CALIFORNIA FOREST STEWARDSHIP PROGRAM

Forestland Steward

SUMMER 2012

Managing Your Forest in Changing Times

Managing a forest is truly a commitment to future generations. The trees you plant, and many of your management goals, won't come to fruition for many years, often decades or longer.

Making decisions for the future is always tricky; any number of unanticipated things can happen. Markets fluctuate, personal lives and goals change, fires or pest epidemics occur… but generally we have confidence that the fundamental forest characteristics—soil, water, climate, species—will remain stable.

However, this may no longer be true. Scientists say we are heading into a period of major changes in the earth's climate, which is expected to have huge implications for every aspect of forests—species composition, biodiversity, water availability, even basic ecosystem functions such as carbon sequestration and air filtration.

So far the climate hasn't changed too much, an average of less than 1 degree overall, but already we're seeing some effects in California. The snow pack is decreasing (p. 6), the fire season increasing (p. 7), and new pests are cropping up (p. 8). Studies indicate that these trends will continue and increase in magnitude. How much is not known or even knowable, as this chapter of our future is being written now.

Forests are unique in that they are not only vulnerable to the impacts of climate change, they also hold many of the solutions. Forests are repositories of biodiversity and other ecosystem services (see p. 9) that are vital to our well-being. Forests play a major role in sequestering carbon, taking it out of the atmosphere where it can no longer affect the climate. This puts forest landowners in an increasingly important position as stewards of these precious lands.

Sound forest stewardship is also sound climate change stewardship. The steps you take to make your forest healthier and more resilient may also help the forest withstand the many stressors, including climate change, that are expected to occur in California over the next decades.

How do you make forest management decisions if the future is unclear? We will touch on that question in this issue of Forestland Steward. This issue doesn't contain answers; rather, we are just starting to identify the questions and explore the implications and possibilities of this uncharted future.

Inside

Pgiam, iStockphoto

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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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.

Emerging threats to California's forests

Forests play a remarkably complex and important role when it comes to climate change. They influence the climate, and are influenced by it. They are a significant part of the solution, but can also be part of the problem.

Trees sequester, or store, carbon as they grow. They take in carbon dioxide (CO_2) from the atmosphere during the process of photosynthesis to make their leaves, branches, trunks, and roots, and then release the carbon when they respire, decompose, or burn.

There is carbon in all parts of a forest—in the trees, other plants, dead wood, and the soil. Young, fast-growing forests act as carbon sinks; they accumulate more carbon than they release. Older forests may release more carbon than they take up, but they store huge amounts of carbon.

Besides carbon sequestration, there are other ways that forests can help ameliorate climate change. Wood products, such as houses, can store carbon for considerable amounts of time. Wood energy used to replace energy from fossil fuels can avoid those additional carbon emissions.

Forests can sequester a lot of carbon, thereby offsetting some of the CO_2 emissions from other causes. However, as climate conditions change, there is a danger that forests could deteriorate due to wildfire, pests, and pathogens, thereby converting to less-productive forests or other habitat types altogether. As a result, these forests could lose much of their carbon stores and become net carbon emitters.

The overall goal, therefore, is to keep forests healthy and able to withstand changes in the climate so they can continue to perform the many ecosystem services, including carbon sequestration, we expect from them.

Migration and Movement

Trees can't walk but they can move over time. When temperatures increase, a species' range may move farther north in latitude or higher in elevation where conditions remain favorable.

Animals may be able to move to new favorable habitat but there are limitations. The habitat may already be occupied or, due to current land uses and fragmentation, it may be difficult to get to the remaining favorable habitat. Those species with very narrow tolerances, adapted to specialized habitats, or those already on the limits of their range may have nowhere to go.

One somewhat simplistic way to think about climate change effects on species is that there will be winners and losers. Some species will flourish under the new climate regimes while others will decline, perhaps even go extinct.

One of the more intriguing, and still largely unpredictable, results of climate change is that species are expected to expand and contract their ranges independently rather than as a communities, resulting in some unexpected and completely novel species associations.

New groupings of species will create new types of ecosystems with new ecosystem functions. It will take time for these new communities to develop the interrelationships that long-evolved ecosystems have. That could have major implications for wildlife, for biodiversity, and for ecosystem services.

What Are the Options?

The anticipated effects of climate change are complex and hard to grasp. We don't have many answers yet. However, even in the face of uncertainty some decisions have to be made. There are many steps forest managers can take to prepare for possible changes. Most of these fall into two major categories: Mitigate or Adapt.

Mitigation

Mitigation includes steps to reduce the effects of climate change. That is, do something about the factors causing it to happen. Since the excess carbon in the atmosphere is largely responsible for

Carbon and Climate: What's the Connection?

Our atmosphere contains a number of gases that serve the very important function of keeping heat in. This is the greenhouse effect that keeps the earth at the correct temperature for life here, thus the gases are known as greenhouse gases. Carbon, in the form of carbon dioxide, is one of the major greenhouse gases.

When we burn ancient stored carbon—oil, coal, and natural gas (the fossil fuels)—we add CO_2 to the atmosphere and increase the insulation effect. This is a major contributor to climate change today.

