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Pacific Northwest Forests and Climate

BY JEREMY LITTELL AND DAVID PETERSON

We already know from over a century of observations in Western forests that climate exerts strong influences on forest ecosystems. The obvious relationships—like severe drought and forest fires, or warmer decades and increased survival of seedlings at upper tree line—have been well studied. Other effects, such as the combined role of climate in insect life cycles and their tree hosts' vulnerability, are just beginning to be understood. So the idea that climate variability plays a role in forests is not new, nor is the idea that understanding that variability is critical for successful planning in forest management and forestry. But events like the 2002 Biscuit fire in Oregon, nearly 500,000 acres, or mountain pine beetle epidemics that impact entire watersheds synchronously over the West, give us pause.

In one sense, the relationships we are witnessing between climate and forests are not new, because the correspondence between climate and forests is also evident in the paleoecological record. When compared across the region and different forest types, lake sediment pollen tells a story of species individualism—different tree species have different climatic tolerances and requirements, so different kinds of climate variability can have different effects on plant assemblages with the end result that forest communities are not as stable as we might like to believe. The paleoecological record also reveals that the role of fire in ecosystems has varied over millennia, both with vegetation and with climate, such that there are feedbacks among climate, vegetation and fire that make ecosystems dynamic and ever changing across the same landscape.

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Experiment with species and genotypes to maintain biological diversity.

In another sense, there is something very novel about the current climate and its impacts on forests. It would be unwise to assume that the last 10 or even 100 millennia of the paleoecological and the paleoclimatological records contain the full range of everything that has and will ever exist in terms of forest ecosystems and their response to climate change. What is different this time is the influence that people have on the climate system (through industry and transportation) and forest ecosystems (through timber harvest, land use and fire exclusion), our expectations of forest resources (including water), and our philosophical approach to land management for resources, conservation and preservation.

The rate of average temperature increase since 1920 in the Pacific Northwest was about 1.5 degrees F, but the expected rate over the next century is somewhere around 0.2 to 1.0 degrees F *per decade*, which translates to an increase of three to nine degrees F by the 2080s, a tripling in the rate of warming. Because climate variability is well recorded in recent records of tree growth, fire and insect outbreaks, and because the mechanisms proposed for those influences hold up repeatedly, it is reasonable to infer that projected increases in temperature and potential changes in precipitation will have larg-

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er effects on forests than those observed so far.

Future impacts on forest ecosystems

What is the state of scientific understanding of the future effects of climate change on forests in the Pacific Northwest? First, we expect changes in tree growth. In areas where tree growth is already water limited (potential evapotranspiration, or atmospheric water demand, exceeds the available water from precipitation), the decreases in growth are likely to be substantial. It is also possible that increased CO_2 in the atmosphere will enhance water use efficiency and thus productivity in these systems. In places where tree growth is energy limited (there is insufficient thermal energy to evaporate the available water or to provide a long growing season) it is possible that tree growth will increase if water availability during the growing season is sufficient.

Second, we anticipate that disturbance rates and potentially disturbance severity will change. Both fire and forest insects respond quickly to changes in temperature. Increased temperature increases water demand, so fuels and vegetation dry out faster and host trees become more susceptible to attack. Climate also tends to synchronize disturbance over regions more effectively in a warmer environment—areas that are traditionally less vulnerable due to topographic or microclimatic effects are pushed closer to the edge. Third, the degree to which tree species, varieties and seed stock are adapted to local climates will change, in some cases rapidly. Seed sources that worked for decades may not be well adapted to new climatic conditions in the near future, and germinant or seedling mortality following disturbance may increase. In other places, these effects may be farther in the future. Whatever the case, changes in tree growth, disturbance rates and tree genotype fitness will have major consequences for what forests look like and how they function in the coming decades.

PHOTO COURTESY OF US FOREST SERVICE

Implementing treatments that minimize loss of structural and functional groups will increase resilience at large spatial scales.

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CLARIFICATION

We would like to clarify a statement made in the lead article in the November/December 2008 issue of the *Western Forester*, entitled *Forestry Education Today and Tomorrow: A National Perspective*, by Terry Sharik.

Although there are currently four NAUFRP institutions that offer an SAF accredited first professional degree in forestry *only* at the Master's level, there are four other NAUFRP institutions that offer the Master's as an SAF accredited first professional degree in forestry and independently offer SAF accredited undergraduate degrees in forestry.

Next Issue: Hardwoods

The case for adaptation

Regardless of what happens with attempts to mitigate the principal causes of climate change, there are enough greenhouse gases in the atmosphere to cause at least a century of warmer temperatures and forest conditions for which we do not have analogues. That fact alone suggests that we need to pursue adaptation, because the effects of climate change are highly likely to occur whether we plan for them or not.

What does adaptation to climate change really mean? Does it mean resigning ourselves to the effects and simply allowing the changes to happen? In part, yes—adaptation assumes that we acknowledge that changes are likely to occur and that we need to plan for them. But it does not mean giving up. Although Tennyson said Nature is "red in tooth and claw," that kind of Darwinian adaptation, in which an organism is at the mercy of an environment that selects for or against it, is a bit extreme. Neither does it mean humans versus nature, in which all problems are solved by ingenuity or force. Instead, it means taking advantage of what the natural world already does—resisting change, but adapting when it must—to increase the likelihood that trees, forest ecosystems and resources produced by forests will persist despite the changes that a warmer climate may induce.

Adaptation to climate change means a mix of acknowledging potential effects, but also a sense that "preadaptation" is possible, and that adaptation is easier and more effective if we make informed decisions rather than resign ourselves to some unknown future. This approach acknowledges that we created the problem, perceived its potential consequences, and must use existing knowledge to do something in advance of the worst impacts. By increasing the resilience of ecosystems to the most likely effects, we can maintain some functionality and continue to provide forest resources. This also means increasing our own flexibility—management, regulatory and appetite for resources—so that when effects do occur, resource demands can be met without degrading forest ecosystems.

PHOTO COURTESY OF PETE ROBICHAUD, US FOREST SERVICE

Managers should implement early detection/rapid response and monitor post-disturbance conditions.

Challenges to adaptation

There are several challenges ahead on the road to scientifically-based adaptation. First, do we know what we need to know to attempt to confer resilience on forest ecosystems? It is somewhat ironic, for example, that we have long referred to fire history records from tree rings to understand links between climate and fire when we have only recently understood the strong modern relationships between climate and fire.

Second, are current silvicultural tools sufficient to provide engineering approaches for adaptation, and if not, what else do we need? We have in many ways succeeded in engineering forests at a very large scale, but some of our accomplishments are not entirely in keeping with the needs of adaptation to climate change; we have removed much of the natural heterogeneity and connectedness in forests that confer resilience to large disturbances. Will we be able to re-install such structures when we need to?

Third, can we muster the will to accomplish ambitious adaptation goals in a resource poor and politically charged atmosphere? Will federal, corporate, state, tribal and private interests be able to define common goals of adaptation and tools of operation that transcend their various mandates and limitations? This collaboration must occur if the projections of future climate effects come to pass.

Research needs: what do we need to know in order to do what needs doing?

Adaptation to climate change effects on forests ecosystems at the scale of the Pacific Northwest will require collaboration and cooperation among scientists, land managers, foresters and policy makers. Scientifically speaking, we know a great deal about forests, but we need to know much more about effects of silviculture on promoting tree vigor and resilience in different kinds of environments and ecosystems. If existing tools are the first things we reach for in the approach to adaptation, we need to understand how best to use them in a new climate and a new management environment. Can selective harvesting really confer resilience on the trees left behind, and what kind of harvesting is best? There is evidence that in drier forest types, increased water supply to trees following harvest increases their resistance to insect attacks. In addition, thinning from below, coupled with removal of surface fuels, can reduce crown fire hazard and wildfire severity. But the universality of these effects is debated, and more research is required on quantitative aspects of these treatments.

We also need to know more about genetic variability within species and sub-species, and about tolerances of different seed stocks to warmer climate, disease and disturbance. Which seed stock will be adapted to which conditions, where will those conditions occur in the future, and is there sufficient supply of seeds and seedlings to mount a significant response to large disturbances?

We need to know more about the effects of warmer climate and increased disturbance on the hydrology of forested watersheds and how especially on post-disturbance streamflow. Increased disturbance rates, higher demand for water, and deleterious effects on cold-water fish will require a more sophisticated approach to watershed management, which in turn will influence forest management. The future expectations for Pacific Northwest watersheds for ecosystem services—including timber, habitat and water—depend greatly on how the combined effects of climate change and adaptation strategies influence watersheds.

Finally, we need visionary, but practical approaches to forestry that include planning, monitoring and reassessment when reality trumps the expected. The most far-sighted plans and strategies have a way of tripping up on near-term details, but we cannot let that stop us

from imagining a potential future for Pacific Northwest forests in which humans and other species rely on forested ecosystems for multiple resources. We must, however, also be able to comprehend and execute the necessary nuts-and-bolts approaches to get there. Those approaches will vary substantially across a region as biophysically diverse as the Pacific Northwest, and they will also necessarily vary through time in a given place. It is up to us to craft that future and to weigh carefully the strategies that will allow it to become reality.

