National Seasonal Assessment Workshop

Eastern and Southern States

Final Report
January 27–29, 2004
Shepherdstown, WV

Gregg Garfin,
Tim Brown,
Rich Ochoa, and
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The workshop was developed and hosted by the following institutions and individuals (in alphabetical order):

- Tim Brown, Program for Climate, Ecosystem and Fire Applications, Desert Research Institute
- Gregg Garfin, Climate Assessment for the Southwest, University of Arizona
- Heath Hockenberry, National Interagency Coordination Center
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Foreword

Lately I've encountered many buzzwords and phrases with regard to people getting together and using science, observations, and common sense in an attempt to look into the future and plan for it. I will shamelessly toss around a few of these words and phrases, such as "usable science," "stakeholder-researcher partnerships," "transition of research-to-operations," "science application partnerships," "technology transfer," and "science delivery and application," in the hope that, like seeds scattered in the wind, the ideas behind these soon-to-be clichés will take root and blossom, and the world (in this case the wildfire management world) will be a better place.

The National Seasonal Assessment Workshops, which were initiated in February 2003, offer a rather unique "tool" for science delivery and application, i.e., a process for researchers, operational forecasters, and fire management specialists to come together, exchange knowledge and ideas, and create information useful to fire managers and those in charge of fire management resource allocation. In this regard, the 2004 NSAW: Eastern and Southern States meeting shows that this tool for science delivery and application, like an algorithm or web-based decision-support system, can (and must) be tweaked, refined, and altered, in order to yield improved results.

In response to stakeholder needs, the workshop was designed to address the specific hydroclimatic and fire management conditions of the eastern half of the United States. These conditions, which noticeably differ from those in the western United States, include at least the following: the spring and fall bi-modal seasonality of the fire season; the importance of prescribed fire as a measure to mitigate human ignition factors in the densely populated eastern United States; the influence of atmospheric circulation patterns in addition to the well-known El Niño-Southern Oscillation—Pacific North America pattern, Arctic Oscillation, North Atlantic Oscillation, and others; the importance and persistence of tree blowdown and ice, frost, and insect damage in elevating fire danger; the rapid response of fuels to short-term dry, high-pressure weather episodes; the perennial high fuel load in Florida—exacerbated by exotic species; the fact that there is no fuel model that can account for the mix of fuels in industry-managed forests; and the importance of state forest and fire management agencies and expertise.

This year's eastern and southern United States climate forecasts and fire potential outlooks were particularly difficult, due to the lack of strong climatic indicators. The workshop participants rose to the occasion and, with lively discussion and exchange of analyses and information, created the best possible pre-season outlooks. Moreover, the participants identified key science research questions necessary to address the challenges posed by years when strong climatic indicators are not what the forecasters see when peering into their crystal balls. The enthusiasm of the participants for future workshops, and to improve the products of the workshop, was palpable, and showed me that the process is working.

I would like to extend my sincere thanks to my co-organizers, Heath Hockenberry, Tim Brown, Rick Ochoa, and Tom Wordell, and to all of the participants in the 2004 NSAW: Eastern and Southern States meeting.

Gregg Garfin
January 30, 2004

Acknowledgments

The National Seasonal Assessment Workshop: Eastern and Southern States meeting would not have been possible without the cooperation and hard work of many people and the commitment of several agencies and institutions. Special thanks go to the following individuals for providing valuable input and assistance.

We apologize if we have left anyone's name off of the list.

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Table of Contents

Executive Summary

The 2004 National Seasonal Assessment Workshop (NSAW): Eastern and Southern States meeting was an important step in a long-term process to develop tools for proactive fire management. During the week of January 27–29, 2004, the workshop brought together climatologists, predictive service units, and fire managers from across the eastern half of the country to produce seasonal fire outlook reports. The objective of the meeting was to improve information available to fire management decision makers, by incorporating the best science available and by fostering collaboration between fire and climate experts from state and federal agencies, universities, and the private sector. The meeting was structured to foster communication between climate forecasters, regional climate experts, Geographic Area Coordination Center specialists, and state and federal fire and fuels specialists.

The Eastern and Southern States meeting was jointly organized by individuals from the National Interagency Coordination Center (NICC) Predictive Services, Climate Assessment for the Southwest project (University of Arizona), and Program for Climate Ecosystem, and Fire Applications (CEFA) at the Desert Research Institute. The meeting addressed long-range forecast and fire management concerns distinctive to the eastern and southern United States, such as a bimodal (spring and fall) fire season, the propensity for short-term, multi-day, drying episodes to promote high fire danger, the effect of snow in the northern half of the region and the strong connection with El Niño-Southern Oscillation in the southern half of the region. Such concerns are frequently overshadowed by a national emphasis on federal lands fire management in the western United States and Alaska.

Workshop deliverables included a third annual consensus climate forecast for the 2004 fire season, produced under the guidance of CEFA. Climate experts from six agencies merged climate predictions into this consensus forecast. This climate decision-support tool, along with regional fire and fuels assessments prepared in advance of the workshop, provided the foundation for the seasonal fire danger outlooks. Pre-season fire potential outlooks for the eastern and southern geographic areas were produced through exchange of information between experts from across the two geographic areas, in an atmosphere of collegial dialogue and collaboration. The workshop offered a unique opportunity for cooperation among participants with varied expertise to share fire danger and climate forecast perspectives, fuels and weather data, and other information. Workshop participants showed strong support and enthusiasm for this type of synergy; arrangements for future interagency cooperation were an important outcome of the workshop.

