



# FORESTLAND STEWARDS

WORKING TOGETHER FOR HEALTHY FORESTS

FALL 2001

## Coast live oak woodland study offers management tips for landowners

*Lawrence E. Bonner  
and Norman H. Pillsbury*

Coast live oak (*Quercus agrifolia*) woodland is an underutilized, rapidly diminishing resource containing many values beyond its aesthetic tranquility and wildlife habitat. While the potential of wood for supplying energy has resulted in increased harvesting pressure on California's woodlands, coast live oak has largely been ignored.

To try to gain an understanding of the suitability of coast live oak woodlands to provide a continuous source of wood fiber for energy and wood products given proper management, a growth and yield study was begun in 1984 by Dr. Norman Pillsbury, California Polytechnic State University.

In addition, the study looked at the response of the woodland ecosystem to selective thinning management. This study has also allowed for the analysis of natural disturbances, such as fire, on this resource and may help answer some of the many questions surrounding Sudden Oak Death (*Phytophthora*

*ramorum*), a disease currently plaguing the coastal woodlands in California.

### Coast live oak woodlands and society

California's coast live oak woodlands usually grow in dense, even-aged stands that cover approximately 700,000 acres from San Diego to Mendocino County. Stands typically average 60–80 years of age.

Urban sprawl and a desire for economic returns from properties containing coast live oak have resulted in unregulated conversion of this resource. Although most landowners

greatly value their oak woodlands for aesthetic beauty, many are forced to find a way to make those acres generate profit. Due to the ever-increasing need for housing, these holdings are often converted into suburban home developments. Woodlands are also being converted into open land for planting grapes or converted to increase grazing acreage.

Currently, little is known about site productivity, tree growth, and the potential effects and response of harvesting or other management practices

*(continued on page 8)*



*The "hands-on" part of research: Measuring tree heights and diameters within the research plots.*

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## Funding update

# Cost-share funding on hold

Chris Rowney

State law requires that all revenue derived from the sale of forest products from the State Forests be deposited in the Forest Resources Improvement Fund (FRIF) (PRC 4799). State law also identifies the purposes for which FRIF may be expended. These specific purposes are:

1. The California Forest Improvement Program (CFIP) for assisting non-industrial landowners in improving their timberlands
2. Urban forestry programs
3. Wood energy programs (e.g. biomass)
4. State Forest System operating costs
5. Forest pest research and management (e.g. pine pitch canker, sudden oak death)
6. State nurseries programs for restocking burned areas and timberland improvement
7. Costs associated with administering the Forest Practice Act

Over the years, the Legislature has also directed FRIF funds to other purposes such as the North Coast Watershed Assessment Program (NCWAP), a multi-agency effort for assisting landowners in cumulative impact assessment. This program is coordinated by the CDF Fire and Resource Assessment Program (FRAP).

Since its acquisition by the state in 1946, Jackson Demonstration State Forest (JDSF) has shown significant increases in growth rate and standing timber inventory. As a result of CDF's conservative management practices, harvest volumes on the 50,000 acre parcel have been maintained at a level lower than growth in order to grow bigger, older trees, restore healthy riparian zones, provide recreation, and enhance timber inventory. The harvest leveled out in 1986 when the JDSF management plan called for a 5-year average annual harvest of approximately 29 million board feet (MMBF), compared

to the annual growth of between 55–60 MMBF.

In the past two decades, the stumpage value of timber (i.e. the value of standing timber as sold) has also generally increased. But stumpage value varies with the timber market, which is related to the housing market and global timber supplies. This means that the net revenue from timber sales to FRIF can and does fluctuate from year to year.

Earlier this year, a lawsuit was filed alleging that operations on JDSF were not in compliance with a 1986 Board of Forestry and Fire Protection policy which required that management plans be "maintained current." The Board has since revised the policy to require that management plans be reviewed every five years, and to permit timber harvesting during the period of updating the management plan, since harvest plans comply with (and in fact generally exceed) the Forest Practice Rules that are current at the time.

In response to the lawsuit, the Superior Court issued an injunction which stopped timber sales at JDSF until the new management plan is approved. As a result, revenue has stopped flowing into the FRIF for at least Fiscal Year 01/02.

Because of the injunction, many important functions of FRIF-funded programs must be severely curtailed. These include CFIP grants, which are one of the most successful programs for restoring California's understocked, non-industrial forestlands.

Meanwhile, CDF continues work on updating the JDSF Management Plan (see <http://www.fire.ca.gov>). CDF's public participation schedule anticipates that the new JDSF management plan will be ready for approval by the middle of next year. Assuming no further legal challenges, CDF hopes to resume sustainable harvesting and demonstration projects that will help stabilize FRIF funded programs for FY 02/03.

## FORESTLAND STEWARD

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**Editor's Note:** Due to a backlog of previously approved projects, there are no funds available for new projects for the following programs this year: Forest Stewardship Program (FSP), California Forest Improvement Program (CFIP), and the Stewardship Incentive Program (SIP). For more information on the status and availability of cost-share programs for forestland owners, call Heather Morrison at the California Forest Stewardship Helpline, 1-800-PET-TREE.