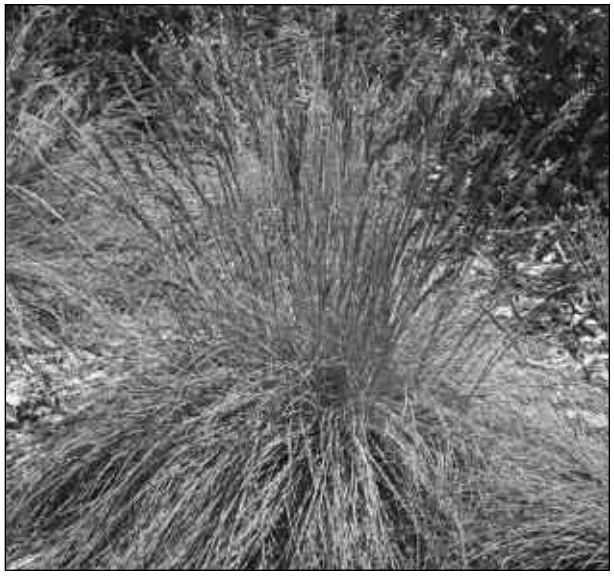

PHOTO COURTESY OF US FOREST SERVICE

Foresters can maintain biological diversity by identifying species and populations sensitive to increased disturbance.

It has been said that forestry isn't rocket science—it's harder. That may well be true. Humans have walked on the moon and returned to Earth, but we still don't know what climatic conditions Douglas-fir in central Oregon is capable of withstanding or whether we will have a one-million-acre fire in the Pacific Northwest in the next decade. We do know that the impacts of climate change on PNW forests will be different than anything we have witnessed, and forests of the future will not resemble the ones we have come to know and rely upon for forest resources. And we think that adaptation is possible, with collaborative effort from scientists, industry, managers and policy makers. In the face of uncertainty, it is useful to consider the future and what looking back to now might be like in 2050 or 2080. Will we conclude that it was better to have acted when we had the chance, based on knowledge we had and our best guesses at future scenarios, than it was to expose ourselves to objectionable risks unnecessarily? Perhaps our children and grandchildren will tell us the answer to that question. ◆

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Silvicultural Approaches to Maintain Forest Health and Productivity Under Current and Future Climates

BY PAUL D. ANDERSON AND DANIEL J. CHMURA

Paul Anderson

Daniel Chmura

Climate modeling based on a variety of scenarios for the Pacific Northwest suggests that over the next century temperatures may increase and that the abundance of summer precipitation may decline. Historically, climate changes at the century scale have been accompanied by adjustments in species population sizes and the composition of vegetation communities. Silvicultural practices may be employed to assist in forest adaptation to climate changes, principally by influencing stand structure and species composition throughout stand development. Forest managers might consider a primary silviculture objective over the next century of increasing forest vigor to increase both resistance and resilience to direct and indirect stresses arising from climate variation.

Plant populations may adjust to climate change in three ways: 1) by expressing an inherent capacity for environmental tolerance by alterations in physiology and development; 2) by migrating to new habitats; or 3) by adaptation in place through natural selection on genetic traits important to survival in the dynamic climate.

PHOTO COURTESY OF PAUL ANDERSON, USFS PNWRS

Underplanted conifers augment natural regeneration in a thinning designed to increase structural complexity and biotic diversity in a young, second-growth Douglas-fir stand in the Oregon Coast Range.

The relative roles of tolerance or adaptive processes will depend on the biological characteristics of the individual species and the time frame considered. However, changes in climate may occur at rates that provide little opportunity for tree populations to migrate or to evolve in place. While plant species with short generation times may have sufficient opportunity to migrate or to evolve in place over a 100- to 200-year period, this is generally not true for forest trees. The trees living today will likely comprise the forests for the next century or longer. In coastal Douglas-fir forests, for example, stand-replacing natural disturbances typically occur at intervals of 200 years or longer, although disturbances may become more frequent in the future. Long-term adaptation to climate changes will require healthy and productive forests in the short-term—an objective that can be facilitated by silvicultural manipulations.

To address silvicultural and genetic approaches to forest adaptation, a multi-disciplinary and multi-agency team of managers and scientists formed the Taskforce on Adapting Forests to Climate Change (http://tafcc.forestry.oregonstate.edu). The principal role of the task force is to provide public and private land managers with science-based management options for meeting a broad spectrum of objectives under alternative climate change scenarios. This article addresses some of the silvicultural issues and

options for adaptation being considered by taskforce partners. Genetic considerations and options for adaptation are discussed in a companion article in this issue.

Silvicultural options to facilitate adaptation

It is important to recognize that it is not simply the changes in average temperature or precipitation, but often the increased variation in extent and timing of climatic conditions that will determine climate-related stresses experienced by forests. For example, a simple increase in average temperature may not induce stress in established forests; however, when combined with decreased summer moisture availability, forests may experience drought resulting in decreased vigor and possibly increased mortality. Alternatively, increased winter temperatures may create mild conditions, yet hinder natural regeneration through failure to meet chilling requirements for seed germination or appropriate timing of budbreak.

To date, most climate predictions have been made at broad regional scales; the ability to predict changes at finer, site-specific scales is yet to be developed. Thus, forest managers will also need to account for local physiographic influences on weather and site resource availability, particularly in mountainous areas of strong topographic relief.

In adapting forests to climate change, silvicultural options need to be focused on addressing forest vulnerabilities arising from climate change stressors. Vulnerability is the degree to which a forest can be negatively impacted by a climate-related stress or associated disturbance agent. For example, in a regenerating forest, vulnerability may be seedling mortality arising from excessive heat load and moisture deficit. Silvicultural options for the regenerating stand may include providing shade and decreasing the abundance of competing vegetation. In contrast, vulnerabilities in a young, dense stand in the stem-exclusion phase may be insect outbreak or fire, as vigor can decline and waves of mortality may result in fuels loading. In this case, the young stand could be thinned to improve vigor by creating a better balance among the amounts of canopy foliage, soil moisture and evaporative demand. Thus, silvicultural options need to address climate-related stressors that vary over time and stage of stand development. This plays to intrinsic strengths of silviculture—the conceptualization of forest stands as developmentally dynamic entities in a landscape context, and scenario building as a means to develop prescriptions and project the influences of management actions to future stand and landscape dynamics.

Active management of forest vegetation may increase forest resistance and resilience to climate changes and mitigate some ecosystem responses to climate changes. Silvicultural practices can be applied adaptively as climate and disturbance regimes change over time. Across the western United States, several long-term, large-scale silviculture experiments are underway that explore the influence of alternative silviculture treatments on ecological structures and processes and the provision of goods and services. These studies can also provide managers scientific knowledge and tools needed to address climate change issues. Based on existing and developing knowledge, the following management options can be recommended:

• ***Thin to avoid overstocked stands susceptible to increased mortality from drought, insects, disease and wildfire.*** Maintain lower densities of canopy foliage as site resources, particularly soil moisture, become more limiting. Decreased levels of site occupancy will decrease stress and will also decrease fuels loading, thus making forests more resistant to disturbance agents such as insects and fire.

• ***Underplant thinned stands with adapted species or genotypes when existing regeneration is unacceptable for future conditions.*** Although understory regeneration is often limited in dense second-growth stands, overstory density management may provide opportunities to introduce regeneration better suited to a future climate through underplanting. Although few, there have been studies that provide insight to species or genetic populations that may successfully regenerate under a partial canopy. For example, a comparison of six conifer and two deciduous tree species planted under stands thinned to three different densities has been conducted in the Oregon Coast Range, and a study comparing the performance of underplanted seedlings of various Douglas-fir families is ongoing on the Capital State Forest in Washington.

• ***Provide structural features at stand and landscape scales to meet the varying habitat requirements of plants and animals.*** Provide diversity

of stand structures favoring a greater diversity of species and genotypes across the landscape. This biological diversity underpins forest resilience to disturbance. Furthermore, it is important to recognize the values arising from the ecosystem as a whole and not simply the tree component of forests.

• ***Use vegetative buffers to mitigate effects of harvest on stream and riparian microclimates and habitat.*** Protect unique in-stream and riparian habitats by maintaining riparian functions of energy and nutrient exchange, filtration, bank stabilization and wood production. Tolerance limits to stream temperatures demonstrated by populations of fishes and other aquatic organisms provide some of the best examples of threshold responses to environmental change.

• ***Where practiced, use intensively managed plantations as an opportunity to facilitate the migration of adapted genotypes or species.*** Regeneration cycles characteristic of commercial timber production may provide an opportunity to relatively quickly distribute commercial species and genotypes better adapted to future environments.

• ***Following disturbance, manage for prompt revegetation with adapted plant communities.*** Attain site occupancy with desired species or genotypes before weedy or invasive species establish. Explore options for establishing species or genotypes better adapted to future environments and disturbance regimes. Consideration should be given not only to desired tree species, but also to forb, grass or shrub species that may provide desired community composition.