In brief, the consensus climate forecasts for February-through July 2004 suggest

- Increased probabilities of below-average precipitation for portions of the Southeast during February–April and May–July.
- Increased probabilities of above-average precipitation for the mid-Ohio valley area during February–April.
- Increased probabilities of above-average precipitation in the upper-Midwest and Great Lakes areas during May–July.
- Increased probabilities of below-average temperature for portions of the Southeast during February–April.
- Increased probabilities of above-average temperature for the upper-Midwest in February–April and all of the Southeast and portions of the Northeast during May–July.

In brief, the fire potential (i.e., fire activity that may impact firefighting resources) outlooks suggest the following:

- Most of eastern and southern geographic areas are to have a near- to below-average fire potential.
- Fire potential is expected to be below average during February–April in an area stretching from the upper Ohio River Valley, across the mid-Atlantic states (as well as Kentucky, northwestern Virginia, eastern Tennessee and western North Carolina), to southwestern New England (see Figure 2, page 6).

- The area with the greatest potential for increased fire danger is portions of west Texas and Oklahoma.

- A slightly elevated fire potential in grass-dominated vegetation types that characterize portions of Minnesota and Wisconsin during February–April, if abnormally dry conditions continue.

- Increased fuel loading in the Northeastern Coastal Plain and North Central Piedmont of North Carolina is of some concern.

- There may be increased opportunities for prescribed fire, especially in the northern and western portions of the Eastern Area.

Among the key recommendations from workshop participants were the following:

1) Validation and verification of the pre-season outlooks produced at the workshop.

2) Examination of synoptic weather patterns associated with multi-day high fire danger episodes in the eastern United States.

3) Development of snow departure from average data for the northeastern United States.

4) Creation of an electronic fire occurrence and acreage database for research and management.

5) Development of an agreed upon and exact definition of fire potential for use in pre-season outlooks.

In summary, the unique climatology, intermix of public and private lands, and extensive wildland urban interface in the eastern and southern United States require fresh approaches to evaluating pre-season long-range fire potential. Pre-season fire danger and consensus climate outlooks for the 2004 fire season in the eastern and southern United States were produced by collaboration between state and federal fire behavior and weather analysts, as well as national climate forecasters and regional climate experts.

Moreover, the workshop generated enthusiasm and cooperation between participants, learning and sharing of expertise, and agreements to again work together, across agencies and disciplines, to produce outlooks for 2005. The workshop improved the process and mechanism for NICC Predictive Services to meet its goals of integrating climate, weather, situation, resource status, and fuels information into products that will enhance the ability of wildland fire managers to make proactive short- and long-range decisions for strategy development and resource allocation, and to improve efficiency and firefighter safety.

Introduction

The 2004 National Seasonal Assessment Workshop (NSAW): Eastern and Southern States meeting marks a turning point in a multi-year process to improve information available to fire management for proactive strategies. The meeting follows a series of highly successful conferences and workshops with a western U.S. focus, driven chiefly by the concerns associated with the highly visible and costly wildfires plaguing the West (Morehouse, 2000; Garfin and Morehouse, 2001; Garfin et al., 2003). The conditions underlying the severe fire seasons of 2000 and 2002 (as well as the catastrophic California fires of 2003), for example, were driven in part by persistent climate phenomena such as La Niña and drought. The aforementioned meetings brought together climate forecasters with federal lands fire managers, fire behavior analysts, fire meteorologists, and others. In 2003, the first NSAW brought these participants together in a structured forecast exercise, in order to create pre-season fire-climate outlooks for the 11 geographic areas administered by the National Interagency Coordination Center (Garfin et al., 2003).

The needs of eastern and southern United States fire management and fire weather professionals are unique, as is the timing of the fire season in these regions. Much of the country east of the Rockies has a bimodal fire season (spring and fall) that is shaped by factors such as the timing and frequency of rain events, and the quick response of fuels to short-term dry weather and low humidity. In contrast to the more protracted fire seasons in the West, fire seasons in the East and South are often marked by more infrequent and shorter duration episodes of elevated fire activity due to transient high pressure weather systems. By convening a workshop dedicated to the eastern and southern areas, with prominent representation from state forestry officials, the discussion and ultimate outcome was focused on the challenges of forecasting fire seasons in these regions.

The meeting brought together individuals from the eastern and southern United States, whose frame of reference, fundamental climate and fire seasons, and interagency alliances differ markedly from the West. With regard to the latter, it was most notable that this year's meeting brought together a different combination of fire and climate specialists. The mix of public lands in the eastern half of the country (and in contrast to the western half of the country) includes substantial state forests, in addition to national forests and parks; thus substantial numbers of fire management and fire weather forecasting participants in the meeting represented state land agencies. A notable addition to the expertise at this year's meeting were climatologists from some of the NOAA Regional Climate Centers, whose intimacy with the nuances of subregional climate variations added richness to the outlooks and interpretations of possible outcomes for the 2004 fire season. This year, one private forest management concern was represented (Georgia Forestry Commission), bringing yet another perspective and another agency of considerable importance to fire management in the southeastern United States.

Goals and Objectives Meeting

The Eastern and Southern States meeting represents an example of "bridging the worlds of fire managers and applied fire researchers" (White, 2003). The organizers of the NSAW workshops, in addition to their capacities as researchers and managers of weather, climate, and fire-related research projects, serve as "bridge builders" in the process. Thus, the process includes characteristics such as direct interaction between partners, adequate time for partnership building, and long-term commitment of people at multiple levels, in order to create effective information, tools and processes for improved fire management. The NSAW workshops (Garfin et al., 2003) are designed to help improve information available to fire managers, and address priorities for future research (such as, those identified in the Joint Fire Science Program's 2003 workshops), including prediction of large fire behavior and occurrence, determination of existing fuel conditions, interaction between fire hazard in climate, and the development of effective partnerships for enhancing utility of scientific information for management application.

