Joint Fire Science Program (JFSP)

Fire History and Climate Change (FHCC) Project Workshop

held in collaboration with

The Wildland Fire Lessons Learned Center

and the

JFSP Fire and Climate Science (FACS) Project

February 9–11, 2010

NAFRI/Wildland Fire Lessons Learned Center
3265 East Universal Way
Tucson, AZ

I. Overview

Climate in the 21st Century is projected to be significantly different from 19th and 20th century climate. Projected changes will strongly influence ecosystem characteristics and fire regimes. The Joint Fire Science Program (JFSP) expressed interest in sponsoring projects regarding fire history and climate change that synthesize existing information in a form that is useful to land managers. Specifically, JFSP called for "an examination of our knowledge of historical fire regimes, an assessment of how this information can help us understand potential fire regimes in the face of climate change, and an interpretation of how this information can help shape fire and fuel management decisions." And required that "proposed work should include some form of interaction with land managers to help refine the management questions of interest and determine the format of products that will be most useful to them."

In response, we proposed a synthesis that would provide a literature-based understanding of how current and potential climate change impacts can be incorporated into fire and fuel management decisions. We proposed use of an ecosystem-based fuels approach to structure fire history knowledge collection, storage, access and synthesis in a way that is meaningful to managers. Our proposed goal was to produce a fire history and climate change (FHCC) synthesis that includes interpretations for managers on how such information can be used in analysis and decision making, along with a complementary "living" knowledge base that will enable users to obtain ecosystem specific knowledge for incorporating climate change considerations into fire and fuels management decisions. Our synthesis would focus on how fire history and fire regimes have related to climate dependent ecosystem characteristics and fuel regimes as a basis for understanding interactions under climate change. In a changing climate, the assumption of static fire regimes does not provide an adequate basis for understanding present or future fire patterns at geographically fixed locations. For managers to effectively use fire history information in a changing climate, they will need to link that historic fire knowledge to climate change patterns based on current or projected ecosystem fuel characteristics.

We fully understand the need to actively engage land managers throughout the synthesis process. As one means of accomplishing this we proposed to hold a Land Manager Workshop 6 to 9 months into the project to evaluate user needs, particularly in regard to selecting appropriate ecosystems categories, and test draft deliverables. Workshop participants would be chosen, with the guidance of our federal cooperators and land management colleagues to represent a cross-section of users. We anticipated participants would include federal and state fire and resource managers, and NGO organizations such as The Nature Conservancy and others. We planned to continue to engage workshop participants throughout project development to review products and provide feedback. Early collaboration with the Wildland Fire Lessons Learned Center yielded agreement to hold the Workshop at the National Advanced Fire & Resource Institute (NAFRI) in Tucson February 9–11, 2010.

The JFSP expressed a desire that we coordinate with another funded project with complementary objectives, the Fire and Climate Science (FACS) project. After an initial joint teleconference, arranged by the JFSP, FHCC and FACS investigators agreed to plan

for a collaborative joint workshop. We met in person during the Association of Fire Ecology meeting in Savannah in December 2009 to advance joint planning for the Workshop. Beyond the efficiency benefits achieved by holding a joint workshop, the two projects were able to substantially advance efforts in areas such as bibliographic data base collaboration.

A description of the workshop and its outcomes follows.

II. General Workshop Objective: Ensure that proposed syntheses of fire history and climate change information will meet the needs of fire and resource managers and other relevant managers and planners.

- Ascertain and evaluate user needs.
- Evaluate approaches to the synthesis projects and draft deliverables.
- Stimulate discussion on how to deal with future climate change and future fire regimes.

III. Selection of Attendees (see Appendix A for list of attendees):

Workshop participants were chosen to ensure balanced organizational and geographic representation. The workshop participants represent a cross-section of fire, resource, and other relevant managers and planners from the U.S. Forest Service, National Park Service, Bureau of Land Management, Fish and Wildlife Service, Bureau of Indian Affairs, and The Nature Conservancy. Selection of participants was also made to include experience in a range of ecosystem fuel types and geographic areas. Considerable effort was made to get representatives from state fire management organizations and the National Association of State Foresters; however these efforts were unsuccessful. The Nature Conservancy which works extensively with private landowners is viewed as a surrogate link to private land owners. Several fire scientists, fire ecologists, and climatologists, participated both as speakers and discussion group participants.