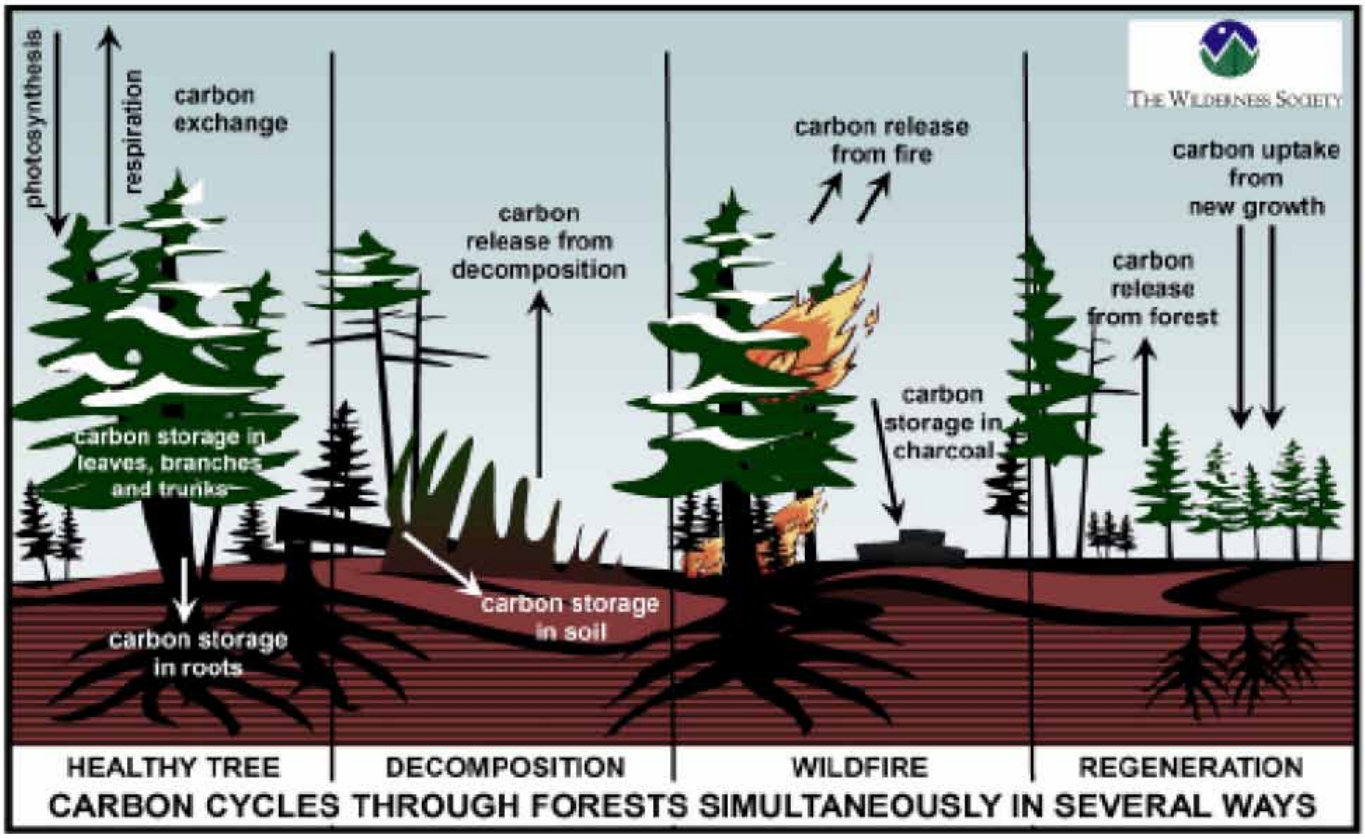


Illustration courtesy The Wilderness Society

this changing climate, we can either decrease the amount of carbon released or increase the amount taken out.

Trees, which have the ability to pull carbon from the atmosphere and store it in their tissues, offer one significant way to mitigate climate change. Forest management practices that increase carbon sequestration rates or avoid carbon emissions may be able to reduce atmospheric carbon. When wood replaces fossil fuel for energy, or wood products are used instead of energy-intensive concrete or other materials, less carbon may be released to the atmosphere. In addition, preventing wildfires, land use conversions, and other forestland disturbances, as well as decreasing the use of fossil fuel in forest activities, can help avoid carbon emissions.

Mitigation will not stop, but could lessen, the effects of climate change.

Adaptation

Adaptation, which involves finding ways to live with climate change, is the other major approach. Much of the adaptation discussion revolves around ways to create forests that can withstand the upcoming conditions. The following are some types of adaptation strategies.

- **Resistance** is the effort to hold off change, to manage the forest to resist impacts from climate change. This can be effective, especially in the short term.
- **Resilience** is a term you're going to be hearing a lot. Forest resilience is the ability of the forest

Weather or Climate?

On cold or snowy days it may be hard to believe that the climate is warming. This is due to confusion between weather and climate. Weather is the short term day-to-day variation in atmospheric conditions; climate is the average over many years, usually decades. While weather can vary wildly, the long-term global trend is clearly toward warming.

Climate change is not new. The climate has changed, sometimes drastically, throughout earth's history. What is new is both the speed at which the climate is changing and the fact that much of it is driven by human activities that put more CO_2 in the atmosphere.

