

Developing a Southwest Fire Science Consortium

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1. Statement of need

The Southwest is one of the most fire-dominated regions of the US and stands out for ecological and cultural diversity, but it is limited in terms of regional capability to disseminate fire research and information. We propose the creation of the **Southwest Fire Science Consortium** to promote communication and meet fire knowledge needs of scientists and managers. In addition, some of the themes we focus on, such as developing future fire professionals, could serve as models for future national initiatives. Our proposal is grounded in the information we collected across the Southwest with JFSP support since the fall of 2009, as well as interactions with the designers of other consortia and JFSP national staff.

In the Southwest, there are several localized efforts to develop scientific information and to disseminate it to practitioners on the ground in a practical manner. However, many of these efforts are moving in parallel, without thoughtful interaction among projects. Managers and scientists are often not aware of each other or of the external resources available. A consortium is needed to bring these parallel efforts together to be more efficient and inclusive, allowing future fire science issues to be addressed from a broader perspective with more information, more partners, and more resources. Finally, including future fire professionals helps to send new managers out into the workforce with practical experiential learning and an academic background based on the most recent science. The interplay between the academic community and the management community in creating future fire professionals will in itself improve fire science delivery and adoption.

We suggest organizing the Southwestern Fire Science Consortium around three key questions:

1. **What do people need to know?** Information needs can be assessed through workshops, surveys, and organization of a community of practice of wildland fire professionals.
2. **What information is already known** (synthesis of existing science) and how should it be communicated (web, publications, workshops, courses)?
3. **What are the key information gaps** between what we need to know and what is already known? This question leads to the identification of critical areas for new research and adaptive management experiments.

Our proposal includes practical goals that can be attained within two years as well as support for developing projects that will lay the foundation for future expansion. Our phased implementation is designed to facilitate stages of growth as the consortium responds to needs in the Southwest.

2. Geographic region

The Consortium will address the “Southwest” defined ecologically rather than by administrative borders. This includes Arizona, New Mexico, southern Utah, and southern Colorado, which are ecologically and culturally part of the greater Southwest (Fig. 1). We intend to reach out to colleagues in northern Mexico as well. The exact boundaries and areas of overlap and collaboration are under discussion with the designers of neighboring consortia. Key organizations are discussed below in Consortium partners.

3. Consortium partners and roles of investigators

- **Northern Arizona University (NAU;** Andi Thode, Pete Fulé, Molly Hunter): NAU faculty are involved in numerous collaborative research projects that provide important information to the fire management community. Some specific examples of fire science delivery and outreach include taking the lead in the Developing Future Fire Professionals Taskforce (described below), planning the 2008 regional Association for Fire Ecology conference, and leading JFSP Roadshows. In addition to project duties listed below, investigators from NAU will be responsible for coordination of activities with ForestERA, the Buffelgrass Coordination Center, tribes, and Federal and State agencies.

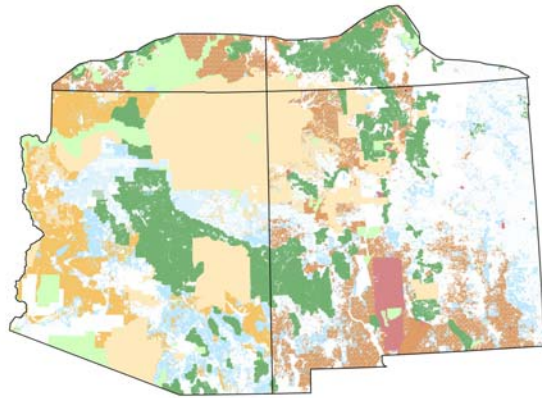


Figure 1. Map of the Southwest Fire Science Consortium area. Public and tribal lands are in color, illustrating their great extent and administrative diversity.