## Seasonal Stewardship

### Time to order seeds, make plans for planting

The state nurseries are a great resource for forestland owners. Not only do they supply native seedlings for planting, but also offer extensive technical advice on selection, handling, planting, and maintenance of seedlings. Both centers maintain lists of private nurseries within the state.

The two state nurseries are the Lewis A. Moran Reforestation Center in Davis (Yolo County) and the Magalia Reforestation Center in Magalia (Butte County). Both nurseries produce native species for purchase by landowners for specific purposes including reforestation, erosion control and watershed protection, windbreaks, Christmas trees, fuel wood, and approved research projects. Seedlings *cannot* be purchased for landscaping or resale.

The state nurseries distribute about 2 million trees annually. The majority, approximately 89%, are planted for forestry on private lands. Forest planting and Christmas tree production utilizes approximately 92% of the total. The remaining 8 percent is divided as follows: public lands, 2.5%; private land for erosion control and watershed protection, 4%; private land for farm windbreaks, 1%; and other uses such as reforestation studies and research, 0.5%.

The L.A. Moran Reforestation Center produces over 300,000 seedlings each year and maintains over 20,000 pounds of seed in its Seed Bank, a refrigeration unit that maintains seed at zero degrees. Seeds are preserved for three major reasons: for routine production, genetic conservation, and for reforestation after fire. There are more than 80 adaptive tree seed zones throughout California and the goal of the Center is to have a 10 year supply of seed in the bank for each adaptive zone.



*In addition to growing seedlings, the Lewis A. Moran Reforestation Center seed operation processes from 2,000 to 11,000 bushels of cones, acorns, and hardwood seed each year. Staff arranges for cone collections statewide, taking those cones and processing them to retrieve their seed, x-raying and further processing to retain only the seed that has the best chance to germinate, and storing the seed in the huge Seed Bank. Small batches of seed in the bank are regularly tested to ensure they will still germinate (see next page for more).*

Seeds are sown in containers at the Moran Center throughout the year. The seedlings are available for shipping from mid-October through the end of May.

The Magalia Reforestation Center is CDF's bareroot nursery and produces an average 2.5 million seedlings annually. Seeds are sown in the ground on the nursery's 15 acres. The lifting season begins in December and continues through March. Seedling orders should be placed by November 1 and are shipped between December 15 and June 1.

Note: It is important to plant trees from the correct tree zone. Those landowners with specific needs, especially after a fire, may want to consider a contract or advance reservation to ensure a

supply of seedlings from the right seed source. Call the nursery to find out minimum requirements and other information.

Magalia Reforestation Center  
6640 Steiffer Road  
Magalia, Ca 95954  
(530) 873-0400

Lewis A. Moran Reforestation Center  
PO Box 1590  
Davis, Ca 95617  
(530) 753-2441

Information on each nursery, order forms, contract information, and "Tips for Planting Seedlings" are also available on the web at <http://www.fire.ca.gov/ResourceManagement/StateNurseries.asp>.



## It's cone season at the nursery

This year the Lewis A. Moran Reforestation Center is buried in cones...about 9–10,000 of them in all. Bumper crops like this are unusual; this is the second largest crop seen in 20 years.

While most people know that the state nursery produces seedlings, the behind-the-scenes work is much more interesting and involved.

The nursery's challenge is to have a 10 year supply of seeds for each of the 80 California seed zones. That means staff have to keep track of how much seed is needed for each zone, then commission climbers to gather cones at the right time. If a cone is picked too early, the seed won't perform; if picked too late, the cone will open and seeds will fall out and be lost.

The seeds are gathered and placed in special bags pioneered by the Center. These bags, made of the same open mesh material used in baseball caps, allows air to flow through freely. The bags are turned each day until the cones open. Then the fun begins...

The nursery has numerous interesting and mysterious machines whose sole purpose is to separate the seeds from the cones and other debris. There are kilns, separators, tumblers, even a dewinger "to get de wings off" pine seeds.

Seeds are further processed for quality. Batches are x-rayed to see which seeds appear viable. Air separators separate the good from bad seed by weight—a tricky operation that varies



(Above) Cones are everywhere.

(Left) Racks of cones in special bags are turned each day until they open.

from batch to batch and throughout the day as the moisture changes. It may take 6–7 tries to get a good separation.

The final seed is stored in the Seed Bank, a cold storage unit set at 0°F and 5–9% moisture content. Basically, the seeds are put into hibernation.

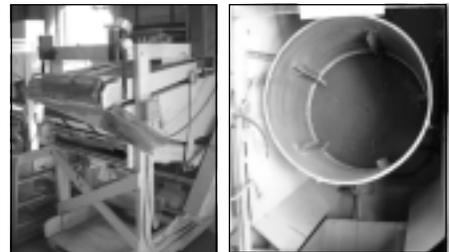
Small samples of each batch are then tested periodically to see how well they germinate. These seeds are taken out of storage, dormancy is broken by chilling and other means, then they go through a "spring" in the germinator to see if they are still viable.

Careful recordkeeping is vital for this operation's success. Information on exactly where the seed comes from, quality characteristics, and germination records ensure that landowners get the high-quality seedlings they require.

—L.L.

(left) Staff at the Moran Nursery work long and hard during cone season. Ed Medina's comment: "It makes you feel good about what you do."

