreaks on the increase, resilience is an important consideration. If one of your goals is to create a resilient forest, you will want to plant a variety of species to provide functional redundancy and heterogeneity.

Type of stock?

There are two general kinds of seedling stock: bareroot and containerized. Which you choose depends largely on site conditions, as well as cost. Bareroot stock is identified by two numbers, e.g., 1-1 or 2-0. The first refers to the amount of time in the seed bed, the second is the time in the transplant bed. Therefore, a 1-1 seedling was in the seed bed for a year, then was transplanted to the transplant bed for another year. Container stock is grown from seed in a container filled with soil.

Choose stock based on site conditions. Container stock will provide higher levels of survival than bareroot stock. Two-year bareroot stock has a higher survival than one-year. For harsher sites, strong healthy seedlings with a good root-to-shoot ratio is ideal. You may need different types of seedlings for various areas of your forest.

How many?

You can calculate how many seedlings you need based on the area to be covered and the desired spacing. But even this requires some important considerations (*see page 7*). In order to achieve a certain stocking level you may want to plant trees closer together and then thin them later. Or you may want to plant them at the desired spacing and assume you won't lose many. How do you decide? An RPF can help.

Seed Bank crucial to reforestation

Today, the California State Seed Bank is more important than ever. With the increasing frequency and size of wildfires and pest outbreaks, whole populations of trees may be wiped out, along with their unique genetic makeup. It is imperative to have appropriate seed in adequate quantities stored and available to replace these populations in the case of a natural disaster.

Seedlings are grown from seed. That sounds quite simple, but the whole process requires a surprising amount of expertise. High-quality seedlings come from high-quality seed, which must be properly collected, processed, and stored. It all requires a great deal of knowledge and care.

The Seed Bank has been doing an expert job of collecting seed for years. Staff there monitor cone crops throughout the state, identify gaps in the Seed Bank inventory, arrange for collection, test seeds for viability, process the seed, store it correctly, and provide seed to nurseries for appropriate uses.

The Seed Bank is a treasure of biodiversity. It is a repository of seed from all over California, representing a huge diversity of species, seed zones, and genetics. Seed is collected not only from timber species, but also from unique seed crops in areas of lower site quality, specialized climates, smaller seed zones, and lower elevations.

The Seed Bank also stores seed for foresters, private landowners, and industry.

Seed collection is a large part of the Seed Bank's work. Cone season, which occurs between July and November, is very unpredictable and a good cone crop may only come once a decade or more. When a good cone year does occur, the cones must be harvested within a short 1–2 week window. Only the best cones are chosen, from the best trees.

There is a strict protocol to harvesting seed. Staff at the Seed Bank know how to handle the cones, and how to pick, deliver, dry, extract, and store the seed. Each tree species has its own needs and critical timeline. If not done right, 50% of the cone crop can easily be lost.

The skills, technology, and equipment found at the Seed Bank are unique, developed over many years. A new modern freezer has just been built to store an adequate amount of seed for catastrophic events and to maintain genetic diversity, especially in relation to climate change. That is good news for forests and forest landowners.

For more on the Seed Bank, see Forestland Steward Winter 2013, <http://fire.ca.gov/foreststeward/pdf/news-winter2013.pdf>.

Watch the two-part webinar recording on Procuring Plant Materials by Teri Griffis at <http://ucanr.edu/sites/forestry/Webinars/Reforestation/>.



Redwood cones are processed at the Seed Bank.

Calling forest landowners!!

Keeping the Seed Bank filled with seed is a community effort. If you see an unprecedented cone crop developing on your property please notify your local CAL FIRE forester, RCD, or the Seed Bank. If the seed type is needed, someone will come out to check your cones. You may be able to exchange cones for processed seed.



We are excited to announce that the new modern seed bank freezer is almost ready. This will replace the old seed bank, which is filled to capacity (right).



Soil Benefits

- Provides water, nutrients, and physical support for trees and other plants
- Exchanges carbon dioxide, oxygen, and other gases that support root growth and soil organisms
- Substrate for organisms linked to vital ecosystem processes
- Water quantity and quality

The bottom line: Soil

Soil is the very foundation of a healthy forest. As you plan and implement your reforestation project, it is important to respect the soil and do your best to keep it healthy.

Soil anchors tree roots, provides stability, and supplies trees and plants with water, oxygen, and nutrients. In return, forest trees and plants protect the soil and nourish it with organic materials. Forests and soils are vital components of a very complex ecosystem.