The fundamental objective of the NSAW workshops is to improve information available to fire management decision makers. In particular, these workshops aim to use climate history and climate forecasts, along with

sub-regional estimates of fuel conditions, 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 (GACC).

The meeting was structured to bring together national climate forecasters, regional climatologists, NICC and GACC Predictive Services meteorologists, regional fuels and fire analysts, intelligence personnel, and state forestry experts in order to:

- Revise the standards, procedures and protocols used in 2003 for producing multi-timescale fire danger outlooks (Appendix A).

- Create comprehensive seasonal fire danger outlooks, that incorporate information about climate and fuels conditions, for the vast and varied eastern and southern geographic areas.

The workshop was structured to minimize the time participants spent passively listening to research presentations and maximize the time spent working on outlook reports; interacting with each other and exchanging data, analyses, and perspectives; and reporting progress, getting clarification, and providing feedback to the meeting organizers, climate forecasters, and other geographic area personnel (see Appendix B for meeting agenda). The key objectives for the workshop were

- To foster communication between climate forecasters and fire management professionals.

- To foster communication and cooperation between federal and state fire management professionals.

- To improve national fire danger outlook "edge-matching" in adjacent regions, through sharing information about regional fuels and climate/weather patterns.

- To provide opportunities for climate forecasters to interact personally with fire management professionals in an environment that encourages mutual respect and transfer of knowledge.

- To create a mechanism for future interagency cooperation and enhanced information flow, by providing an environment conducive to dialogue and discussion.

- To gather feedback from workshop participants, in order to improve the outlooks and to improve the process used to generate the outlooks.

Communication and Cooperation

As with the 2003 NSAW, one of the highlights of the workshop was a high degree of coordination, communication, and cooperation within and between participants in the geographic area workgroups. The workshop provided an opportunity for fuels, fire behavior, and fire weather specialists (often dispersed throughout large multi-state geographic areas) to meet face-to-face and through conference call-in sessions, in order to discuss on the ground and forecast conditions throughout the broader geographic area.

The flow of information between geographic areas was impressive. Participants noted the synergy and improvements in analysis fostered by lively multi-region discussion, exchange of perspectives, and contrasts in style of analysis; in short, the whole created by this collective knowledge and expertise was far greater than the sum of the parts. Discussion of contrasts in fire season characteristics, fuels, and climate conditions, lead to an enhanced appreciation of the commonalities and regional differences necessary for effective fire preparedness and management. Moreover, a commitment by the NOAA Climate Prediction Center to multi-day participation in the workshop, based on a request from 2003 NSAW participants, provided abundant opportunities for the geographic area work groups to tap into a wealth of expertise in the area of seasonal climate forecasting.

Workshop Products

Wildland Fire Outlook: Eastern Area

Potential: Below-normal to normal; Possibility of above-normal in parts of western Great Lakes.

The Eastern Area outlook only addresses expected conditions for February through April of 2004. The western Great Lakes and northwestern Big Rivers Compacts (see Figure 1) received below-normal precipitation amounts through the latter half of 2003. Negative precipitation anomalies have been alleviated somewhat over the northeastern third of Minnesota and far northwest Wisconsin due to relatively significant snowfall and estimated water equivalent amounts in place at the end of January. The El Niño-Southern Oscillation (ENSO) through the winter of 2003–04 was in a neutral state, or in between El Niño and La Niña episodes, and will likely remain in a neutral state through the spring of 2004. Historically, neutral ENSO climatic impacts during this outlook period are uncertain across the Eastern Area. However, negative precipitation anomalies and levels of drought remained over the rest of Minnesota, western Wisconsin, Iowa, and northwest Missouri. If these areas do not see the expected slow improvement as projected in the consensus climate forecast and seasonal drought outlook, they may experience the potential for multi-fire or large fire episodes during spring 2004.

The eastern Big Rivers, Mid-Atlantic, and Northeastern Compacts received above-normal precipitation during 2003 and early 2004. This trend is expected to continue at least into the early spring months and should sustain below-normal fire potential to persist over much of these areas with no prolonged periods of fire activity expected (Figure 2).

The spring fire season is driven by fine dead fuels and the influence of relatively short-term weather patterns/episodes. Developing a seasonal fire activity outlook based on this fuel component is difficult when referencing climate forecasts/projections. These climate forecasts indicate that these reestablished normal trends are likely to continue. If this materializes, it is likely that the Mid-Atlantic and the Northeast have a strong probability of experiencing normal fire activity for the spring.

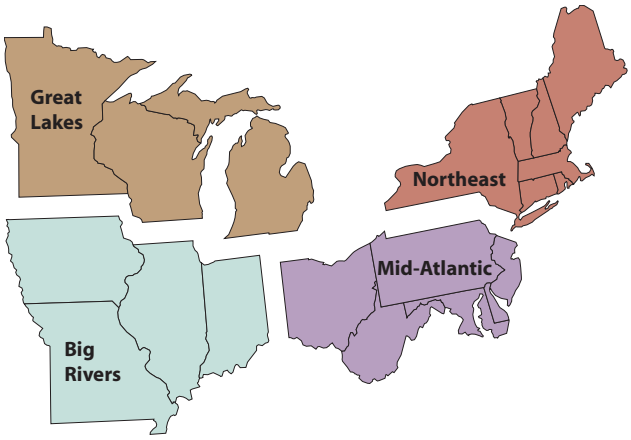

Figure 1. The four fire management compacts comprising the Eastern Area.