IV. Presentations (see Appendix B for workshop agenda):

The following presentations were made to provide participants background information on the state of the science on climate, climate change, fire history, wildland fire, and related fire management topics. **(Follow hyperlinks to view podcasts of presentations**).

Introduction Stan Coloff
http://fosters.oscr.arizona.edu/ltrr/StanColoff.mp4

State of Science – Climate Change Bill Sommers
http://fosters.oscr.arizona.edu/ltrr/BillSommers.mp4

Using Paleo and Modern Fire History in Management Tom Swetnam
http://fosters.oscr.arizona.edu/ltrr/TomSwetnam.mp4

Climate and Wildland Fire in the US http://fosters.oscr.arizona.edu/ltrr/DonMcKenzie.mp4	Don McKenzie
LandFire - A platform for understanding interactions among Fuels, Fire and Climate http://fosters.oscr.arizona.edu/ltrr/MattRollins.mp4	Matt Rollins
Application of Weather and Climate Information to Fire Management http://fosters.oscr.arizona.edu/ltrr/TomZimmerman.mp4	Tom Zimmerman
Fire and Climate Synthesis (FACS) http://fosters.oscr.arizona.edu/ltrr/PeterBrown.mp4	Peter Brown

V. FHCC Group Discussion Notes:

The investigators sought input and guidance from land/fire managers on several issues (posed as questions) on how to best package available information to support manager needs. The questions below guided group discussions throughout the workshop. The following comments are a compilation of the discussions of two separate participant groups of about 12–14 people each.

Q1. Should we structure this synthesis to meet the needs of managers who have a solid fire management knowledge base–or to meet the needs of a more diverse group of managers who need to consider fire as part of a broader climate change context?

The consensus was that the audience for the synthesis should include natural resource managers as well as fire managers. The reasoning for broadening the target audience beyond fire managers was that the implications of the research extend beyond fire. In addition, decisions about vegetation management and fuels are often made by natural resource managers such as ID Teams, botanists, and range managers. There was recognition that managers at different levels need different types of information. For this reason, attendees recommended that the investigators tier the organization of the synthesis to meet the information needs of different end users.

There was some disagreement as to whether the synthesis should target policy-makers and the general public. Most of the group felt that if the synthesis was written at a level that managers could use, then it would be accessible to policy makers as well (In this case, the term policy maker primarily refers to administrative personnel at the regional and national level). The group strongly supported the development of 1-page summaries for policy makers along the lines of the IPCC (Intergovernmental Panel on Climate Change) reports. Whereas some argued that the synthesis should be written with the public in mind, most felt that this was beyond the scope of the task. One suggestion

was to make the synthesis available to (agency public information officers) PIOs and outreach personnel for interpretation to the public.

Q2. Should the synthesis include an overview of the fundamental concepts of climate change science?

Almost all attendees felt that the fundamentals of climate change needed to be included, reasoning that managers need a common language and set of concepts to start internal and external discussions regarding land management decisions. Fact sheets were seen as critically important for presenting climate change fundamentals and attendees stressed the need to keep this section brief and to the point. Most felt that strong graphics could be used to cover the major topics, with links to the primary sources and more in-depth overviews. A point repeated by many attendees was that coverage of the basic science behind climate change should not defend the science, only present it.

One attendee argued that the agencies have, for the most part, been quiet on climate change and that the synthesis provides an opening to do some internal pedagogy and an opportunity to get natural resource managers on the same page. For this reason, there was some support for going deeper into basic climate change science.

A point that reappeared through discussions of many of the questions, including Q2, was the need to address uncertainties–areas where researchers are confident in the science, and areas where they are not. There was warning that emphasis on uncertainty could be used to poke holes in the findings, but addressing uncertainty insufficiently could undermine credibility of the synthesis as a whole. This is a fine line to walk and that reality was acknowledged throughout the workshop.

