

Knowledge Exchange: A Two-Way Street

The best available science is of little use if it gathers dust on the shelves of library stacks or is deeply embedded on an obscure website. A key part of the Joint Fire Science Program (JFSP) mission is to ensure research on wildland fire science is readily available to practitioners in a useful format so it can help support sound management decisions. The JFSP has made great inroads in this arena on a national level, but managers short on time often have to sift through an overload of information that may not be specific to their region. In the next few years, the JFSP wants to break the conventional mold of science delivery by creating ecologically coherent, regionally based consortia and encourage practitioners to take part in driving the research agenda. The key to the program's success is establishing mutual trust between scientists and managers and opening pathways of communications that run both ways.



The JFSP is firmly established as a driver of fire-related research. Since the JFSP was formed in 1998, the number of completed projects has accumulated. By 2007, the JFSP had funded more than 350 projects on wildland fire science research, and between 1998 and 2005 the JFSP had invested more than \$100 million in fire-related research projects, according to a 2007 report to the JFSP by Jamie Barbour, titled “Accelerating Adoption of Fire Science and Related Research.”

Barbour writes that the JFSP “has long recognized that investments made in fuels management and wildland fire science need to be accompanied by science interpretation and delivery.” Since its inception, the JFSP has funded projects with a strong technology transfer component. That original commitment to exchange information between scientists and practitioners received an even stronger boost in 2008, the 10th anniversary of the JFSP, which was marked by a thorough program review. “The 10-year review was positive,” says John Cissel, JFSP program manager. “Everybody including Congress likes what we are doing.”

One of the review team’s primary recommendations was to spend more energy and resources on fostering a two-way communication process between scientists and those who will ultimately benefit from knowledge gained: practitioners involved in applying fire science on the ground. This would entail spending more energy and resources on delivery and adoption activities. “We needed a boost in our allocation for delivery and to push it closer to the ground, expanding existing partnerships in many parts of the country, and improving our effectiveness by building on those groups,” says Cissel.

To ensure that these goals are achievable, in its Five-Year Investment Strategy announced in August 2009, the JFSP Governing Board outlined a roadmap to increase funding for science delivery. As a result, delivery and outreach investments have nearly tripled and represent one-quarter of the total JFSP budget.

Barbour’s report and another submitted to the JFSP by Vita Wright in 2010, “Influences to the Success of Fire Science Delivery: Perspectives of Potential Fire/Fuels Science Users,” suggest that new strategies to improve channels of communication

are needed to increase adoption of the best available science. The JFSP has responded with a plan of action to improve on traditional means of getting information into the hands of users and transform knowledge into meaningful action. The plan involves breaking the conventional mold of communication roughly based on the traditional teacher/student relationship: a teacher standing in front of a class and filling the empty heads of the students. Instead, there is strong agreement that the ultimate customers, the managers, should play a strong role in setting the research agenda and that knowledge exchange should be a two-way street with feedback loops and open communication

channels that can be forged only in an environment of mutual trust, honesty, and respect.

In response to the 10-year review, and in light of the budget priorities of the Governing Board, in August 2009, the JFSP solicited proposals for the development of several regionally based consortia, defined by coherent ecological boundaries, for the purpose of improving communication and exchange of information between scientists and managers. In the first phase of funding, eight were chosen to initiate planning and implementation of the regional consortia: Alaska, the Appalachians,

California, the Great Basin, the Lake States, Piedmont and Southern Coastal Plain, the Southern Rockies, and the Southwest. Future plans include adding more regional consortia to eventually blanket most of the United States; six additional consortia are currently under consideration.

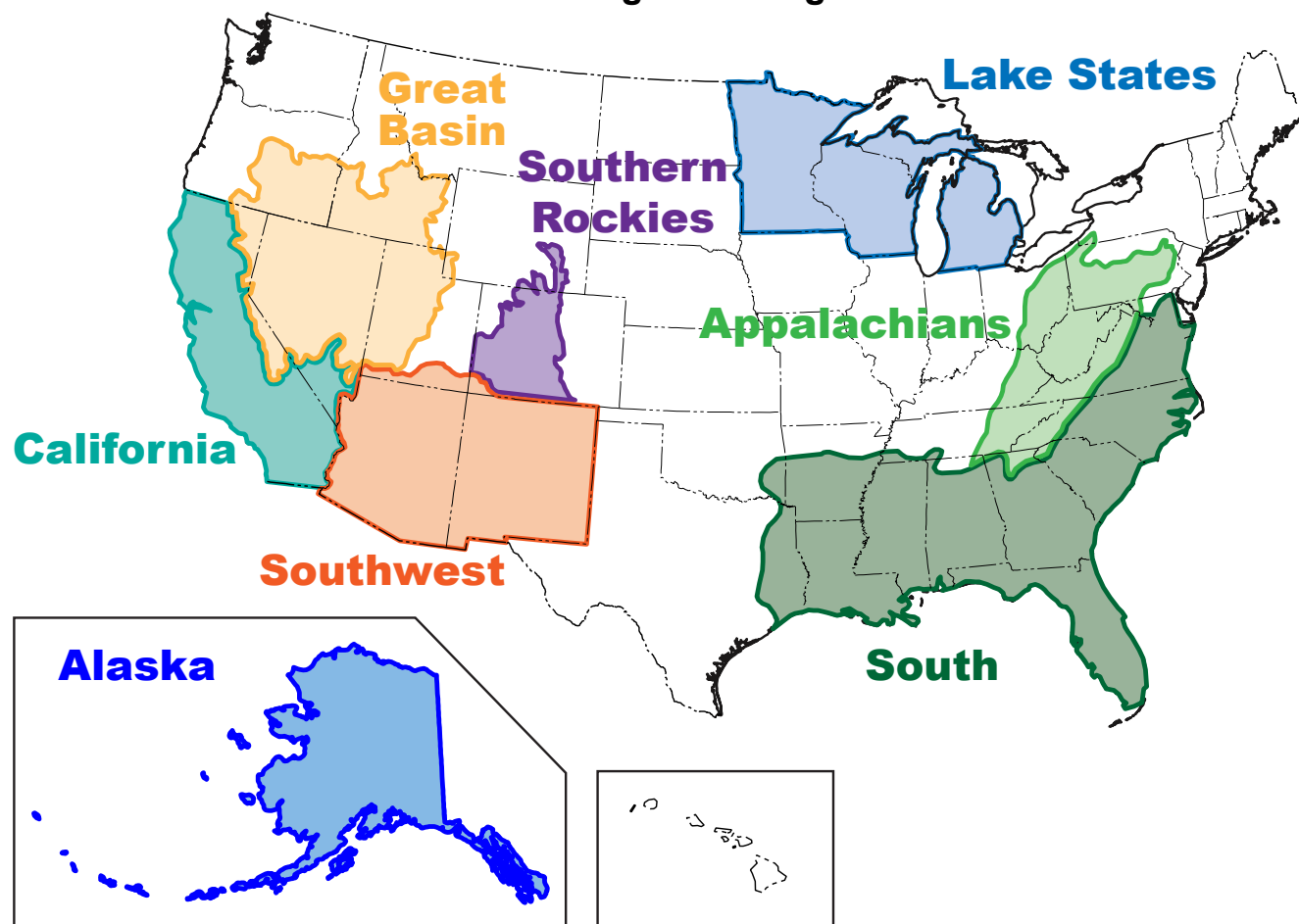
“We are banking on the consortia to be one of our primary avenues for information dissemination,” says Paul Langowski, vice-chair of the JFSP Governing Board. “The initial efforts of the first eight consortia were so well received by both the management and science communities, the board decided to solicit proposals for additional consortia in 2010 rather than wait until a formal evaluation of the initial consortia.”