• ***Promote development of mixed-species or multi-provenance forests.*** Decrease risks associated with major pest outbreaks and promote greater genetic diversity and more broadly adapted populations. Consider deploying a mixture of seedlings including some species or provenances adapted to more stressful environments. Areas of transition between forest types and population boundaries may be areas to initially consider for incremental shifts in a species distribution.

• ***Monitor the effectiveness of management options.*** The efficacy of active management in addressing climate-related stresses will often be site-specific and, therefore, will require follow-up observation for assessment. The objective and value in adaptive management is the accumulation of knowledge across experiences that can be leveraged to develop future innovations.

Challenges to existing silviculture tools

Although a wealth of information and experience exists from which to craft innovative management practices addressing climate-related stresses, there are emerging challenges to some of our basic silvicultural tools.

Site index has been fundamental to projecting potential forest growth and productivity. These indices describing relationships between tree size and age are assumed to be relatively constant characteristics of location. However, growth patterns over time may become unstable with rapid changes in climate. In recent years, plant associations have been defined to classify forest sites in terms of potential vegetation community development. Such plant associations have been incorporated as proxy measures of site productive potential in some forest growth simulation models (e.g., Forest Vegetation Simulator). However, as species respond differently to climate changes, there is likely to be a reorganization of species assemblages that may not be recognized under current classification schemes. Thus, use of plant associations to provide a stronger ecological link to the empirical indices of site productivity may also become less useful.

Silviculturists and other resource managers rely on models to project forest development and productivity into the future. Existing models are predominantly driven by empirical growth and yield relationships that inherently assume a constant environment. A major challenge to silvicultural adaptation of forests is to develop new forest growth and development models that explicitly incorporate dynamic climate changes to better predict forest composition and productivity under alternative future climate and management scenarios.

Thoughtful, innovative application of existing silvicultural principles and practices are likely to benefit forest vigor and therefore forest resistance and resilience to climate change stressors for some time into the future. We can draw on a wealth of scientific and practical knowledge gained through a century of forest research and management to develop innovative management schemes that address emerging climate-related stresses. Adaptively applying these innovations will facilitate future adjustment to ecological and social changes. ◆

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Genetic Options for Adapting Forests to Climate Change

BY BRAD ST.CLAIR AND GLENN HOWE

Brad St.Clair

Glenn Howe

Successful reforestation requires planted or naturally regenerated seedlings that are well suited to the site. Genetic studies of forest trees provide ample evidence of large differences among seed sources in adaptive traits—traits such as the timing of growth initiation and cessation, cold and drought hardiness, and growth rates. Furthermore, much of this variation is related to the temperature and moisture regimes of the seed sources. In general, populations are at or near their optimum for their climates. As a result, seed zones and seed transfer guidelines have been developed and widely used that specify using relatively local seed sources for reforestation. These guidelines, however, assume that climates are static over the long term, an assumption that we now know is unlikely.

The continued use of local seed sources will likely lead to a decline in the health and productivity of both planted and native forests during the next century given projected changes in climate. In a study of Douglas-fir in western Oregon and Washington, the authors found that the continued use of local sources (i.e., current seed zones) would result in a high risk of maladapted stands by the end of the century. Douglas-fir populations expected to be adapted to the climate at the end of this century are located 500-1,000 meters lower in elevation and 2-5 degrees further south in latitude. A study in British Columbia by Tongli Wang and others based on an extensive set of lodgepole pine provenance tests indicated that productivity would increase (up to seven percent) given warming of about 1.5°C, but would substantially decline given greater warming, particularly in southern British Columbia, with some populations being extirpated. Productivity could be increased by as much as 14-36 percent, however, by changing seed transfer recommendations and moving populations to their optimal climates.

Concerns over impacts of climate change on forest productivity and health, and questions about appropriate management responses, led to the formation of the Taskforce on Adapting Forests to Climate Change (http://tafcc.forestry.oregonstate.edu). An accompanying article discussed silvicultural approaches to deal with climate change. This article discusses genetic options including management actions that could be taken to influence the natural or human selection of genotypes, movement of genotypes across the landscape and conservation of genetic diversity.

Planning for climate change

To evaluate management options for responding to climate change, we must first evaluate the risk inherent in climate change. Risk is defined as the product of the probability of occurrence of an event and the impact of that occurrence. Both are difficult to predict. Although scientific consensus predicts that temperatures will rise, projections for the Pacific Northwest vary considerably (0.1-0.6°C per decade) with a best estimate of 0.3°C per decade (http://cses.washington.edu/cig/fpt/ccscenarios.shtml#anchor2). Although projections for precipitation are less certain, warming without increases in summer precipitation will result in considerably more drought stress. Managers must also consider the risk of extremes in climates, including the potential for fall and spring cold events in the near-term,

PHOTO COURTESY OF DAN MIKOWSKI, USFS PNWRS

Post-fire restoration may provide an opportunity for reforestation with mixed species or populations adapted to a future climate.

even if the future brings long-term warming. To evaluate the impact of climate trends and extremes, we need to know about genetic variation in adaptive traits. For some species such as Douglas-fir and lodgepole pine, we have good information, but for others, particularly non-commercial species, we know much less.

Recommendations for planning for climate change include:

• ***Develop your organization's perspective on risk.*** Given the uncertainty inherent in predicting future climates and forest responses, each organization should evaluate their perspective on risk and needs. State and federal agencies may have different perspectives than private interests. For some organizations, financial risks may be particularly important, but for others, ecological risks may be their primary concern. Although the ecological, financial and social risks of different management options should be considered, there is currently insufficient information to quantify these risks accurately.

• ***Prioritize species and populations for vulnerability to climate change.*** Some species may be less sensitive to climate change than others. For example, western white pine is considered a generalist because differences among seed sources are relatively small, but Douglas-fir is considered a specialist because it has considerable seed source variation that is associated with climate. Populations at the southern boundaries of a species' range may be more vulnerable because there are no populations from warmer environments that can migrate into these areas as warming occurs. Small populations may be more vulnerable owing to low genetic diversity.

• ***Monitor for climate change impacts.*** Changes in species composition, reforestation problems associated with drought, changes in the timing of bud flush because of poor winter chilling, and increased disease and insect problems may all be indicative of climate change. Organizations should monitor their forests and collect the data needed to detect climate change impacts as they occur, and determine what their "trigger" should be for concluding that management approaches should be changed.

• ***Manage for uncertainty.*** One approach to managing for uncertainty is to diversify. A diverse approach includes incorporating both genetic diversity and a diversity of silvicultural approaches across the landscape. The varied ownership and management of forests in the western United States should help.

• ***Plan your response.*** Responses to climate may be 'reactive' or 'anticipatory.' If you plan to react to climate change once adverse effects are observed (i.e., based on your 'trigger'), it would be wise to know exactly what your management responses will be. Some responses may be quick to implement, but others may take years to plan and carry out. For example, large fires may provide excellent opportunities to adjust species and seed source composition via planting, but acquiring the appropriate seed sources may require years of advanced planning. Furthermore, practices may need to be changed to plant new species and seed sources in areas that have been regenerated naturally in the past.

Genetic options for naturally regenerated forests

• ***Maintain species and genetic diversity.*** Genetic diversity provides populations with the capacity to adapt to climate change via natural selection. Existing genetic diversity can be conserved by locating reserves in areas of high environmental heterogeneity and high genetic diversity (such as might be found in mountainous areas with steep elevational gradients) and by using silvicultural practices that make stands more resistant to fire and pests, such as thinning or prescribed fire.

• ***Maintain corridors for gene flow.*** Genetic diversity may be enhanced in native forests by promoting gene flow through pollen and seed migration. Introduced genetic variation via gene flow from adjacent stands may increase the frequency of adapted genotypes and allow for natural selection.

• ***Establish "genetic outposts."*** Stands that are genetically adapted to future climates may be planted adjacent to native forests to increase the potential for migration of pollen and seed into naturally-regenerated forests. A small number of genetic outposts may be sufficient, and commercial plantations next to native forests may serve this function. The concept of genetic outposts is a departure from the previous view that 'pollen contamination' was considered detrimental to conservation objectives.

Although naturally-regenerated forests may be made more resistant and resilient through silvicultural approaches, plant populations may become increasingly maladapted and unable to keep pace with climate change. Therefore, we should begin thinking about conserving ecosystem functions, not necessarily current ecosystems, and it may become necessary to use artificial regeneration in areas that were formerly regenerated naturally to maintain vital ecosystem functions.

Genetic options for planted forests

• ***Create seed banks for vulnerable populations.*** Given the potential for loss of species and genetic diversity, organizations should give greater emphasis to seed collections for long-

term storage in seed banks. This is particularly true for unique or isolated populations that may be at an increased threat from fire or pests.

• ***Move species and populations to match future climates.*** 'Assisted migration' is the movement of species, provenances or breeding populations from areas where they currently occur to new sites where they are expected to be adapted in the future. Although large movements may not be wise at this time, it may be wise to begin moving genotypes from colder to warmer to environments within existing seed zones, and perhaps across adjacent seed zones.