- **University of Arizona (UA;** Don Falk): UA has leadership and strength in historical, climatological, remote sensing, and social aspects of fire science. UA faculty provide fire science translation and outreach to managers and policy makers in several primary areas including development of long-range climate forecasting tools; participating in training courses at the National Advanced Fire & Resource Institute; and teaching academic courses in fire sciences. UA will be responsible for coordination of activities with CLIMAS, Fire Climate and Synthesis, FireScape, and the Arizona Forest Health Council.
- **Ecological Restoration Institute (ERI;** Pete Fulé): The ERI is a leader in conducting research and disseminating information about forest restoration in the Southwest. The “working papers” produced by ERI were identified by fire managers as valuable sources of information. The Consortium will partner with ERI to produce additional “working papers” on topics relevant to fire managers in the Southwest. In addition, ERI will coordinate activities with the other Southwestern Ecological Restoration Institutes.
- **Rocky Mountain Research Station Flagstaff (RMRS;** Jose Iniguez): RMRS scientists conduct collaborative research with multiple partners on a variety of fire-related issues in the Southwest. In addition, Science Application and Integration staff members facilitate science delivery to managers.
- **The Forest Guild (Alexander Evans):** The Forest Guild is a professional organization focused on sustaining and restoring the integrity of forests while meeting the needs of the communities that rely on them. The Guild provides experience in collaborative research and science dissemination through fact sheets, briefings, and multimedia formats. The Forest Guild will be responsible for coordination with New Mexico’s Collaborative Restoration Program and other JFSP funded consortia.
- **Developing Future Fire Professionals in the Southwest Taskforce:** The Taskforce includes federal, state and local land management agencies as well as two and four year academic institutions in the Southwest. It addresses the challenges of developing a diverse cadre of fire professionals with the

training, education, and experience needed for effective fire management. The focus of the group is to design a new approach to wildland fire education in the Southwest, based on practical, experiential learning. The Taskforce will help disseminate the most recent science and technology and to build stronger bonds between agencies and academic institutions. This group would like to become a committee under the Consortium.

- **US Forest Service Southwestern Region** (Bill van Bruggen, Dave Mertz, Mary Rasmussen): Region 3 participates in a number of activities related to fire science and delivery. A few examples include participation and funding for the Developing Future Fire Professionals Taskforce, sponsoring the AFE Southwest conference, and development of the Four Forests Restoration Initiative. Their partnership in the Consortium will entail serving on the initial executive board and continued involvement in the Taskforce, including providing funding for a coordinator position.
- **National Park Service Intermountain Region** (NPS; Dan Oltrogge): Currently, NPS has collaborative research projects in Grand Canyon National Park, Zion National Park, and others. In addition, they were a sponsor of the 2008 regional AFE conference and have participated on the Developing Future Fire Professionals Taskforce. Their partnership in the Consortium will entail serving on the initial executive board and continued involvement in the Taskforce.
- **Arizona State Forestry** (Vicky Christiansen)/**New Mexico State Forestry** (Donald Griego): State Forestry organizations provide wildland fire prevention and suppression resources on state and rural private lands. Their partnership in the Consortium will entail serving on the initial executive board and involvement in the Taskforce.
- **Wildland Fire Lessons Learned Center**: The purpose of the Center is to foster communication and collaboration among all fire professionals and to provide access to learning tools and training. The Center website was identified by fire managers as an invaluable source of information in the form of fact sheets and videos. The Consortium will partner with the Center to produce such products with content relevant to fire managers in the Southwest.

Existing science delivery partnerships

Due to the limited space in this proposal, selected key partnerships related to fire and fuels management in the Southwest are described briefly in **Table 1** below. All partnerships would benefit from a regional level consortium that connected partners, and delivered science information applicable to their projects. Some of these projects and partnerships have great potential for substantial involvement in the planned activities of the Consortium.

Table 1: Brief descriptions of existing partnerships in the Southwest.