Q3. Considering that General Circulation Models (GCM) and Emissions Scenarios are the basis for climate change predictions–how much effort should be devoted to describing them?

Most attendees felt that GCMs were fundamental and needed to be included along with basic information on how the global climate works. Graphics were seen as key in helping people to visualize the global climate and how the models represent it. One attendee stated that people hear about GCMs all the time, but probably do not know exactly what they are–what does it mean to say that GCMs predict climate change or that the different models do not always agree with each other? Land managers need this type of basic information. They are being asked questions by the public and stakeholders and they need to be able to respond to substantiate why they are making certain decisions related to climate change. One suggestion was to show how the models capture past climate variability (maybe through links to video representations)–those depictions provide a strong argument in support of what the models are saying about the future.

There was warning to not let coverage of basic climate science detract from the main goal, and some felt this type of information might be better located in an appendix. There was general agreement that basic definitions of terms and concepts in climate change modeling and science are needed along with descriptions of the advantages and disadvantages of particular approaches or models. However, the FACS and FHCC groups were encouraged to work together to produce joint materials and to take advantage of existing resources.

Q4. The synthesis will address both "fire history" and "historical fire regimes". What do those concepts mean to you?

Many acknowledged that at first reading they did not see a significant difference in the two terms, and some admitted they essentially viewed the two as interchangeable. Upon further discussion, though, most felt that the two terms can be differentiated as follows: fire history is the record of the fire events that have occurred on a specific piece of land, and fire regimes are the ecological processes that have developed over time–the fire cycles in specific vegetation types that are usually measured according to return intervals, seasonality, extent and severity. In other words, fire history is the data and historical fire regimes are the synthesis and narrative, the aggregate of the data. Linking this to the FHCC proposed conceptual organization, fire history was described as 'what we know' and fire regimes as 'what we understand.' Researchers noted that fire history research is usually geared to identifying regime characteristics.

From a land manager's perspective, fire regime classifications allow one to visualize what a stand or landscape might look like with a certain frequency/severity of fire. One attendee noted that land managers must pay attention to both the general patterns and the unique histories of sites. "If you focus solely on general patterns you miss the unique events that came before in a specific place that have shaped it in distinctive ways." This was referred to as the 'duality of ecology and history' in that land managers must pay attention to the general classifications and patterns which make up fire regimes but also the contingencies (fire history) that overlay those in specific places.

The investigators asked, "If you did not have fire history, could you infer a fire regime from fire effects?" The answer was that we probably don't know enough to get it right.

Q5. How will improved historical information relating climate to fire regimes help you shape fire and fuel management decisions under climate change?

Triage was a term that was repeatedly used in both discussion groups in response to this question. The synthesis will help managers to identify how to apply scarce resources in building resiliency in certain systems and to recognize which systems might receive less resources to avoid 'tilting at all windmills at once' as one attendee expressed it. The synthesis would help in understanding how plastic and adaptable ecosystems were in the past and how they might respond as we move into the future. Historically, what were the rates of change in a certain ecosystem, and what will be the probable change rates projected into the future? Understanding these questions would help with planning and treating potential trouble spots and increasing resilience through prescribed fire and adjustment of stocking levels. The synthesis could also help in setting up monitoring programs to identify the changes (species migrations, invasions) as they are taking place.

Recent research by Peter Brown was cited as an example of the link between historical research and land management. Brown's work on ponderosa pine at Mt. Rushmore has shed light on an ongoing debate about the prevalence of crown fires in ponderosa systems. Brown found only 3–4% crown fires historically, even though the area is currently experiencing a great deal of crown fires. This information provides a basis for treatment, and has important implications for potential litigation. Investigators were encouraged to provide support/evidence for managers who are going to be

explaining to a skeptical public why they are changing management strategy based on climate change.