Quick overview of forest soils

Soil is composed of various layers, or horizons. At the very bottom is the parent rock. Parent rock determines a lot about the mineral characteristics of the soil. As the parent rock breaks down over time, it creates weathered material. As you go up in the soil horizon, there are increasing amounts of organic matter mixed in with the mineral soil.

At the very top is the topsoil, inorganic material mixed with decaying organic matter and covered by leaf litter. Topsoil is the living layer where the roots, fungi, microorganisms, invertebrates, and small vertebrates live.

The ability to hold water and nutrients is determined by the soil's characteristics. Soil pores, the spaces between particles, are of utmost importance to plants and trees. This is where water and air collect.

Mycorrhiza are extremely important to a forest. The fungal hyphae, thread-like filaments, are small enough to access the water and air in tiny soil pores that roots are unable to reach. Mycorrhiza also provide other benefits. They help build soil structure, move water and nutrients around the forest, and protect tree roots from pathogens.

After a burn

When the forest is gone, due to fire or harvest, the soil is unprotected. In some cases, heat from an intense fire can create a layer of hydrophobic (water repelling) soil. When soil is less absorbent, rainwater runs off more quickly, washing down soil, reducing water quality, and increasing the chance of flooding.

After a burn it is important to evaluate the damage and take steps to prevent erosion. You may want to cover the soil with slash or mulch, or seed it with appropriate species of grasses. (*See Recovering from Wildfire for more information, <http://anrcatalog.ucdavis.edu/pdf/8386.pdf>.)*

A low-intensity fire can also create charred material, called black carbon, which is good for the soil and increases fertility. This carbonized wood sequestered in the soil helps hold nutrients and can take decades to break down. Frequent small burns increase the amount of soil carbon.

Maintain soil quality

Maintaining your forest soil in the best possible condition should be a high priority. It takes a long time to increase soil quality but soil can easily be degraded by poor management. Erosion, soil compression, fire, and herbicides can all affect soil health, and the health of your forest.

Healthy forests do a good job of protecting the soil. The tree canopy and ground litter shield the soil from erosive forces, such as wind and rain, heat and cold, and nourish it with fallen leaves, woody debris, and other organic material, which provide a constant input of carbon.

A diversity of plants/trees is good for the soil. For example, ceanothus and alder are nitrogen-fixers and provide valuable nitrogen, which is deficient in most forests, to the soil.

Be especially aware of the living components of the soil: the mycorrhiza, invertebrates, and other creatures that are an integral part of the forest. While soil is renewable, it builds up over a very long period of time. It's best to take care of the soil you have.

Site quality, index, and class

Soil and climate are the most important factors for determining the productivity (potential to grow trees) of your forest. This productivity is defined in terms of site quality, site index, and site class.

Site quality refers to how well trees are growing on the site.

Site index is the most common measurement of productivity on forestland, based on the height of specific trees at a specific age. There are tables that allow you to estimate the site index of your forest.

Site class is the simplified number (in Roman numerals I–V) to define productivity. Site class I is the best and class V the poorest.

For a more thorough discussion of this important topic, plus directions for estimating the site index of your forest, see the Spring 2006 issue of *Forestland Steward* at <http://fire.ca.gov/foreststeward/pdf/newsletter29.pdf>.

Teeming with life

The organisms that live in the soil—bacteria, fungi, worms, burrowing animals, etc.—create a fascinating web of life and play a huge role in soil health.

These creatures recycle organic matter, aerate the soil through their movements, and add to the organic matter.

Some fungi form partnerships with tree roots, called mycorrhiza, that help the trees thrive (*see Forestland Steward Fall 2013, <http://fire.ca.gov/foreststeward/pdf/news-fall2013.pdf>).*

Planting tricks of the trade

Finally! After all the planning and preparation and waiting your seedlings are ready. It's time to plant the forest.

Preparing the site

Your objective when planting is to give your seedlings a competitive advantage over the other plants that compete for moisture, nutrients, and light. Seedlings are slower growing than most grasses, annuals, and shrubs, so an important step in the process is to prep your site.

Site prep involves clearing the area around the planting site. This is generally done by mechanical or chemical means, sometimes by fire. Which to use will depend on site characteristics, cost, forest type, regulatory requirements, and your goals.

Mechanical clearing is often accomplished with bulldozers or tractors, but can also be done by hand.