• ***Mix provenances to hedge your bets.*** The uncertainty of future climates may be mitigated by increasing genetic diversity through planting provenance mixtures. Mixtures may be deployed at the stand level or they may be deployed across the landscape by planting different areas to different provenances.

• ***Plant at higher densities to allow for natural and human selection by thinning.*** Planting provenance mixtures at the stand level may be combined with higher planting densities to allow for higher mortality or the thinning of slow growing trees that show evidence of maladaptation.

• ***Select and breed trees for future climates.*** Genetic variation exists for cold hardiness, drought hardiness, growth phenology, and disease and insect resistance. For species within tree improvement programs, it may be possible to specifically select for traits such as drought hardiness that may be important in the future. Initiating a breeding program can, however, be a long-term and expensive prospect, and silvicultural options may be more feasible for some traits, for example, for new diseases or insects. Breeding for broadly adapted genotypes may also be possible, although its efficacy has not been tested.

Needed tools and research

With funding from the U.S. Forest Service Global Change Research Program, the authors are currently developing an interactive web-based tool that will allow users to display current seed zones or breeding zones, characterize those zones for climate variables important to the adaptation of a chosen species, and show how those zones may shift given alternative future climate scenarios.

Furthermore, a national database for provenance test data is being initiated that will ensure that the data from many of the earlier established provenance tests will not be lost and will be made available for study given the new context of climate change.

The USFS Pacific Northwest Research Station is also initiating new long-term field tests in collaboration with several small- to medium-sized forestry companies to push the limits of moving coastal Douglas-fir provenances. Provenance tests and short-term seedling common garden studies are needed for unstudied and other key species. Characterizing breeding populations and genotypes for adaptive traits should help to understand deployment options for tree improvement programs. Studies of reproduction and establishment from seed are needed to better understand the consequences of climate change on native forests. Continued research on genetic variation in response to climate and development of the tools to transfer knowledge of that research will contribute to our ability to act from a base of knowledge about likely outcomes from different management options. ◆

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Western Climate Initiative Focuses on Regional Cap-and-Trade System

BY ADRIAN MILLER

Since Vice President Al Gore went on tour with his *Inconvenient Truth*, there has been a flurry of ideas and proposals across local, state and national jurisdictions as to how society should respond to climate change. Cap and trade, carbon taxes and regulation of greenhouse gases as pollutants are just a few of the large-scale programs being considered throughout the United States and beyond.

So why should foresters care? These policy discussions are fertile ground for decision makers and the public to begin to understand the inherent value forests have in mitigating climate change. Because of this recognition, there are potential opportunities on the horizon.

With the exception of California, most states have not begun to establish state-level regulation of greenhouse gases. At the national level, while there have been a number of bills proposed, there has not been significant movement on climate change policies. At press time, President-elect Obama supports cap and trade; however, it is unclear at this point how this issue will be prioritized in the new administration. Most of the action has been regional, such as the northeast's Regional Greenhouse Gas Initiative (RGGI), and in our neck of the woods, the Western Climate Initiative (WCI).

WCI was formed on February 26, 2007, by the governors of Washington, Oregon, California, New Mexico and Arizona to establish a regional cap-and-trade system as a tool to reduce the region's greenhouse gas emissions. Since then, WCI has expanded to 11 members in the United States and Canada, as well as observers from both these countries and some Mexican provinces.

Representatives from the executive branches of these member states and provinces have been meeting since WCI's inception to design an outline for a regional cap-and-trade system. The Design Recommendations for the WCI Regional Cap-and-Trade Program were released in September 2008. Since WCI has no authority of its own to regulate greenhouse gas emissions, it is up to individual member states to adopt the regulatory requirements needed to implement the agreement. This is an important point; no matter what are agreed to in WCI negotiations, it is up to the states, often through the legislature, to implement the proposal.

Grossly oversimplifying, cap and trade is a regulatory program to limit the emission of greenhouse gases, but anticipates that emissions allowances and offsets will be traded among emitters to reduce the cost of meeting compliance obligations. Forest offsets are often the most discussed part of cap-and-trade policy in forestry circles; however, there are many other pieces of cap-and-trade policy that can have an equal or potentially greater impact to land managers.

Greenhouse gas allowances represent the right to emit one unit (the unit measure of greenhouse gases is reflected in metric tons of carbon dioxide equivalents [$mtCO_2e$] of greenhouse gas emissions). Understanding the distribution of allowances by free allocation or auction is key to forecasting the potential impact to forest landowners. Facilities covered by the cap will either have to reduce emissions, acquire allowances equal to their emissions, purchase offsets to reduce emissions, or some of each. If allowances are allocated at no cost based on historic emissions, then the only participants in the market are the regulated entities that need the allowances to be able to continue to operate.

WCI has recommended that some allowances be initially auctioned, moving over time to a 100 percent auction system. This would allow groups (e.g. financial speculators or non-governmental organizations) to purchase allowances, which they could then sell at a profit or retire to force further reduction by emitters. Both have the same effect, which is limiting the supply of allowances and driving up the cost of compliance for manufacturing facilities that need them to stay in business. If we continue to lose markets for our forest products as a result of poor cap-and-trade

design, it will create a negative feedback loop, increasing the likelihood that forestland will be converted to other uses, further impacting global climate stores.

Another critical WCI policy decision that is left to the states is how to treat emissions from biomass and biofuels. Greenhouse gases released from combusting forest biomass or biofuel should be considered "carbon neutral" since the carbon in the fuel was recently in the atmosphere, and unless sequestered in forest products, would eventually return through decay or wildfire. Facilities that emit carbon dioxide from biomass or biofuels should not have to purchase allowances for those emissions. This policy recommendation would have an immediate positive impact to existing manufacturing facilities and has the potential to create incentives for development of biomass power and cellulosic biofuels, both increasing demand for a wider variety of forest products.

Forestland is not covered as a regulated sector under the proposed WCI design, thus forest landowners may be eligible to provide offsets. For emitters, offsets provide the greatest opportunity for decreasing the cost of compliance since this effectively increases the number of allowances available. For forest landowners, offsets provide a potential new revenue opportunity. That being said, there is no such thing as free money.

While forest offsets are being sold today under a variety of protocols in voluntary markets, a regulated market for offsets has proven to be more challenging. Since an offset must represent the equivalent of an emission reduction for the capped entity, policy makers must translate a "reduction in emission" to an "increase in sequestration" for forest offsets. A critical component to an effective program is the starting point (baseline) that forest offset providers measure the increase in sequestration from. The length of time carbon needs to be stored (permanence) in the forest or wood products so that it is equivalent to an emission reduction is another factor that has to be established. Crediting for avoided emissions from avoided deforestation or substituting wood-based products for more greenhouse gas intensive products is another approach that brings its own set of challenges. WCI has prioritized addressing the issues for forest offsets over other types of offsets. While it is critical that forest offsets are carefully crafted, we must not let perfection be the enemy of good by letting the transaction costs of participation exceed the value of the carbon credit.

A well designed cap-and-trade program has the potential to offer both increased demand for wood across all sectors of manufacturing and energy production as well as a new income opportunity through marketing forest offsets. As foresters, we need to continue to be vigilant in participating directly with WCI's design process as well as with our own state's policies on climate change.

More information on WCI, including contact information for WCI representatives from individual states, can be found at www.westernclimateinitiative.org. ◆

Adrian Miller is associate director of Forest Management for Washington Forest Protection Association in Olympia. He can be reached at 360-705-9284 or amiller@wfpa.org.

South Puget Fellows Honored

Don Hanley (left photo) and John McMahon (right photo) received their Fellow certificates from 2008 Washington State SAF Chair Zoanne Thomas as 2008 South Puget Sound Chapter Chair Tom Hanson looks on. The awards were presented at the South Puget Sound and Green River Community College Student Mentoring night in October.

New Woodlands Carbon Venture Creates Opportunity for Pacific Northwest Family Forest Owners

Thanks to a partnership with the American Forest Foundation, Pacific Northwest family woodland owners will have a voluntary opportunity to join new markets in carbon storage and carbon offset trading.

"New markets, such as the Chicago Climate Exchange (CCX), have emerged to help add value to forests and forest products, so sustainable forest management can effectively compete with other land uses and energy intensive products," said Mike Gaudern, president of Woodlands Carbon Company.

"The principle is to pay woodland owners for their yearly growth in terms of carbon taken from the air and stored in wood," said Gaudern. "The goal of Woodlands Carbon is to maximize the potential for carbon sales as a new annual revenue source for family forest owners. This is an entirely volunteer program."

Woodlands Carbon will assist family woodland owners that want to sell carbon credits into a voluntary market by serving as an aggregator. Aggregators create pools of forestland that collectively store enough carbon to be traded in blocks on the CCX. Woodlands Carbon can also sell carbon directly to entities that want to offset their carbon footprint, such as utilities or manufacturers.