(Below) A variety of machines are needed to retrieve the seed. (Left) Separator; (Right) Dewinger; (Bottom) Chris Gieber puts sugar pine cones into the tumbler.



## Road work

# Get ready to winterize your roads

**W**interizing consists of maintenance and erosion control work needed to drain the road surface, to ensure free flowing ditches and drains, and to open all culverts to their maximum capacity.

- ◆ Before winter, all permanent, seasonal, and temporary roads should be inspected and prepared for the coming rains.
- ◆ On unsurfaced roads, waterbars may be required at spacings dictated by the road gradient and the erodibility of the soil.
- ◆ Trash barriers, culvert inlet basins and pipe inlets should all be cleaned of floatable debris and sediment accumulations.

◆ Ditches that are partially or entirely plugged with soil and debris should be cleaned and heavy concentrations of vegetation which impede ditch flow should be trimmed.

◆ Excavate all unstable or potentially unstable fills and sidecast which could fail and be delivered to a watercourse during the coming winter.

◆ Once seasonal and temporary roads have been winterized, they should be gated and closed to non-essential traffic.

—from *Handbook for Forest and Ranch Roads* by William Weaver and Danny Hagans. Available from the Mendocino County Resource Conservation District, 405 Orchard Ave, Ukiah, Ca 95482. (707) 468-9223. \$20.



*Culverts need to be inspected before and during winter storms. Fix problems before failure occurs.*

## Use Your Appliances Wisely

- ✓ Turn off appliances, lights and equipment when not in use.
- ✓ To help prevent electricity outages, **do not run large appliances** between 5 a.m.–9 a.m. and 4 p.m.–7 p.m.
- ✓ Do your laundry efficiently by using the warm or cold water setting for washing; always use cold water to rinse.
- ✓ Conserve energy by running your dishwasher only when it is fully loaded, and turn off the dry cycle to allow dishes to air dry instead.

### Inexpensive Energy Solutions

- ✓ Choose **Energy Star**® products. Purchase compact fluorescent light bulbs. They use a quarter of the energy and last five to ten times longer than conventional light bulbs.
- ✓ Reduce your hot water temperature. Set your water heater to the “normal” setting or 120 degrees unless the owner’s manual for your dishwasher requires a higher setting.
- ✓ Replace furnace filters once a month. Dirty filters restrict airflow and increase energy use. Keep your furnace clean, lubricated and properly adjusted.
- ✓ Install low-flow showerheads. You’ll be surprised how much this simple device can cut your hot water costs.
- ✓ Wrap your hot water tank with jacket insulation. If your water heater is gas, be sure to leave the air intake vent uncovered.

### Eliminate Wasted Energy

- ✓ Turn off lights in unoccupied rooms.
- ✓ Unplug electronic devices and chargers when they’re not in use.
- ✓ Close the damper on your fireplace when you’re not using it.
- ✓ Unplug that spare refrigerator in the garage if you don’t really need it.

**Check out [www.flexyourpower.ca.gov](http://www.flexyourpower.ca.gov) for more information and ways to save money!**



## Invasives

# Getting a handle on broom (part II)

John LeBlanc

Scotch broom (*Cytisus scoparius*), French broom (*Genista monspessulana*), Spanish broom (*Spartium junceum*), and Portuguese or striated broom (*Cytisus striatus*) were introduced to California in the mid 1800s for landscape planting, mine tailings stabilization, and roadside erosion control.

Traits once considered useful and desirable are the same attributes that define brooms as aggressive and invasive noxious weeds: tolerance for most soil conditions, ability to fix nitrogen and grow for most of the year, and copious production of long-lived seeds. These otherwise attractive attributes for erosion control make the plants difficult to manage elsewhere.

Brooms grow rapidly and form dense stands that are inaccessible and unpalatable to wildlife. The dense stems make regeneration of most other species difficult or impossible and create a dangerous fire hazard.

### Toxicity

Brooms contain alkaloids and hydroxytyramine and should not be ingested in any form. While various parts of the plant are said to be cathartic, diuretic, and emetic, large doses can cause vomiting, purging, and low blood pressure. Advanced stages of toxicity can cause complete respiratory collapse and speed up the heartbeat. Large doses have been reported to cause fatal poisoning.

### Ecology

Scotch broom is native to the British Isles and central and southern Europe. Today it is estimated to infest more than 600,000 acres in California.

French and Spanish broom are native to the Mediterranean region and Canary Islands. French broom is the most widespread of the three species, reported in at

least 23 counties in California. Spanish broom is less widely distributed, but appears to be expanding its range.

Distribution of all species of broom in the south and central valley is limited by dry conditions. At higher elevations, all are limited by cold winter temperatures.

### Soils and Root System

Brooms can successfully invade pastures, fields, and grasslands. All grow best in dry sandy soils in full sunlight; they also grow well in a variety of soil textures and a wide pH range.

A common feature of the brooms is an aggressive root system characterized by a taproot that can exceed 2 feet in length and an extensive, many branched, shallow lateral root system. As with most legume species, brooms can fix nitrogen from the atmosphere which allows them to grow on otherwise poor quality soils.

