North American Seasonal Assessment Workshop, April 4-7, 2006
Progress Report (Submitted by Gregg Garfin, CLIMAS)

Executive Summary

The North American Seasonal Assessment Workshop (NASAW) was convened at the NOAA David R. Skaggs Research Building, in Boulder, Colorado, April 4-7, 2006. The workshop built on existing efforts by the NOAA's RISA program, National Interagency Coordination Center, and Program for Climate, Ecosystem and Fire Applications (Desert Research Institute) to forecast fire potential for the United States. (*N.B. – these efforts are named the National Seasonal Assessment Workshop -- NSAW*). Overall goals of the workshop included: improving the flow of fire management information between the United States, Canada, and Mexico; improving the capacity of three nations to use climate forecasts and climate monitoring information in proactive fire management and resource allocation; improving linkages to NOAA efforts; recruiting collaborators for future North American efforts and learning how to improve future efforts through their feedback; producing an experimental fire potential outlook.

Workshop participants from the United States, Canada, and Mexico combined climate forecasts and monitoring information along with vegetation condition and forest/rangeland fuels field reports to create an experimental North American fire potential map for the 2006 fire season, based on expert assessments. (*N.B. – Due to procedural concerns from fellow North American colleagues, the Canada and Mexico fire potential forecasts should be considered* ***embargoed****. This report is intended only for program managers and funders of the workshop; the report is not for general distribution*). The 2006 experimental fire potential map indicates above normal fire potential for most of northern Mexico, the U.S. Southwest, southern Texas and the southern Gulf Coast across to Florida, the Eastern seaboard from the mid-Atlantic states to southern New England, the central Rockies and parts of the Great Basin, southwestern Alaska, British Columbia, and the northern Canadian Plains provinces.

In general, Canadian and Mexican workshop participants were exceedingly enthusiastic about the workshop and expressed support for convening a second NASAW. They also endorsed the value of the workshop for bringing together climate and fire specialists and for fostering proactive planning philosophies for fire management. Participants from both countries mentioned that they would like to emulate the NSAW process in their countries. Workshop participants stressed the value of co-creating a North American fire potential map for resource allocation decisions, documentation in support of resource requests, and enhancing and expanding existing tri-national collaboration in fire management.

Participants mentioned some impediments to the use of pre-season fire potential forecasts, such as short-term resource request timelines, and they recommended the following for future NASAWs: broader participation and more detailed input from Mexican and Canadian agencies, development of procedures and protocols for an official tri-national fire potential product, a broader range of parameters for use in the expert assessments, a longer lead time to prepare for future meetings. Participants agreed to garner support for future efforts through home agencies, other bi-national collaborations, and within-country pre-season assessments (e.g. NSAW). Participants agreed to organize a second NASAW, beginning with a fall 2006 conference call.

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A. Introduction

Between 2003-2006, with funding from the NOAA Climate Program Office and the USDA-Forest Service (through the National Interagency Coordination Center; NICC), the Regional Integrated Sciences and Assessments (RISA) program (led by the Climate Assessment for the Southwest [CLIMAS]), the Program for Climate, Ecosystem and Fire Applications (CEFA; Desert Research Institute), and NICC Predictive Services, collaboratively developed a series of workshops to predict pre-season fire potential for the United States. The process, known as the National Seasonal Assessment Workshops (NSAW), has helped to bridge the worlds of climate science, fire science, and fire management. Arguably, the NSAWs have enhanced national fire preparedness, prescribed fire management, and awareness of the connections between climate and fire.

Participants in the workshops bring together expertise in meteorology, climatology, ecosystems management, forestry, fire science and remote-sensing to analyze and synthesize a wide variety of data, forecasts, and information to predict fire potential. Climate contributions include state-of-the-art NOAA Climate Prediction Center seasonal climate forecasts and information from NOAA family partners, such as the RISA program (notably CLIMAS, Western Water Assessment, California Applications Program, Southeast Climate Consortium), the Experimental Climate Prediction Center at Scripps Institution of Oceanography, the International Research Institute for Climate and Society (IRI), Regional Climate Centers, State Climate Offices, and the NOAA Earth System Research Laboratory, as well as USDA-Natural Resources Conservation Service snowpack analyses, Geographic Area Predictive Services analyses, and university-based research. Fire and land management contributions include state-of-the-art statistical and dynamical seasonal fire forecasts from the California Applications Program and Oregon State University; on-the-ground fuel status reports from the USDA-Forest Service, Department of Interior agencies, and state agencies; remotely sensed data from NOAA-NESDIS and NASA-EROS; data analyses and products from the USDA-Forest Service Research Stations, and university-based research. The tremendous variety of data and research from these agencies and institutions have been incorporated into fire management operations through the hard work of Geographic Area Predictive Services personnel, as facilitated through interactions at the NSAW meetings, and expert contributions from climate and fire scientists and program administrators.