Emerging Threats

wildfire
drought
invasive species
forest pests

Other Concerns

forest health
water
wildlife & fish
biodiversity
timber
wetlands
soil
recreation
aesthetics

Expected climate-related changes in California

FACTOR	DESCRIPTION
Hydrological	Changes in temperature, precipitation, and hydrological processes (e.g., decreased snowpack, earlier spring runoff, lower summer baseflow).
Fire	Changes in the extent and frequency of disturbances from wildfires, pests, and disease outbreaks.
Biological	Conditions may favor the spread of invasive species.
Biological	Tree species expected to move northward or to higher altitudes.
Biological	Changes in reforestation and regeneration success.
Biological	Changes in forest productivity affecting growth and carbon storage. The effect of additional CO2 on forest productivity is uncertain.
Economic	Economic impacts from increased fire damage and fire suppression costs.

Data Source: PEW Center on Global Climate Change 2008, from FRAP 2010 Assessment

CAL FIRE's five strategies to mitigate against greenhouse gas emissions:

- **Reforestation** to sequester more carbon
- **Forestland conservation** to avoid forest loss to development
- **Fuels reduction** to reduce wildfire emissions and utilization of those materials for renewable energy
- **Improved management** to increase carbon sequestration benefits and protect forest health
- **Urban forestry** to reduce energy demand through shading, increase sequestration, and contribute biomass for energy generation

—http://www.fire.ca.gov/resource_mgt/resource_mgt_eprp_climate/climate_change.php

to return to its original state after a disturbance, such as wildfire or a pest outbreak. A resilient forest ecosystem will maintain its ecological functions and processes, structure, and species composition. Promoting resilience involves taking steps to make your forest healthier and decrease stressors, increase diversity and redundancy, and promote connectivity. Spacial heterogeneity of forest structure and fuels appears to be important to resilient forests.

• **Response** is a strategy that encourages gradual adaptation and help the forest transition to new conditions. It allows natural processes to occur, such as species movement, changes in community structure and composition, and changing disturbance regimes.

• **Realignment** is the process of actively modifying forests to expected future conditions.

Warmer/Wetter or Warmer/Drier? Models Don't Have All the Answers

Climate models have many uses, and just as many limitations. Models can't forecast what is going to happen, they can only suggest scenarios. Models simplify complex situations and, therefore, may miss important considerations. And models may disagree; for example, current models show northern California becoming either warmer/wetter or warmer/drier.

That said, good models can usually point us in the right general direction and provide some important insights into possible futures.

Until recently, most climate models were very coarse—now they are becoming increasingly refined. You can even model the climate changes expected for your local area (*go to http://cal-adapt.org/, see p. 10*).

What Do We Know?

What do we know for sure? We know that there is a great deal of uncertainty in current predictions of the future. But we also know that the future climate will be different from today's.

All the evidence agrees that overall temperatures are increasing. How much warmer, where it will occur, and the ramifications of these higher temperatures, are less clear. As a corollary to the warming, we expect snowpacks to be smaller. Since California snowpacks store an immense amount of water, there will be less water available later in the year. That means drier conditions and more risk from wildfire.

California is a very large state with a great range of topography, habitat types, and climate. The effects of climate change will vary throughout the state. Temperature increases are expected to be greatest in the interior areas such as the Northwestern Basin and Range, Modoc Plateau, and Sierra and Sierra foothills.

There are also going to be differences over time. Climate change is expected to be more intense in the second half of the century compared to the next few decades.

Stay Tuned

Climate change will have tremendous impacts on California's forests. Although a vast amount of information exists, there are few definitive answers yet. Management options are still being formulated. Stay tuned.

Managing today for a different tomorrow

Forest management under climate change has a whole new toolbox. Many of the techniques are familiar, but the basic framework and goals are different. At this time, management recommendations are still in the experimental stage and the state of our understanding in its infancy. For the time being there is not much to do but accept this state of uncertainty.

Strategies to Address Emerging Threats

Uncertainty is uncomfortable, especially when decisions have to be made. How do you move forward under these conditions? Depending on many factors, both personal and situational, you may decide to:

- Do nothing and wait until the situation and options become clearer,
- Take small steps to address potential future climate-related issues,
- Try new and innovative approaches.

Add Climate Change to Your Plan

We often talk about the importance of your management plan as the blueprint to acheive your goals and objectives. When you prepare or update your management plan, start to incorporate climate change planning. Some suggestions:

- Find the best estimates of climate change for your specific property. How much change in temperature is expected? What are the major threats? Are there water issues to consider? What about wildfire, pests, invasive species?
- What steps can you take to protect your forest from the anticipated threats? What are the main vulnerabilities?
- How might climate change affect your management goals and objectives?
- What actions can you take? What are the priorities?
- What are the costs associated with your management for climate change?
- Do you have an adaptive management plan? What do you need to monitor? How will you respond to new information?

Monitoring a Must

Now, more than ever, it's imperative to have a plan for monitoring and adaptive management. This plan will help you respond quickly if conditions change and remain flexible when new information comes in.

Contact your Registered Professional Forester, local CAL FIRE Forestry Assistance Specialist, UC Coop Extension Advisor, or Natural Resources Conservation Service (NRCS) office for assistance with planning (*see p. 10*).