Information Overload

We get a firehose of information, and it’s often delivered with the fognozzle on. That comment from one practitioner aptly captures the reaction of managers to the cascade of information that bombards them.

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The JFSP Knowledge Exchange Consortia



One way to redirect the stream of information is by creating regional consortia based on ecologically, rather than administratively, coherent boundaries defined as closely as possible to local ecoregions and organized according to reasonable geographic and vegetation areas. “The consortia act as filters to weed out information that is not relevant to different ecoregions,” says Tim Swedberg, JFSP communication director. People in the Southwest don’t need copious information on conditions in the Lake States, for example. Similarly, the issues managers face in the Appalachians differ greatly from those of the Piedmont or Coastal Plain. “There is a lot of information out there,” says Swedberg. “Filtering creates a trusted conduit that vouches for the information and delivers it in the best way possible.”

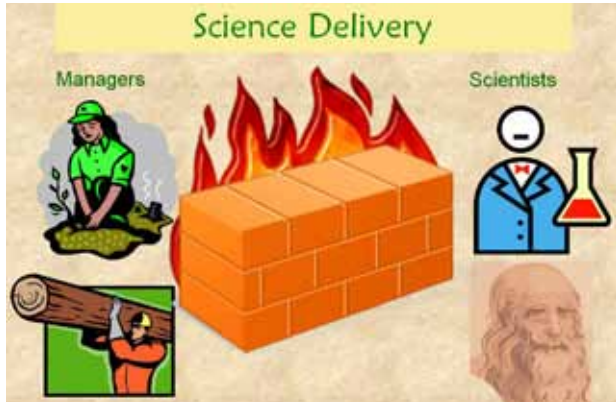
“There is only so much that can be done at a national level,” says Langowski. “Our experiences with roundtables and road shows showed us that the local and regional interactions provided opportunities that we could not provide at a national level. The regional consortia will help us ensure those connections for the future.”

In addition, by connecting scientists to managers and fostering heightened communication between managers from different jurisdictions, the fire community can be encouraged to work together rather than just within strict administrative boundaries. This type of collaboration is crucial for effectively addressing complex management issues that span large landscapes, including fire, invasive species, and wildlife habitat. “Fire plays a very important role in helping us manage these vast landscapes, but it can also produce unwanted consequences,” says Jeanne Higgins, a forest supervisor with the Humboldt-Toiyabe National Forest and member of the JFSP Governing Board. “The more we can understand about where fire can be beneficial and where it will have unacceptable results, the better we can take appropriate action.”

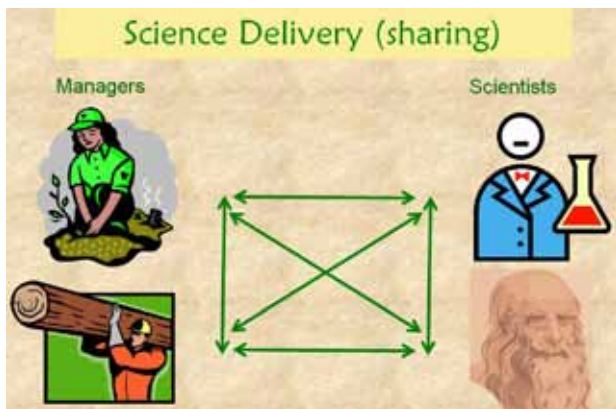
Breaking the Communication Barrier

Information overload isn’t the only barrier to effective communication. Language barriers among the different cultures of academic researchers and

Slides provided by Tom Waldrop, Consortium of Appalachian Fire Managers and Scientists principal investigator.
The slides show how information barriers can impede information exchange.



Language barriers can be difficult to overcome.

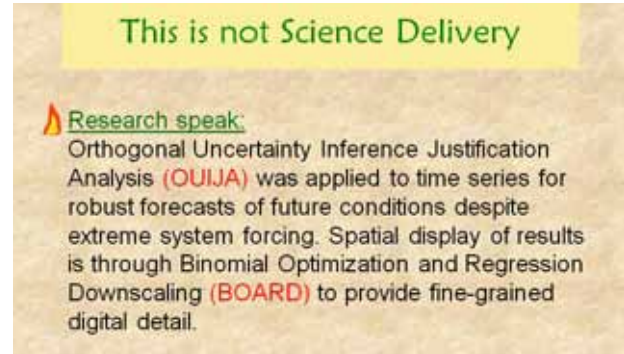


The best way to foster clear communication is through personal interactions.

field practitioners, with their different conventions and dialects, can create a smoke screen inhibiting open pathways of communication. Quite often managers and scientists actually agree on a concept but get hung up on vocabulary.