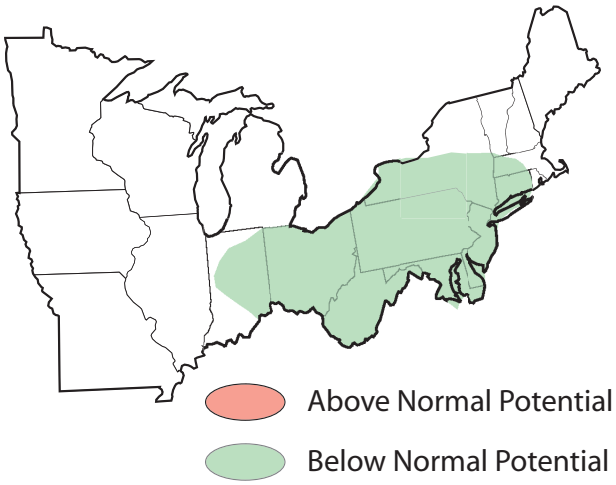

Figure 2. Expected fire potential for February–April, 2004. This outlook incorporates the condition of fuels across the Eastern Area based on the latest precipitation and soil moisture anomalies, drought and snow depth data, and the consensus climate outlook.

Discounting the potential for major fires during the spring would be a serious mistake. Fire frequency peaks during the spring, due to the abundance of fine dead fuels and the absence of live green fuels. These fuels are readily available and respond to short-term variations in weather that cannot be reliably inferred from the national situation and consensus forecast products included. Vegetation types that are grass dominated or that grow on thin or sandy soils respond to even short duration drying and are prone to burn aggressively in otherwise normal periods. Though this area of concern

represents less than 10 percent of the total acreage in the Eastern Area, located largely on Cape Cod, Long Island, the New Jersey Pine Barrens, the Del-Mar-Va peninsula, and the northern Great Lakes, they are interspersed with widespread interface communities.

Two well-known examples are the Mack Lake Fire of 1980 and the Stephan Bridge Fire of 1990, both in the Jack Pine plains of northern Michigan near Mio (Figure 3). While both seasons were relatively unspectacular overall, these two events devastated communities in their paths. The Mack Lake fire burned more than 20,000 acres and killed one firefighter on May 5th, 1980. It occurred only four drying days after 0.61" of rain on April 29–30 and normal rainfall during the month of April. The Stephan Bridge Fire burned 5,916 acres and destroyed 44 homes on May 7, 1990.

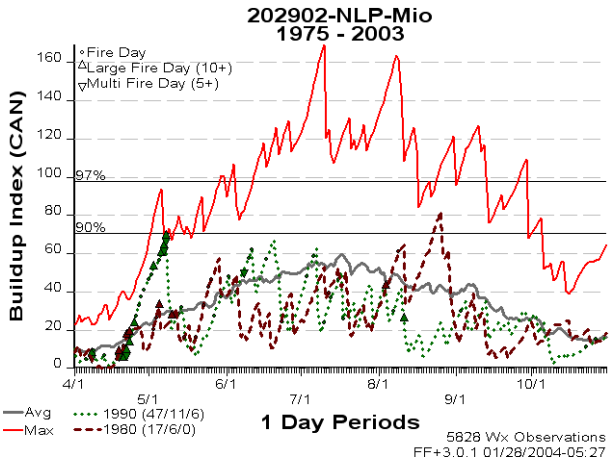

Figure 3. The overall character of the fire seasons and the short duration events that led to the 1980 Mack Lake and 1990 Stephan Bridge fires. The Canadian buildup index (BUI) is a measure of fire danger. The red solid line shows the maximum recorded BUI and the gray solid line shows the 1975-2003 average BUI. The green dotted line shows the 1990 BUI (Stephan Bridge), and the brown dashed line shows the 1980 BUI (Mack Lake). Upward-pointing triangles indicate large fire days and downward-pointing triangles indicate days with multiple fires.

State Compact Outlooks

Great Lakes Outlook

Lingering precipitation deficits and their effect on large fuels and organic soils do exist in Minnesota and western Wisconsin. While the seasonal variables ERC and BUI fell to typical minimums by the end of the 2003 season, Drought Code and Keetch-Byram Drought Index values remain elevated. This condition may contribute to increased fire behavior and mop-up difficulty where fires occur in those areas. With no expectation that late winter precipitation will deviate from climatological norms, even those dry areas are expected to experience some improvement. Based on this, prolonged periods of above-normal fire activity are not expected over much of the Great Lakes.

Mid-Atlantic, eastern Big Rivers, Northeast Compacts

Based upon the most recent weather and climate data available, the early spring fire season forecast is for below-normal activity. Prolonged periods of fire activity are not expected through the spring fire season. It is difficult to assess fuel conditions at this early date, but the spring fire season in these areas are driven by fine, dead fuels and the factors that influence them. Related to fire activity, these fuels are responsive to short-term weather variations versus seasonal trends.

Following a drought pattern that existed during the previous five years, normal precipitation and temperature patterns returned to the Northeast and the Mid-Atlantic regions in spring 2003. Through the course of the summer and fall of 2003, precipitation amounts mitigated the precipitation deficits that resulted from the drought period. Climate indicators and forecast models indicate that this portion of the area is no longer categorized in drought conditions. Into the winter, normal precipitation patterns and snowfall amounts continue to exhibit normal trends. However, it is important to acknowledge that several days to a week of moderate to high fire danger can create fuel conditions that may produce an episode of fires or a major fire, particularly in areas of sandy soils.

Resource Outlooks

Historically the Eastern Area does not import large amounts of resources. However, based upon current information, the spring 2004 fire season across portions of the western Great Lakes and northwestern Big Rivers could potentially be robust if adequate precipitation amounts/events do not occur in certain areas. Despite the late January storm that created new snowfall amounts across northern and eastern parts of the Eastern Area, some of the areas in precipitation deficits before this precipitation event remain so, especially over southern Minnesota and northern Iowa. If these below-normal snow depths/snow amounts do not ameliorate through the remainder of the winter months, grasses will remain standing. These fine fuels will then be readily available after snow melt and may create a high need for resources if any periods of high fire danger occur before green-up results in ignitions.