There were concerns that there needs to be recognition of the limitations of using historical information. Uncertainty about future conditions may overshadow the role of historical information about a particular system. Systems are highly altered from historical patterns, so big changes in the future are going to result in unknown changes in density and distribution–the mechanisms and processes might be outside of our understanding. We know about the survivability of species under different climate regimes but not the regeneration patterns of certain species. Do we know enough about the inherent genetic variation of species to understand how they will respond? We also need to know how invasives, insects and disease interplay and how climate can switch them around. There were also concerns that we do not know enough about how treatments work in certain ecosystems. For example, in pinyon-juniper, there is debate about how treatment can push systems into conversion thresholds for plant communities under the right climatic conditions.

One attendee stated that the synthesis will help to 'daylight' the need for better predictive systems. The Black Saturday Fires of Australia were cited as an example of unprecedented climate conditions and the view that 'our normal is changing'.

There were also a number of topics that attendees would like to see addressed in some fashion–biomass, C sequestration, T&E species, sensitive habitats, and water management. Biomass is becoming important (C sequestration, co-generators for power). Managers are going to be asked to manage for C while simultaneously mitigating fire risk–a difficult paradox. In terms of NEPA documents and forest planning, managers will need guidance on how climate change is going to affect T&E species, sensitive habitats, etc. Vegetation type conversion thresholds are going to be a major concern, and managers are going to be trying to determine if a certain system will return after a burn or if there will be a conversion. The investigators were encouraged to try to help managers answer that question. Changes in lightning regimes could also be critical, and it was suggested that it also be covered in the synthesis. And finally, how we manage water and watersheds will be important in a warmer, drier future, and fire will play a role in that.

Q6. We have proposed a few structural approaches for use in our synthesis. One involves describing information in terms of "What we know", "What we understand", and "What we expect". Do you consider this useful?

Attendees reported that initially they did not see a difference in the first two categories, but understood them more fully after explanation. However, this was seen as a warning sign that different terminology might be needed in order to clarify (one suggestion – 'just the facts', 'how it works', and 'what to expect'). Attendees also assumed that these categories would lead to 'what we don't know', 'what we need to know', and 'why this matters'. Attendees liked the implicit connection to After Action Reviews (AARs–debriefing sessions used by fire management units) and suggested making the connection more clear

Attendees recommended an emphasis on how the first two feed into 'what to expect'–how data and knowledge support where we think we are going. There were also specific suggestions of including coverage of which ecoregions are at greatest risk and which areas are going to experience the most ecological change in successional

processes. Anecdotal examples using experiences of other land managers could also be used to explain what can be done to make a difference. Checklists and case studies were recommended for inclusion within the different sections.

Q7. We also are proposing to discuss climate/weather and fuels/fire linkages at 3 scales to explain atmosphere–vegetation interaction under climate change. These conceptual scales are "Ecosystem Fuels, Seasonal and Incident". Do you consider this useful?

There was a great deal of discussion of how these scales split spatially and temporally. For example, Santa Ana winds could be described at the incident or seasonal scale. Attendees were not sure how the synthesis would get down to the incident level, or how useful that information would be.

Most felt that these were categories, not scales. In addition, most attendees felt that the use of the term 'incident' would be confusing to users who would assume that the synthesis was providing climate information that would be relevant on an individual fire ('event' scale might be better but problems remain there as well). Most agreed that the scales should be clearly defined and perhaps represented visually (showing how a fire can span scales). It was also proposed that the investigators consult with predictive services to coordinate approaches and terms that might be compatible.

Q8. We have proposed synthesizing 'fire history' information for the entire US at the Bailey ecodivision level. Is that a reasonable scale to present information?

The general consensus was that the ecodivision level would provide a useful overarching organizational framework but focusing on vegetation type (where the information was available) would be most useful for land manager purposes. Examples of comments:

- "Start as fine as you can afford to do and that the data will allow and then you can always scale up."
- "Rather than 'one-size-fits-all', work at finer level where there is more information and provide general info for areas with less information."

Ecodivision might be helpful at the regional level, but at the Park or unit level, managers would view the ecodivision level as too coarse (For example, the Klamath Mts and the Mojave Desert are included in the same ecodivision). However, most acknowledged that in some parts of the country the depth of information that will allow a more detailed organization did not exist. In areas where there is more information, they would expect a finer breakdown–ecoprovince, vegetation type, plant association; however, in areas where there is not that type of information, ecodivision will have to suffice.