Language matters so much at every level, in fact, that midway through implementing the project, organizers opted to change the title of the project from Fire Science Delivery Consortia to Fire Science Knowledge Exchange Consortia. "Delivery is a problematic word," says Cissel. "The term knowledge exchange doesn't roll off the tip of the tongue, but it does help focus on the two-way exchange of information."

Active knowledge exchange involves a kind of courtship phase between scientists and managers. "Passive delivery is a science push. If the managers are dictating what they need, it becomes a pull," says Swedberg. "We are trying to foster a dialogue where scientists and managers help frame problems together." An active, rather than passive, process of knowledge exchange must also transcend the technical language, or jargon, of different disciplines. Most managers



Knowledge exchange should transcend the jargon of different disciplines.

find that the best way to foster active exchange and clear communication is through personal interactions. To cite a concrete example, foresters might explain their treatment decisions using the technical language common to them. For example, a forester is apt to speak in terms of basal area, which is used to determine the volume of timber on a site. Wildlife biologists would describe the need for clumping trees together to achieve their management goal, enhancing habitat. By directly viewing a project together, on site, members of both cultures may discover that they are describing the same essential concept using a different vocabulary. Asking questions back and forth, they are able to get beyond the words. "Once the science is generated, it becomes a process of 'show me'," says Swedberg. Moreover, relationships forged in person are easier to maintain, as the "show me" step moves to the "call me" phase.

When Cultures Collide

Faculty members are typically assessed for tenure and promotion based on three criteria: research, teaching, and public outreach. But in practice, in most universities, a solid history of publication is a requisite for rising through the ranks. The engines of university research are geared to promote prolific publication of peer-reviewed articles. The race for grant money often drives the research agenda, and few of the major funding agencies incorporate support for knowledge exchange or outreach from scientists to the community of managers they ultimately serve. The JFSP is unusual among granting agencies in that a large portion of its financial support is dedicated to activities that communicate the results and relevance of research projects to fire specialists and resource managers through workshops, presentations at meetings,

demonstration sites, and other forms of outreach to managers and the general public. In addition, scientists and managers from the various agencies are often members of the research team, which can, in the best case scenario, allow management-driven research and ultimately adoption.

Leda Kobziar, principal investigator (PI) with the Southern Fire Exchange, says that effective outreach ultimately makes a difference in land management. She maintains that if you care about outreach, you may sacrifice some of the publishing in an effort to communicate with the end user. “For me, it’s a question of personal integrity,” she says. “We all have the ability to do both, but my personal commitment, why I got into science at all, is to affect management on the ground.”

There are other barriers in getting the science to the end users, including the way research is funded. Research scientists are often under great pressure to complete a project while securing funding for their next one, which leaves little time for communicating research to managers and the public. “If there is funding for outreach, it often falls to the graduate students on the project to get it done,” says Michael Babler, PI for the Southern Rockies Fire Science Network. Moreover, money or time is rarely budgeted for presentations outside the academic community. “The people on the ground don’t attend scientific conferences,” says Babler.

Time and Space Constraints

In-person meetings, whether field trips, workshops, or conferences, are considered key components of consortia activities: these one-on-one encounters help cement personal relationships among participants and can lead to cooperative interaction confirmed with a handshake...or pave the way for informal phone calls. While face-to-face networking has been shown to raise awareness and adoption of new information, limited time, meeting fatigue, and budget limitations make frequent meetings impractical. Personal and professional contact can be augmented by using the new social media and by capitalizing on existing websites to offer a central resource where information can be accessed quickly.

Topical webinars can convene in real space and time, transmitted for participants seated at their office or home computers and archived for later viewing by those unable to attend at the appointed time. Several consortia are creating blogs and online discussions through their websites. Some are implementing an

“ask an expert” corner where managers can find quick answers from a specialist in their area. Newsletters announcing research news or webinar topics can be dropped directly into a subscriber’s email inbox and are being adopted by most of the consortia. These newsletters also drive traffic on a regular basis to a consortium’s website where recent research syntheses, regularly updated calendars of events, and links to relevant sites are posted.

In the organizational phase, each consortium used feedback from constituents and partners through formal and informal surveys, questionnaires, personal interviews, and phone calls to help decide how best to utilize the new media, existing strengths, and history of regional partnerships to achieve goals. Also, the consortia were given free rein to devise unique approaches and encouraged to think outside the box. While all consortia face similar challenges and are adopting similar approaches to address them, each one has also forged a variety of tools tailored to address specific needs and build upon the existing partnerships and resources in their areas.

REGIONAL CONSORTIA



The Appalachians

The geographic area of the Consortium of Appalachian Fire Managers and Scientists (CAFMS) encompasses the central and southern Appalachians, stretching south along the Eastern Continental Divide from Pennsylvania to Georgia and Alabama. Due to their ancient age, the forces of erosion over millions of years, and repeated glaciations, the Appalachians are home to some of the most ecologically diverse and sensitive species on the planet.

Compared to western regions and the Southern Coastal Plain, and despite a strong tradition of people using fire to shape the landscape before and after European settlement, fire science in the Appalachian region is relatively new. “Most fire science programs in the Appalachians didn’t get started until the mid-1980s,” says Tom Waldrop, CAFMS PI and research

forester with the U.S. Forest Service (USFS) Southern Research Station.

