

Appendix A – February 2010 Workshop Highlights

We held a Fire History and Climate Change (FHCC) Project Workshop in collaboration with The Wildland Fire Lessons Learned Center and the JFSP Fire and Climate Science (FACS) Project February 9–11, 2010 at NAFRI/Wildland Fire Lessons Learned Center in Tucson, Arizona. A full Workshop Report is on file with the JFSP. Copies can be obtained on request from the authors.

The FHCC Land Manager Workshop sought to engage land managers to help ensure that the proposed syntheses would meet the needs of fire and resource managers and other relevant managers and planners by:

- Ascertaining and evaluating user needs.
- Evaluating approaches to the synthesis projects and draft deliverables.
- Stimulating discussion on how to deal with future climate change and future fire regimes.

We structured the Workshop around 12 Questions. We highlight Workshop outcomes as summarized responses to those 12 Questions, as follows:

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?

1. Synthesis should include natural resource managers as well as fire managers at different levels and that managers at different levels require different types (complexity) of information.
2. 1-page summaries for policy makers along the lines of the IPCC (Intergovernmental Panel on climate Change) reports.

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

1. Include fundamentals of climate change to provide managers basic concepts and terminology and facilitate internal and external discussions relative to land management decisions
2. Fact sheets, brief and to the point, presenting climate change fundamentals with strong graphical descriptions.
 - a. Avoid defending climate change science...present basic science.
 - b. Address uncertainties—areas where researchers are confident in the science, and areas where they are not

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?

1. Discuss GCM's, depict graphically, and discuss variation in agreement of model results, and refinement in predictive accuracy.
2. More detailed discussion of GCM's and climate modeling could be included in appendix.

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

1. Clarify and distinguish between the terms “fire history” and “historical fire regimes”
2. 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
3. Weather vs. Climate analogy
4. Expand discussion (examples) on fire history and fire regimes
5. Fire history ‘what we know’, fire regimes as ‘what we understand.’
6. Fire regime classification – indicative of what a stand/landscape would look like with a given frequency and severity of fire
7. Historical fire regimes may help characterize areas absent fire records (history).
8. Fires now beyond threshold values, “normal” is changing veg. types.
9. Focusing solely on general patterns may miss unique (significant) events that substantially influence change in veg. and fire regimes.

(This was one of the most intensely discussed topics....there is clearly and wide range of views and understanding on fire history, fire regimes and historical fire regimes. Great care must be made to clearly define these terms and further explain with examples)

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

1. Triage – The synthesis should provide managers a basis upon which to prioritize management actions and treatments to most effectively use the available funding...i.e. won't be able to “fix” everything...what actions will bring the greatest benefit.
2. The synthesis should help in understanding how plastic and adaptable ecosystems were in the past and how they might respond as we move into the future...i.e. how to build future ecosystem resilience...and what is unlikely to succeed.
3. Vegetation model links to climate change...i.e. veg. changes accelerated in changing climate
4. Historically, what were the rates of change in a certain ecosystem, and what will be the probable change rates projected into the future.
5. 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.
6. There were concerns that there needs to be recognition of the limitations of using historical information.
7. What is the likely range of variability in future fire regimes...what are the applicable locales?
8. Uncertainty about future conditions may overshadow the role of historical information about a particular system.
9. The synthesis should help to ‘daylight’ (emphasize) the need for better predictive systems.
10. 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.

- a. Unprecedented climate conditions suggest our view of “normal” is changing. i.e. Black Saturday Fire of Australia- 2009.
11. Related Topics – Suggest the influence of future climate change and future fire regimes on these topics be addressed in some fashion.
- a. Carbon sequestration and mitigating fire risk
 - b. T&E Species
 - c. Sensitive Habitats
 - d. Biomass (fuels mgmt.) co-generation
 - e. Vegetation type conversion thresholds
 - f. Lightening regime(locale and frequency) changes
 - g. Water/watershed management.

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?

1. Need to clearly define/describe the key terms “what we know” , “what we understand”, and “what we expect” ...and by extension “what we don’t know” or “What we need to know”
2. The Synthesis could include discussion of ecoregions at greatest risk, ecoregions “expected” to experience the greatest ecological change in successional processes.
3. Anecdotal examples (case studies, lessons learned, after action reviews, etc.) of manager experiences describing actions that conducted...what made a difference...and what did not work. (This may be applied in several of the Synthesis chapters).