Existing partners	Description
Forest Ecosystem Restoration Analysis (ForestERA)	ForestERA provides a scalable set of spatially explicit information in a format that is accessible to wide audiences in the Southwest.
The Nature Conservancy (TNC)	TNC in the Southwest works collaboratively to distribute fire science information to managers at a variety of scales.
Bureau of Indian Affairs Western Region, Southwest Region and Navajo Region	BIA will work with tribes in finding ways to incorporate new fire science research into ongoing fire management practices and will continue to participate in the Taskforce.
New Mexico’s Collaborative	Funds projects on Federal, Tribal, State, County or municipal forest

Forest Restoration Program	lands which must include a diverse and balanced group of stakeholders in their design and implementation.
Four Forests Restoration Initiative	The Kaibab, Coconino, Apache-Sitgreaves and Tonto national forests are engaged in a collaborative, landscape-scale initiative designed to accelerate restoration of fire-adapted ecosystems.
FireScope	Federal, State, and non-governmental partners are engaged in a planning process to coordinate fuel reduction and fire restoration activities across multiple landscapes in southern Arizona.
Southwestern Ecological Restoration Institutes (NM, CO, AZ)	The institutes work collaboratively on research, education, and outreach to address the needs of land managers and stakeholders concerned with restoring forested ecosystems.
Southern Arizona Buffelgrass Coordination Center	The non-profit SABCC was established to address the buffelgrass issue and the growing fire risk in southern Arizona.
Fire Climate and Synthesis	FACS is a west-wide effort to summarize and deepen our understanding of the longer-term relationships between climate variability and fire occurrence, through data analysis, synthesis, and delivery tools for managers.
CLIMAS	CLIMAS focuses on the impacts of climate variability and change on human and natural systems in the Southwest.
Arizona Forest Health Council	Established by the Governor of Arizona for the purpose of developing and implementing the strategies for restoring Arizona's forests.

Table 2: Roles and responsibilities of project investigators

Personnel	Role	Responsibility
Andrea Thode	PI	Project oversight; participation in conference planning; oversee graduate students, Consortium coordinator, and future fire professional development coordinator.
Molly Hunter	Co-PI	Synthesis work; cooperate with existing partners; workshop development; participation in conference planning.
Jose Iniguez	Co-PI; Fiscal Cooperator	Project oversight; agreements oversight; workshop development.
Zander Evans	Co-PI	Development of webinars; cooperate with other consortia.
Pete Fulé	Co-PI	Cooperate with existing partners; workshop development.
Don Falk	Co-PI	Cooperate with existing partners; workshop development.

4. Consortium structure and governance

Governance of the Consortium needs to be efficient, inclusive, and transparent. We have started to develop an inclusive consortium by inviting participation across geographic, agency, organization, and bureaucratic boundaries. The Consortium will be led by an executive board of no more than 11 people drawn from both AZ and NM. The board will be a reflection of the diverse fire community in the Southwest, having representatives from federal agencies, state agencies, NGOs, academia, and the restoration institutes. The PI will act as chair of the executive board and one Co-PI will also serve on the board. The executive board will meet annually to help guide the Consortium, take advantage of external funding opportunities, and review progress via a report on program effectiveness (discussed in the

Program Effectiveness section below). Monthly conference calls will keep projects moving forward efficiently.

To ensure the Consortium functions efficiently, we will establish a review committee to prepare recommendations to the executive board. The review committee will include all Co-PIs and other members who reflect the diversity of people and organizations in the southwestern fire community. The committee will use teleconferencing and webinars keep travel costs low. The committee will accept proposals from the Consortium at large for current and future projects including topics for workshops, webinars, syntheses, and field trips. To avoid conflicts of interest, members of the review committee or executive board will abstain from discussions on proposals with which they are closely associated.

The Consortium will encourage transparency by listing both the executive board and the review committee on the Consortium website. The Southwest fire community will be encouraged to connect with both committees to make suggestions about activities and priorities. We will also post meeting notes and Consortium governance policies online.

5. End-user communities

The fire science delivery and outreach activities of the Consortium will target resource managers, public officials, Consortium partners, public land stakeholders, and the general public—everyone interested and invested in fire management and resource conservation in the region. The following list describes the beneficiaries, how they were engaged in the planning phase and the ways in which institutions will be targeted in the future.