How trees and wood products store carbon

Carbon storage is a frequently-discussed component of efforts to combat climate change. Trees help address climate change by removing carbon dioxide from the atmosphere and converting it through photosynthesis to carbon. Carbon is then stored in wood, vegetation and in the soil—a process known as carbon sequestration—and oxygen is released back into the atmosphere.

Planting new forests and actively managing existing forests both sequester carbon. As trees grow they continue to store significant amounts of carbon (sometimes up to 20 percent of the tree's weight) throughout the tree's lifespan. An acre of reforested land can store up to two metric tons of carbon per year, according to the Environmental Protection Agency. An economic value is placed on that carbon storage through a process called carbon credits.

If carbon storage relies on trees growing, does a market that promotes the sale of carbon credits simply mean that landowners will keep their existing trees growing longer?

"Extending growing rotations and cashing in is too simplistic," said Gaudern. "Carbon is trapped and stored by a growing tree. However, in a mature tree, the growth slows and damage may occur due to insects and/or fire. Once mortality occurs, that tree begins putting carbon back into the atmosphere. Bigger trees and older forests alone do not meet the goal of long-term carbon storage. Sustainable forest management and the use of renewable products that they produce, such as timber versus steel, or wood ethanol versus fossil fuels, has to be included in the mix to achieve that goal. It means that the system of forest carbon storage is both additional (is measured in real growth), avoids leakage (does not just move demand for substitute products to other part of the system) and permanent (last for up to 100 years).

How do woodland owners participate?

Landowners can participate in the CCX market by selling carbon credits that result from their forest management activities. They can also sell carbon credits from wood products that come from their harvested trees. Wood products carbon credits usually equal about 30 percent of the total amount of carbon stored in a harvested tree.

For now, Woodlands Carbon is focused primarily on trading carbon credits on CCX. There are two main requirements to trade carbon on the CCX.

First, CCX requires that your forest management activities be certified through an internationally recognized system. CCX recognizes several programs including the American Tree Farm System and the Forest Stewardship Council.

Second, a baseline inventory of trees growing in your forest must be established. Models are then used to determine the annual tree growth. This annual growth is used to estimate the annual amount of carbon being stored.

The rules on inventory methods and growth models are being finalized and will be available to landowners, consulting foresters and those interested in buying carbon credits. These rules and guidance will be published in a handbook that will soon be available.

Woodlands Carbon is establishing a revolving loan fund to help offset the initial inventory costs to landowners. Low-costs loans will be made available that will be repaid through the initial carbon sale proceeds.

Woodlands Carbon is also exploring direct sales to businesses that are currently purchasing carbon credits, as well as those who are expressing an interest to do so for the purpose of voluntarily offsetting their carbon emissions. This creates further competition and marketing opportunities both for the buyers and family landowners.

Where's the money in carbon offsets?

Economic and political drivers ultimately shape the expansion of the carbon market, including supply and demand. In December 2008, carbon was trading on the Chicago Climate Exchange at $1.65 per metric ton. Over the past year it has ranged from $1.00 to $7.00 per metric ton.

Many with a stake in carbon markets are keeping their eyes on the new administration in Washington D.C. to see if it will push for a mandatory national cap-and-trade system for greenhouse gas emissions. Mandatory rules in Europe benefited the expansion of the carbon market as demand for carbon offsets increased. However, forests and forest products were not allowed to be used as offsets. This was a mistake, according to Gaudern, and one that is being addressed via the voluntary marketplace.

"As people realize the importance of adding value to forests for their benefit of storing carbon, the role that they play has changed in the climate change debate. The annual carbon payments add another economic benefit alongside timber harvest values for the land," said Gaudern.

Woodlands Carbon is a new project of the Oregon Small Woodlands Association (OSWA) working in partnership with the American Forest Foundation. The vision is to see that privately owned family woodlands are a thriving part of the Pacific Northwest's landscape in 2050. The association works toward that vision by providing family woodland owners educational, advocacy and new market opportunities. The American Forest Foundation, through its internationally recognized forest certification program, is committed to increasing and maintaining the amount of good forestry on America's family forestlands.

Gaudern until recently served as OSWA's executive director before being named to head the new venture.

For additional information, email Mike Gaudern at woodlandscarbonco@gmail.com or visit www.oswa.org and www.forestfoundation.org. ◆

Guest Opinion

Considering Climate Change

BY KEN FAULK

The western forests that we see today were brought about largely by climate change over long (geologic) periods of time. More recently, perhaps the last 10,000 or so years, mankind has added its influence to what are now the western forests. Over the last several million years, the dominant species of the forest changed from one to another in response to the prevailing climate of the era.

The forests that I am familiar with in western Oregon usually have a dominant species. We know the dominant species of the western forests have changed over time. Often we can find remnants of past forests hanging on in small pockets or lingering as a minor species in today's forests. I like to think that they are biding their time, waiting for climate change to welcome them back.

As I'm writing this, I can look out the window and see Mary's Peak, a 4,000 foot high mountain in the Oregon Coast Range. Occupying the top of the peak is a small forest of noble fir. The tallest of the other Coast Range mountains also wear this "noble" crown. Are these coast range mountain tops providing a redoubt to which the once-dominant nobles have retreated to await the return of the ice from the north and to re-occupy the lower elevations?

We have a minor species here in the Willamette Valley called ponderosa pine. Is it waiting for the return of the dryer climate it was thriving on when it was the dominant species of this area?

Each species of tree has a range of climate and soil conditions in which it can exist and even flourish. In fact, we often refer to the region that displays this climate condition as the species range. Different species can depend on the same climate conditions often causing their ranges to overlap. Our mixed forests are a result of overlapping ranges.

In those forests with overlapping species range, our management practices can change the whole ecosystem. If we favor harvest of a certain species and remove it from the mix, we may change the insect, disease and fire potential, possibly with dire consequences.

Here in the Willamette Valley, only 10 percent of the oak woodland and savanna, which welcomed settlers 175 years ago, still exists today. Some of the loss is due to changes in the use of the land, but much more is due to Douglas-fir occupying sites previously dominated by oak. The fir and oak ranges overlap. The Native American practice of burning the hills and, later, the settler practice of grazing kept the Douglas-fir at bay. When those practices ceased, the fir took advantage of the opportunity to invade oak sites, soon overtopping and shading out the oak.

As a response to heightened awareness of and concern over climate change, man caused or natural, some woodland owners are being advised to consider planting or favoring a different species than is now dominant in the region. I find this reasoning flawed. Our western tree species are adapted to a wide range of climate and soil conditions that will favor their growth and general health. If, over time, there is such a great change in climate as to favor one of our minor species, it will come out of hiding in its own sweet time. ◆

Ken Faulk is president of the Oregon Small Woodlands Association. He can be reached at kfaulk@peak.org.

Thinning, Carbon Sequestration not at Odds, Studies Suggest

While forest managers are on a quest to purge the nation's forests of hazardous fuels, scientists at the same time are calling for managing forests to sequester carbon. Since trees absorb carbon dioxide, that would appear to present a conflict at first glance. But new research shows that thinning actually results in more carbon storage over the long-term, creating a win-win for forest managers grappling with two of the 21st century's biggest resource issues.

A new study to be published in the January 2009 issue of the scientific journal *Frontiers in Ecology and the Environment* suggests that what is good for reducing the risk of catastrophic wildfire is also good for controlling climate change.

Using computer modeling, the researchers looked at how fuel treatments affected the ability of a forest in California's Sierra Nevadas to absorb carbon over 100 years, with and without wildfires. The model runs showed that after a century of growth, an unburned stand stored the most carbon. But when wildfire was included, much of the stand's carbon went up in smoke. If thinning was introduced first, however, the stand retained more carbon when fire came through. The researchers concluded that in forests that are adapted to wildfire, carbon storage in trees (it can also be stored in soil and groundcover) was best protected by fuel treatments that created a less dense forest dominated by large, fire-resistant trees.

"We found that if you want to maintain this carbon on a site for 100 years, then you probably want to thin the stand," said Matthew Hurteau, who led the study.

In a 2008 study in the same journal that examined four forests burned in the wildfires of 2002, Hurteau and other researchers found that fuel treatments would have cut carbon dioxide emissions by as much as 98 percent.

Indeed, U.S. EPA estimates that managed forests in the United States absorb the same amount of carbon dioxide emitted by 235 million cars each year.

As recently as eight years ago, researchers assumed that the more trees in a forest, the more carbon that forest absorbed. A report by the Intergovernmental Panel on Climate Change issued in 2000 noted that younger trees consume more carbon than older trees, and more quickly. That would suggest that a forest crowded with young trees—in other words, one full of hazardous fuels—would provide the most benefit for sequestering carbon. But in fact, removing those trees and leaving the larger ones in place creates a better carbon "sink," Hurteau said.

"One of our take-home messages in the new paper is that in these fire-prone forests, when you basically consolidate the carbon in fewer large trees, you create a forest that's more resistant to wildfire, and they sequester more carbon over the long-term," Hurteau said. "That's the best approach to carbon sequestration."

