

**Title:** A National Climate/Fuels Assessment and Outlook for the 2003 Fire Season

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**Participating Institutions/Hosts:**

National Interagency Coordination Center (NICC) Predictive Services

Climate Assessment for the Southwest (CLIMAS)

Desert Research Institute Program for Climate, Ecosystem, and Fire Applications (CEFA)

University of Arizona Institute for the Study of Planet Earth (ISPE)

**Project Period:** November 2002-June 2003

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**Project Summary:** This project seeks to improve information available to decision makers to set priorities for allocation of firefighting resources at local, regional, and national scales, as well as for multi-agency coordination and determination of preparedness levels, through the development of standards and protocols of seasonal outlooks for each of the 11 Geographic Area Coordination Centers (GACCs). The project provides a means to develop the protocols and process necessary for the incorporation of long-range climate forecasts and pre-fire season fuel assessments into regional wildland fire outlooks. These seasonal outlooks for each GACC will follow a standardized format that can be easily updated *by the GACCs* periodically through their fire season as necessary. The project will bring together GACC personnel, national and regional climate forecasters, regional fuels specialists, regional managers and others for a 4-day workshop, which will result in the creation of integrated climate/fuels/fire outlooks in order to improve information available for decision-making that affects ecosystem health, property and human life. Climate and fuels specialists will present the pre-fire season state of knowledge with regard to on the ground conditions and long-range forecasts. GACC personnel, in consultation with national and regional forecasters, will produce final products of the project. Representatives of each GACC will present these fire season outlooks for review during the final day of the workshop. Editorial, graphic design, and administrative support staff will make the reports available through the Internet and in hardcopy format during the days immediately following workshop.

## **1. Goals, Objectives, Overview**

This project seeks to improve information available to decision makers to set priorities for allocation of firefighting resources at local, regional, and national scales, as well as for multi-agency coordination and determination of preparedness levels, through the development of standards and protocols of seasonal outlooks for each of the 11 Geographic Area Coordination Centers (GACCs). The process outlined in this proposal directly addresses the goals of NICC Predictive Services to provide coordination between the geographic areas, develop capacity within the geographic areas, and improve the capabilities of the geographic areas to incorporate new and long-term information into their decision-making processes.

The project is an outgrowth of a series of highly successful annual fire-climate workshops in Tucson AZ. The workshops have attracted approximately 75 participants each year, including mostly fire managers and climatologists from the Western United States, Alaska, the southeastern United States and Mexico. We specifically propose to emulate and expand upon activities at the 2002 *Fire in the West* workshop, which focused on the creation of fire season climate and fuels outlooks for the Southwest. In addition to hearing research talks and participating in discussion about future research and operational needs, selected participants at *Fire in the West* created (1) a national consensus climate forecast for the fire season (the format of which was based on the recommendations of all participants), and (2) a fire season weather, climate, fuels outlook for the Southwest Coordination Center (SWCC).

Based on our experience with *Fire in the West* and other seasonal forecast workshops (e.g. Gregory et al., 2001), we propose to convene a workshop to bring together national climate forecasters, GACC intelligence and meteorology personnel, NICC Predictive Services personnel and others in order to (1) decide upon a set of standards, procedures and protocols for producing multi-timescale fire danger outlooks and (2) put these standards to immediate use by creating comprehensive weather, climate, fuels seasonal fire danger outlooks for each geographic area.

### **1.1. Why Climate? Why a Multi-Time Scale Approach?**

Climate varies on timescales from months to centuries or more, and on spatial scales from the global to the micro-local. Recent success in producing relatively accurate long-range forecasts is largely based on improved understanding of the connections between persistent ocean-atmosphere interactions (i.e., El Niño-Southern Oscillation, *ENSO*) and global to regional climate changes. In addition, insights gained from research into processes that govern the long-term circulation of the North Pacific Ocean and the interaction between the North American land surface and adjacent oceans, such as the North Atlantic Oscillation, Pacific Decadal Oscillation and the North American Monsoon, are adding skill to long-range forecasts.

Climate forecasts and drought monitoring have continued to improve rapidly, based on the advances in understanding aforementioned parts of the climate system and advances in monitoring long-term conditions, such as the Standardized Precipitation Index (e.g., Schlobohm and Brown, 2001; Guttman, 1998). In addition, research suggests that

knowledge of long-term climate-fire relationships, along with information contained in seasonal climate forecasts, provide useful tools for fuels treatment scheduling, in addition to the actual treatment implementation (Brown and Betancourt, 1999).