Most summaries of fire history use vegetation type. So, organizing the information by vegetation type is preferred, combined with synthesis at the ecodivision (or even better, ecoprovince) level and a recognition that vegetation types cross ecodivisions and ecoprovinces. It was also suggested that the investigators need to include a description of the relationship to LANDFIRE/BEHAVE models, and then let managers crosswalk the information to fuel type.

In later discussions it was pointed out that there had been very little discussion of the Southeast and a number of attendees felt that the region should get strong coverage in the synthesis–that is where the most acres are treated. In addition, Alaska could provide some

early insights into the future in other areas. A manager from Alaska said that it is surprising how fast things are changing–many units are losing Black Spruce, fires are burning year round, ecosystems are changing to deciduous systems and with so many fires, and the regime may be changing from a few large fires to many small fires

Q9. The amount and type of published fire history information will vary greatly among ecodivisions, such that for some locations (e.g. Arizona) a relatively rich trove of biophysical based knowledge will be available while at other locations (e.g. Maine) we will need to rely more on cultural history sources. For ecodivisions where no specific published literature exists, we will need to rely on interpretation of larger scale information. Is this a reasonable approach?

The synthesis is going to be driven by the data and analysis available. Most felt that sources of information such as historical journals, naturalist descriptions, anthropological reports etc. were valid for areas without dendrochronology records as long as there was clear description and explanation of the limitations, scales, and uncertainty associated with different sources. Attendees felt that as long as managers know that the information presented is the best available, they will use it as appropriate. "It is what you buy yourself by using hierarchical system – scale down in AZ and up in ME."

There were suggestions to supplement data sources with current understanding of prescribed fire processes areas without fire scars as well as information on life histories and plant strategies.

Q10. The synthesis will include extensive review of current literature. How important is it for you to be able to access the original documents we cite in the synthesis? If it is important, do you have the tools needed to access journal and other publications thru bibliographic links?

In short, it is very important to provide some sort of basic link to the original documents, but the mechanisms of access are more difficult. Most felt that being able to access the abstract was sufficient in most cases and managers would go get the full references when needed. There was concern that hyperlinks change, so there needed to be full references of some type. The investigators were encouraged to look at the Rainbow Series for an example of a balance between synthesis and references.

Q11. We believe that LANDFIRE data and models can provide useful tools for understanding the relationship between fire and climate change.
1) Is this a reasonable belief?
2) How important would a LANDFIRE link be to you?
3) How should we approach LANDFIRE information in this synthesis?

There was acknowledgement that there were problems in linking with LANDFIRE, but general encouragement to go ahead with creating the connection. Attendees stated that LANDFIRE had proved its usefulness in allowing people to work across agency boundaries–at the watershed level for example; however, LANDFIRE has come under criticism because of its coarseness. And by linking with LANDFIRE, the investigators were tying their credibility to the biases and views that go along with LANDFIRE. If users feel that the underlying vegetation data is wrong, they might be quick to dismiss the work of the synthesis.

Attendees recommended that the investigators be specific about what LANDFIRE data they were using and why. Also, again there needs to be a disclaimer up front about uncertainties.

Q12. Several questions could be posed that will reveal gaps in knowledge. For example the following questions were recently posed (D. Petersen):

Scientific Questions

a. Are fire area and fire severity changing as a result of a warmer climate?

b. Will fire regimes change in response to a warmer climate?

c. What will be the relative roles of climate and fuels as limiting factors?

d. How will spatial and temporal patterns of wildfire be affected by warmer climate?

Management Questions

e. How will a warmer climate affect fuel treatments and silviculture?

f. Are different fire management strategies needed in a warmer climate?

Would it be of value for this synthesis to include a knowledge needs section highlighting questions/issues of importance that are only partially addressed or unaddressed by existing literature?