Herbicides can kill competing vegetation and are cheaper than manually clearing the site, but this option can be controversial because of the toxicity. If you choose to prep with herbicides, it is imperative to use the correct herbicide at the proper rate and the right time. Follow the application directions precisely and use appropriate protective gear. Some herbicides require a PCA (Pest Control Advisor) certification and liability insurance.

Controlled burning can be an effective way to clear some sites, but requires planning, permits, and correct conditions to implement safely.

Proper care of seedlings

Planting is a time when seedling roots are very vulnerable. Poor handling can interfere with their ability to grow. Proper care of your seedlings and good planting techniques can make or break your future forest.

Check seedlings. At the nursery, check your seedlings carefully. Root tips should be less than 1/4 inch. Strip back the bark of the stem and root system on a couple of trees; the inner bark should be moist and glistening white. Mold or sour odor suggests improper storage. If the stock is yellow, brown, or has brown spots, it is badly damaged and has little chance of survival.

Transport. Keep the seedlings cool and moist at all times. Transport them at night or ship them in a refrigerator truck. You can cover seedlings with a special blanket available at forestry supply

stores but don't use a dark tarp, which can increase heating. Be aware that the bed of a pickup can heat up by the exhaust system.

Storage. It is best to plant as soon as possible, generally within 3 or 4 days of receiving your seedlings. If you have to store them, do it correctly. Above all, keep the roots moist and don't let them dry out. Stack the seedling bags or boxes to allow adequate air circulation and cooling.

The ideal temperature for storage is 34° to 36° F. Temperatures of 40° or above can damage the seedlings. Avoid freezing temperatures, which can damage plant cells.

Planting

Tools. The right tools will make your job much easier. There are hand tools, power tools, and machines. A hoedad and planting shovel are two useful hand implements (see *illustration below*).

Timing. The best time to plant depends on the planting stock, climate, location, and soil conditions. Bareroot seedlings are dormant and should be planted in the winter when the soil is moist. Container seedlings can be planted during the growing season since they are protected by soil.

Spacing. The number of seedlings you plant depends on the area and spacing, as well as the species, site characteristics, and your goals. If you are planting after harvest, the Forest Practices Act mandates the density, usually 300 trees per acre after 5 years.

You may want to plant seedlings at your final desired spacing or plant them closer together with the intention of thinning later. Trees are usually grown at a spacing of 10' x 10' or 12' x 12'.

An interesting option is variable stand density, where trees are planted in groups with open space between. This creates areas of natural, denser habitat with space between to decrease competition and fuel continuity.

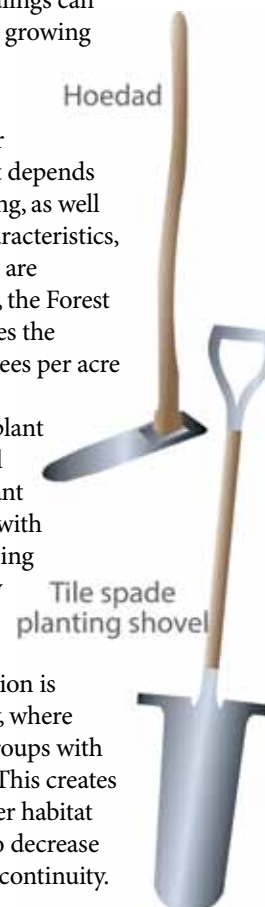


Illustration from Rose and Haase, 2006. *Guide to Reforestation in Oregon*. FRL Research Contribution 31, OSU College of Forestry, Corvallis. <http://hdl.handle.net/1957/7854>

Checklist for Planting

- Handle seedlings gently and as little as possible. Avoid touching roots.
- Keep seedlings cool (34–36° F) and protect them from freezing or temperatures above 40°.
- In the field, store seedlings in the shade or under a reflective space blanket. Don't use canvas or dark-colored coverings. Minimize field storage.
- Protect seedlings (especially roots) from drying out. Reduce exposure to dry air and add water when needed during storage and just before planting.
- Use bags or boxes that are constructed or coated to prevent water loss. Keep them securely closed (use tape to repair rips/tears).
- Dip seedlings in water for 1 minute before placing them in the planting bag to provide added protection to the root system.

— adapted from *The Care and Planting of Tree Seedlings on Your Woodland*, by OSU Extension

Get the details

This article covers only the very basics of planting. Next, go to the following resources for greater depth (see page 10 for links).