Over a decade of research has shown strong links between long-term climate (months to years in advance), fire incidence, and area burned (Swetnam and Betancourt, 1990; 1998; Brenner, 1991; Barnett and Brenner, 1992; Westerling et al., 2001). Many areas contain a characteristic pattern that links fuels to climate -- high fire activity tends to occur when the preceding year (or years) is moist and the concurrent year is dry, as illustrated by climate-fire relationships for the Southwest, Sierra Nevada and Great Basin (e.g., Westerling et al., 2001). These studies show that total seasonal precipitation (and probably relative humidity) changes based on the state of the ocean-atmosphere system. Less, however, is known about the distribution of intra-seasonal precipitation and the occurrence of ignition factors, such as dry lightning. Moreover, climate can have an important effect on large fuel moisture in addition to more easily observed and measured effects, such as seasonal abundance and curing of fine fuels.

## **1.2. National-Level Decision Making and the GACCs**

Fire occurrence is dependent on multi-timescale processes. Therefore, we suggest multi-timescale fire danger outlooks provide a more robust basis for fire management decision-making. Long-range outlooks incorporating information about pre-season fuel conditions, probability of persistent weather patterns and changes in the probabilities of above or below average seasonal total precipitation and temperature provide the basis for national and geographic area directors to preposition resources and anticipate fire season severity. Periodic seasonal outlook updates, monthly and 10-day outlooks all provide an important overview for national and regional managers to make the case for resource allocation. The more shorter-range outlooks back up the seasonal outlook, the greater the confidence in decision making. The NICC utilizes these geographic area products on a regular basis to brief National Directors and support requests for resource positioning and severity funding. Moreover, local users, such as fire behavior analysts, can benefit from these medium-range outlooks. In our opinion, standardization of multi-timescale regional fire danger outlooks will provide all of the players, from the local to the national level, with a solid basis for decision-making, forecast improvement, acceptance by local and regional fire managers, and communication and sharing of expertise between the geographic areas (thus improving the ability of some geographic areas to best utilize their forecasting resources).

The implications of interactions between climate and fire hazard can be framed in terms of dollars, cents, and lives. Rapid population growth and increased development along the outskirts of major cities, has accelerated the trend toward conflation of urban and rural land use patterns and associated increase in fire risk at the urban-wildland interface. With regard to program planning, climate data are useful in determining the number of incidents that will be planned for over the course of a fire season. The effects of climate-related fluctuation of fire regimes on wildlife habitat and endangered species management, highlights the need for climate information in order to successfully implement policies. Simply put, funding appropriated too late in the fire season can result

in catastrophes.

At present, there are inconsistencies among the GACCs with respect to seasonal assessment products. For example, seasonal outlooks are only produced by a portion of the GACCs. Moreover, the components contained within GACC seasonal outlooks vary greatly between the GACCs. Some GACCs produce climate/weather-only outlooks, without regard to fuel conditions. Some GACCs rely upon recent climate conditions and an assessment of climate conditions "on the ground" at the time of writing an outlook, with no regard to climate forecasts produced by NOAA and other climate forecast agencies. Rarely do the GACCs include modeling runs and fire behavior scenarios. In addition, the use of graphics and the balance between graphics and text used in outlooks at all timescales varies greatly between the GACCs. Another aspect that should be addressed are the positions and skills needed to produce these assessments so GACC and regional fire managers will trust and use the products once completed.

We specifically propose to create standard protocols and procedures for creating comprehensive seasonal and monthly weather/climate/fuels outlooks (see *preliminary suggested* protocols in Appendix A). We expect that these protocols will have relevance to shorter-range outlooks, as well. The standardization of seasonal outlooks will allow regional directors and national managers to directly compare conditions between regions the GACCs; thus allowing national and regional managers to assess trade-offs with regard to resource allocation and pre-positioning of resources. By convening the GACCs together for this workshop, we hope to avoid unnecessary duplication of effort ("reinventing the wheel"), while building bridges between regional and national perspectives and between fire management professionals and climatologists. Furthermore, all GACCs will benefit from the combined expertise of the GACCs (based on feedback from fire managers within their region) regarding how to most effectively present the content of wildland fire outlooks regardless of timescale.