### Growth

Stem growth can be rapid (3–4 feet) in the first year. Initial rapid growth during the first 4 or 5 years is followed by 6 to 8 years of relatively slow growth followed by a period of senescence where there is more dead woody than green tissue. As plants grow, the inner stems die back providing a highly flammable fuel.

Green broom stems are photosynthetic. On mature Scotch, Portuguese, and Spanish broom, the stems are responsible for almost all of the plant's photosynthetic capacity. French broom also has photosynthetic stems, but the persistent leaves also contribute significant photosynthetic ability.

### Reproduction and Sprouting

Brooms are often found along roadsides in nearly pure stands where soils are frequently disturbed. Equipment and contaminated road surfacing materials can spread seeds. While brooms do not establish well in highly shaded areas,



Photo © Erik T. Nilsen

Scotch broom, like most members of the legume (or pea) family, can fix nitrogen from the atmosphere. This allows it to grow on nitrogen-deficient soils.

they initially invade open sites such as logging roads, landings, skid trails, and harvest areas.

A mature Scotch broom plant can produce about 15,000 seeds per year. On average less than 5% of the seeds are lost to insect predation, and 98% of surviving seeds are viable.

Scotch broom, like other pioneer species, uses a variety of tactics to spread. About 40% of the seeds in any year will germinate immediately after dispersal. Another 25% germinate the second year. The majority of the remaining seed have an impervious seed coat that requires scarification to germinate. Movement along waterways, transportation in gravel and road surface materials, or exposure to low intensity grass or brush fires can stimulate germination of these seeds.

Seeds will germinate for many years even after the parent plants are removed. Seeds stored in glass jars at Kew Gardens in England remained viable after 81 years. In the field, seeds were found to germinate at least 4 years after removal.

In the Sierra Nevada, few animals eat Scotch broom seeds. In coastal conditions, quail and grouse can be relatively effective seed predators, digesting enough of the seed to effectively kill them.



Scotch broom also sprouts readily. Plants cut during the growing season can grow back to their original size in 1 to 2 years.

### Control Strategies

Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests through a combination of techniques. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control chemicals are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

Through IPM practices, we can develop a strategy for controlling brooms.

Heavy shade is an effective long-term treatment. Broom is moderately shade intolerant, needing nearly full sunlight to thrive. It will grow in partial shade, but the plants grow slower. French broom appears to be more tolerant of shade than Scotch or Spanish broom. Competition from grasses and other vegetation may control broom seedlings so removal of broom should be followed by propagation of preferred plants.

Though about a dozen potential insect biological control agents have been identified and are under investigation, no releases have yet been approved.

### Mechanical Control

Hand pulling of young plants is an effective strategy when the infestation is relatively small. Hand pulling is easiest when the soil is moist and is most effective before the plants produce seed, in the first two years following germination. Large plants can be mechanically removed using specialized tools such as a Weed Wrench™. When attached to the base of the plant the handle acts as a lever to remove the plant and its root system. Hoeing very young plants can also be effective. Both of these techniques cause some soil disturbance that can lead to reinvasion.

Soil disturbance should be avoided as much as possible. Seeds will only germinate in the top 2.4 inches of the soil but disturbance can bring these long-lived seeds close enough to the surface to germinate.

Only about 10% of Scotch broom stems will resprout when lopped near the base during the driest period, which generally extends from the end of July until the first rains in October. Lopping at other times can lead to vigorous sprouting. For most effective results, lop within 3 inches of the soil surface.

Mowing is also more effective when Scotch broom is under drought stress. Since drought stress and high fire danger occur together, care should be taken to avoid causing sparks with the equipment. Mowing close to the ground results in the least amount of sprouting.

Deer, rabbits, and other herbivores do not readily graze brooms, possibly due to the bitter taste of the stems and the availability of more palatable forage. However, in other parts of the world goats control Scotch broom through grazing.

### Fire for Control

Using fire for Scotch and French broom control has had varied results. Some researchers suggest frequent prescribed fires to encourage regeneration and to deplete the seed bank over time. Cooler fires can encourage seed germination, followed by prescribed fires that kill the young seedlings before they generate seeds. Soil temperatures between 130°F–300°F in moist conditions stimulated seed germination. Hot fires that generated soil temperatures over 300°F killed Scotch broom seed. Getting soil temperatures this high and deep enough to effectively deplete the seed bank is difficult to achieve safely.

### Chemical Control

Many herbicides are effective on broom. The concentration, timing, and method of application determine which herbicide and method of application is most appropriate. Since herbicide formula-

### Warning: use chemicals cautiously

- ◆ Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label.
- ◆ Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, out of the reach of children, unauthorized persons, pets, and livestock.
- ◆ Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits and/or vegetables ready to be picked.
- ◆ Dispose of empty containers carefully. Follow label instructions for disposal. Never reuse containers. Make sure empty containers are not accessible to children or animals.
- ◆ Never dispose of containers where they may contaminate water supplies or natural waterways. Do not pour down sink or toilet. Consult your county agricultural commissioner for correct ways of disposing of excess pesticides. Never burn pesticide containers.

tions and recommendations are subject to change, check with your Agricultural Commissioner or Pest Control Advisor for current recommendations.

Of the common herbicides available to landowners, glyphosate at a solution of 1.5–2% of the concentrated product is mixed in water. Spray the plant until it is thoroughly wet. Apply this mixture just as the flowers are blooming for most effective control.