UC Cooperative Extension *Forest Stewardship Series*, especially Forest Regeneration

Guide to Reforestation in Oregon by Rose and Haase

OSU Extension publications, Forest Regeneration section

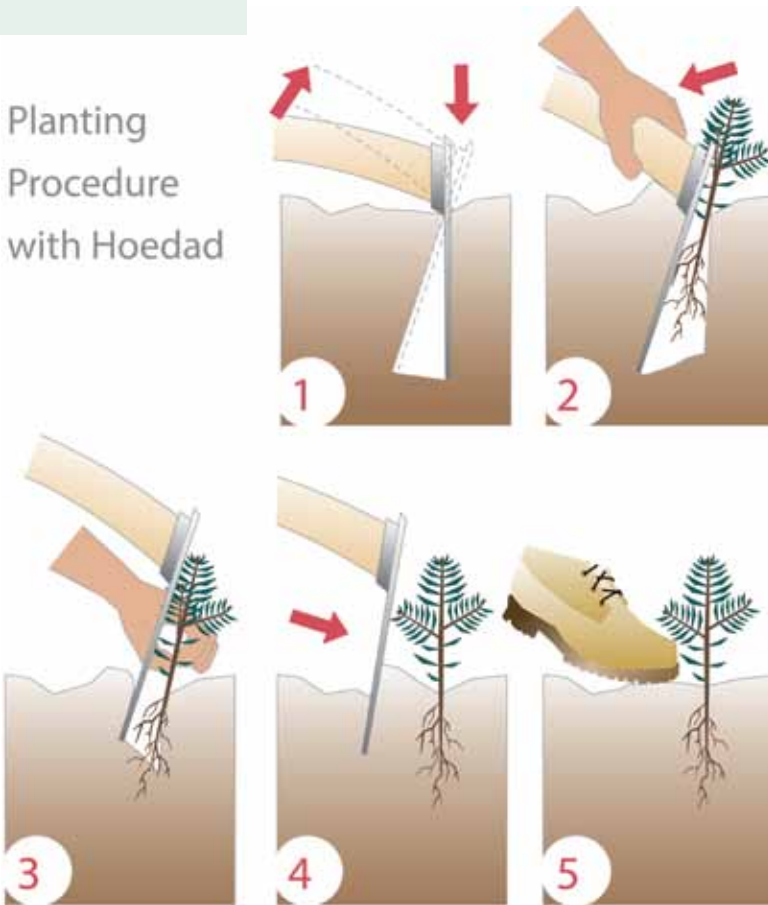
Planting techniques. Keep roots moist and carry no more than 50 to 100 seedlings in the planting bag at one time. Plant each seedling correctly (see *one technique below and problems on page 12*).

After planting

Protect your seedlings. Seedlings are tasty morsels to a large number of hungry animals and you can easily lose your young trees at this stage. There are many types of tubes, cages, and other protective measures to help your seedlings survive their most vulnerable years (but be sure to remove them when no longer needed). You may need to control competing vegetation, even grass, over those first years. Monitoring is essential.

Monitor. Your job isn't finished when the planting stage is completed. All kinds of problems may come up and the earlier you discover and address them the better off you'll be. Build monitoring into your reforestation plan, with regular visits to the site. Keep notes and take photos. You may need to adapt your management plans as you go along.

Planting Procedure with Hoedad



1. Insert blade deeply and pull back to open hole. 2. Insert seedling, making sure the roots are straight down. 3. Backfill gently around roots. 4. Firm soil with planting tool. 5. Pack soil firmly around seedling.

From Rose and Haase, 2006. *Guide to Reforestation in Oregon*. FRL Research Contribution 31, OSU College of Forestry, Corvallis. <http://hdl.handle.net/1957/7854>

Reforestation Legacy

The major California reference on reforestation, *Reforestation Practices for Conifers in California* by Gilbert Schubert and Ronald Adams, was written in 1971, almost 45 years ago.

We've come a long way since that time.

The old publication is very obviously out of date. It covers the science of the time: ancient equipment, ripping hillsides, shooting cones out of trees...today's

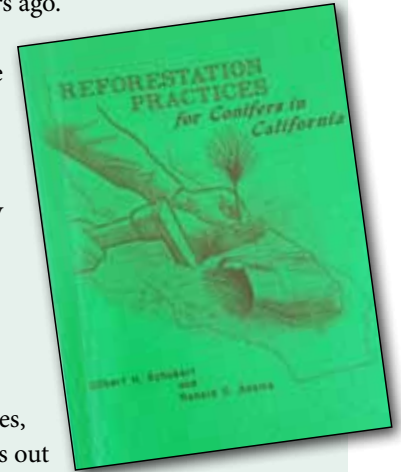
forest science has progressed considerably.