Scheduling a single national workshop annually presents issues with respect to timing. No single timeframe will best serve all geographic areas. Our proposal is to convene the meeting in late February or early March, which is prior to the beginning of the fire season for most of the GACCs. We realize a workshop at this time would find some geographic areas in the midst of their fire season. Those areas (e.g. the Southern area) can benefit in the following ways: (1) applying the common standards and protocols to their mid-to-late season outlooks (and 10-day outlooks), and (2) obtaining feedback and information from other geographic areas. The other geographic areas can benefit from the expertise and input provided by regions in the midst of their fire season. We emphasize proactive management and the establishment of a regular schedule of easily updateable outlooks. We would also like to maximize the distribution of information contained in the outlooks and put into action a mechanism for gathering feedback during the course of the fire season. Moreover, we propose to make these outlooks easily accessible in a timely fashion in a variety of formats, including the Internet, paper copies of the individual regional outlooks, and a report containing all of the outlooks.

*Note: In the future, we plan to hold multiple meetings each year, with the goal of*

*combining a post-season assessment activity for some regions with a pre-season forecast activity for other regions. In this way, regions can benefit from post-season lessons learned by regions in their off-season.*

In order to enhance the utility of the seasonal outlooks, we propose to solicit input directly from those who will distribute and use the information (e.g., Deeming, 1992). We propose to contact regional directors and GACC personnel in order to identify the users of seasonal outlooks. We propose to then contact the users and survey them in order to answer the question "What you need/want to see in this document?" By establishing content, protocols and feedback for fire season outlooks that satisfy the needs of users, we will effectively operationalize interaction between climate forecast and geographic area fire management communities, thus building an important bridge in the line of communication between the two communities. Studies from past workshops show the correct interpretation of climate forecasts is often not obvious, and understanding their limitations is crucial to the correct application of this valuable information (Hartmann and Pagano, 2001). Therefore, we propose to put the expertise of the national climate forecasters responsible for creating seasonal forecasts at the service of workshop participants. Based on input from workshop participants about the appropriate format, the national climate forecasters will create a consensus fire season climate forecast for the U.S. With the combined expertise of the climate forecasters, GACC meteorologists and intelligence personnel, as well as the expertise of editorial and design assistants we propose to make the format and information contained in the outlooks simple, to the point, and easy to use.

## **2. Components, Timing, Methods**

The project is divided into four phases. Phase 1 of the project will focus on assembling the steering and advisory committees, and making initial contacts with the participant community regarding timing of the meeting and content of the seasonal outlooks. Phase 2 will involve logistical matters, such as securing a venue and inviting participants. Phase 2 will also involve the development of protocols and procedures for the seasonal outlooks. Phase 3 includes the workshop itself. Phase 4 focuses on distribution of workshop deliverables and follow-up activities. Each phase is discussed below.

### **2.1 Phase 1. Planning (Fall 2002).**

Phase 1 activities include the following:

- assembling the steering and advisory committees and creating a schedule of meetings
- contacting key participants and their supervisors in order to raise consciousness about the workshop, secure their commitment to participate
- contacting GACC Intell personnel and meteorologists in order to determine (a) the makeup of the audience that will use the seasonal outlooks, (b) successful elements from past outlooks and suggestions for improvements, (c) concerns about outlooks and outlook users
- conducting a survey regarding what the users would like to see in the content of the seasonal outlooks
- building bridges between the climate forecast and fire management communities

## **2.2 Phase 2. Logistics and Protocol Development (Fall 2002-Winter 2003).**

Phase 2 activities include the following:

### **a. Logistics**

- preparing a database of participants
- preparing and sending invitations to all participants
- securing a venue
- securing audiovisual equipment, Internet connections, and computers
- arranging travel for invited speakers
- developing an agenda and supplementary materials for the workshop
- coordinating and arranging schedules of editorial and graphic assistants
- creating a press release and planning for a press conference

### **b. Protocols and Procedures**

- development of preliminary protocols and procedures for the seasonal outlooks
- dissemination of preliminary protocols and procedures for comment by GACC Met and Intell personnel
- development of guidelines for workshop process
- development and communication to GACC personnel of a checklist of materials necessary for the development of the seasonal outlooks (e.g., weather maps, climate and fire statistics, fuels assessment information, etc.)

## **2.3 Phase 3. Workshop (Spring 2003).**

Phase 3, the workshop, includes these major components: (1) information transfer and exchange, (2) dialogue and interaction between climate scientists and fire managers, (3) the creation of a national consensus climate forecast for the fire season, (4) dialogue about and finalization of procedures and protocols, (5) GACC work sessions to develop regional seasonal outlooks, (6) presentation of the outlooks, (7) feedback about the process.