In part because of a long cultural history of fire use, public perception of prescribed fire in the region is in some instances less negative than elsewhere. Nevertheless, land managers have sometimes been reluctant to burn in the mountains for a number of reasons, including lack of experience burning on slopes and the historic emphasis on timber production. Fire in the Appalachians can also behave very differently than in much of the West. “It is a very complex grouping of different species, different fuel loads, different moisture regimes, and more complex fire behavior,” says Waldrop. Most wildfires die out before they reach the catastrophic size of some western fires, but that trend is changing over time with an increase in accumulated fuel loads. In addition to downed woody fuels, stands of mountain laurel and rhododendron are much thicker than they were 50 years ago. “When low-intensity fire comes into a thicket, it has the potential to move into the crowns of trees,” says Waldrop. Because of the complex topography and relatively large size of prescribed fires in the region, aerial ignition at multiple sites is often necessary. “We have a thousand mini fires going on at once, and we are only beginning to understand fully how smoke behaves from multiple points rather than from a single point using a drip torch.”

The Appalachian consortium is building on a number of existing networks. The U.S. Fire Learning Network (FLN), which includes the Appalachian FLN and the Southern Blue Ridge FLN, is supported by the National Fire Plan through a conservation partnership forged in 2007 among The Nature Conservancy, the USFS, state agencies, and private landowners. These networks are part of a national effort to demonstrate research results to the public and other managers through specific demonstration projects. The FLN has been primarily driven by managers with extensive practical experience who are good at finding innovative ways to use fire in the landscape. The FLN has established small demonstration sites in Kentucky, Ohio, Virginia, and West Virginia. The consortium wants to encourage technology transfer between these experienced managers and fire scientists from area universities, the USFS Southern and Northern Research Stations, and other state and federal cooperators.

The Rainbow Series is a national effort to synthesize fire research based on information divided into fire’s effects on flora, fauna, cultural resources and archaeology, soil and water, air, and invasive plants.



CAFMS is using that template to make the information available in an easily accessible format and to expand the knowledge base to include information on fire history and cultural uses of fire in the region.

Waldrop says that there is much to be gained from scientists and managers working together. “Ecosystems are different, but people are the same,” he says. Professional experience has taught him that applied research can be management driven. One key is to get everyone involved in the planning process from the start. “I have learned you don’t design a fire around a research study, you design a research study around a fire.”

See: www.cafms.org/.



Piedmont and Southern Coastal Plain

The Southern Fire Exchange (SFE) spans 11 states in the southeastern Piedmont and Coastal Plain from Virginia to Texas. This region includes fire-dependent yellow pine ecosystems that have been managed with fire much longer than other forested ecosystems in the South. In addition, there are pockets

of distinct vegetation communities that differ sharply from yellow pine systems. Cypress domes and other wetlands are often embedded within a pine-dominated landscape. During wet weather, these wetlands may serve as a fire barrier; in very dry weather, however, when the accumulated organic soils burn, they can create long-duration smoldering fires with significant smoke emissions, says Leda Kobziar, PI with the SFE and assistant professor of fire science and forest conservation at the University of Florida, Gainesville.

A high priority identified by SFE landowners and forest managers is more research on smoke modeling and weather forecasting targeted to the specific conditions of the region, where smoke and fog combined—so-called “superfog”—can reduce visibility on highways to zero, leading to smoke-caused accidents. Existing smoke models need further testing and validation for accuracy in coastal areas where smoke may either blow out to sea or inland, depending on sea breezes. “We need to support the development of modeling science, improve its accuracy, and connect the users to those who are designing the models,” says Kobziar. “We need to do

a better job of predicting where the smoke is going to go.”

The SFE is tapping into a valuable trove of knowledge on prescribed fire and fire ecology through the resources and networks of the Tall Timbers Research Station and Land Conservancy, established in 1958. Tall Timbers, known as the home of the study of fire ecology, has the longest running record in the country of advocating prescribed burning and has established and maintains an extensive fire ecology database, the E.V. Komarek Fire Ecology Database. In addition, Tall Timbers has held fire conferences and published its proceedings every other year since its inception. The SFE is also promoting the efforts of CAFMS to revise and update the Encyclopedia of Southern Fire Science, which can be found at www.fire.forestencyclopedia.net.

In addition, the states belonging to the consortium already have existing, active prescribed fire councils, comprising private landowners and state and federal agencies. At least half the prescribed fire in the SFE network is conducted on private lands or by private nongovernmental organizations, and these groups are



well-represented at prescribed fire councils in each of the 11 states in the SFE. "This could prove to be our best outlet to the wildland fire community," says Kobziar. "These are existing networks we can build on."

The SFE also shares the resources of the USFS Southern Research Station through its technology transfer arm, InterfaceSouth, centered in Gainesville, Florida, which focuses on the wildland/urban interface. The University of Florida has maintained close ties with InterfaceSouth through its extension division, and InterfaceSouth staff serve as members of the SFE's executive committee.

In its initial survey, Kobziar says response was greatest from North Carolina and Florida, in part because SFE organizers were working with a network of people identified by the executive team on the project. "The team was working with people we knew in a short time frame, and outreach dissipates the further from the source you go," says Kobziar. The contact list has since expanded to nearly 3,500 members; however, as the team accumulates, even more people are added to the list of concerned stakeholders in each state. In extending contacts throughout the South, the SFE is giving numerous presentations at interagency, state, and prescribed fire council meetings, and the SFE is promoting Web resources such as webinars, links to existing databases, and an online forum with an "ask the expert" function where questions and answers can be catalogued. The SFE has also developed numerous fact sheets and a monthly newsletter. Kobziar notes, however, that the crucial element for success is the "call me factor," which is developed through personal contact and fostered through mutual trust.

See: www.southernfireexchange.org/



The Lake States

The northern Lake States of Michigan, Minnesota, and Wisconsin are divided into three ecological provinces: Prairie Parkland consisting of prairie and forests, Laurentian Forest with mixed conifer and

deciduous forests, and Eastern Deciduous Forest. Nearly 30 percent of the forested area is considered fire dependent, including jack pine, mixed red pine and eastern white pine, peatland forest ecosystems, and less common types such as coastal pine and sedge-dominated wetlands. "The Lake States Fire Science Consortium will focus most of its efforts on these fire-dependent systems," says Charles Goebel, PI for the consortium and associate professor in the School of Environment and Natural Resources at Ohio State University.