- a. **Current professionals** engaged in wildland fire management and related fields are central to the Consortium's efforts. Most managers are employed by public or tribal institutions, some by non-governmental or private organizations, many of which are members of the Consortium (e.g., Forest Service, NPS, BIA, TNC). Current professionals such as fire ecologists, fire management officers and fuels specialists from different agencies including BLM, USFS, NPS, States, FWS and BIA were engaged via our webinars, surveys and workshops. As the community of practice grows, we expect that all resource managers in the Southwest will be aware of the Consortium and the opportunity it will provide to access fire science information and share ideas with fire scientists.
- b. **Future fire professionals, Two- and four-year universities** (e.g., Northland Pioneer College, Southwestern Indian Polytechnic Institute, San Juan College, Maricopa Community Colleges, NAU, Highlands, UA). This critical group is addressed directly through targeting of educational institutions (see below), student groups (e.g., Forestry Clubs, Student Association of Fire Ecology), and contacts with faculty. Students and faculty were particularly engaged in the workshops where they provided valuable input. Moreover, the development of future fire professionals was identified as one of the highest priorities in the survey and by workshop participants. The Consortium can provide information and contacts to support fire science curricula, invite professional guest lecturers, and sponsor students to attend field trips.
- c. **Authors of public policy** related to fire and natural resource management range from local to national officials. The Consortium will reach out to public officials at all levels. Invited specialists, such as urban/rural fire professionals participated fully in the workshops.
- d. **Communities in fire prone environments** will be a special focus. The Consortium can play a role in enhancing contacts and transferring fire science information among the managers working for various agencies around a particular community vulnerable to severe fire. In the planning stage, the

- e. **Consortium partners and related organizations** are invested in improving the use of fire science in the Southwest. This core group has and will continue be key beneficiaries of Consortium activities. These partners were active throughout the planning phase and have shown great enthusiasm for the Consortium and the future possibilities for fire science transfer across the Southwest.
- f. **Scientists** will benefit from feedback on research needs, partnering with managers in developing new research, outlets for technical and lay presentations, publication of their research, and improved opportunities to develop interdisciplinary research collaborations and recruit motivated students. The Consortium explicitly recognizes the two-way nature of the scientist-manager relationship and expects to serve as a conduit for improving feedback from practitioners to researchers. Scientists for government, universities and the private sector participated in various webinars and workshops and expressed great interest in having a mechanism to exchange ideas and set research priorities with a group that actively involves fire managers.

6. Planned activities

The Consortium worked very diligently over the last 4 ½ months to solicit input through webinars, workshops, surveys, phone and email contacts, and meetings. Sixty-four people from 17 organizations participated in 6 webinars to share ideas and to solicit input on technology transfer, ecosystems of interest, decision making, using FRAMES, and a review of Consortium plans. We did an email and personal survey of resource and fire managers in the Southwest (84 managers). The coordinator has thus far personally contacted over 300 fire managers in the Southwest by phone and email using information found in the Southwest Area Mobilization Guide. The coordinator also presented information on the Southwest Consortium at the USFS Region 3 fire management officers meeting (38 people from 10 national forests), the Albuquerque Zone Board meeting (24 people from 8 agencies), the Southwest Area Coordinating Group meeting (15 people from 9 agencies), and the Southwest Interagency Fire Teams meeting (210 people from 26 agencies). Finally, we held three workshops to solicit input on research needs, technology transfer and asked, “What can the consortium do for you?” These were held in Tucson, Albuquerque and Flagstaff with 106 people from 30 organizations in attendance. The PI is currently scheduled to talk about the Consortium at the BIA tri-regional meeting on Feb 24th and the coordinator will be attending other fire management meetings during the spring to keep agencies involved and updated on Consortium activities and progress. On March 2nd, the Consortium will host a webinar on the Ecological Impacts of Mastication, which will explain recent JFSP funded research.