Fires in the peat soil areas may also be very problematic if spring-time rainfall events/amounts are minimal.

Without strong indications for above or below-normal wildfire potential, there may be increased opportunities for prescribed fire, especially in the northern and western portions of the Eastern Area. Conditions throughout the area could also allow for sharing of resources with the rest of the country.

Wildland Fire Outlook: Southern Area

Potential: Below-normal to normal; Above-normal in parts of Texas.

No significant long-term trends for wide spread dry conditions are evident. Chances remain for short-term episodes of elevated fire danger, typical of normal fire seasons. Texas is the primary area of concern in the southern region based on current conditions and a modest potential for above-normal temperatures and slightly below-normal rainfall. However, no significant long-term resource needs expected for the duration of the assessment period. Our confidence in this assessment is moderate to high.

Long-Range Climate and Weather Forecast, with Implications for Fire Activity

Current conditions in the equatorial Pacific are reflecting the neutral phase of ENSO (neither El Niño nor La Niña) and these conditions are expected to continue throughout the assessment period. Weather conditions in parts of the southeast are strongly tied to ENSO; however, the neutral phase does not provide strong guidance for either above or below-normal conditions.

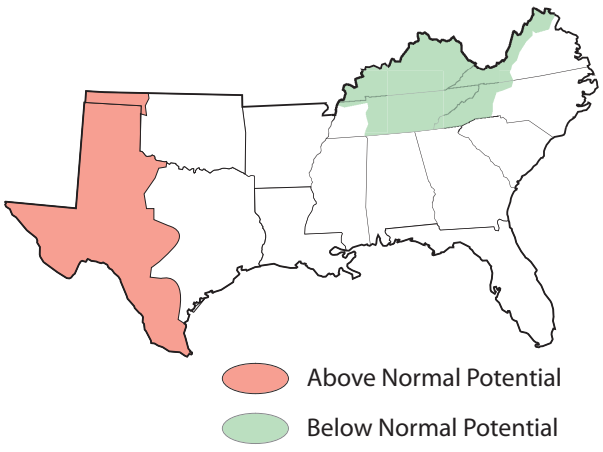

Figure 4. February–July 2004 fire potential for the Southern Area.

Similar ENSO conditions (weakly warm sea surface temperature anomalies) existed last year when much of the region experienced record low fire activity. Current conditions across the region are slightly drier than at this time last year, particularly in Texas. Without a strong signal indicating above-normal precipitation, no strong recovery is expected. However, there is also no dominant signal for an abnormally dry period, so drought conditions are not expected to get significantly worse.

In the absence of a strong ENSO signal, weaker climate patterns begin to play a dominant role in southeastern climate, particularly the Pacific North American pattern (PNA). The PNA establishes a pressure dipole between the Pacific Northwest and the Southeast with a positive PNA indicating lower than normal pressures in the Southeast while the negative phase leads to higher pressure. For fire weather purposes, the negative PNA phase is the primary concern as the enhanced high pressure over the region limits rainfall and enhances deep layer atmospheric drying, which is a potential mechanism for some isolated fire episodes. The PNA is not currently predictable at a seasonal time scale as it varies over a period of weeks.

Texas and western Oklahoma are the primary areas of concern (Figure 4). These areas are currently drier than the rest of the southern region with no significant indicator pointing towards a significant wet period to provide substantial relief. An increased probability of above-normal temperatures in the May–July period may lead to enhanced drying during this period and elevated fire risk.

Fire Occurrence and Resource Outlooks

Calendar year (CY) 2003 ended with the Southern Area having only 41 percent normal fire occurrence and only 36 percent of normal total acres. This was due to the Southern Area having a mild spring fire season and very low fall wildfire activity. January 2004 fire occurrence and acres burned as of this date (01/28/2004) have been close to normal. Based on the current climatology, we expect that the fire activity for calendar year 2004 will increase somewhat over 2003, but that this increase will be minimal. The only possible exception to this would be the western half of Texas. At this time, the current drought in west Texas is not

likely to be mitigated prior to the spring fire season, which has the potential to require resources from out of the local area to handle the fire load.

Fuels management has always been a primary concern in the southeastern states. The outlook for CY 2004 is very positive. This would include across the board fuels management activities, such as mechanical, prescribed fire, and chemical. Current research indicates that chemical fuels management requires a period of between 12 and 16 months after the application for the fuels to degrade, so that a wildland fire will not be a problem. The opportunity to use chemical fuels management should allow a sufficient amount of time to apply herbicides and this would mean minimal, if any, additional resource needs.

Management Implications and Concerns

Management implications for the area are anticipated to be routine or business as usual. Exceptions have been noted for west Texas and North Carolina. North Carolina is mentioned due to the increased fuel loading that has occurred in the state's Northeastern Coastal Plain counties (Hurricane Isabel) and the North Central Piedmont counties (January 2004 winter ice storm damage). These areas, subject to the anticipated spring weather pattern, can generate above-normal fire intensities with mop-up requirements that will tax local fire suppression resources.

With near-normal conditions across much of the region and no significant trends toward widespread dryness, fire risks will remain near-normal across the region with a modest probability of elevated fire risk in Texas. No additional resources are anticipated.

The complete pre-season fire danger outlooks for the eastern and southern geographic areas can be found on the NICC Predictive Services website (http://www.nifc.gov/news/pred_services/Main_page.htm [click on one of the geographic areas on the map]). For the Eastern Area, this report should be considered as a preliminary assessment of potential fire danger, as the region is subject to significant intraseasonal variability in weather patterns, as well as the possibility of changes in fuels conditions due to late winter/early spring precipitation. Seasonal fire danger outlooks will be updated throughout the course of the fire season for each of the geographic areas. The aforementioned website should be checked periodically for updates.