The value of carbon credits from forest management practices should factor in the long-term benefits of thinning for carbon sequestration, he added. Currently, some carbon accounting systems in carbon-credit trading markets penalize thinning on the assumption that such projects reduce carbon storage. California is currently revising its carbon accounting system to reflect the true value of thinned forests, Hurteau said.

It is not yet clear, Hurteau said, what effect prescribed burning—another commonly used method of clearing out hazardous fuels—has on carbon storage in forests. He hopes to study controlled burns next. But their emissions should be considered in the context of their benefit for reducing the risk of catastrophic wildfire, he said.

"Prescribed burning releases carbon, but it's so important for system function that to forego prescribed burning for carbon reasons would, I think, be a mistake," he said.

But even as the carbon sequestration benefits of forests become increasingly important as greenhouse gas emissions continue to rise, massive die-offs of trees—due in part to climate change—are undermining forests' ability to store carbon.

"The carbon that's sequestered by trees can be lost pretty quickly to mortality," said Craig Allen, a researcher with the U.S. Geological Survey's Jemez Mountains Field Station near Los Alamos, N.M., at a forestry and climate change workshop held in Albuquerque on Nov. 20. Rising temperatures have dried out forests, weakening trees and making them less resistant to insect infestations, drought and other potentially fatal stresses, he said. ◆

—Reprinted from Land Letter, *written by April Reese, Western reporter, December 4, 2008*

USDA Announces New Office of Ecosystem Services and Markets

On December 18, 2008, Agriculture Secretary Ed Schafer announced the intention to establish a new USDA Office of Ecosystem Services and Markets and the creation of a federal government-wide Conservation and Land Management Environmental Services Board to assist the Secretary of Agriculture in the development of new technical guidelines and science-based methods to assess environmental service benefits that will in turn promote markets for ecosystem services including carbon trading to mitigate climate change.

"Our Nation's farms, ranches and forests provide goods and services that are vital to society—natural assets we call "ecosystem services," said Schafer. "The Office of Ecosystem Services and Markets will enable America's agriculture producers to better compete, trade their services around the world, and make significant contributions to help improve the environment."

Agriculture producers provide many ecosystem services that have historically been viewed as free benefits to society—clean water and air, wildlife habitat, carbon storage and scenic landscapes. Lacking a formal structure to market these services, farmers, ranchers and forest landowners are not generally compensated for providing these critical public benefits. Market-based approaches to conservation are proven to be a cost-effective method to achieve environmental goals and sustain working and natural landscapes. Without financial incentives, these ecosystem services may be lost as privately-owned lands are sold or converted to development.

Secretary Schafer intends to name Sally Collins Director of the Office of Ecosystem Services and Markets (OESM). Organizationally, OESM will be located within the Office of the Secretary, providing direct access to the Secretary. Collins will assume this position after serving as Associate Chief of the USDA Forest Service for the past eight years, where she pioneered concepts for ecosystem services and markets as part of that agency's sustainable land management mission.

OESM will provide administrative and technical assistance to the Secretary in developing the uniform guidelines and tools needed to create and expand markets for these vital ecosystem services and will support the work of the Conservation and Land Management Environmental Services Board. As directed by the authorizing legislation the first ecosystem services to be examined will be carbon sequestration. The Office of Ecosystem Services and Markets and the Conservation and Land Management Environmental Services Board will be established to implement actions authorized by the 2008 Farm Bill.

The Conservation and Land Management Environmental Services Board will be comprised of the secretaries of Interior, Energy, Commerce, Transportation and Defense; the chairman of the Council of Economic Advisors; the director of the White House Office of Science and Technology; the administrator of the Environmental Protection Agency; and the commander of the Army Corps of Engineers. The secretary of Agriculture will chair the Board. The chairman of the White House Council on Environmental Quality and the administrator of Office of Information and Regulatory Affairs will serve as vice-chairs.

Nominations will be sought in the near future for a federally chartered public Advisory Committee to advise the Board. The Advisory Committee will include farmers, ranchers and forest landowners and Tribal representatives, as well as representatives from state natural resource and environmental agencies, agriculture departments, and conservation and environmental organizations. ◆

Climate Change Task Force Report Available Online

In March 2007, on the advice of the Society of American Foresters' Committee on Forest Policy, the SAF Council created the Climate Change and Carbon Sequestration Task Force. Council charged the task force with evaluating the implications of global climate change on forests and forest management, addressing the role of forestry and forests in climate change, offering recommendations for SAF policy activities, and the following tasks:

- briefly assess and summarize the literature on the global climate change implications for forests and their management;
- briefly assess and summarize climate change mitigating options involving forests, including forests' potential as a carbon sink (with cost comparisons to other methods, if information is available), and domestic and international policies relating to forests' role in climate change; and
- recommend possible policy measures to guide effective climate change mitigation through forests and forest management, addressing existing and potential carbon-trading markets, opportunities for renewable energy to contribute to mitigation of greenhouse gas emissions, and strategies to minimize the vulnerability and promote adaptation of forests to impacts from climate change.

Prior to publication, the manuscript of the report was reviewed, in whole or in part, by more than 20 scientists.

To download a copy of the report, visit www.safnet.org/jof_cctf.pdf.

In addition, a position statement, "Forest Management and Climate Change," which was based on the report, was adopted by SAF on December 8, 2008. The position statement, as well as other products from the Task Force, can be downloaded at www.safnet.org/policyandpress/positionstatements.cfm#cc.

Nominate a Colleague for an Award

There are many talented SAF members among us who are deserving of an SAF award. With annual meeting award ceremonies right around the corner, now is the time to consider nominating a colleague for a state society or national SAF award for this year.

National awards, which honor members in areas of science, policy, volunteerism, communications, leadership and others, are due at the end of February. For a full list of awards, descriptions and nomination forms, visit the national SAF website at www.safnet.org/who/national-awards.cfm. Nominations should be coordinated with your state awards chair (see sidebar for contacts).

The Oregon SAF has a variety of awards that are presented on an annual basis when a worthy candidate is nominated. These include Forester of the Year, Forestry Appreciation award, Chapter Achievement award, Research award, Lifetime Achievement award, Tough Tree award and Outstanding Student award.

For a description of each award and a list of past participants, visit www.forestry.org/or/awards/index.php. Nominations are due to Jim Rombach by February 27.

Washington State SAF honors a Forester of the Year, Chapter of the Year, Volunteer of the Year, and others as deemed appropriate. Visit www.forestry.org/wa/awards/index.php for more information. Nominations for Forester of the Year are due to Dick Hopkins and nominations for Chapter of the Year are due to Doug St. John by February 27.

The Inland Empire Society has awards for Forester of the Year, Communicator of the Year, Student of the Year, Outstanding Student Chapter, Outstanding Student Chapter Website and the Irwin Student Chapter of the Year (traveling plaque). Contact Keith Blatner right away if you have a nomination.

The Alaska Society presents annual awards for Forester of the Year and Young Forester of the Year. For more information, contact Sue Rodman. ◆

Union County Tree Farmers Recognized for Excellence

PHOTO COURTESY OF KEVIN WEEKS

Left to right: U.S. Forest Service Deputy Regional Forester Cal Joyner and Oregon State Forester Marvin Brown congratulate Ted Brown (no relation), Brown's son Sandy Brown, and Mary Brown on being named Oregon Outstanding Tree Farmers of the Year.

A family from Union County has been named Oregon's Outstanding Tree Farmers of the Year for 2008. The Oregon Tree Farm System recognized Ted and Mary Brown during a ceremony at the World Forestry Center in Portland on November 24.

Ted and Mary Brown purchased the Wisdom Creek Tree Farm in 1957 and expanded in 1978 to the farm's current size of 756 acres. The Browns manage their timber stand near Union in northeastern Oregon with their two children.

"Our main goal for the land is to maintain biodiversity," said Ted Brown. The Brown's land, which forms the southern border of the Wallowa-Whitman National Forest, is rich with diverse species of wildlife.

Local chapters of the Oregon Small Woodlands Association select the County Outstanding Tree Farmers of the Year in Oregon. The Oregon winner is selected by a team of professional foresters from the public and private sectors.

The Oregon Department of Forestry, an active partner of the Oregon Tree Farm System, helps landowners manage their forestlands to ensure that family-owned tree farms achieve economic, environmental and social benefits.

More information on the Oregon Tree Farm System is available at www.otfs.org.

State Society Awards Contacts

Oregon: Jim Rombach, 360-576-7644, jlrombach@aol.com

Washington: Doug St. John, 425-452-5702, dougstjohn@greencrow.com; Dick Hopkins, DHopkins@greenriver.edu

Inland Empire: Keith Blatner, 509-335-4499, blatner@wsu.edu

Alaska: Sue Rodman, 907-267-4902, rodmansu@muni.org

Calendar of Events

Helicopter Logging Workshop, Jan. 30, Coeur d'Alene, ID. Contact: FEI

Fuel Reduction on Steep Slopes, Feb. 2-3, Coeur d'Alene, ID. Contact: FEI

Mechanized Harvesting, Feb. 4-5, Coeur d'Alene, ID. Contact: FEI

LEED Green Building and Sustainability, Selkirk Chapter meeting, Feb. 18, Spokane, WA. Contact: Lynn Kaney, lkaney@ povn.com, 509-671-3374.