The Consortium partners spent a significant amount of time and effort investigating the most significant information and research needs in the Southwest. Our survey results showed that 55% of Consortium participants ranked field meetings as the highest priority. The next three most important elements of technology transfer were a new web portal, developing future fire professionals, and systematic reviews. The survey indicated that a regional conference, webinars, and other forms of research synthesis such as a newsletter were also important to Consortium participants. In addition Consortium participants provided a long list of high priority research and synthesis topics, which we will use to identify topics for Consortium activities. Examples of research and synthesis topics are : (1) Designing treatment strategies for large landscapes to alter fire behavior, provide wildlife habitat, and sustain forests, (2) Management of invasive species, (3) Effects of climate change, feedbacks with fire, insects and disease, and how managers can respond now, (4) How severity and seasonality of prescribed fire

affects treated areas, and (5) How larger Mexican spotted owl conservation area assessments affect interagency management of fires across boundaries.

Field Trips, Workshops and Meetings

We plan to develop 2-3 workshops and field trips per year. The workshops will target specific topics identified under information needs and may focus on sub-regions within the Consortium. We would be happy to coordinate this with the JFSP Road show approach and the Fire Science Digest efforts. Outcomes of these workshops will be funneled into ERI working papers, our newsletter and the Wildland Fire Lessons Learned Center. In addition to new workshops, the Southwest Consortium will work with existing organizations to facilitate planned activities in the Southwest. Examples include the SAF National Convention in October 2010, and a fuels and fire ecology workshop USFS R3 is developing. "Self-service" demonstration sites will be developed out of workshops and field trips. These will include website information about the workshops and field trips along with downloadable site guides.

Fire Science and Management Conference

We plan to put on a fire science and management conference in the Southwest every four years. We would partner with the Association for Fire Ecology and others who put on the last Southwest Fire Conference (January 2008). In addition, new partners would be brought in with the Consortium. Conferences would have associated field trips and workshops and would bring together the sub-regions within the Consortium. This allows for cross-pollination between sub-regions and different aspects of fire science and management. Partnerships with neighboring consortia will be facilitated when possible. The Consortium will present its first conference in January 2012.

Some managers don't attend conferences due to the costs. Travel grants have been built in to support managers and students in getting to the conference. In addition, funding to support conference planning has been built in to minimize the registration costs for attendees.

Development of Future Fire Professionals

There has been a consensus that developing future fire professionals through a combination of education, training, and experience is a critical part of our Consortium. We are planning to fund a part-time worker to develop relationships and a program to facilitate the development of future fire professionals in the Southwest. Planned activities within the Consortium will include supporting undergraduate and graduate student work that meets the Consortium objectives and goals.

The USFS R3 Fire and Aviation program has already shown great interest in the development of future fire professionals by funding a 1 year coordinator position to help carry out the tasks identified by the Taskforce. These tasks include: (1) developing educational requirements for fire professionals, (2) creating agency/university agreements for paid internship positions, (3) scoping an apprenticeship program to provide the training needs for students to meet IFPM qualifications for higher level agency positions, (4) agency/university agreements for agency teachers to help teach NWCG courses at universities, (5) agreements between two and four year academic institutions, (6) a mentorship database, (7) contacts with student service coordinators in southwest academic programs with a fire emphasis, (8) agreements with Native American 2-year colleges, and (9) working with current diversity program coordinators in the agencies for recruitment into fire positions. The coordinator will be housed at NAU and will work closely with southwestern universities, tribes, NGO's, and federal and state agencies. The funding from USFS will be leveraged with the funding in this proposal to extend this position and to work with multiple agencies. We hope to also work with other agencies to build funding for a full-time position.

Websites

Based on feedback from Consortium participants during webinars and meetings, we identified a number of websites that fire professionals already use. Instead of creating a new website with similar resources, we will be working with FRAMES to continue to develop a portal for the SW Fire Science Consortium. The FRAMES portal will contain: (1) links to popular existing sites, (2) general Consortium announcements, (3) synthesis of research products, (4) a Consortium newsletter, and (5) the latest fire research announcements.

In addition, the Consortium plans to create an on-line searchable database of on-going fire research and management projects in the Southwest. This will be tackled as a pilot project for the first two years of the Consortium. The pilot will include: (1) working with FRAMES on the use of their existing database structure and portal, (2) scoping of what information needs to be presented, (3) exploring how users can enter data and maintain their data, (4) evaluation of proper keyword lists for searching, (5) scoping possibilities for development of spatial representations of the data and spatial searches, and (6) opening a pilot database on-line for testing and comments by Consortium partners and members.