Compared to some regions, prescribed fire has been less commonly used as a tool for fuels reduction, in part due to complex ownership patterns and the need to consider multiple uses on federal, state, and private lands. The goals of managing for recreation, conservation and restoration of wildlife habitat, and timber production can sometimes lead to competing demands. "There are not a lot of large wildfires in the Lakes region, and there is less prescribed burning and less wildland/urban interface than in the West and the Southeast," Goebel says. Mechanical and herbicide treatments have eclipsed the use of prescribed fire in fuels reduction in most situations. Even in the fire-dependent jack pine habitat preferred by the endangered Kirtland's warbler, traditional jack pine plantations have proven successful in producing warbler habitat. "For 30 years, forest managers have done a pretty good job of producing warbler habitat, almost to the detriment of diversity and other issues," Goebel says. "We need to quantify other species that are supported by jack pine stands and think more broadly about the range of ecosystem services." The consortium plans to help support these efforts, in partnership with the U.S. Fish and Wildlife Service and Seney National Wildlife Refuge.

Though federal agencies are major land holders, these large tracts are interspersed with private holdings by timber companies and landowners who supply the forest products industry, which has been less enthusiastic about the use of fire as a management tool. Pulp mill operators using jack pine plantations, for



example, do not want charred wood in their processing plants. On the other hand, a large cabinet and furniture making industry in the Lake States presents a potential for capitalizing on wood with some imperfections.

“Consumers like the look of distressed wood with some char, staining, and fire scars...red pine and white pine, for example,” says Goebel. The consortium plans to track marketing trends and quantify consumer perception, working with industry and private land managers who might reconsider the use of prescribed fire in this context.

The consortium also wants to pull together the combined wisdom of people with years of experience, experts who may be close to retirement and whose knowledge could be lost when they leave. A manager’s guidebook, distilled from one-on-one, recorded interviews with leaders across the region, will serve as a permanent resource available in print and online for younger scientists and managers to use.

From the start, the consortium has placed a high priority on identifying a project coordinator who can bring personal relationships to the table, a person people inherently trust. Robert (Zeke) Ziel, who recently retired from the Michigan Department of Natural Resources with more than 30 years of management experience, fits the bill. “We didn’t need a scientist; we needed somebody who can take the information, talk to people, and have them listen.”

See: www.lakestatesfiresci.net



Southern Rockies

The Southern Rockies Fire Science Network (SRFSN) comprises a distinct ecoregion, with mountains ranging in elevation from 3,700 to 14,400 feet across four zones: alpine, subalpine, upper montane, and lower montane/foothill. The geographic scope, which includes Colorado and south-central Wyoming, was defined using The Nature Conservancy’s ecoregional conservation approach as outlined in *Designing a Geography of Hope: A Practitioner’s Handbook to Ecoregional Conservation*

(Groves et al. 2000). The original geography was revised in cooperation with the Southwest Fire Science Consortium to address areas in southwest Colorado and northern New Mexico that were identified in both consortia’s original proposals.

“The Nature Conservancy takes a nonconfrontational approach, partnering with landowners and public agencies,” says Mike Babler, PI for the consortium and Colorado fire initiative program manager with The Nature Conservancy. That nonconfrontational approach would be impossible without a finely tuned understanding of the communication process.

In its organizational stages, because of time constraints, consortium organizers bypassed the formal survey procedure and went straight to its stakeholders, conducting one-on-one interviews and telephone conversations with fire scientists and fire practitioners. That process revealed the need to encourage people to talk to each other in productive ways.

Misunderstandings can be based on miscommunications. In one discussion, for example, Babler found fairly strong disagreement among three research scientists, one from a federal agency and two from the academic community, concerning the fairly complex concept of historic fire regimes, frequency, and return intervals. “It turned out that they were actually in agreement on most points, but they were fighting over language,” he says. In cases like this, it can help to intervene in the communication process and define common terms from the start through a process known as facilitated conversation. “Science-based conversation can dispel emotional arguments,” Babler says.

The SRFSN is counting on support from a number of existing organizations in the region with a history of working together. For example, the Front Range Roundtable was formed after the 2002 fire season, which included the Hayman Fire, the largest fire in recorded history in Colorado. The roundtable is a collaboration of 30 entities from federal, state, and local agencies; scientific institutions; and community and environmental groups. “There is a lot of information on the ecosystems of the Front Range and a high degree of interest because of the large population affected by wildfire,” Babler says. “We want to make sure these conversations are based on the best available science and to raise awareness of forest health and public safety by engaging the public in management decisions.”

The SRFSN also taps into the extensive research conducted over many years by the USFS Rocky

Mountain Research Station, which will be used as a springboard to expand and improve partnerships among scientists, management, and the public and to increase the ease of access to research. Among burn bosses, the steering organizers found that awareness of an extensive research database is low. And those that were aware of the various databases were often frustrated trying to find relevant information to address their questions. The consortium wants to streamline access to available studies and make the relevant information more readily accessible on its website. “We want to be all inclusive to the science world, the management world, policymakers, researchers, and decisionmakers in the local communities, using the existing collaborative groups to generate a back-and-forth conversation among all stakeholders,” says Babler.

See: www.srmeconsortium.org



The Southwest

The boundaries of the Southwest Fire Science Consortium (SWFSC) are defined ecologically as the biotic communities of the southwestern United States, including Arizona, New Mexico, and southern Utah. From desert scrub to high-elevation alpine tundra, a total of 20 biotic communities are found in the region, which is diverse both ecologically and culturally, with a large portion managed by tribal nations in addition to state and federal agencies.

Fire regimes in the area are likewise diverse, ranging from forested systems, such as ponderosa pine that evolved with frequent fires, to sensitive desert systems where fire was historically not a significant part of the natural landscape. This diversity makes fire research and fire management in the area challenging. In some desert systems, invasive vegetation such as buffelgrass has filled in the interspaces between cactus and shrub, increasing the potential for fire, which can result in complete vegetation conversions that radically alter southwestern deserts. “Fires could burn every year in a system not designed to burn at all and which has very few adaptations to fire,” says Andrea Thode, consortium PI and associate professor at the Northern

Arizona University School of Forestry. For example, the saguaro cactus, an iconic species of the Sonoran Desert and the state flower of Arizona, is under threat from fire fueled by the invasion of buffelgrass.