While reforestation know-how has improved immeasurably, much of this information has not been formally documented, and many of those with deep knowledge are now retiring.

To capture the current state-of-the-art of reforestation, a Reforestation Legacy group has formed to update *Reforestation Practices*. This group, which consists of both private industry and public agency representatives, is working on a new, highly technical publication for professionals and landowners alike. The group hopes to develop multimedia presentations as well.

The first three chapters will be about seeds. For example, did you know that each tree species has a different processing requirement? The expertise that has developed on this topic will help both the public and private sectors improve reforestation practices.

Funding for the updated publication is expected to come from a variety of sources: the Board of Forestry, industry, and various Federal and State agencies. We'll let you know when the project is completed.



Need help?

Reforestation is costly, but there is plenty of help available if you know where to look.

If you need financial and technical help with reforestation, CAL FIRE administers a number of landowner assistance programs. The California Forest Improvement Program (CFIP) offers cost-share to assist landowners with land management planning, conservation practices to enhance wildlife habitat, and practices to enhance land productivity. There are special rates for reforestation following wildfire.

CAL FIRE also has the Forest Stewardship Program, which combines funds from State and Federal sources to assist with multiple-ownership watershed and community issues related to prefire fuels treatment, forest health, erosion control, and fisheries. This year there is new funding for carbon sequestration projects (*see Forestland Steward Fall 2014/Winter 2015, <http://www.fire.ca.gov/foreststeward/pdf/news-fall14winter15.pdf>*).

For more information: http://calfire.ca.gov/resource_mgt/resource_mgt_forestryassistance.php.

2015-16 CFIP COST-SHARE CAP RATES

PRACTICE	CFIP CAP RATE	90% COST-SHARE ¹	75% COST SHARE
Management Plan	\$5000 +	\$4500 +	\$3750+
High (New)	\$3.00/acre 1 st 160 acres \$2.50/acre each additional acre to 1000	\$2.70/acre 1 st 160 acres \$2.25/acre each additional acre to 1000	\$2.25/acre 1 st 160 acres \$1.88/acre each additional acre to 1000
<i>Rates for plans larger than 1000 acres are negotiated w/ CAL FIRE forester</i>			
Management Plan Revised/Low (Mini)	\$1750 + \$1.40/acre	\$1575 + \$1.26/acre	\$1313 + \$1.05/acre
RPF Supervision	\$150/acre 1st 20 acres \$75/acre each additional acre	\$135/acre 1 st 20 acres \$67.50/acre each additional acre	\$112.50/acre 1 st 20 acres \$56.25/acre each additional acre
Site Prep			
Light	\$350/acre	\$315/acre	\$262.50/acre
Moderate	\$500/acre	\$450/acre	\$375/acre
Heavy	\$800/acre	\$720/acre	\$600/acre
Trees & Planting			
Average	\$225/acre	\$202.5/acre	\$168.75/acre
Moderate	\$350/acre	\$315/acre	\$262.50/acre
Difficult	\$550/acre	\$495/acre	\$412.50/acre
Tree Shelters	\$350/acre	\$315/acre	\$262.50/acre
Pre-commercial Thinning²			
Light	\$350/acre	\$315/acre	\$262.50/acre
Moderate	\$450/acre	\$405/acre	\$337.50/acre
Heavy	\$700/acre	\$630/acre	\$525/acre
Pruning²	\$200 for 50 trees/acre \$350 for 100 trees/acre \$450 for 150 trees/acre	\$180 for 50 trees/acre \$315 for 100 trees/acre \$405 for 150 trees/acre	\$150 for 50 trees/acre \$262.50 for 100 trees/acre \$337.50 for 150 trees/acre
Release²			
Light	\$250/acre	\$225/acre	\$187.50/acre
Moderate	\$400/acre	\$360/acre	\$300/acre
Heavy	\$700/acre	\$630/acre	\$525/acre
Follow-up/Slash Disposal			
Light	\$250/acre	\$225/acre	\$187.50/acre
Moderate	\$550/acre	\$495/acre	\$412.50/acre
Heavy	\$900/acre	\$810/acre	\$675/acre
Land Conservation/Wildlife/Fisheries Projects ³	Cost based on problem. Use EQIP rates as a guide		

¹ The 90% rate will cover all projects on substantially damaged timberland by wildfire, insects, diseases, wind, floods, landslides, or earthquakes.