Eastern and Southern U.S. Consensus Climate Forecast

Seasonal forecasts of two-category probabilistic temperature and precipitation anomalies were produced for the eastern and southern United States as significant input into creating wildland fire seasonal outlooks for the areas. Forecast consensus was reached by combining several monthly and seasonal forecasts produced at the International Research Institute for Climate Prediction (IRI), the Scripps Institution of Oceanography Experimental Climate Prediction Center (ECPC), the NOAA/NCEP/NWS Climate Prediction Center (CPC), and the NOAA/CIRES Climate Diagnostics Center (CDC). Forecaster judgment was also incorporated from the Florida State University Center for Ocean-Atmospheric Prediction Studies (COAPS) and Predictive Services at the Southern Area Coordination Center. The primary purpose of the consensus forecast was three-fold; to produce seasonal climate forecasts for use in developing an eastern and southern United States seasonal wildfire outlook; to determine whether or not additional probabilistic information could be provided for areas where individual forecasts showed little confidence; and to directly integrate climate forecast information into specific geographic area decision making.

The forecast periods were February–April and May-July 2004. A combination of dynamical and statistical models from the respective organizations, and forecaster judgment were incorporated in producing the forecasts. Specifically, the CPC contribution was based on a dynamical model, a statistical model, long-term trend, and forecaster judgment that comprise the official CPC long-lead outlooks. The IRI contribution was based on combining the results of several dynamical climate forecast models and SST predictions. The ECPC contribution included current monthly forecasts from global and regional forecast models. The CDC contribution included numerous numerical model and statistical experimental seasonal forecasts. The COAPS contribution was based largely upon ENSO forecast judgment. The Predictive Services contribution was largely statistical and forecaster judgment.

The forecasts were produced via teleconferencing prior to the workshop, with some adjustments made based on comments offered during the workshop. The discussions were characterized by collegiality between participants, and enhanced communication between forecasters from the major national climate forecast entities

in the United States. Forecast discussion lead to determining regions of warm/cool and dry/wet, and assigning a consensus probability. Since the forecasts were comprised of only two categories, the probabilities simply represent the chance of above or below average. Given the current state of the art for climate prediction, probabilities of 65 percent and larger relate to fairly high confidence, whereas 55 percent represents only a slight hedge.

Figure 5 shows the 2004 eastern and southern U.S. seasonal consensus forecasts for temperature and precipitation for the periods February–April and May–July. The highlights of these forecasts include: increased probabilities of below-average precipitation for portions of the Southeast during February–April and May–July, above-average precipitation for the mid-Ohio valley area during February–April, and above-average precipitation in the upper-Midwest and Great Lakes areas during May–July. During February–April, increased probabilities of below-average temperature are indicated for portions of the Southeast and increased probabilities of above-normal temperature are indicated for the upper-Midwest. In May–July, all of the Southeast and portions of the Northeast have increased probabilities of above-normal temperature. The seasonal outlook of wildfire potential, which was developed in part from these figures, is available at the NICC web site: http://www.nifc.gov/news/intell_predserv_forms/season_outlook.html.

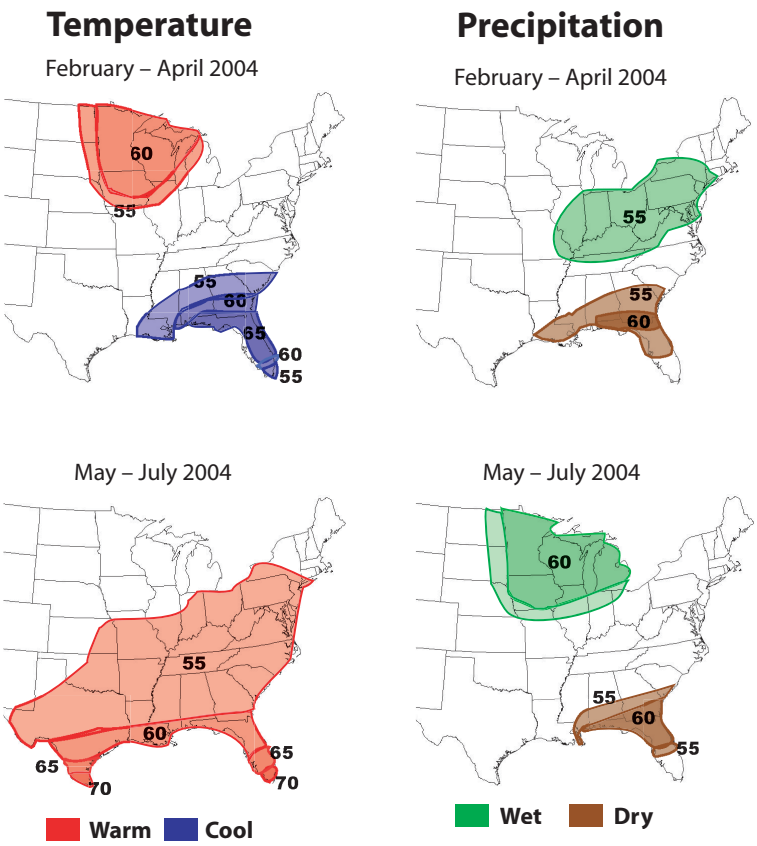

Figure 5. Eastern and southern U.S. consensus climate forecast. Issued January 26, 2004.

This is the third effort to produce a consensus forecast by combining forecasts from different organizations (see Brown et al. 2002; 2003). Thus, specific quantitative skill results cannot be offered at this time. However, forecast skill has been established for most of the inputs, and it is likely that the consensus forecast skill would be equal to or slightly larger than individual forecasts, depending on the region and the number of inputs in agreement.