Painting the cambium region of cut stumps with glyphosate or triclopyr at 50% of concentrated material can also be effective. Stump treatments are most effective when applied within a few minutes of cutting.

*A new publication on brooms, written by John LeBlanc, will soon be available from UC Cooperative Extension.*



## Oaks (cont.)

### Oaks *(continued from page 1)*

on oak woodlands. By gaining understanding of these ecosystem attributes as well as changes in understory vegetation, regeneration, and erosion, landowners can have management options and make factual decisions affecting coast live oak woodlands.

### The long-term thinning study

The ten sites selected for this study were distributed throughout Central California: four sites in Monterey County, five in San Luis Obispo County, and one in Santa Clara County. Three plots were established at each site consisting of one control and two experimental plots. The two experimental plots were thinned after an initial inventory was taken. One plot per site was selectively thinned heavily (leaving 50 square feet per acre) and one was selectively thinned lightly (leaving 100 square feet per acre). The thinning was done in 1984.

Approximately every five years the plots are revisited and remeasured. With each new set of data, analysis of growth, yield and changes in the ecosystem are conducted. The results and their interpretation can be useful for landowners making management decisions or implementing a management plan in their oak woodlands.

### Stay tuned for more

Concern about the continuing loss of oak woodland is addressed in this study that looks at sustainable, economically-feasible management as a desirable alternative to land use conversion. In future issues, we will continue the discussion of management techniques to improve forest health and productivity and explore the benefits of the oak forests.



*Collecting samples for grass and forbs analysis.*

### What this means to you

The “Coast Live Oak Thinning Study in the Central Coast of California –Twelve Year Results” is the third report published on this long-term study and extends our knowledge about the effects of thinning in coast live oak stands to a 12-year period. Analysis was conducted on the number of stems per acre, basal area per acre, total volume, wood volume, sawlog volume, tree movement by diameter class, economics, predicting incomes and rates from sustained thinning, economic considerations based on forage, wildlife and aesthetics, changes in the forage layer in the thinned plots, and analysis of regeneration.

The discussion of many of these topics may be useful to landowners. The most useful information for a majority of landowners, however, is the conclusions of the study.

Two major forest fires occurred during the 12 years of the study. Our data shows that the denser, unthinned (control) plots sustained greater damage from fire than the thinned (treatment) plots. If landowners actively manage their oak woodlands, losses from catastrophic wildfire can be kept to a minimum. Thinning in oak woodlands can generate profit in the short term while protecting the resource (and thus investment) against losses from crown fires.

Stands whose growth has declined due to crown closure and high densities

respond well to thinning. The benefits of thinning were apparent in the 1989 analysis and further proven in the 1997 analysis. Both basal area and total volume growth percentages were significantly greater in the thinned plots than the control plots. Average per acre growth rates for the 12-year interval ranged between 20 and 31 percent for treatment plots but only 1 percent for control plots. In general, total volume growth was approximately twice as great in the treated plots compared to the control plots.

The fact that growth rates and biomass/fuelwood yields increased significantly after thinning means that landowners can expect a direct income that represents the minimum economic benefit of managing oak woodlands.

Economic benefit as a result of thinning can also be realized through improved forage production for domestic livestock, improved habitat for game and non-game wildlife, and through enhanced landscape aesthetics giving rise to increased homesite property values. Greater forage production following thinning means that landowners can graze additional head per acre.

Thinning in oak woodlands increases the amount of “edge” across a landscape. This can lead to increased wildlife production that can be managed by landowners for economic gain through the selling of permits to hunt on their land. Thinning oaks

*(continued next page)*



## For Teachers

# Burning Issues CD-ROM teaches fire ecology

**P**roject Learning Tree (PLT), the award-winning environmental education program, helps students gain awareness and knowledge of their environment, their place within it, as well as their responsibility for it.

Now Project Learning Tree is offering workshops to help teachers teach about fire ecology and fire management. The curriculum centers around *Burning Issues*, an interactive CD-ROM developed as a joint project of the Bureau of Land Management (BLM) and Florida State University.

Most of California is adapted to burn and many ecosystems actually require periodic fires to thrive. But fire ecology is not an easy topic—the issues are complex and there are many competing interests and concerns.

*Burning Issues* was developed to introduce young people to fire ecology

and its many related issues. The game is fun and challenging, taking advantage of students' natural fascination with fire to teach about the important role of fire in natural ecosystems and about fire management practices used to maintain safe and sustainable environments.

Many extremely complex issues are covered, including the role of fire in ecosystems, prescribed burns, relationships between fire and invasive weeds, wildlife considerations, and wildland fire management. Students learn that there is no one right answer to these issues but that background knowledge, critical thinking, and problem solving are required in all situations.

The *Burning Issues* adventure begins with a trip to the National Interagency Fire Center where students choose one of four EcoVentures in various parts of the country. Each EcoVenture covers a

different aspect of fire ecology and gives students an understanding of a distinct ecosystem.

The CD-ROM contains a multimedia mix of video, slides, interactive activities, student field notebook, and other features that create an exciting (and educational) game that culminates in an actual fire simulation used for training fire managers.