### **2.3.1 Suggested Agenda**

The suggested flow of the meeting, depending on feedback from our steering committee, regional managers, and GACC participants, is as follows:

#### **Day 1**

Travel day.

#### **Day 2**

8:00 AM -12:00 PM National climate forecast talks, other relevant research talks and discussion.

1:00 PM-5:00 PM Regional fuels assessment talks and discussion.

5:00 PM-7:00 PM Forecasters-Only Session to Create Consensus Forecast

#### **Day 3**

8:00 AM-10:00 AM Regional fire season outlook procedures and protocols.

10:00 AM-5:00 PM GACC outlook work and report writing sessions.

#### **Day 4**

8:00 AM-5:00 PM GACC outlook work and report writing sessions.

## **Day 5**

8:00 AM-11:30 AM GACC outlook report presentations.

11:30 AM-1:00 PM Working lunch: discussion and feedback about results and process.

For the forecast and fuels talks on Day 2, we intend to create an atmosphere that allows for a highly interactive exchange of information and views on the use of climate and fuels information in planning and management of forest fire hazards. Presentations will be relatively brief, in order to maximize opportunities for questions, discussion and comment. Speakers will be instructed to prepare their talks for an audience in which it is assumed that participants are not expert in the fields of climate forecast and fuels assessment. The consensus climate forecast activity will be modeled on the successful consensus forecast session convened at the *Fire in the West* meeting in Tucson AZ, March, 2002.

On Day 3, following a discussion of the protocols and procedures developed by the steering committee (in consultation with pre-workshop input from participants and the advisory committee), each GACC will break out into its own small session in order to develop its individual seasonal outlook on a laptop computer. Each GACC will have brought with them the great majority of the materials necessary to assemble the report; access to the Internet will allow them to secure additional images and statistics. Steering committee members and climate forecasters will be available for consultation and guidance, upon the request of the individual GACCs. Based on our experience with *Fire in the West*, (during which Intell and meteorology personnel from the SW Coordination Center produced a seasonal outlook in conjunction with steering committee members Tim Brown and Tom Wordell), we anticipate that this activity will require about one and one half days' worth of effort (i.e., Days 3-4). Participants will devote part of their time to scenario building, based on climate and fuels (including information from the talks on Day 1), as well as other relevant factors; the other part of their time will be devoted to report writing.

On Day 5, individual GACCs will present their seasonal outlooks to the workshop participants at large. Again, we will create an atmosphere conducive to information exchange, collegial discussion, and constructive comment. During the late morning, we will convene the entire group for a working lunch, in order to gather feedback about the process and recommendations to improve anticipated monthly outlook updates and future workshops. The outlook reports will be prepared for immediate distribution to land management administrative units, and they will be made available via the GACC web sites and mirrored at the CEFA/DRI web site.

### **2.4 Phase 4. Follow-up (Spring 2003).**

Phase 4 activities include the following:

- timely delivery of the products from the workshop to participants, interested parties, and the press
- editing the individual outlooks and proceedings volume
- preparation of products for distribution on the Internet
- follow-up contact with participants regarding their satisfaction with process and

their recommendations for future workshops

### **3. Products**

The proposed project will produce an array of products, including a report on the seasonal fire danger outlook needs assessment, a report on the protocols, procedures and content for the seasonal outlooks, a final report on the seasonal outlooks and the workshop, a national consensus climate forecast (distributed on the Internet and in a publication such as the NOAA Experimental Long-Lead Forecast Bulletin), individual geographic area seasonal fire danger outlooks (distributed on the Internet and in paper copies). The projects products will be available on the CEFA web site and will be linked to an array of related sites such as NICC Predictive Services, CLIMAS, and others.

### **4. Benefits to Recipients/Participants**

The proposed project will provide important benefits to both the fire management and climate research communities. It will break ground for the establishment of a system for Geographic Area Coordination Centers to create regular, comprehensive, standardized fire season outlooks for improved and proactive fire management. Content, procedures and protocols developed by the steering committee in concert with outlook users will provide important baseline for the creation of monthly outlooks and future seasonal outlooks. Coordination between the climate forecast and fire management communities will build bridges between the communities and allow for an operational exchange of information between regional and national entities. This coordination will also help to enhance the capacity of the GACCs to produce their own seasonal outlooks. We believe that standardized, comprehensive seasonal outlooks will provide one of the critical products commonly requested and utilized to support decision makers, especially at the geographic and national levels.