Recommendations

Workshop participants were given several hours on the final day of the workshop to convey data and analysis needs that would enhance future workshops and constructive criticism of the workshop process. The following suggestions were offered by the participants.

Data and Research Needs

Participants noted that fuels and fire danger assessments could be refined and improved if state and regional fuels specialists prepare preliminary quantitative fuels analyses in advance of the next workshop and bring data to the meeting. In addition to drought index and ENSO index data commonly needed to assess potential for fire danger in the Southern Area, participants suggested that ignition potential and instability data would be useful for future pre-season assessments. Participants stressed that sound data are critical for accurate assessments, and they recommended quality assurance studies for the meteorological data stations and fire statistics used in the outlooks.

The participants also reiterated a concern that has been raised at almost every gathering of the fire scientists during the past several years—that fire scientists and managers need a comprehensive, centralized, quality controlled, easily accessible, electronic database of fire occurrence/location/acreage statistics. Another request of the research community by the participants is for an easily accessible database or information product that portrays snow data as departures from average. In addition, participants expressed that the major research questions for the Eastern Area, with its fixed fire management resource availability from year-to-year, are: When do episodic conditions result in overtaxing and/or exhaustion of available resources? What is the potential for multi-day fires? (see also, "Case Studies").

Report Distribution

Participants suggested a structured random sample survey effort to obtain feedback from the users of the report, as well as the potential customer base (e.g., district fire management professionals), in order to improve the report style and content and to make the workshop reports more usable.

National Climate Forecasts

Participants noted that improved seasonal forecasts are always welcome. Some participants expressed frustration with the NOAA-CPC seasonal climate outlooks and NSAW consensus forecast and suggested that forecasters venture educated guesses for the large regions of the country characterized by "EC" (equal chances of above-average, average, and below-average conditions) on outlook maps. Others expressed the view that stating "I don't know" is a valuable bit of information, and perhaps as valuable or more valuable than a guess.

Case Studies

Participants from the Eastern Area identified a need for research into the atmospheric causes of week-long weather anomalies that produce high fire danger episodes, such as those associated with the Mack Lake and Stephan Bridge fires. A synopsis of the atmospheric patterns that portend such episodes, as well as analysis of the atmospheric mechanisms associated with possible interannual variability of these patterns are necessary for attribution of fire danger potential.

Multi-region Meetings

The participants all agreed that it was exceedingly useful for both the eastern and southern geographic areas to meet concurrently, as it enhanced their ability to assess issues associated with fire potential at the borders of geographic areas. They suggested that it was important to maintain contact with neighboring western U.S. geographic areas in order to coordinate outlooks at geographic area borders and assess potential resource demands that might affect the East and South. Participants stressed that future workshops should include representatives from each of the fire management compacts. In addition, they recommended that intelligence coordinators attend future workshops.

Verification

The participants were in unanimous agreement that the outlook products of the workshop be evaluated and validated against actual events. They pointed out that it is important to assign attribution to outlook successes and errors. Furthermore, they requested that evaluation of this year's outlooks serve as the starting point for next year's workshop.

Conclusions

The 2004 National Seasonal Assessment Workshop (NSAW): Eastern and Southern States meeting was an important step in a long-term process designed to improve information available to fire managers. As with the 2003 NSAW, the 2004 Eastern and Southern States meeting brought together climate forecasters, regional climatologists, fire management, and fire weather specialists in order to create an experimental operational product to evaluate long-range pre-season fire potential. In particular, the 2004 meeting was successful in addressing the unique and considerable fire management concerns of the eastern and southern United States—concerns frequently overshadowed by a national emphasis on federal lands fire management in the western United States and Alaska. Thus, the meeting, which laid a cornerstone of effective partnership building between state and federal fire managers and national climate researchers, was, to paraphrase astronaut Neil Armstrong, one giant leap for fire management in the United States.

During the workshop, climate forecasters produced a third consensus forecast for the fire season and continued to learn about key forecast, climate diagnostics, and data needs necessary to effectively serve the fire management community. The 2004 meeting developed an operational process for multi-state personnel to produce pre-season fire danger outlooks. Workshop participants and climate forecasters worked together in a focused and productive manner; the workshop process successfully created an atmosphere of collegiality, openness, enthusiasm, and an impressive degree of cooperation between workshop participants.

Participants showed strong support and enthusiasm for cooperative work in a "work retreat-style" atmosphere away from offices and routine. They also expressed that they value the process and products of the workshop; however, during times such as winter 2003–2004, when even the best indicators of future climate yield ambiguous results, preparing a pre-season outlook can be a frustrating process.

In response to suggestions from participants in the February 2003 NSAW, organizers increased the time that workshop participants spent in work sessions devoted to constructing fire danger outlooks and in constructive dialogue about techniques and improvements to the outlooks. In response to suggestions for increased opportunities for interested workshop participants to question forecasters about the regional details of climate forecasts (Garfin et al., 2003), Russell Martin of NOAA-CPC devoted extra time to participating in the 2004 Eastern and Southern States meeting. Mr. Martin's participation during the first two days of the meeting, and the fact that he was available to answer climate forecast technical questions in a forthright and down-to-earth manner, helped the workshop process immeasurably. It is precisely this kind of interaction that will engender trust and bring the climate forecast and fire management communities closer together in the grand experiment to make climate forecasts more usable and useful to decision makers (e.g., Stern and Easterling, 1999; White, 2003).