Project Learning Tree has a grant to train teachers to use the *Burning Issues* curriculum in their classes. Several workshops will be presented throughout California over the next months. Participants will receive a copy of the *Burning Issues* CD-ROM and a variety of Project Learning Tree and other educational materials for various grade levels.

For more information or a workshop schedule, contact Kay Antunez at CDF, (916) 653-7958 or [kantunez@fire.ca.gov](mailto:kantunez@fire.ca.gov).

## Oaks (continued from previous page)

around existing homesites, to enhance visual corridors, can increase the overall fair market value for the property by opening up views of the surrounding landscape.

## Conclusion

The increased growth rates of the remaining trees in a stand coupled with managed forest regeneration can result in the realization of economic gains from oak woodlands in perpetuity.

Simple models designed from this study preliminarily suggest that a cutting cycle of every 15 years may be optimal to ensure an even flow of dollars per acre for oak woodland owners. Managing coppice regeneration to prevent browsing by wildlife and domestic livestock can accelerate the growth of the future crop of trees. Within 15 years the growth rate of the trees remaining

from the previous thinning slows, an indication that another selective thinning is needed. By using the single tree selection silviculture method of thinning, a baseline of volume is always present within a stand. This ensures that the ecological values associated with oak woodlands will remain intact.

Pursuing additional economic gain by increasing the amount of head that can be grazed or through the implementation of hunting programs makes thinning in oak woodlands an option worth serious consideration for landowners desiring to realize a profit from their oak woodlands.

## Future Analysis

Data was collected during the summer of 2001 for the fourth analysis of this long-term study. The researchers hope to have the results from this latest round of analysis by the end of the

summer of 2002. This new information is expected to increase our awareness of the growth and yield potential of stands of coast live oak and further answer the questions of the economic viability of profitably managing this resource without jeopardizing its ecological values.

It is our intent to raise landowners' awareness of oak woodland's potential through additional articles published here and in other natural resource publications. For more information regarding this study, please feel free to contact the researchers directly.

*Lawrence Bonner is the owner of Elwood's Ecosystem Management and can be reached at 805-549-3801 or [elwoo02@attglobal.net](mailto:elwoo02@attglobal.net). Dr. Norman Pillsbury is a Professor of Forestry, Natural Resources Management Department, Cal Poly State University and can be reached at 805-756-2271 or [npillsbu@calpoly.edu](mailto:npillsbu@calpoly.edu).*



## Resources

# Species commonly grown at the L.A. Moran Center

*The L.A. Moran Reforestation Center provides a list of tree and shrub descriptions of some of the species commonly grown there as containerized seedlings. Call for specifics as inventory varies from year to year.*

Canary Island Pine—*windbreaks, erosion control*

Coast Redwood—*windbreaks, reforestation*

Coulter Pine—*erosion control, reforestation*

Eldarica Pine—*erosion control, windbreaks*

Incense Cedar—*erosion control, windbreaks, reforestation*

Italian Stone Pine—*erosion control, windbreaks, screening*

Knobcone Pine—*erosion control, reforestation*

Ponderosa pine—*erosion control, reforestation*

Sierra Redwood/Giant Sequoia—*reforestation*

Arizona Cypress—*erosion control, windbreaks*

Beefwood—*erosion control, windbreaks*

Big Leaf Maple—*wildlife, wood, shade*

Blue Elderberry—*erosion control, wildlife, screening, flowers, berries*

Buckbrush—*erosion control, wildlife, firesafe plantings, flowers*

California Bay—*erosion control, wood, screening*

Coffeeberry—*erosion control, wildlife, firesafe plantings, berries*

Deerbrush—*erosion control, wildlife, firesafe plantings, flowers*

Hollyleaf Cherry—*erosion control, windbreaks, wildlife, firesafe plantings, fruit*

Laurel Sumac—*erosion control, wildlife, screening, firesafe plantings, flowers, berries*

Lemmon's Ceanothus—*erosion control, wildlife, firesafe plantings*

Madrone—*erosion control, wildlife, screening, flowers, berries*

Mountain Mahogany—*erosion control, wildlife, screening, firesafe plantings*

Redbud—*erosion control, wildlife, firesafe plantings, flowers*

Toyon—*erosion control, wildlife, screening, firesafe plantings*

Ironbark Eucalyptus—*erosion control, windbreaks*

Manna Gum Eucalyptus—*erosion control, windbreaks*

Red Gum Eucalyptus—*erosion control, windbreaks*

Black Oak—*erosion control, wildlife*

Blue Oak—*erosion control, wildlife*

Canyon Live Oak—*erosion control, wildlife*

Engelmann Oak/Mesa Oak—*erosion control, wildlife*

Interior Live Oak—*erosion control, wildlife*

Valley Oak—*erosion control, wildlife*

## Technical Assistance Resources

*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 Department of Forestry & Fire Protection

Forest Landowner Assistance Programs  
Jeffrey Calvert  
(916) 653-8286  
jeffrey\_calvert@fire.ca.gov