² Disposal of slash must meet minimum Fire Hazard Reduction Standards per Forest Practices Act.

³ Maximum allowable costs do not appear for land conservation or habitat improvement. In these categories activity is variable and will depend on site condition, acreage, and/or type of project. However, costs will be evaluated based on rates used for SIP or EQIP.

Contact the experts

The following resource agencies will be happy to help you get started in finding cost-share programs and grants. Contact the Helpline or find your local CAL FIRE, UC Coop Extension, RCD, or NRCS office (*see page 10*).

Stewardship Helpline (1-800-738-TREE) or ncsaf@mcn.org

CAL FIRE Forestry Assistance Specialist (FAS)

UC Cooperative Extension Forestry

Resource Conservation District (RCD)

Natural Resources Conservation Service (NRCS)

More info on the website

Go to the Forest Stewardship website for newsletters, tree notes, and much more. Find us at <http://calfire.ca.gov/foreststeward>.

Resources All about reforestation

After a wildfire

Recovering from Wildfire: A Guide for California's Forest Landowners <http://anrcatalog.ucdavis.edu/pdf/8386.pdf>

Recovering from Wildfire in Southern California Forests <http://cemendocino.ucanr.edu/files/17268.pdf>

After the Fire: Resources for Recovery. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/wa/home/?cid=STELPRDB1259629>

Webinar Series on Reforestation presented by the Society of American Foresters, UC Extension, and others. Watch the recordings at <http://ucanr.edu/sites/forestry/Webinars/Reforestation/>.

Oregon State University Extension has some wonderful forestry publications at <https://catalog.extension.oregonstate.edu/topic/forestry-and-wood-processing>. Although focused on Oregon forests, there is helpful information throughout. Go to the Reforestation section for some gems:

- **Successful Reforestation: An Overview.** <https://catalog.extension.oregonstate.edu/sites/catalog.extension.oregonstate.edu/files/project/pdf/ec1498.pdf>
- **Selecting and Buying Quality Seedlings.** <https://catalog.extension.oregonstate.edu/ec1196>
- **The Care and Planting of Tree Seedlings on Your Woodland.** <https://catalog.extension.oregonstate.edu/ec1504>

University of California Cooperative Extension also has excellent resources. The Forest Stewardship Series at <http://anrcatalog.ucdavis.edu/pdf/8323.pdf> includes Forest Regeneration at <http://anrcatalog.ucdavis.edu/pdf/8237.pdf>

Guide to Reforestation in Oregon by Rose and Haase. <http://www.oregon.gov/odf/privateforests/docs/ReforestationGuide.pdf>

Keeping your Forest Soils Healthy and Productive

<http://cru.cahe.wsu.edu/CEPublications/eb2019/eb2019.pdf>

Forestland Steward has had several issues covering reforestation. Go to <http://www.fire.ca.gov/foreststeward/newsletter.html>.

Tree Planters Notes from the US Forest Service's Reforestation, Nurseries, & Genetics Resources (RNGR) provides the latest technical information on reforestation.

<http://www.rngr.net/publications/tpn>

How to Collect, Store, and Plant Acorns.

<http://www.californiaoaks.org/ExtAssets/HowToAcorns'07.pdf>

Regenerating Rangeland Oaks in California.

<http://www.californiaoaks.org/ExtAssets/Regenerating%20Rangeland%20Oaks%20in%20California.pdf>

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

Stewardship Forester
Stephen Smith; stephen.smith@fire.ca.gov

Forestry Assistance Specialists

Guy Anderson (Mariposa/Madera/Merced) 209-966-3622 x218
vacant (Santa Rosa) 707-576-2935
Brook Darley, (Redding) 530-224-1420
Damon Denman (Siskiyou) 530-842-3516
Adam Frese (Tuolumne/E. Stanislaus) 209-532-7429 x109
Ivan Houser (Lassen) 530-257-4171
vacant (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
vacant (Placer/Yuba/Nevada) 530-265-4589 x101
Jason Butcher (Humboldt/Del Norte) 707-726-1258
Edwin Simpson (Fresno/King) 559-493-4307