Workshop organizers improved upon the 2003 NSAW through better pre-workshop preparation, such as preparing a special web page with links to data and diagnostic analyses needed by participants. The NICC devoted considerable effort to improving pre-workshop communication with participants, in order to gauge their needs for the meeting; in addition, NICC prepared an FTP site to facilitate data transfer. Participants in the Eastern and Southern States meeting learned which data, diagnostic analyses, and research products will improve future workshops. Moreover, the improved understanding of participants with regard to the workshop process and their enthusiasm for future workshops, will help to spread the word about NSAW meetings. This year's participants will work to secure the willingness of state and regional fire compact officials to participate in future workshops. This growing cadre of enthusiastic experts will ensure the effective communication of information and better diffusion of climate forecasts and pre-season fire potential outlooks to key fire managers in the eastern and southern United States.

Issues, data, and research needs to be addressed in order to improve the outcomes of future workshops include the following:

1) Validation of pre-season outlooks.

2) Examination of synoptic weather patterns associ-

ated with multi-day high fire danger episodes in the Eastern United States.

3) Creation of an electronic fire occurrence and acreage database for research and management.

4) Development of an agreed upon and exact definition of fire potential for use in pre-season outlooks.

In summary, the unique climatology, intermix of public and private lands, and extensive wildland urban interface in the eastern and southern United States require fresh approaches to evaluating pre-season long-range fire potential. Collaboration between state and federal fire behavior and weather analysts, as well as national climate forecasters and regional climate experts, allowed for the successful production of pre-season fire danger and consensus climate outlooks for the 2004 fire season in the eastern and southern United States. Workshop participants identified key fire-climate research needs. Moreover, the workshop generated enthusiasm and cooperation between participants, as well as the learning and sharing of expertise. The workshop improved the process and mechanism for the NICC Predictive Services organization to meet its goals of integrating climate, weather, situation, resource status, and fuels information into products that will enhance the ability of wildland fire managers to make proactive short- and long-range decisions for strategy development and resource allocation, and to improve efficiency and firefighter safety.

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Appendices

Appendix A: 2003 Pre-Season Fire Danger Outlook Protocols

A. Executive Summary

1) 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.

B. Introduction and Objectives

1) Include guidelines for use of the report and a disclaimer.

C. Current Conditions (including comparison with historical records)

1) Snow (NOHRSC data, SWE)
2) Precipitation anomalies (recent week, month, water year)
3) Temperature anomalies (recent week, month)
4) ENSO & other climate indices impact on weather and atmospheric circulation
5) Weather and atmospheric circulation
6) NFDRS, Fire Danger, and other fire potential indicators
7) Drought indices and maps (PDSI, SPI, KBDI, soil moisture, ground water, etc.)
8) Vegetation status (NDVI, Greenness imagery)
9) Fuel moisture (live, dead and foliar if known)
10) Fire occurrence data (number, size, duration if known for current year)
11) Fire behavior observations and/or Farsite run comparisons (if appropriate)

D. Climate and Weather Outlooks

1) Long-range climate outlooks (NOAA-CPC, IRI, Scripps, and others)
2) Projected atmospheric circulation
3) ENSO and other relevant index forecasts
4) Drought forecasts (including NCDC drought amelioration)
5) Soil moisture forecasts
6) Fire weather indices

E. Fire Occurrence and Resource Outlooks

1) Estimates on number of fires (based on historic lightning episode information, acres burned, duration, Scripps/Westerling model, and others)
2) Estimates of expected resource needs

F. Future Scenarios and Probabilities

1) Fire Family Plus
2) Priority sub-regions within Geographic Area
3) Fuel-type considerations
4) Climate considerations
5) Season Ending Event Probabilities

G. Management Implications and Concerns

H. Summary and Recommendations

Appendix B: Agenda

Tuesday, January 27

Morning

08:00-08:30	Introduction, logistics, and opening remarks - Gregg Garfin, CLIMAS; Rick Ochoa, NICC
08:30-08:45	National Consensus Climate Forecast (moderated by Tim Brown)
08:45-10:15	Climate forecast panel discussion – IRI, CPC, Scripps and Regional Climate Center perspectives Questions and comments from participants (moderated by Tim Brown)
10:30-12:00	Weather & Fuels Assessments/Outlooks (moderated by Rick Ochoa) Each GACC to discuss season, weather and fire considerations specific to them and have invited fuels specialists to discuss current situation, emerging issues (insect/disease, windfall, drought, etc), and tools they use to gauge fire/fuels severity – 45 minutes for each GACC

Afternoon

13:00-13:30	Discussion of seasonal assessment procedures and protocols (Moderated by Gregg Garfin and Rick Ochoa)
13:30-13:45	Breakout room/area assignments, Internet access, assistance, logistics – Gregg Garfin
13:45–17:00	Breakout sessions by Geographic Area to begin preparing outlooks – Some climate forecasters will be available for consultation

Wednesday, January 28, 2004

Morning

08:00-12:00	Breakout work sessions by geographic area to continue preparing outlooks

Afternoon

13:00-13:30	Reconvene for group discussion of issues arising from work until now Opportunity to discuss issues, needs, logistics, etc. for successful completion
13:30-17:00	Breakout work sessions preparation of outlook, report writing, and presentation to group on Thursday morning

Thursday, January 29, 2004

Morning

08:00-10:00	Breakout work sessions - finalize outlook reports and presentations Today's focus should be on preparing a presentation to the group on your findings and conclusions
10:00–11:00	Outlook presentations (Moderated by Tim Brown) Introduction and logistics for final presentations Informal presentations (25-30 minutes for each Geographic Area; hold discussion until 11:00)
11:00-11:30	Peer-to-Peer coordination: Open discussion and feedback on GA outlooks (Moderated by Gregg Garfin)
11:30-12:30	Close out: Discussion and feedback about the workshop and workshop process (Moderated by Gregg Garfin and Rick Ochoa)
12:30	Adjourn

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