The consortium provides a way for managers, scientists, and policymakers to interact and share science in ways that can effectively move new information to management practices and bring management issues to research. The SWFSC actively seeks proposals from the community for topics and areas of interest to be addressed by the consortium. Working papers are being developed with the Ecological Restoration Institute to produce a number of succinct syntheses on topics relevant to fire managers in the Southwest. In addition, the SWFSC is partnering with the nationally based Wildland Fire Lessons Learned Center (www.wildfirelessons.net), creating regionally based online videos and accompanying written stories that will advance fire science. The consortium also hosts a series of monthly webinars through the Forest Guild.

Many of the high priority topics for research and synthesis identified by consortium partners will require reaching across state lines, federal and state agency boundaries, tribal lands, and even international borders. Managing at the landscape scale, dealing with the invasion of buffelgrass, and planning for the conservation and recovery of the Mexican spotted owl, listed as threatened under the Endangered Species Act, will require multiagency planning and the cooperation of private landowners as well. Interactive and in-person events will help foster solutions to these problems. With more than 150 participants, the Southwest Interagency Fuels Workshop 2011, which benefited from significant support from the SWFSC, was a positive step. This event was a huge success and is currently being planned for every 2 years.

Thode, who has a background in agency management, underscores the value and importance of



talking to managers, opening doors, and finding ways to fund the kind of research that will be of most use in the field. “That is the thing I like to do,” she says. “I hope our efforts will lead to additional research and collaboration.”

See: www.swfireconsortium.org



Alaska

With an area of 586,400 square miles, Alaska is the largest and the most sparsely populated state in the country. Ecologically, it has much more in common with northern Canada than with the 48 contiguous states; both Alaska and Canada encompass large areas of boreal forest and tundra situated in high latitudes. In addition, while climate change is a global concern, these northernmost regions of North America are already feeling the heat from a warming climate.

“The effects of global warming are more pronounced in northern latitudes and are occurring more rapidly than in other parts of the planet,” says Sarah Trainor, PI with the Alaska Fire Science Consortium and research assistant professor in the School of Natural Resources and Agricultural Sciences at the University of Alaska Fairbanks (UAF). Since the 1950s, Alaska has registered a 3.4° F rise in average temperatures, and the average annual extent of burned areas is expected to double by mid-century. As a result, fire scientists and managers are already learning to deal with the effects of climate change, present and future, on fire and ecosystems in Alaska. For example, many indigenous tribes of the northern and western Interior depend on subsistence hunting for survival. In its research agenda, the consortium sets a high priority on gaining more and better information on how fire under a climate change scenario will affect vegetation in tundra, shrubland, and treeline ecosystems that will have implications for moose, caribou, and other subsistence species.

Alaska is comprised of a number of state, federal, and Alaska Native organizations that support strategies for managing wildland fire and prescribed burning.

“The firefighting community in Alaska is a very tight-knit group,” says Trainor. The Alaska Wildland Fire Coordinating Group (AWFCG), formed in 1998, is a major lynchpin in ensuring the cohesiveness of the community. A collaborative interagency group, the AWFCG holds an annual Fall Fire Review. Because of difficult transportation logistics, the Alaska consortium is using that traditional venue for its annual meetings.

Though sparsely inhabited throughout most of the state, the population of Alaska is growing quickly in metropolitan areas, and the combination of increased fire severity and frequency, along with expansion of residential structures in the wildland/urban interface, are a growing concern for fire managers. Rural villages also need protection but are accessible only by air or water. As a result, fire management officers often must rely on aircraft support, including helicopters, water tankers, and smokejumpers, for suppression of wildfire. Lack of reliable, speedy access to the Internet and cell phones can also make communications difficult. “Cell phone use is fairly limited to major population centers and elsewhere is tied to the road systems,” Trainor says.

Lack of consistent Internet access and busy schedules can make real-time, remote attendance at webinars problematic. However, webinars are archived so that those who cannot attend in real time or in person can access the information at their convenience. In October 2010, for example, nearly 30 people attended a webinar on Fire and Forest Dynamics in Northern Boreal Forests, conducted remotely by a Canadian fire scientist affiliated with the UAF. The majority of participants were managers representing a wide spectrum of U.S. and Canadian agencies: wildfire specialists, wildfire biologists, resource managers, and fire ecologists.

One of the principal aims of the Alaska consortium is to optimize the process of knowledge exchange. “At scientific conferences, the language and protocol for communicating information don’t always match how people absorb information,” says Trainor. The consortium wants to break the



traditional communication mold through which science information is delivered to field experts. Instead, the consortium organizers envisage engaging the scientists with the managers to translate the information into a useful format that can be applied on the ground. “The ultimate goal is to make the process much more fluid,” she says.

See: www.akfireconsortium.uaf.edu



Great Basin

The Great Basin, once known as the “Big Empty,” lies within an ecological boundary that crosses the borders of five western states in a basin and range topography. The ecosystem has been irrevocably altered by the spread of cheatgrass, introduced by settlers and still marching across the landscape today. “Our ecological boundary encompasses the largest area of cheatgrass in the country,” says Mike Pellant, PI for the Great Basin Science Delivery Project (GBSDP) and coordinator of the Bureau of Land Management (BLM) Great Basin Restoration Initiative.

Though the invasion of cheatgrass began in the 19th century, it has been on an upward spiral in recent decades. Nearly 7,700 square miles on BLM sagebrush shrublands alone are now dominated by cheatgrass at lower elevations. Upslope, native pinyon and juniper trees are spreading into former sagebrush shrubland. These processes are fueling either more intense or more frequent wildfire, which has united land managers and private ranchers in a common cause and engaged the active participation of scientists in this imperiled ecosystem. “Here in the Great Basin, we don’t argue about the issues,” says Pellant. “Everything is related ecologically, and people have been working with common boundaries and common threats for a long time; that’s one of the beauties of this consortium.”