No Regrets

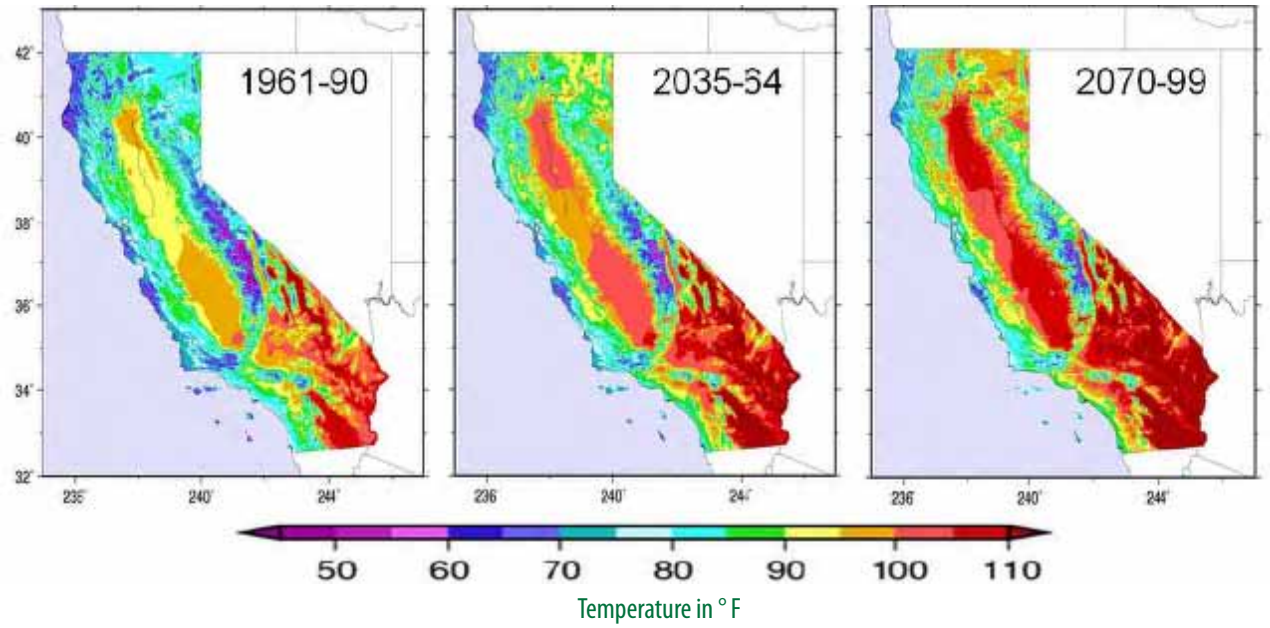
Generally, good forest stewardship is also good climate change stewardship.

Making your forest more resilient, whether for business as usual or changing climate regimes, involves many similar approaches and techniques.

Resilience includes a focus on structural diversity, biodiversity, and redundancy to make sure that ecosystem services continue even if some species decline.

Additionally, constant monitoring and an adaptive management plan are necessary so you can respond quickly to new conditions.

California Historical and Projected July Temperature Increase 1961–2099



—2009 CA Climate Adaptation Strategy, http://resources.ca.gov/climate_adaptation/docs/Statewide_Adaptation_Strategy.pdf

Water and fire: two key forest stressors

New water and fire regimes are going to be major drivers of forest change in California.

Water

Changes in water quantity, quality, and availability will be a recurrent theme throughout this century. Forests supply much of our water—they accumulate, filter, and store it.

Climate change is expected to alter every aspect of California's water system, including the distribution, volume, timing, and type of precipitation, as well as distribution and timing of release downstream. There will be more frequent and severe droughts, more evapotranspiration, drier soils, more variability in precipitation, more intense storm events, more flooding, and warmer water in streams and lakes.

The winter snowpack is already decreasing due to warmer temperatures, with a greater percentage of the annual precipitation falling as rain. This trend is expected to continue and increase over time. Climate models suggest that the snowpack losses will occur earlier at lower elevations and in milder areas.

The snowpack, which stores water throughout the winter, is critical to water availability later in the season. Without that storage, periods of high rainfall could result in flooding downstream.

In recent years the snow has also begun melting earlier in the year, again because of the warmer temperatures. This means that peak spring runoff occurs earlier and the summer is drier for a longer period of time. This has major implications for trees, other plants, animals, and fish, and for humans. Water shortages are expected.