The climate forecast community will benefit from the synergy involved in creating a consensus climate forecast. The climate forecast community will benefit substantially from face-to-face contact with fire management professionals, as it will directly help them to improve their understanding of the needs of the fire management community and to improve the format and content of climate and weather forecast products for the fire management community.

National and regional fire managers and regional directors will benefit from the timely dissemination of comprehensive weather, climate, fuels seasonal fire danger outlooks, as it will enhance their ability to make wise decisions about the allocation of resources for the upcoming fire season.

### **6. Suggested Coordinators and Advisers**

Role of the Steering Committee. The Steering Committee (SC) is responsible for “making the meeting happen.” SC members, in conjunction with the Advisory Committee, create the overall vision for the meeting, create and administer the budget, garner feedback from the Advisory Committee and others, assemble essential materials and personnel for conducting the meeting and producing deliverables, create an agenda and structure for the meeting, oversee the logistics of the meeting.

***Suggested Steering Committee (7):***

NICC Predictive Services (1)  
Program for Climate, Ecosystem and Fire Applications (CEFA)/DRI (1)  
Climate Assessment for the Southwest (CLIMAS)/University of Arizona (1)  
Geographic Area Coordination Center Meteorologists (1)  
Geographic Area Coordination Center Intelligence (1)  
NIFC Fire Director (1)  
NWCG (1)  
Center Managers (1)

Role of the Advisory Committee. The Advisory Committee (AC) is responsible for providing the SC with guidance and oversight, especially with regard to meeting content and deliverables. In other words, the AC makes certain that all participating organizations have a voice in the outcomes, and that “all bases are covered.”

***Suggested Advisory Committee:***

Regional Directors  
Center Managers  
Intell Predictive Services  
MAC Groups  
National Wildfire Coordination Group  
Joint Fire Sciences Program  
Regional Integrated Sciences Assessments  
NOAA Climate Prediction Center  
Potential Users of Fire Season Outlooks from Land Management Agencies (BIA, BLM, FWS, NPS, USFS)

**7. References**

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## APPENDIX A

### Suggested Seasonal Outlook Report Protocols

(Critical section headings are highlighted)

- **Executive Summary**
  - A specific forecast statement (i.e., “the bottom line”) should be explicitly included in the executive summary and final summary and recommendations.
  - Include a statement about your confidence in the forecast. Mention why you do or do not have confidence, based on your assessment of the various tools used in your forecast.
- **Introduction and Objectives**
- **Current Situation (leading up to time report is written)**
  - Snow
  - Water year precipitation
  - Recent temperature
  - Weather and atmospheric circulation
  - Soil moisture
  - Snotel
  - Drought indices and maps (PDSI, SPI, KBDI, etc.)
  - Vegetation status (NDVI, Experimental greenness)
  - Fuel moisture
- **Comparison of Current and Historical Conditions**
  - Precipitation anomalies (recent week, month, water year)
  - ENSO and other climate indices of relevance
  - Drought indices and maps
  - Fire activity
  - Live and dead fuel moistures
  - Fire behavior
  - Fire danger
  - Departure from average greenness
  - NDFRS indices
  - Farsite run comparisons
  - Fire Family Plus (ERC, Index values, etc.)
- **Climate, Weather, Fire Forecasts/Outlooks**
  - Long-range climate outlooks (NOAA-CPC, IRI, Scripps)
  - Projected atmospheric circulation
  - ENSO and other relevant index forecasts
  - Drought forecasts (including NCDC drought amelioration)
  - Soil moisture forecasts
  - Fire weather index
  - Statistical fire start/acreage burned
- **Predicted Fire Occurrence and Resource Needs**
  - Estimates on number of fires by size and duration
  - Estimates of expected resource needs
- **Future Scenarios and Probabilities**

- Fire Family Plus
- Priority sub-regions within Geographic Area
- Fuel-type considerations
- Climate considerations
- Season Ending Event Probabilities
- **Considerations, Concerns and Management Implications**
- **Summary and Recommendations**

#### **Seasonal Wildland Fire Format Suggestions**

- Text: Text should be in short, easy to understand, concise statements that refer to and elucidate the accompanying graphics. Remarks need to be “to the point.” A specific forecast statement (i.e., “the bottom line”) should be explicitly included in the executive summary and final summary and recommendations. Accompanying summary tables have been used by many GACCs.
- Length: 10-15 pages (total including graphics). Text will be 3-5 pages.
- Graphics: Include all graphics necessary to bolster your forecast, but not so many that the user will be confused or turned off. Additional materials can be folded into an appendix.