The GBSDP has benefited from longstanding partnerships that already existed in the region. “Many of us have been working together for more than a decade,” says Pellant, “we are not just in the initial



courtship phase.” Partners include the Great Basin Cooperative Ecosystems Studies Unit, Great Basin Research and Management Partnership, Great Basin Landscape Conservation Cooperative, and Great Basin Restoration Initiative.

The GBSDP is targeting its efforts primarily on range and wildlife programs on lands managed by four federal agencies: the BLM, USFS, National Park Service, and U.S. Fish and Wildlife Service. Pellant wants to see the lines of communication extended among the federal and state agencies, private landowners, tribal agencies, and the Department of Defense. “Our other partners need to know what we are doing and how well it works,” he says.

The GBSDP is also creating “restoration cadres” to address the rapid turnover in the federal workforce, which has led to a crisis in institutional memory. The idea is to identify a group of younger to mid-level career resource and fire specialists and build bridges between the younger generation and seasoned managers within the agencies and the broader scientific community. This older generation’s combined experience sometimes spans decades, and its members can serve as facilitators to motivate a younger generation of scientists to build on existing capacities within the agencies.

The GBSDP website will include a link to a “lessons learned” forum where researchers and practitioners can relate what they learned from successful and unsuccessful experiments. “We can learn from scientists even when their experiment showed a result at odds with the original hypothesis,” says Pellant, who sees this as a kind of narrative testimonial, where people can connect and relate their information informally to others.

See: <http://greatbasin.wr.usgs.gov/gbrmp/ScienceDelivery.aspx>

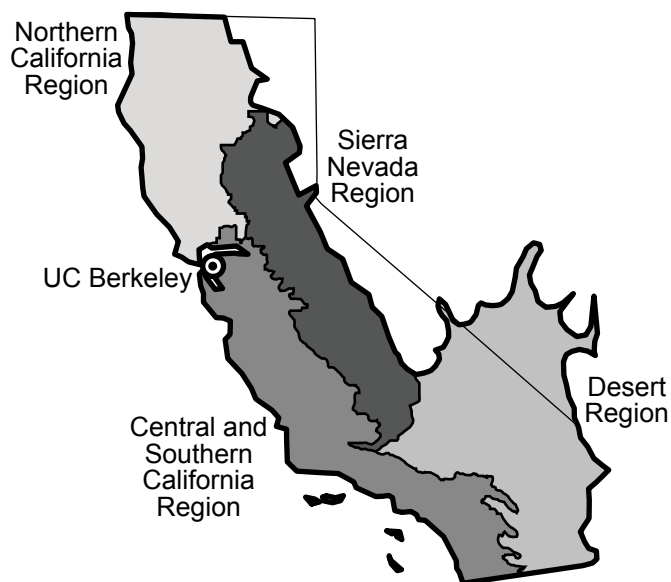


CALIFORNIA FIRE SCIENCE CONSORTIUM

California

California is an ecologically diverse state with a large number of distinct ecoregions, a high population density that continues to expand into fire-prone ecosystems, and rising costs of fuels treatments and fire prevention and suppression. To make the statewide approach more manageable in light of this ecological diversity and the state's size, the California Fire Science Consortium is organized with a strong central hub and four distinct ecoregions, each with their own strengths and needs: the Northern California Region, Sierra Nevada Region, Desert Region, and Central and Southern California Region. Each of these nodes has its own leader and team of scientists and managers to focus on local activities, seminars, and field outings. A fifth team is organized to address the wildland/urban interface, which is found throughout the state and is expanding due to continued development in fire-prone ecosystems.

In its initial statewide survey, consortium organizers found strong agreement among federal and state agencies and resource management staff on the need for more scientific rigor applied to supporting documents, such as environmental assessments and



environmental impact statements, required under the National Environmental Policy Act to justify decisions made by fire management and fuel treatment planners. These documents require strict scientific analysis and documentation. The consortium is seeking the best examples of efficient dissemination and use of scientific information in the environmental review process and encouraging adoption of these practices by other fire science practitioners throughout the state.

The California consortium officially began implementing its plans in February 2011. In addition to the original federal agencies and stakeholders involved in fire management who were interviewed in the planning stages, the consortium has begun contacting state- and county-level fire personnel who were left out of the initial scoping interviews. "We want to include the whole fire community, those involved in fire prevention and suppression, safety and preparedness, and research and planning," says Tim Kline, consortium coordinator. A key player in this approach is CAL FIRE, California's Department of Forestry and Fire Protection, which responds to more than 300,000 emergency incidents each year and works to educate the public on ways to protect property and natural resources. "CAL FIRE is an existing connection with private land managers and public agencies that we would like to take advantage of," says Kline.

The consortium also plans to engage indigenous communities who have occupied their ancestral lands continuously since European settlement. This is not only a way to share fire management resources on tribal lands, but also a way to provide a platform for tribes to share their own cultural history of fire with researchers. "These communities have a wealth of knowledge that we would like to share," says Kline.

In addition, the consortium has access to several research forests belonging to the University of California. The Blodgett Forest in the Sierra Nevada, for example, is an existing site for fire and fire surrogate studies. "This is an excellent location where different treatments can be viewed side by side," says Kline, "and it is a potential site for a field demonstration." Through webinars, such demonstrations can be accessed by those for whom real-time attendance is not feasible. Other potential demonstration sites include the Blacks Mountain Experimental Forest in the Lassen National Forest, the Lassen-Plumas Administrative Study, and two other fire and fire surrogate study locations.

In response to the need expressed by stakeholders for locally relevant and timely access to information, the consortium is identifying a network of scientists

within the individual teams who are willing to respond to specific questions from stakeholders and fire management personnel. “Quite often, email messages to individual researchers are just swept under the rug,” says Kline, who plans to field the email questions and channel them to the person most capable of answering the question. The “ask a scientist” approach fosters a more direct and easy pathway of communication. “By bridging this communication gap, we also hope to encourage the generation of more applicable science from researchers,” says Kline.