Forestry Assistance Specialists  
Jill Butler (Santa Rosa)  
(707) 576-2935

Rich Eliot (Fortuna)  
(707) 946-1960

Tess Albin-Smith (Fort Bragg)  
(707) 961-1531

Adam Wyman (Red Bluff)  
(530) 529-8548

Chris Anthony (Camino)  
(530) 644-2345 x292

vacant (Fresno)  
(559) 243-4108

Glenn Barley (Riverside)  
(909) 320-6120

### California Resources Agency:

California Environmental Resources  
Evaluation System (CERES)  
Deanne DiPietro  
(916) 653-8614  
deanne@ceres.ca.gov

### California Association of RCDs

Thomas Wehri  
(916) 447-7237  
carcd@ns.net

### Natural Resources Conservation Service

Jerry Reioux  
(530) 792-5655  
jerry.reioux@ca.usda.gov

### Farm Service Agency

Larry Plumb  
(530) 792-5520

### California Dept of Fish & Game

Marty Berbach  
(916) 327-8839  
mberbach@dfg.ca.gov

### U.C. Cooperative Extension Forestry

Richard Harris  
(510) 642-2360  
rrharris@nature.berkeley.edu

Gary Nakamura  
(530) 224-4902  
gmnakamura@ucdavis.edu

### USDA Forest Service

Sandra Stone  
(707) 562-8918  
sstone01@fs.fed.us



# Calendar

## November 6–8, 2001

**Board of Forestry**  
Sacramento  
California Dept. of Forestry  
916-653-8007; fax 916-653-0989

## November 10, 2001

**Wetland Restoration and Stewardship**  
San Leandro, CA  
The Aquatic Outreach Institute  
510-231-5778; \$25-\$35 (Limit 25)

## November 13–14, 2001

**PNW Integrated Vegetation Management Conference, "Forests and Rights-of-Way: War on Weeds"**  
Portland, OR  
Western Forestry and Conservation Assn  
Richard Zabel 503-226-4562,  
richard@westernforestry.org  
\$125 before 11/1/01; \$150 after  
[http://www.westernforestry.org/ivmc/pnwintvegmgmtconf.htm#a\\_topics](http://www.westernforestry.org/ivmc/pnwintvegmgmtconf.htm#a_topics)

## November 13, 2001

**The Horace Albright Lecture in Conservation: Conserving the Nation's Forest and Wildlands: Meeting Environmental and Institutional Challenges**  
Lecturer: Michael Dombeck, Ph.D.,  
Former Chief, USDA Forest Service  
UC Berkeley  
510-642-0095, [www.cnr.berkeley.edu/forestry/lecture.html](http://www.cnr.berkeley.edu/forestry/lecture.html)

## November 14–16, 2001

**California Forest Pest Council's 50th Annual Meeting**  
Redding, CA  
Scott Johnson 916-991-9808,  
johnsonsa@jtfco.com  
<http://www.caforestpestcouncil.org/>

## November 14–15, 2001

**Salmon and Steelhead in Your Creek: Restoration and Management of Anadromous Fish in Bay Area Watersheds**  
Oakland, CA  
Center for Ecosystem Mgmt. & Restoration; CEMAR, 510-420-1570,  
symposium@cemar.org  
<http://www.cemar.org/symposium/symposium.html>

## November 15, 2001

**Environmental Regulatory Update**  
Sacramento, CA  
UC Davis Extension  
800-752-0881, fax 530-757-8558  
\$155  
Section 012HSD581  
[www.universityextension.ucdavis.edu](http://www.universityextension.ucdavis.edu)

## November 15–18, 2001

**California Resource Conservation District's Annual Meeting**  
Ventura, CA  
CARCD  
916-447-7237, [staff@carcd.org](mailto:staff@carcd.org)  
<http://www.carcd.org/actnow/whatsnew.htm>

## November 17, 2001

**Twelfth Annual Fall Conference Creeks, Wetlands, and Watersheds**  
Fremont, CA  
Aquatic Outreach Institute 510-231-5778  
Conference involves a number of events, each with limited attendance. Call for more information.

## November 17–18, 2001

**The State of the Sacramento River Conference**  
Red Bluff Community Center  
Sacramento River Preservation Trust  
530-345-1865; \$5-\$40  
[www.sacriverttrust.org](http://www.sacriverttrust.org)

## November 28–30, 2001

**Fish Passage Workshop**  
San Luis Obispo, CA  
For the Sake of the Salmon, CDFG, Fish Net4C, Cal Trout, & NMFS  
[info@4sos.org](mailto:info@4sos.org); \$75  
<http://www.4sos.org/wssupport/info/CA-Brochure.doc>

## November 29–30, 2001

**Selling Forest Products**  
Corvallis, OR  
Oregon State University  
Conference Assistant 541-737-2329,  
[conference@cof.orst.edu](mailto:conference@cof.orst.edu)  
<http://webdata.for.orst.edu/cof/extended/conferen/conflist.idc?z=z>

## December 2–4, 2001

**The Western Forestry Conference: Dollars & Common Sense in Forestry**  
Eugene, OR  
The Western Forestry & Conservation Association  
Kai 888-722-9416 or 503-226-4562  
[kai@westernforestry.org](mailto:kai@westernforestry.org)

Professionals, academics, general interest  
\$175 by 11/19 or \$200 after 11/19  
[www.westernforestry.org](http://www.westernforestry.org)