Attendees felt that these are important questions that should be addressed in the synthesis, and these brought out a number of important points for the investigators to keep in mind while building the synthesis. One attendee stated that how you propose your confidence intervals around your answers to these questions will be important – that is where the important information lies. Another felt that showing managers how to understand the questions, synthesize, and develop answers for themselves in relation to their own unit would be key (e.g. you are seeing changes in the fuels, how does that affect planning?) In addition, attendees felt that using these questions would help to broaden research by spurring more comprehensive questions about changes in vegetation distribution and patterns, successional trends and vegetation types. One attendee expressed it as, "If you can answer these questions, great–you know where you are going." Generally, attendees felt that these questions might help frame adaption and mitigation strategies.

There were some concerns related to these questions, particularly the focus on warming. It was pointed out that not every place will be warming. Also, some felt that question *c* needed to be reworded. Investigators were again cautioned to be clear about what was not known in relation to these questions as well and to not shy away from the 'we have no idea' answer.

One attendee noted that the social aspects of climate change and how it relates to land management had not been discussed, and the investigators were encouraged to look at the LTER projects for ideas on how to incorporate the social dimensions.

Final Users Needs Discussion:

The final wrap-up discussion of user needs honed in on some of the topics discussed in the breakout sessions and a number of constructive ideas emerged regarding the organization and content of the synthesis. The first was the recommendation to structure the synthesis around a set of case studies in specific geographic areas/vegetation types/ecodivisions that represent a cross-section of the climate–land management

challenges facing land managers, including the perspectives of managers and the types of decisions that they are facing. Next, attendees felt the synthesis should tie the science back to those challenges and decisions and show how the science can inform the decision process. Investigators were encouraged to build narratives about the sites, and then show what we know from the science, and what the greatest short and long-term needs are in terms of adaptation strategies. Future scenarios were also seen as a way of framing the case studies (e.g. given these facts, this system could go this way or this way). The scenarios could draw from fire history and fire ecology, and be supported by diagrams showing potential changes in fire frequencies, fire regimes, ecological feedback, etc. The Union of Concerned Scientists has built some future scenarios of change in geographical areas and these were cited as a potential model to follow.

The group discussed the current situation in which there is agreement that warming is occurring and that drought is increasing in places where fire is occurring–the need to take action is strong. However, managers are being forced to act with insufficient and uncertain information. The areas where the synthesis can help the most is in long term planning. Managers said that they could use planning/operational examples of where science has been used. The point was raised that the Forest Service is about to begin developing a cohesive fire and fuels strategy and the synthesis can feed into it.

The group also discussed the fact that many actions geared to climate change need to be done anyway. But, managers can't burn or treat everywhere, so how do they prioritize? Managers stated that they needed help in identifying actions to make ecotones more resilient, and in identifying indicators for monitoring (e.g. changes in the timing of snow melt). On a more specific level, managers said they needed guidance for NEPA and Forest Plans in terms of carbon sequestration, emissions and climate change mitigation.

Prioritization was a continuous theme raised by the mangers at the workshop. One suggestion was to include a list of the top 10 threatened ecosystems based on fire and climate change or a ranking system for high value resources and 'treasured landscapes'. Attendees felt that clear targeted lists such as these could help policy makers focus and redirect funding for help.

In terms of packaging the synthesis, the investigators from both the FHCC and FACS projects were encouraged to create products that appeared seamless to outside users. They were also encouraged produce materials in a form which will be maintained and updated. The synthesis needs to be in CD and text forms since internet connections are still a problem in many rural areas. Video and multimedia were seen as important for reaching younger audiences in the land/fire management communities.

For distribution and dissemination, JFSP regional consortiums were seen as an important vehicle. And, attendees felt that the case studies could be directly integrated into the S-590 course. State university extension systems and NRCS were viewed as important partners for reaching private landowners. For reaching the public, the investigators were warned to not try to simplify complex messages, but to express the findings in ways that show how future climate and fire might impact people directly–take advantage of burned landscapes for education and to build public support for policy. The investigators were encouraged to communicate the places where decisions will impact society–that will influence policy makers.

There were a number of other sites and projects cited as examples that might be useful in organization and presentation: FEIS (consistent set of units), Climate Change

Resource Center (video), TNC LANDFIRE (vegetation models), IPCC data distribution center (graphics), and NOAA climate services.