Oregon Logging Conference, Feb. 19-21, Eugene, OR. Contact: www.oregonloggingconference.com, 541-686-9191.

Chilean Forestry, March 1-10, Chile. Contact: Anglatin Travel, www.anglatin.com, 800-918-8580.

Inland Empire SAF annual meeting, March 6-7, Colville, WA. Contact: www.iesaf.org.

Learn ArcPad in One Day, March 19, Tualatin, OR. Contact: Resource Supply, jon@resourcesupplyllc.com, www.resourcesupplyllc.com, 503-707-6236.

Tree School Clackamas, March 21, Oregon City, OR. Contact: http://extension.oregonstate.edu/clackamas/forestry/treeschool, 503-655-8631.

Fuel Reduction on Steep Slopes, March 30-31, Bend, OR. Contact: FEI

Mechanized Harvesting, April 1-2, Bend, OR. Contact: FEI

Helicopter Logging Workshop, April 3, Bend, OR. Contact: FEI

SAF National Leadership Academy, April 4-7, Coeur d'Alene, ID. Contact: Louise Murgia, murgial@safnet.org, 866-897-8720 x18.

Alaska SAF annual meeting, April 28-May 2, Fairbanks, AK. Contact: Kathryn Pyne, Kathryn.pyne@alaska.gov.

Oregon SAF Conference, April 29-May 1, Canyonville, OR. Contact: Eric Geyer, 541-679-2524, ericg@rfpco.com.

Variable Probability Sampling Workshop, Spring 2009, Corvallis, OR. Contact: Donna Williams, conferences@oregonstate.edu, 800-737-9300.

Fuel Reduction on Steep Slopes, May 4-5, Kamloops, BC. Contact: FEI

Mechanized Harvesting, May 6-7, Kamloops, BC. Contact: FEI

Washington State SAF annual meeting, May 6-8, Ellensburg. Contact: Eric Watrud, 509-925-0947, eric.watrud@dnr.wa.gov.

Helicopter Logging Workshop, May 8, Kamloops, BC. Contact: FEI

Oregon Forest History Roundtable, May 15, Tillamook, OR. Contact: Doug Decker, ddecker@odf.state.or.us, 503-359-7439.

Contact Information

FEI: Forest Engineering Inc., 620 SW 4th St., Corvallis, OR 97333, 541-754-7558, www.forestengineer.com.

Send calendar items to the editor, *Western Forester*, 4033 SW Canyon Rd., Portland, OR 97221; fax 503-226-2515; rasor@safnwo.org.

November and December SAF Council Meeting Updates

November Update

BY CLARK W. SEELY, CF

The SAF Council held their 2008 convention meeting in Reno, Nevada, on November 5.

Highlights of the November meeting include:

• Council reviewed two draft position statements based on the Climate Change Task Force report. Input was provided, and final action will be considered at the December meeting. Council will possibly be considering a new position statement on bioenergy, in part based on the task force report.

• Council Student Representative Stephen Purvis provided an update of student activities, particularly those associated with the convention. Student involvement is high, and work is focusing on retaining membership post graduation, increasing student membership and connecting more effectively with student advisors.

• HSD Chair Ken Jolly provided a report of the previous day's HSD meeting. It was a productive meeting with focus on utilization of small diameter wood, SAF website and email improvements, further concepts for HSD awards and membership decline.

• The joint effort with the National Association of State Foresters regarding national policy on forest sustainability is positively evolving, based significantly on SAF officer attendance and involvement with the 2008 NASF annual meeting.

• Council received a financial status report that showed the impact on investments from recent market declines. While the investments have lost value, compared to general market declines, the investment losses are far less than could have been the case if Council had not revised the investment objectives two years ago. The balance sheet for 2008 will show a net loss based on unrealized losses, but overall financial status is stable and manageable.

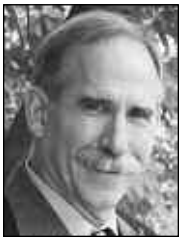
• Council reviewed and provided recommendations for revisions to the final draft Strategic Plan and Actions documents. The plan and actions will be finalized at the December meeting.

• The 2009 SAF Leadership Academy dates were established for April 4-7, 2009, at Coeur d'Alene, Idaho.

I would also like to thank Kirk David for his service to the membership of the Northwest as he completes his District 1 Council term. He has been very dedicated to the profession and his Council responsibilities, and served his fellow members very well. He will be greatly missed.

December Update

BY G. KIRK DAVID



On Sunday, December 7, an orientation was conducted in Bethesda, Maryland, for our four new SAF Council members (Chuck Lorenz, District 1; Lynn Sprague, District 4; Ken Jolly, District 7; and Mark Elliot, District 10) along with other Council attendees.

When President Tom Thompson convened the Council meeting on Monday, Council ratified several interim actions:

• Hawaii 2011 Convention Site.

• Position Statement on Biodiversity in Forest Ecosystems.

• Position Statement on Urban Forestry.

• Comments on National Forest Certification.

• Letter on Soil Fumigants.

• Continental Dialogue on Invasive Species Letter.

Final 2009 District Reports were presented by each Council district representative.

Council critiqued and evaluated Chief Executive Officer Michael Goergen's performance.

Council reviewed and approved a 2009 Budget and a revised SAF Strategic Plan.

Nadine Block, Committee on Forest Policy (CFP) chair, gave the CFP report. Council adopted two new Position Statements: 1) Forest Management and Climate Change; and 2) Forest Offset Projects in a Carbon Trading System.

David Smith and SAF Counsel Susan Dorn presented a Certification Review Board response to Council concerns about the CF® program.

Bill Rockwell, Forest Science and Technology Board chair, gave the FS&TB report. FS&TB desires some emphasis at Leadership Academy to include Working Group leaders in addition to state officers.

Council approved the establishment of an endowment for the Bob and Ann Gregory Award in Forestry to provide economic assistance to outstanding students or professionals from outside of the U.S. and Canada to attend an SAF Convention.

Ken Jolly, 2008 House of Society Delegates chair, gave the HSD report. Recommendations to Council are: 1) SAF support efforts to utilize, within the limits of sustainability, low-quality, small-diameter wood in all possible markets including local scale energy; 2) National Office staff develop 'standard minimum content and components' for all SAF websites at the chapter, division, state and national level, and adherence to those standards be encouraged, acknowledging the uniqueness and creativity of each unit's website; 3) affirm support for

National Office staff to explore the feasibility of creating 'alias' email accounts for SAF members; 4) 2009 HSD chair and conveners explore the need for additional HSD awards for state societies, divisions and chapters; and 5) Council establish a committee, with staff support, to address the issue of membership decline, with specific consideration to a 20-point suggestion list from SESAF and APSAF. Council moved to send recommendation #5 on to the Council Committee on Membership.

On Tuesday: Stephen Purvis, student representative to Council, gave the Student Executive Committee (SEC) report. The National Student Congress and other activities went well this year at convention. The SEC would appreciate local professional chapter assistance to identify faculty advisors at all forestry schools.

Kirk David, Leadership Development Committee chair, provided a report. The 2009 SAF National Leadership Academy will be held April 4-7 at the Coeur d'Alene Resort and Conference Center in Coeur d'Alene, Idaho. Registration details are forthcoming on the SAF website. In 2009 the LDC plans to review the SAF *Tools for Leaders* website pages for applicable content to add, subtract or change. After a tie vote broken by President Thompson, Council voted to not plan for a 2010 Leadership Academy yet.

President Thompson gave the Communications Committee report. A "Trees are the Answer" campaign is in progress for 2009.

Terry Clark, Science and Education director, gave the Committee on Forest Technology School Recognition report. Council approved the charter for the change to the Committee on Forest Technology School Accreditation, the school application process, and the Standards, Procedures and Guidelines for Accrediting Educational Programs in Forest Technology.

Past President John McMahon conducted additional discussion of Forest Technicians. Council moved: 1) the school application process needs to acknowledge that associate degrees are not considered professional degrees, and 2) CFP revise position statements to include the different role of technicians from professional graduates.

Christopher Whited, senior director, Marketing and Membership, provided a report. His emphasis is on SAF brand unification, member recruitment efforts from the national level and retention from the local level, an employer campaign, mentorship and unit services.

Carlton Gleed, director of Conferences and Meetings, gave the 2008 Convention update. Attendance reached 1,603. The Orlando convention is September 30-October 4, 2009; Albuquerque is October 27-31, 2010; and Honolulu is November 2-6, 2011.

Michael Goergen gave a report on the electronic election process. In 2006 (all paper ballots), 40 percent of the voting membership returned ballots. With electronic and paper balloting in 2007, the return rate dropped to 35 percent, and in 2008 to 32 percent.