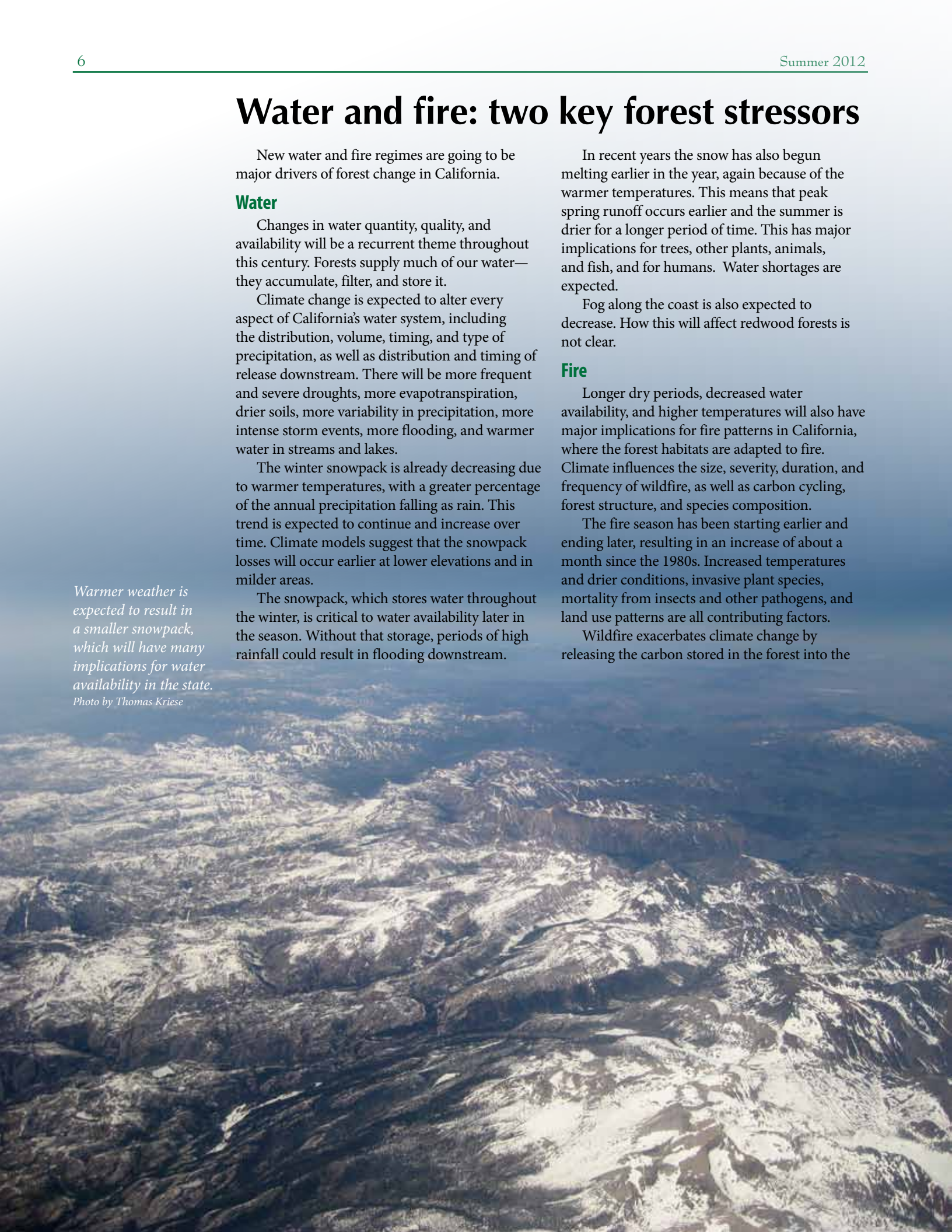
Fog along the coast is also expected to decrease. How this will affect redwood forests is not clear.

Fire

Longer dry periods, decreased water availability, and higher temperatures will also have major implications for fire patterns in California, where the forest habitats are adapted to fire. Climate influences the size, severity, duration, and frequency of wildfire, as well as carbon cycling, forest structure, and species composition.

The fire season has been starting earlier and ending later, resulting in an increase of about a month since the 1980s. Increased temperatures and drier conditions, invasive plant species, mortality from insects and other pathogens, and land use patterns are all contributing factors.

Wildfire exacerbates climate change by releasing the carbon stored in the forest into the



Warmer weather is expected to result in a smaller snowpack, which will have many implications for water availability in the state.
Photo by Thomas Kriese

atmosphere. In addition, after a wildfire forestland is most vulnerable to natural conversion since invasive species can often establish faster than natives, soil losses occur, and seedlings may have trouble regenerating under new climate conditions.

The increasing risk of wildfire can best be addressed through efforts to make forests more resilient.