Synthesis

An important need that participants have identified is synthesis of existing fire science. Topics for the synthesis work will come from our current list of research needs and further activities of the Consortium. We will synthesize fire science in the following four ways with an additional optional approach:

Quarterly Newsletter: The Consortium newsletter will be a summary of events and new science related to fire in the Southwest. This could include citations and summaries of newly published research by topics (wildlife, fuels, ecology, etc.). Graduate students will be funded to work on the newsletter's "recent science" sections. The newsletter will be electronic and distributed via email lists and available off the Consortium website for download.

Lessons Learned: Advances in Fire Practice: The Consortium will partner with the Wildland Fire Lessons Learned Center to produce videos and stories on research and management projects in the Southwest. The Consortium will provide topics, contacts and information to the center. The center will produce 2 stories a year under the "Advances in Fire Practice" section about projects specific to the Southwest.

ERI Working Papers: The Consortium will join forces with the Ecological Restoration Institute in developing two additional "working papers" per year. Graduate students will be paid to research and summarize topics decided on by the Consortium. Papers will be edited by the ERI staff editor and made available as electronic documents on the ERI and Consortium websites. Some recent topics of working papers have been, "[Controlling Cheatgrass in Ponderosa Pine and Pinyon-Juniper Restoration Areas](#)" and "[Understory Seeding in Southwestern Forests.](#)"

Webinars: We plan to develop four webinars a year to complement field meetings and to present research findings in the Southwest. Topics for the webinars will come from the Consortium and we will encourage Consortium members to present webinars on work and research they are doing. The Consortium will host the platform and give logistical support. Webinars will be archived for access on the Consortium website.

All partnership projects will be linked through the Consortium website and will acknowledge the collaboration of the Consortium with the different groups.

Optional Planned Activity: Systematic Reviews

We propose two systematic reviews as an optional piece of this proposal. These will follow the evidence-based science paradigm and the international guidelines developed by the Centre for Evidence-Based Conservation (<http://www.cebc.bangor.ac.uk>). This protocol entails a synthesis of all pertinent information surrounding a predetermined management question. An example is the current JFSP-funded project “Post-wildfire seeding in forests of the Intermountain West: trends, costs, effectiveness, and use of native seed” led by Fulé, Hunter, and colleagues. These syntheses are very valuable to managers as they directly address questions that are plaguing land management, condense a broad research area with up-to-date information, and can be used for treatment decisions, NEPA documentation and responses to public inquiries. We propose to complete two syntheses over two years on priority topics identified by Consortium partners. The costs of the two reviews total about \$136,000. Systematic reviews are particularly important in the southwestern region because of its extraordinary diversity, from four desert scrub biotic communities up to alpine tundra, for a total of 20 biotic communities (Brown 1994). Across this broad spectrum of biotic communities, there is a great diversity of fire management challenges, ranging from spread of fire-prone invasive grasses in desert systems that are not fire-adapted to restoration of frequent fire forested systems.

7. Program effectiveness

We will use standard instruments for measuring the effectiveness of the Consortium, such as self-assessments, web-based surveys, meetings with other regional coordinators, and external reviews by scientists and managers. We have already used many of these tools in gathering information during the pre-proposal phase. For example, a web-based survey tracked successes, needs for improvement, and suggestions from the three workshops. The PI and Co-PIs will present the results of our program evaluation on an annual basis to the executive board. Measures of program effectiveness will include documenting completion of each of the deliverables mentioned in this proposal. Perhaps more importantly, our assessment will focus on ensuring we are meeting the needs of the SW fire community and strengthening the link between scientists and managers. To that end, we will track participants in each of our activities, website visitors, projects facilitated by the Consortium, and publications involving Consortium funding or other assistance. We also intend to record qualitative case studies of Consortium successes.

9. Literature Cited

Brown, D.E. (ed) 1994. Biotic Communities: Southwestern United States and northwestern Mexico. The University of Utah Press, Salt Lake City, Utah.