My three year term as SAF Council representative expires on December 31, 2008, so this is my last Council Meeting report to Districts 1 & 2. I have truly appreciated the honor of representing District 1 for these past three years, and I thank Rick Barnes and Clark Seely for their partnership and dedication. I know that District 1 is in excellent hands for the next three years as Chuck Lorenz takes on this role. ◆

Immediate Past District 1 Council Representative Kirk David can be reached at 208-683-3168 or kirkdavid@earthlink.net. Current District 1 Council Representative Chuck Lorenz can be reached at 360-357-9088 or c_4str@yahoo.com. District 2 Council Representative Clark Seely can be reached at 503-945-7203 or cseely@odf.state.or.us.

New State SAF Leaders Elected

The Oregon and Washington State SAF elections for 2009 were completed in December. New officers were elected and position statements were approved.

In Oregon, Tim Keith, a retired Oregon Department of Forestry employee and current part-time Emergency Fire Cost Committee administrator for the department, was elected chair-elect. He will be the chair in 2010. Steve Pilkerton, a research forest engineer in the Forest Engineering, Resources and Management Department at Oregon State University, will serve a one-year term as OSAF delegate-at-large. Both have substantial SAF experience and look forward to maintaining a vital, meaningful professional organization, strengthening our chapters and improving the public's understanding of forestry. Mark Buckbee, with the BLM in Roseburg, serves as OSAF chair in 2010, and Marc Vomocil moves to past chair.

Tim Keith

Steve Pilkerton

Oregon SAF members also approved position statements on Using Pesticides on Forest Lands, Salvage Harvesting and Clearcutting, and approved a bylaws revision proposal.

John Walkowiak, CF, was elected to the position of chair-elect for the WSSAF in 2009, leading to chair in 2010. John recently took a position with the Washington Department of Revenue—Forest Tax and is a Southwest Washington Chapter member. He served as co-program chair for the 2008 WSSAF annual meeting. As chair-elect, he is looking forward to connecting with other SAF members and expanding membership interaction, increasing communications opportunities, and getting in touch with our political leaders. Before moving to Washington, John was an active SAF member in Iowa, where he served as state society chair and policy chair. Doug St. John moves to the WSSAF chair position for 2009 and Zoanne Thomas becomes the past chair.

John Walkowiak

WSSAF members also approved position statements on Washington Trust Land Management and Wood Product Production from Washington's Forests.

Policy Scoreboard

Editor's Note: To keep SAF members informed of state society policy activities, Policy Scoreboard is a regular feature in the Western Forester. *The intent is to provide a brief explanation of the policy activity—you are encouraged to follow up with the listed contact person for detailed information.*

OSAF Adopts and Endorses Revised Position Statements. Several expiring OSAF position statements were reviewed and revised by the Policy Committee, and four updated positions were approved by the OSAF Executive Committee in 2008: "Salvage Harvesting," "Using Pesticides on Forest Lands," "Clearcutting," and "Active Management to Achieve and Maintain Healthy Forests." The older position statements were of good quality, but the revision process allows for some fine-tuning and integration of newer issues such as invasive species and biomass energy. Three of the updated positions were on the fall election ballot for endorsement by OSAF voting members, and were supported by 95+ percent of those who voted. Although not required under SAF guidelines, OSAF takes this step to strengthen member awareness and support of its statewide positions.

A one-year extension of the position statement on "Landslides on Forest Lands" expired in December 2008, and by this printing an updated position may be approved by the Executive Committee. The issue remains timely as some well-publicized landslides in late 2007 again raised questions about possible links to forestry activities. In addition, whereas forestry regulations were substantially strengthened over the past decade, state and local policy makers have yet to adopt other measures that meet the legislatively mandated concept of "shared responsibility" for public safety concerns. All OSAF position statements are online at www.forestry.org and draft revisions are posted in the "members only" section. Contact: Paul Adams, OSAF Policy chair, 541-737-2946; paul.adams@oregonstate.edu.

A Busy Year for OSAF Comments on Forest Issues and Proposals. During 2008, OSAF sent or contributed to seven letters to policy and decision makers on various forest issues and proposals. These included comments sent to the BLM on their Western Oregon Plan Revisions Draft EIS, as well as a letter to Governor Kulongoski as he conducted his "consistency review" of the Final EIS issued by BLM. OSAF also submitted comments on a report released by a task force appointed by the governor, which emphasized federal forest management problems in Oregon. In response to OSAF's comments, the chair of the task force stated: "We appreciate your recognition of the unique mandate for O&C lands and your call for an active management response to 'the wildfire hazards and forest health problems that now exist in Oregon's federal forests.' Those points are consistent with the findings and recommendations in our initial report."

In response to concerns about forest health, wildfire hazards and old-growth forests on federal lands, Rep. DeFazio and Sen. Wyden each issued their own draft legislative proposals targeted at federal forest management in the Pacific Northwest. The national SAF office, with input from the OSAF Policy Committee, sent a letter to Rep. DeFazio with multiple pointed concerns about his proposal. A joint letter from OSAF and the national office to Sen. Wyden also raised many issues

with the Senator's proposal, including its ambiguities, narrow focus and conflicts with existing legal mandates. Contact: Paul Adams, OSAF Policy chair, 541-737-2946; paul.adams@oregonstate.edu.

Are Idaho's Forests a GHG Source? No, they are a substantially large sink equivalent to 40-70 percent, varying by wildfire activity, of all the greenhouse gas (GHG) emissions from fossil fuel burning in the state. Last edition it was reported that a draft GHG inventory identified Idaho's forests are a net source of GHG emissions, whereas nationwide forests are a net sink. Ongoing analysis at the University of Idaho identifies the problem with the draft inventory as inaccurate national forest inventory data used by the U.S. Department of Agriculture to set the 1990 baseline emissions level for the state. Because recent timber growing stock inventory levels are lower than the overstated baseline level, the USDA concluded that carbon has been removed from the forest. Using several different sets of data and analytical approaches, new analysis shows that Idaho's forests are a huge net sink for carbon, even in years with extraordinarily large wildfires like 2006. Contact: Jay O'Laughlin, IESAF Policy chair, 208-885-5776, jayo@uidaho.edu.

Toward a Comprehensive National Policy on Forests. According to Al Sample, president, Pinchot Institute for Conservation, "The future of forests and forestry will be determined less through what is traditionally regarded as 'forest policy' and more as an indirect result of energy policy, climate policy, trade policy and even national security policy. The case for forest conservation and sustainable management is being made by a new and different set of spokesmen, and it is being conveyed to national policymakers who are unaccustomed to hearing these messages." This excerpt is from the lead article of the organization's newsletter for Fall 2008. It is recommended reading and available online at http://pinchot.org/uploads/download?fileId=197. Contact: Jay O'Laughlin, IESAF Policy chair, 208-885-5776, jayo@uidaho.edu. ◆

Industry Veteran Starts GPS Supply Company

Jon Aschenbach, a forester and 25-year industry veteran in forestry and GPS has created a GPS equipment/software supply company called Resource Supply LLC. Resource Supply is focused on serving clients in Oregon, Washington, Northern California and Idaho that have a need for professional GPS equipment, rugged PDAs, laser rangefinders, mapping software and other field mapping/surveying equipment.

"Resource Supply offers one of the most talented and technical GPS teams found in the Northwest," said Aschenbach. "We are field people who have used all ranges of GPS extensively, from consumer to mapping to surveying. We pride ourselves in saying that we've worked in about every conceivable environment."

Resource Supply has signed up an impressive list of vendors including Magellan Professional GPS for survey-grade and mapping-grade GPS systems, Tripod Data Systems (TDS) for rugged PDAs, Laser Technology for laser rangefinders and Geneq, Inc. for sub-meter GPS.

Resource Supply is also providing a number of workshops focused on GPS at a facility in the Portland metro area as well as on-site for clients who require customized training. ◆

Resource Supply Introduces Waterproof GPS Hand-held

Resource Supply, LLC introduces the Mobile Mapper 6 (MM6). It is a rugged, waterproof GPS hand-held built specifically for professional GIS data collection in areas such as forestry, agriculture, utilities, state/local government and various other applications. The MM6 is the industry's first rugged GPS/GIS data collector for under $1,000.

"You won't find a better value for a GPS/GIS data collector in the two- to five-meter range," said Resource Supply President Jon Aschenbach. "The ruggedness factor is a huge benefit when working outside in the Pacific Northwest."

The MM6 runs Windows Mobile 6 and is fully compatible with popular GIS software such as all ESRI products, AutoCAD and other GIS/CAD programs. Users have a choice of running the Mobile Mapper 6 data collection program or ESRI's ArcPad.

It comes standard with an integrated two megapixel camera. The photos can be linked to GIS features recorded by the MM6. It also has a built-in Bluetooth transceiver for wireless connectivity.

The MM6 weighs less than eight ounces and fits easily in your shirt or coat pocket. It runs up to 10 hours on two AA batteries, which are either rechargeable or alkaline. The unit comes with 128 MB of built-in data storage and a 2GB SD card for extended mass storage.

For more information, visit www.resourcesupplyllc.com or contact Jon Aschenbach at 503-707-6236 or jon@resourcesupplyllc.com.

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