## December 3–5, 2001

**Fish Passage Workshop**  
Ventura, CA  
For the Sake of the Salmon, CDFG, Fish Net4C, Cal Trout, & NMFS  
[info@4sos.org](mailto:info@4sos.org); \$75  
<http://www.4sos.org/wssupport/info/CA-Brochure.doc>

## December 12–13, 2001

**Native Plant Propagation and Restoration Strategies**  
Eugene, OR  
The Nursery Technology Cooperative at OSU and Western Forestry and Conservation Assn.  
Richard Zabel 503-226-4562,  
[richard@westernforestry.org](mailto:richard@westernforestry.org)  
\$195 before 12/5 or \$225 after

## January 16–19, 2002

**CA Forestry Association 2002 Annual Meeting: "Modern Gladiators in the Arena of Public Opinion"**  
San Francisco, CA  
California Forestry Association  
916-444-6592

## January 22–24, 2002

**23rd Annual Forest Vegetation Management Conference: Recommending Success**  
Redding, CA  
Forest Vegetation Management  
Keith Greenwood 530-873-0530,  
[kgreenwood@spi-ind.com](mailto:kgreenwood@spi-ind.com); Reg.: Sherry Cooper 530-224-4902, fax 530-224-4904,  
[shcooper@ucdavis.edu](mailto:shcooper@ucdavis.edu)

*For more information on these calendar items, call the number given or the Forest Stewardship Helpline, 1-800-738-TREE. To submit an event or to receive this calendar by email, contact Sherry Cooper, 530-224-4902; [shcooper@ucdavis.edu](mailto:shcooper@ucdavis.edu).*

## ONLINE CALENDAR!

Find a more comprehensive calendar, updated monthly, at the California Forest Stewardship website:

<http://ceres.ca.gov/foreststeward>



## Species Spotlight

# King of the pines/Queen of the Sierras

**S**ugar pine (*Pinus lambertiana*) is a much-beloved pine species. Called “the most princely of the genus” by its discoverer, David Douglas (of Douglas-fir fame), sugar pine has also received royal accolades as “king of the pines” and “queen of the Sierras.”

What makes sugar pine so special? Its beauty and attributes are unsurpassed. It is the tallest and largest of the pines, reaching heights of 200 feet and more than 60 inches dbh. Old trees can exceed 500 years. Its wood excels in quality and value. And the cones are unmistakable, often over two feet long.

The name comes from its sweet sap, which John Muir preferred over maple syrup. Native Americans ate the sap and used the tree for a large number of purposes: seeds and bark for food, small roots for baskets, pitch for glue and gum to repair canoes and fasten arrowheads and feathers to shafts, and the leaves and bark for

medicinal teas.

As a historical side note, Sutter’s Mill, where the California gold rush began, was built to process sugar pine.

Sugar pine can be identified by their long needles, clustered five to a fascicle. They have long, horizontal branches that are often drooping at the ends from the weight of the large cones. Because the cones hang on the ends of the branches, large seed-eating birds are unable to eat the seeds. However, predation by the sugar pine cone

beetle (*Conophthorus lambertianae*) can make up for that, sometimes causing up to 93 percent loss of seeds. Other seed predators such as the white-headed woodpecker, Douglas squirrel, and other birds and small mammals eat sugar pine seeds but they also contribute to the species by dispersing seeds away from the parent tree.

The natural range of sugar pine extends from Mexico to Oregon and east to Nevada with over 80 percent

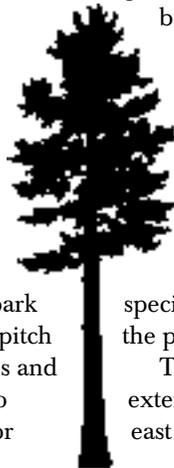
of the trees found in California. Elevation ranges from near sea level to over 10,000 feet.

Sugar pine is rarely found in pure stands but is a component of many other plant communities. The densest populations are found on the western slopes of the Sierras.

While young sugar pines are susceptible to fire, mature trees can survive most fires and their susceptibility to secondary attack by insects and disease following fire is rated low. The trees are ozone tolerant but not very drought tolerant. This low drought tolerance is one reason that sugar pine planting has not been as successful as some other pines.

Sugar pine populations have been declining due to an introduced pathogen, the white pine blister rust (*Cronartium ribicola*). This disease causes cankers that girdle the main stem, killing seedlings and young trees. Luckily, some trees have a natural genetic resistance to the rust. Other diseases include dwarf mistletoe (*Arceuthobium californicum*) which can weaken the trees to attack by bark beetles, however, it spreads slowly and can be controlled by pruning. The mountain pine beetle (*Dendroctonus ponderosae*) is the most important insect pest, often killing large groups of trees. A number of other bark- and cone-feeding insects can also cause mortal damage, especially when the trees are stressed by drought or other conditions.

While sugar pine is considered a soft wood, it is a very hard pine. The wood is extremely desirable, offering large, clear pieces with high dimensional stability. It is lightweight, easily milled and worked, and has a straight, uniform grain unique among pines. It is used for items like moldings, door frames, and special products like piano keys and organ pipes.



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Send to CDF, Forestry Assistance, P.O. Box 944246, Sacramento, CA 94244-2460.  
Phone: (916) 653-8286; Fax: (916) 653-8957; email: jeffrey\_calvert@fire.ca.gov