And, finally, there were a few warnings. Investigators were told to be aware of the fact that we do not have complete information on where we are moving forward and need to think through how much we are willing to hold on to landscapes and how much we are willing to let processes take their natural course. Also, there is a temptation to highlight the catastrophic but there is also a danger of overstating. And, there was a repeated reminder not to ignore the social science side of climate change since that is where the greatest uncertainty lies.

Appendix A: Attendee List

Name		Email	Phone	Address - Affiliation
Bigio	Erica	ebigio@ltrr.arizona.edu		Univ. of Arizona
Brown	Tim	tim.brown@dri.edu	775-674-7090	2215 Raggio Parkway, Reno NV 89512
Brown	Peter	pmb@rmtrr.org	970-229-9557	2901 Moore Ln. Ft. Collins, CO 80526
Brunson	Ed	ed.brunson@bia.gov	615-564-6780	545 Marriott Dr. Suite 700, Nashville, TN 37214
Caprio	Tony	tony_caprio@nps.gov	559-565-3126	Seqouia-Kings Canyon NP 47050 General Hwy. Three Rivers, CA
Coloff	Stan	stan@stan.coloff.name	804-776-7195	1804 Wilton Creek Rd. Hartfield, VA 23071
Conard	Susan	sgconard@aol.com	207-338-1294	George Mason Univ.
Falk	Donald	donfalk@u.arizona.edu	520-626-7201	School of Natural Resources, Univ. of Arizona
Farris	Calvin	calvin_farris@nps.gov	541-205-6339	P.O. Box 1713 Klamath Falls, OR 97603
Fege	Anne	afege@aol.com	858-472-1293	12934 Tekana St. San Diego, CA
Garfin	Gregg	gmgarfin@email.arizona.edu	520-626-4372	Inst. of the Environment, 845 N. Park Ave. Tucson, AZ 85721
Kaib	Mark	mark_kaib@fws.gov	505-248-6819	USFWS 500 Gold Ave SW, Albuquerque, NM
Lata	Mary	mlata@fs.fed.us	308-432-0328	USFS Reg. 2 Nebraska NF
McDaniel	Josh	jmcdaniel@benchmarkrs.com	970-201-0809	370 Martello Dr, Grand Junction, CO 81507
McKenzie	Donald	donaldmckenzie@fs.fed.us	206-732-7824	400 N 34th
Milesneck	Ted	ted_milesnick@blm.gov	208-387-5198	3833 S. Development Ave, Boise, ID 83705
Passek	Jan	jan_passek@fws.gov	907-786-3654	1011 E. Tudor Rd. MS 238, Anchorage, AK 99505
Rollins	Matt	mrollins@usgs.gov	605-594-2633	USGS-EROS Data Center, Souix Falls, SD
Sekavic	Leslie	lsekaved@fs.fed.us	208-387-5228	FS-NIFC
Smith	Randall	randallsmith@fs.fed.us	520-388-8370	300 W. Congress, Tucson, AZ 85701
Sommers	William	wsommers@gmu.edu	703-993-4012	George Mason Univ.
Steffens	Ronald	steffensr@greenmtn.edu	802-287-8294	Green Mountain College, VT
Stewart	Cathy	cstewart@fs.fed.us	406-329-3534	USFS Reg.1 200 E. Broadway, Missoula, MT 59802

Sutherland	Elaine Kennedy	esutherland@fs.fed.us	406-542-4169	FS RMRS Missoula MT
Swetnam	Tom	tswetnam@ltrr.arizona.edu	520-621-2112	Laboratory of Tree-Ring Research, University of Arizona, Tucson 85721
Van Dyck	Michael	mvandyck@fs.fed.us	970-295-5774	USFS Forest Mgmt. Center 2150A Center Ave, Ft. Collins, CO 80526
Waltz	Amy	awaltz@tnc.org	541-388-3020	115 NW Oregon, Suite 30, Bend, OR 97701
Wilcox	Craig	cpwilcox@fs.fed.us	928-348-1761	711 S. 14th Ave, Safford AZ
Zimmerman	Tom	tomzimmerman@fs.fed.us	208-387-5871	WFM-RDA, UAFS-NIFC, Boise, ID