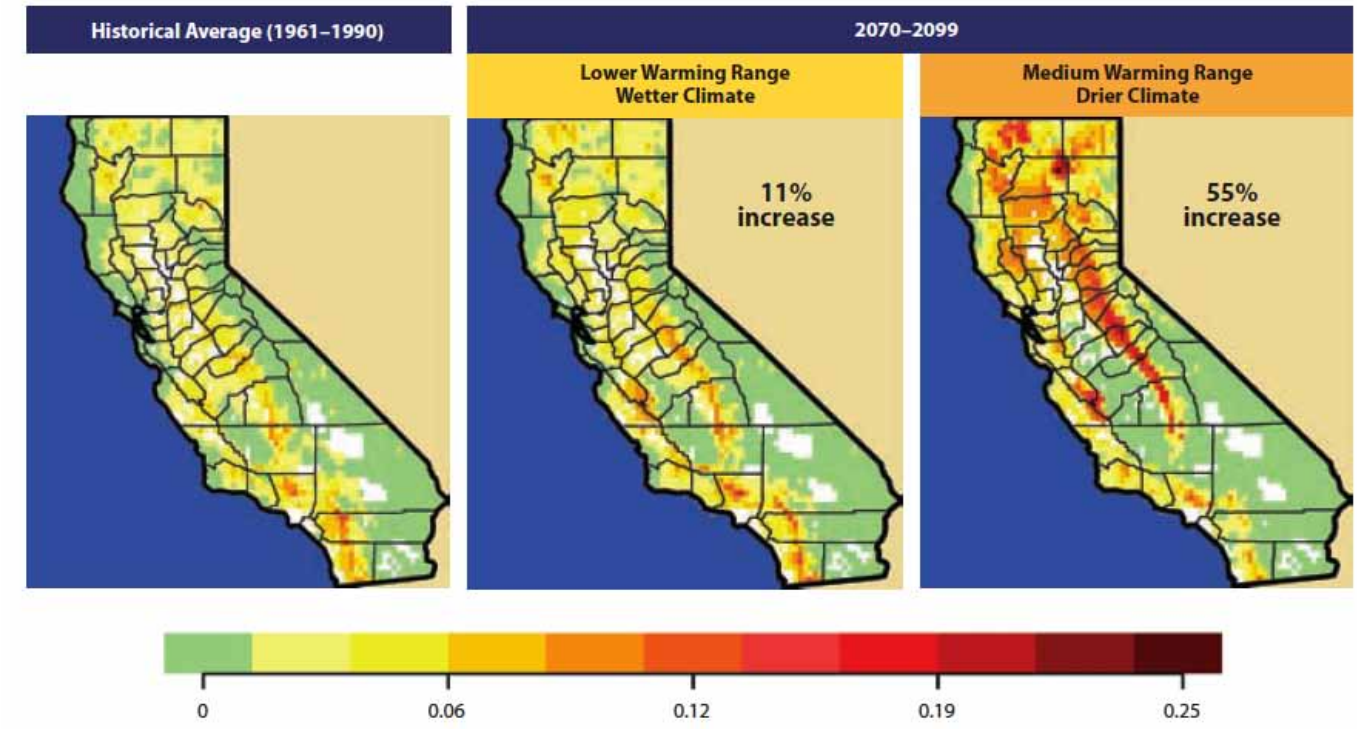
Fuels management to remove excess fuels and ladders and increase spacing between trees can help keep a fire from going into the crowns and out of control. Strategic placement of fuels treatments can increase the effective area treated.

Prescribed burns can, in some cases, provide many of the benefits of fire while decreasing the risk of uncontrolled wildfire. The issue of air quality, one of the major concerns with prescribed burns, must be balanced with the extreme amount of smoke released in the event of an uncontrolled wildfire.

More information on fire: CA Fire Science Consortium, www.cafiresci.org/.

CAL FIRE San Diego County Fire Authority

Increasing Wildfire Frequency



—Our Changing Climate: Assessing the Risks to CA, http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF

Expect the unexpected: Invasive species, pests, and other surprises

Don Owen, CAL FIRE, Bugwood.org

Red Turpentine Beetle

What next? There are numerous stressors that act alone and in combination with one another to affect our forests. Some of these are well known, others not so much. All have potential serious implications in relation to climate change.

We've seen a number of pests and diseases in California over the last few years, including Sudden Oak Death, bark beetles out of control, and the recent gold-spotted oak borer.

Insects, fungi, and other pathogens are part of any natural ecosystem. In fact, they play a critical role in culling forest stands by attacking weakened trees. Sometimes an outbreak or epidemic occurs and kills large swaths of trees; this also is natural.

EdStock, iStockphoto

Bark Beetles

Today there is heightened concern because forests are now facing a suite of stressors that could act synergistically, amplifying the effects of each to cause great harm.

A plausible scenario: Increased temperatures cause bark beetles to expand their range and produce more generations in a season. Trees, weakened by drought, become more susceptible to bark beetle attack. Epidemic tree mortality from beetles adds dead fuels to the forest, increasing the risk of catastrophic wildfire. Wildfire creates conditions conducive to invasive plant species, changing the habitat permanently. The long-term result: a major loss of ecosystem services and increases in carbon emissions.

We know that climate change will affect many community interactions, including longstanding pest-host relationships. New and exotic pathogens are expected to appear.

In addition, species no longer able to tolerate new conditions may disappear from the forest and other, less desirable, species take their place. Invasive plants are weedy types that can outcompete natives and alter the ecosystem. In a changing climate, an invasive species may be one that is simply expanding its range in response to changed conditions. But regardless of the cause, new species can have major impacts on a forest community and ecosystem.

Air pollution has some surprising connections to forests and climate change. Ozone, another product of burning fossil fuels, can increase transpiration and drought stress in trees, which increases vulnerability to insect attack and wildfire. Nitrogen, which in some forms is a potent greenhouse gas, acts as a fertilizer that contributes to the density of forest stands and can increase drought stress.

All of these interactions among forest species, insects, pathogens, other stressors, and climate change are incredibly complex and poorly understood, but they need to be on your radar. The best defense at this time is to be attentive to your forest so you can recognize changes and respond quickly.

Sudden Oak Death
Joseph O'Brien, USDA Forest Service, Bugwood.org

Gold-spotted Oak Borer
Mike Lewis, Center for Invasive Species Research, Bugwood.org

Can landowners be compensated for the societal benefits from their forest?

The importance of forests to our well-being cannot be overstated. They provide benefits vital to our very survival. These benefits, widely known as ecosystem services, include (but are not limited to):

- Provisioning Services—food, clean water, fuel, timber, other goods
- Regulating Services—climate (including carbon sequestration), water, disease, pollination, flooding
- Supporting Services—soil formation, nutrient cycling, biodiversity
- Cultural Services—education, aesthetics, cultural heritage values, recreation, tourism

Healthy forests filter and store water, regulate temperature, sequester carbon, support wildlife and fish, recycle nutrients, provide jobs, and bring us joy.