See: www.cafiresci.org/

Positive Feedback

Though a formal assessment of the original consortia has not yet been performed, informal feedback from managers, researchers, consortium organizers, members of the JFSP Governing Board, and agencies involved in JFSP projects has been overwhelmingly positive.

Jeanne Higgins, member of the JFSP Governing Board and a line officer of a large federal land base, is extremely pleased at how well the effort has developed. “Connecting appropriate, applied research with land managers is critical,” she says. “Managers have the opportunity to interact with scientists and share their questions and issues, which helps develop better applied research and ensures a useful outcome.”

Erik Christiansen values the “face time” the JFSP programs and researchers have afforded at the national level through its numerous outreach efforts. Christiansen, who is the past chair of the National Wildfire Coordinating Group’s Fuels Management Committee and current fuels program coordinator for the Department of the Interior’s Office of Wildland Fire Coordination, recognizes, however, that it’s hugely impractical for all of the research results to be funneled through a national coordinating group. “We certainly don’t know all of the management questions that need to be asked,” he says. “The regional consortia will help to ensure that local managers and practitioners are in close contact with the researchers

specializing in their local areas, and that knowledge exchange has a better chance of occurring where it truly needs to: at the local level.”

Paul Langowski agrees. “No matter how good the science is, if it never gets into the hands of managers or influences the way we do business, its value is minimal,” he says. “That’s where we see the biggest payoff for the consortia; getting geographically relevant science into the hands of the folks who are doing the work on the ground. The consortia provide JFSP with an opportunity to do just that. We could not replicate it at the national level, no matter the funding or staffing available.”

Suggested Reading

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Rogers, E.M. 2003. Diffusion of Innovations. 5th ed. Free Press-Simon & Schuster, New York.

The JFSP Knowledge Exchange Consortia. www.firescience.gov/JFSP_Consortia.cfm.

Wright, V. 2010. Influences to the Success of Fire Science Delivery: Perspectives of Potential Fire/Fuels Science Users. Final Report to the Joint Fire Science Program. JFSP Project #04-4-2-01. www.leopold.wilderness.net/unpublished/UNP127.pdf.

Innovative Approaches

At the planning stage, each consortium adopted similar communication plans, relying on traditional venues, such as face-to-face meetings, field trips, workshops, and conferences, and relying on the use of new media approaches via websites, webinars held in real time and archived for later viewing, blogs, and online databases. However, since each organizing committee or board developed its own plans independently based on formal and informal surveys and conversations with stakeholders with specific aims, new and creative approaches also emerged.

► **Restoration Cadres.** The Great Basin Science Delivery Project (GBSDP) Steering Committee realized that the combined wisdom and experience of older scientists and managers is often lost as those people near retirement. In addition, as young scientists and managers advance through the ranks, they often transfer to other parts of the country. This turnover of young and old can disrupt the continuity of experience gained over time. Restoration cadres represent an effort to identify younger to mid-level people with the drive and potential to be leaders in their field and link them with scientists and managers who, due to long experience, are at the mentoring level. "I am part of that generation," says Mike Pellant, principal investigator of the consortium. "We only have a finite amount of time, so we need to find people in the right stage of their career and transfer the information and experience to the new generation."

► **Lessons Learned.** Another approach taken by the GBSDP and the Southwest consortium as well is the creation of a "lessons learned" component. Eugénie MontBlanc, GBSDP coordinator, cites a U.S. Forest Service project involving a prescribed burn where the results were different from the hypotheses. "We made assumptions that were incorrect, but we learned other things in the process," she says. "Even when a hypothesis proves incorrect or a rehabilitation project is unsuccessful, as when wildlife behaves differently than expected or a seeding effort did not work well, that information can be useful to others."

The Southwest consortium is collaborating with the nationally based Wildland Fire Lessons Learned Center (LLC), www.wildfirelessons.net/Home.aspx. The LLC is a multiagency effort to document and archive information on past experience in fire management in a variety of media, from written case studies to video interviews with managers who explain what went right or wrong in a particular situation. Fire managers in the Southwest identified the LLC as an "invaluable source of information in the form of fact sheets and videos," according to the consortium's project proposal. The consortium will partner with the LLC to create products tailored to the needs of fire managers in the Southwest. The aim is similar to that

of the restoration cadres—learning from the experts—as the wisdom of seasoned personnel remains available over the long term for the benefit of younger and less experienced professionals, with a focus on concerns at the regional level.

► **Manager's Guidebook.** The Lake States consortium is planning a guidebook that will be based on 1- to 2-hour interviews with leaders across the region. This project grew out of the recognition by organizers, through interviews and surveys during the planning stage, that a great deal of substantial knowledge on fuels, prescribed fire, and management is not readily available if it is published at all. Much of the knowledge resides in the memories of professionals who may be close to retirement. Transcripts of the interviews will be posted online and eventually distilled into a guidebook of expert knowledge available on the consortium website.

► **Indigenous Cultures.** A number of the consortia identified Native Americans as a rich source of knowledge dating back before European settlement. Many of the tribal nations in the northern Lake States, for example, have active forest management programs using prescribed fire, and the consortium considers their participation crucial to the success of the regional network. Likewise, the California consortium aims to engage indigenous communities in the state. Tim Kline, coordinator of the consortium, sees this effort as doubly useful. "This is a way to share fire management resources that could be useful in managing tribal lands, as well as providing a platform for tribes to share their own cultural history of fire with researchers," he says.

These and other creative approaches to consortia activities demonstrate that knowledge exchange is even more than a two-way process of sharing information and using new technologies to facilitate interaction. Wisdom can also be shared between the older and younger generations, creating a cultural continuity based on historic knowledge gleaned over time.



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FIRE SCIENCE DIGEST **ISSUE 11** **AUGUST 2011**

JFSP *Fire Science Digest*
is published several times a year.
Our goal is to help managers
find and use the best available
fire science information.

Credits

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