Invitees Unable to Attend

Fay	Frank	ffay@fs.fed.us	202-205-1129	FS F&AM/WO
Weiz	Rubin	rweisz@fs.fed.us	505-842-3217	FS Reg. 3 Albq.
Hilbruner	Mike	mhilbruner@fs.fed.us	703-605-5254	FS,National Program Leader Fire Systems Research
Grissom	Perry	perry_grissom@nps.gov	520-733-5134	Suguaro NP
Hunter	Molly	Molly.hunter@nau.edu	928-523-6650	N. Ariz. Univ
Thode	Andi	Andi.thode@nau.edu	928-523-5457	N. Ariz. Univ

Appendix B: Agenda
JFSP
Fire History and Climate Change Synthesis (FHCC)
Fire and Climate Science (FACS)
Workshop

February 9-11, 2010
Wildland Fire Lessons Learned Center
3265 East Universal Way
Tucson, AZ

General Workshop Objective: Assure proposed syntheses of fire history and climate change information will meet the needs of fire and resource managers and other relevant managers and planners.

- Ascertain and evaluate user needs.
- Evaluate approaches to the synthesis projects and draft deliverables.
- Stimulate discussion on how to deal with future climate change and future fire regimes.

Tuesday February 9

Registration		8:30
Welcome – Introductions	Stan Coloff	8:45
Workshop Overview	Stan Coloff	9:00
Process, Overview of JFSP Task, FHCC Project Goals, FACS Project Goals		
Science Presentations Common to both Projects		
State of Science – Climate Change	Bill Sommers	9:15
Break		10:00
Using Paleo and Modern Fire History in Management	Tom Swetnam	10:15
Climate and Wildland Fire in the US	Don McKenzie	11:00
Lunch		11:45
LandFire - A platform for understanding interactions among Fuels, Fire and Climate	Matt Rollins	1:00

Application of Weather and Climate Information to Fire Management
Tom Zimmerman 1:30

Background for Discussion Sessions

Fire History and Climate Change (FHCC) Bill Sommers 2:00

General Outline of Project – Anticipated Final Report Outline
"presumptions or concepts" about information needs, literature search and compilation methods (Zotero), Ecosystem Fuel Scale (Bailey Ecoregions),

a. Synthesis of Knowledge at the EFS level
- Bailey Ecodivisions
- Literature Search and
- Compilation Methods (Zotero)

b. Summary and Conclusions
c. Appendix, Data Base Access

Fire and Climate Synthesis (FACS) 2:20

Objectives and Approaches
Geography of fire climatology
Fire climatology & policy Peter Brown
Proposed information delivery methods Elaine Sutherland

Instructions to discussion groups Stan Coloff 2:40

Break 2:45

Break into groups for discussion: 3:00

Group A FHCC Project Discussion (Catalina Room)
Group B FACS Project Discussion (Rincon Room)

Adjourn for day 5:00

Happy Hour at Hotel Bar…or other suitable location ~6:00

Wednesday February 10

Opening comments and Questions 8:00

Group Discussions continue 8:30
Groups Summarize Key Points/Comments 9:30

Break 10:00

Group Discussions (Switch groups) 10:15
Group A FACS ***Rincon Room***
Group B FHCC ***Catalina Room***

Lunch 11:45

Discussions continue 1:00
Groups summarize key points and comments 2:00

Reconvene—Groups A and B report out key points 2:30

Break 3:00

Develop Recommendations (Whole Group Together) 3:15
Identify recommendations and user needs **common** to both projects, potential linkages and recommendations and user needs specific to each of the two projects as appropriate

Adjourn for day 4:30

Thursday February 11

Opening comments and Questions 8:00

Summarize and prioritize participants' comments/recommendations 8:30
Overall, FHCC Project, FACS Project

Break 10:00

Planning for follow-up input from participants 10:15

Work Shop Concludes 11:00