For the most part we take these services for granted. We expect forests to do their countless jobs, such as replenishing aquifers and removing carbon from the atmosphere, and don't even think about it.

The danger is that climate change could affect forest ecosystems such that their ability to provide these critical benefits is highly impaired. In fact, many climate change models predict a loss of many of these services, including carbon sequestration.

Stewards of the forest

Forest landowners are the stewards of the myriad benefits provided by forests. Managing these resources is usually a source of pride but can be costly. In some cases it can require sacrifice on the part of the landowner since other alternatives, such as land development, can be so much more lucrative.

When forests are developed or converted to other uses carbon is irretrievably lost from the system. In addition, forest fragmentation can have far-reaching negative consequences to ecosystem services. Because of increasing threats to our entire ecosystem support system, it is imperative to protect the remaining intact forestland.

While a few ecosystem services have economic value—timber, fuel, recreation, the emerging carbon market—most do not.

As part of a shift in approach, there is currently a lot of discussion about compensating landowners for their stewardship of public benefits. Compensation would recognize good stewardship and could help forestland remain whole, even pay for restoration and enhancements.

R0072 Wikimedia Commons

Pollination is one of many ecosystem services that occurs in forests.

How might compensation work?

Needless to say, we are not there yet and a number of issues still need to be worked out. However, incentives, subsidies, grants, tax credits, and voluntary markets are all forms of payment that can help landowners protect and restore forestland so that it continues to provide the suite of ecosystem services we need and expect.

Currently, a number of programs are in place to pay landowners for one service at a time—there are opportunities to sell carbon credits, endangered species and wetlands programs, timber protection zones (TPZ), etc. However, to be both economically and ecologically effective, it makes sense to address multiple values at the landscape scale. Some new approaches are being explored to do that. Bundling and stacking are two examples. Bundling merges multiple ecological values from a piece of property under a single credit type, while stacking allows landowners to independently sell different types of credits from a single property.

We don't know how these discussions will play out, but we'll keep you posted.

Resources on ecosystem services

Giving Credit Where Credit Is Due: Increasing Landowner Compensation for Ecosystem Services. 2011. LaRocco and Deal. GTR 842. *http://www.fs.fed.us/pnw/pubs/pnw_gtr842.pdf*

Ecosystem Services and Climate Change *http://www.fs.fed.us/ccrc/topics/ecosystem-services/*

The Impact of Climate Change on California's Ecosystem Services. 2009. Shaw, M.R. et al. California Climate Change Center. *http://www.energy.ca.gov/2009publications/CEC-500-2009-025/CEC-500-2009-025-D.PDF*

Carbon Sequestration. CAL FIRE website for those interested in certifying carbon from forests in California (follow links on the left for more information). *http://www.fire.ca.gov/resource_mgt/resource_mgt_stateforests_carb.php*

Resources Make informed decisions

Climate Project Screening Tool

This is an intriguing tool to help set priorities, assess vulnerabilities, and reduce uncertainty by identifying the range of impacts that climate changes and management actions might have on a resource. An example from Inyo National Forest provides a template that landowners will find helpful. *http://www.fs.fed.us/psw/publications/documents/psw_rp263/psw_rp263.pdf*

Knowledge is power, and the body of knowledge about forests and climate change is large and growing rapidly. It is worth your while to keep abreast of this information to help make the best management decisions possible. The following resources can help.

Cal-Adapt can help identify climate change risks in local geographic areas throughout the state. It provides interactive maps to explore climate impacts and climate projections and scenarios to aid in making management decisions. Try out the tools to learn about your property. *http://cal-adapt.org/*

The **Climate Change Resource Center** has a section for private forest landowners. Hidden in the simple homepage is an immense amount of information. Go to the issues box on the left, then follow the tabs. Each has a short overview and then a more comprehensive synthesis, which includes sections on the Issues, Expected Changes, and Crucial Questions/Options for Management. You can spend weeks at this site. *http://www.fs.fed.us/ccrc/topics/forest-stewardship/*

TACCIMO (Template for Assessing Climate Change Impacts and Management Options) allows you to explore the literature and generate a report for your location. It provides the latest research and expertise concerning environmental threats to forests, and matches effects with management options. There is a video and other information to help you get started. *http://www.sgcp.ncsu.edu:8090/about.aspx*

Climate Change and Forestry at the California Climate Change Portal. *http://www.climatechange.ca.gov/state/forestry.html*

Climate Change: Threats and Opportunities Chapter 3.7 of the 2010 California Forest and Range Assessment. *http://frap.cdf.ca.gov/assessment2010/3.7_climate_opportunities.html*

Managing Sierra Nevada Forests. 2012. Edited by Malcolm North. Gen. Tech. Rep. PSW-GTR-237. Albany, CA: USDA Forest Service, PSR Station. 184 p. *http://www.fs.fed.us/psw/publications/documents/psw_gtr237/psw_gtr237.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
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

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USDA Forest Service
707-562-8875

Calendar

August 14, 2012; 6:30 pm–8:30 pm
Funding for Forest Management Plans
Location: 100 Forni Road Placerville, CA
Sponsors: CalFire, Nor Cal Soc of Am Foresters, UC Coop Extension, NRCS, El Dorado RCD
Contact: Dr. Richard Harris at rrharris2464@sbcglobal.net or (707) 685-5508
Note: The grant program is available to owners of any forest type 20–5,000 acres in size.