Tom Tinsley and/or Patrick McDaniel (Amador) 530-647-5200

California Association of RCDs

916 457-7904; staff@carcd.org

Natural Resources Conservation Service (NRCS)

State Forester; 530-792-5655

UC Cooperative Extension Forest Advisors

Mike De Lasaux (Plumas, Sierra) 530-283-6125; mjdelasaux@ucdavis.edu
Ryan DeSantis (Shasta, Siskiyou, Trinity) Counties; 530-224-4900; rdesantis@ucanr.org
Greg Giusti (Mendocino, Lake) 707-463-4495; gagiusti@ucdavis.edu
Susie Kocher (El Dorado, Amador, Calaveras, Tuolumne) 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) 707-445-7351; yvala@ucdavis.edu

USDA Forest Service

Dan McKeague, Forest Landowner Asst Programs 707-562-8875; dmckeague@fs.fed.us

Calendar

May 16

Living With Wildfire: Making Your Home More Fire Safe

Location: Weaverville Fire Hall

Contact: rdesantis@ucanr.edu

Website: <http://ucanr.edu/sites/forestry/Events/?calitem=270944&g=28858>

May 18

Webinar: Past, present, and future in the forests of California's Sierra Nevada: variability in forest response to environmental change, and the role of management in promoting ecosystem resilience

Register: <http://www.cafiresci.org/events-webinars-source/category/past-present-and-future-in-the-forests-of-the-sierra-nevada-variability-in-forest-response-to-environmental-change-and-management-strategies-to-promote-ecosystem-resilience>

May 19

Northern California Chaparral Fire Hazard Summit

Location: Hopland, CA

Sponsors: California Fire Science Consortium and UC Cooperative Extension

Contact: Amber Shrum 707-744-1424 x101

Flyer: <http://hrec.ucanr.edu/files/208509.pdf>

May 20

Redwood Region Forest Management and Market Opportunities

Location: Eureka, CA

Cost: \$15 (includes lunch)

Contact: 707-445-7351

Info: <http://cehumboldt.ucanr.edu/files/211195.pdf>

Register: <http://ucanr.edu/survey/survey.cfm?surveynumber=15307>

Note: Register by May 15; no late registration

May 27

UC Sierra Nevada Adaptive Management Project (SNAMP) Annual Meeting

Location: McClellan, CA

Contact: Kim Ingram, kcingram@ucanr.edu

Website: <http://snamp.cnr.berkeley.edu/events/may-27-2015-snamp-final-meeting>

Registration: <http://ucanr.edu/survey/survey.cfm?surveynumber=14971>

May 29

Managing Large Burned Landscapes in the Sierra Nevada

Location: Georgetown, CA

Website and Registration: <http://www.cafiresci.org/events-webinars-source/category/managing-large-burned-landscapes-in-the-sierra-nevada>

Notes: Learn about fire effects and post-fire management plans of the King Fire.

June 8–10

Southern California Chaparral Symposium

Location: Arcadia, CA

Website and Registration: <http://www.cafiresci.org/events-webinars-source/category/the-2nd-southern-california-chaparral-symposium-understanding-the-ecological-value-of-chaparral-landscapes-ecosystem-services-human-management-and-future-trends>

Notes: Importance of chaparral landscapes to the ecology, resources, and people of southern CA.

June 16–17

Board of Forestry Meeting

Location: Resources Building, Sacramento

Website: <http://bofdata.fire.ca.gov/>

June and July

Forestry Institute for Teachers (FIT):

• June 14–20 in Plumas County

• June 21–27 in Tuolumne County

• July 5–11 in Shasta County

• July 12–18 in Humboldt County

Website: <http://www.forestryinstitute.org/>

September 23–26

International Plant Propagators Society

Location: Modesto, CA

Website: <http://www.ippswr.org/>

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Common Planting Problems

1. Too Deep

needles buried
hole okay
tree position poor



2. Too Shallow

roots exposed
hole too shallow



3. Air Pocket

from improper
tamping



4. 'L' Roots

hole shallow



5. 'J' Roots

hole shallow
roots often exposed
to air



6. Compacted Roots

hole too narrow
not properly
opened



7. Not Vertical

shallow planting
caused by improper
digging of hole



8. Too Loose

improper
tamping after
planting



9. Poor Planting Soil

planting in rotten wood,
deep duff or debris,
not damp mineral soil



10. Satisfactorily Planted Tree