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? [This was the most challenging topic for the both Work Groups...and the comments reflect disparate views on how this topic should be handled in the Synthesis....a good deal more discussion is needed to determine how to appropriately incorporate and link (tag) fire history references to the 3 scales...

1. Short term(incident or event- local fire forecast (subprovince , province)
2. Seasonal-interannual – El Nino, La Nina, PDO (division, province)
3. Climate/climate change - fire regime (domain, division)
4. Clarify distinction between the 3 scales to be used in the Synthesis. Use climate/fire examples to demonstrate and explain the 3 scales...both spatially and temporally.
5. 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.
6. 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. Does “event” correspond to “incident”?
7. Most felt that these were categories, not scales. In addition, most attendees felt that the (‘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)

8. 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?

1. Synthesis of fire history at the ecodivision level useful as an overarching organizational framework where tied to vegetation classification (plant association groups)
2. Use as fine a level (ecoprovince) as the data permits and scale up to the level (ecodivision) the historical data will allow.
3. Recognize synthesis of fire history at the ecodivision level or even province level may not be useful at the Park or unit level...probably too coarse for practical use by field managers.
4. Include a description of the relationship to LANDFIRE/BEHAVE models, and then let manager's crosswalk the information to fuel type.
5. Several attendees felt the Southeast region should get strong coverage in the synthesis—that is where the most acres are treated

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?

1. The synthesis is going to be driven by the data and analysis available.
2. OK to use information such as historical journals, naturalist descriptions, anthropological reports etc. absent dendrochronology records, provided a clear description and explanation of the limitations, scales, and uncertainty associated with different sources.
3. Scale down in the southwest (AZ) where fire history data is abundant....scale up in New England (ME) where fire history data is sparse.
4. 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?

1. Access to the abstract will be sufficient in most cases.
2. Synthesis needs to provide a basic link to original documents.
3. Hyperlinks change, so there needed to be full references of some type.
4. The Rainbow Series provides 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?

1. OK to use LANDFIRE data and models for large scale fuel modeling and predictive applications...i.e. ecodivision level and perhaps ecoprovince level in some cases. (Note- some users view underlying vegetation data is incorrect.)
2. LANDFIRE had proved its usefulness in allowing people to work across agency boundaries—at the watershed level for example.
3. LANDFIRE has come under criticism because of its coarseness...some might dismiss this Synthesis as not being valid.
4. Be specific about what LANDFIRE data they were using and why...identify uncertainties in use of data.

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?***
- g. 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?***

1. 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. 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.
 - a. How you propose your confidence intervals around your answers to these questions will be important – that is where the important information lies.
 - b. Show 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?)
 - c. “If you can answer these questions, great—you know where you are going.”
2. Need to discuss social aspects of climate change and how it relates to land management. Look at the LTER projects for ideas on how to incorporate the social dimensions.
3. These questions emphasize global warming...and that not all places 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.

Workshop attendees provided very valuable insight and guidance that strongly shaped the direction of this synthesis. We gratefully acknowledge their help by listing the attendees of the Workshop and their affiliations at that time:

- Erica Bigio – University of Arizona
- Time Brown – Desert Research Institute (DRI)
- Peter Brown – Rocky Mountain Tree Ring Research (RMTRR)
- Ed Brunson – Bureau of Indian Affairs
- Tony Caprio – National Park Service
- Stan Coloff – George Mason University
- Susan Conard – George Mason University
- Donald Falk – University of Arizona
- Calvin Farris – National Park Service
- Anne Fege – San Diego county Museum
- Gregg Garfin – University of Arizona
- Mark Kaib – US Fish and Wildlife Service
- Mary Lata – US Forest Service
- Josh McDaniel – Wildland Fire Lessons Learned Center
- Donald McKenzie – US Forest Service
- Ted Milesneck – Bureau of Land Management
- Jan Passek – US Fish and Wildlife Service
- Matt Rollins – US Geological Survey
- Leslie Sekavic – US Forest Service
- Randall Smith – US Forest Service
- Bill Sommers – George Mason University
- Cathy Stewart – US Forest Service
- Elaine Kennedy Sutherland – US Forest Service
- Tom Swetnam – University of Arizona
- Michael Van Dyck – US Forest Service
- Amy Waltz – The Nature Conservancy
- Craig Wilcox – US Forest Service
- Tom Zimmerman – US Forest Service