August 22, 2012; 6:30 pm–8:30 pm
Funding for Forest Management Plans
Location: Sonora, CA
Contact: Dr. Richard Harris at rrharris2464@sbcglobal.net or (707) 685-5508
Note: The grant program is available to owners of any forest type 20–5,000 acres in size.

August 23, 2012
SNAMP California Spotted Owl Integration Team Meeting
Location: TBA
Notes: http://snamp.cnr.berkeley.edu/events/

August 24, 2012
Variable Density Thinning Field Trip
Location: Stanislaus-Tuolumne Experimental Forest
Contact: Chris Mallek, crmallek@ucdavis.edu, to sign up for the trip. Space is limited so sign up early.
Note: Learn about variable density thinning and other concepts described in GTRs 220 and 237.

September 12, 2012
Board of Forestry Meeting
Location: Resources Building, Sacramento
Contact: 916-653-8007
Website: http://www.bof.fire.ca.gov

September 10, 17, 14; 11 a.m.-1 p.m.
Webinar Series on Rural Roads of California
Series 3: Rural Road Assessment, Remediation, and Restoration
Session 1: September 10—Road Assessment and Inventory, Prioritizing Road Treatments
Session 2: September 17—Deciding to Upgrade or Decommission Monitoring Treatment Effectiveness
Session 3: September 24—Road Treatment and Maintenance Costs, Funding
Contact: Dr. Richard Harris at rrharris2464@sbcglobal.net or (707) 685-5508
Cost: Free
Note: Series 1: Rural Roads and the Environment and Series 2: Rural Road Design and Operations can be viewed at http://ucanr.org/roadswebinar. The field trip on October 29 is part of this series.

September 19, 2012
Wildfire Prevention Conference
Location: Pala Resort & Casino, San Diego
Contact: 626) 335-7426 or kziemann@cafiresafecouncil.org
Sponsors: CA Fire Safe Council, Farmers Insurance
Notes: Free registration, lunch provided. Presentations by Kate Dargan, ret. State Fire Marshal, and Malcolm North, USFS Ecologist

October 10, 2012
Board of Forestry Meeting
Location: Resources Building, Sacramento
Contact: 916-653-8007
Website: http://www.bof.fire.ca.gov

October 23, 2012
SNAMP Annual Meeting
Location: TBA
Notes: http://snamp.cnr.berkeley.edu/events/

October 29, 2012
Road Field Trip to Mendocino County
Location: Navarro River
Contact: Dr. Richard Harris at rrharris2464@sbcglobal.net or (707) 685-5508
Cost: Free
Registration: http://ucce.ucdavis.edu/survey/survey.cfm?surveynumber=8763
Notes: Road decommissioning and upgrading to address sediment and instream restoration.

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Thoughts on seed zones and other ideas

Remember the definition of silviculture: "The ***art and science*** of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis"?

At a time when ***science*** has not yet caught up to a full understanding of what climate change means to California forests, the ***art*** of silviculture becomes even more important. Forest managers may want to focus on their art and take some risks—based on experience, observation, and sound intuition, of course—to try new approaches.

These could include simple management steps such as increasing the spacing in stands where water availability is expected to be limited, which could help decrease competition and increase survival. Or adding new species to the mix when planting.

Seed zones are another concept that could be revisited. Until recently, conventional wisdom mandated planting stock only from the same seed zone. This made sense because seeds adapted to the site probably had the best chance of survival.

But what if the future is not like the present? In that case, stock from the immediate area might not be the best fit for future climate conditions. The problem is, we don't know what those future conditions will be.

Some land managers are now hedging their bets by planting a mix of genetic types. While the majority of planting material may continue to be from the traditional seed zone, a percentage is taken from adjacent seed zones, or areas with conditions that are more like those anticipated.

Note: any experimentation should be done cautiously. The ***art*** of growing a forest requires knowledge and wisdom.

Some general forest management ideas for an uncertain century

- Increase landscape diversity—consider large-scale resilience, size of management units, and connectivity.
- Maintain biological diversity—experiment with species and genotype mixes. Identify species, populations, and communities that are sensitive to increased fire and develop conservation plans for them.
- Plan for post-disturbance management—treat fire and other disturbances as normal processes. Incorporate fire management into planning.
- Maintain and improve the resilience of watersheds and aquatic ecosystems by implementing practices that protect, maintain, and restore watershed processes and services.
- Implement early detection and rapid response post-fire—monitor conditions; eliminate/control exotic species.
- Manage for realistic outcomes—identify key thresholds and prioritize projects with a high probability of success; abandon hopeless causes; consider alternatives that might be undesirable in an unchanging climate.
- Incorporate climate change into restoration—avoid trying to replicate historical conditions, but continue to learn lessons from historical variation.
- Anticipate big surprises—there may be mega-droughts, larger fires, species extirpations, loss of resilience, and system collapses.

—adapted from http://www.fs.fed.us/ccrc/topics/wildfire/index.shtml