NSAW workshop participants suggested that fire outlooks would be improved with information from our North American neighbors, Canada and Mexico. In response to this request, CEFA director Tim Brown established contacts with Canadian fire management colleagues, and garnered interest from colleagues across Canada. CLIMAS program manager Gregg Garfin established contacts with Mexican fire scientists and foresters at a 2005 joint meeting of the Society of American Foresters (SAF) and its Mexican equivalent, the Asociación Mexicana de Profesionales Forestales (AMPF; the Mexican Association of Professional Foresters). Brown and Garfin established connections with U.S., Canadian, and Mexican climate forecasters, as well as authors of the monthly tri-national North American Drought Monitor. They were assisted by colleagues in Canada and Mexico, notably Miguel Cortez-Vázquez of the Mexican Meteorological Service (Servicio Meteorologico Nácional – SMN). In order to facilitate participation by our

North American colleagues, additional workshop funding was garnered from the NOAA Climate Program Office and the Bureau of Land Management International Fire and Aviation Program. (N.B. – funding for bilingual translation greatly enhanced communication and facilitated contributions by colleagues from Mexico).

This document reports on the process and products from an experimental North American Seasonal Assessment Workshop (NASAW) held at the NOAA David R. Skaggs Research Building, in Boulder, Colorado, April 4-7, 2006. Section B reiterates the goals of the workshop. Section C briefly describes the workshop process. Section D discusses workshop products. Section E focuses on the highlights of a discussion between Canadian, Mexican, and United States participants in the workshop, and the recommendations put forth by the discussants. Section F lists action items for future workshops. Two appendices contain the experimental and unofficial fire potential predictions from Canada and Mexico. (N.B. – Due to procedural concerns from fellow North American colleagues, the Canada and Mexico fire potential forecasts should be considered ***embargoed***. This report is intended only for program managers and funders of the workshop; the report is not for general distribution).

B. Workshop Goals

- Improve cross-border coordination on fire management, resource allocation, and preparedness
- Improve the use of NOAA-family climate information and forecasts in fire management operations, and build capacity for the use of climate information in diverse management and cultural settings
- Coordinate climate forecasting and information flow between the United States, Canada, and Mexico, based on the groundwork established by the North American Drought Monitor
- Export a RISA-based knowledge exchange process and demonstrate the transferability and scalability of the process
- Stress linkages to existing and forthcoming NOAA efforts (RISA, U.S.-Mexico Border Climate Outlook, NAME, NIDIS, North American Drought Monitor, 2006 Monsoon-Region Workshop)
- Identify and work to recruit other potential scientific collaborators in the three countries, and develop protocols and standards for collaborative work
- Identify key stakeholders and outline needs for product evaluation, and metrics for product improvement
- Produce a workshop report and experimental fire potential map

C. NASAW Process

The North American Seasonal Assessment Workshop was held in conjunction with the 2006 National Seasonal Assessment Workshop: Western States & Alaska. The NASAW was structured to maximize interactions between climate and fire specialists, and to provide substantial concentrated time for participants to develop their reports. The first day was devoted to orientation, training, and knowledge exchange. 2005 NSAW participants had requested training to better understand (and thereby improve their use of):

(1) the elements that contribute NOAA-CPC seasonal climate outlooks, (2) remote-sensing vegetation data products, (3) the North American monsoon, and (4) medium-range weather forecasts. These topics were covered during the first morning. The rest of the day was for exchange of information critical to producing the fire potential outlooks. During a working lunch, operational and experimental U.S. climate and fire forecasts were presented. This was followed by presentations by Mexican and Canadian participants on current climate conditions and climate forecasts. Finally, fuel assessment experts from each of the nine U.S. Geographic Areas, Canada, and Mexico discussed vegetation conditions, fuel moisture, and other land management factors that might influence fire activity. The aforementioned exchange of information was critical for participants to assess priorities for harmonizing fire potential forecasts along Geographic Area and national borders.

The second day of the workshop was devoted to creating the fire potential outlooks. During the morning, international participants sat in on discussions with neighboring United States Geographic Areas, in order to get a sense of the kind of approach and synthesis practiced by U.S. participants, as well as to discuss synchronizing forecasts at the borders. The afternoon afforded concentrated time to synthesize information, create forecast maps, and write executive summaries. During the morning of the third day, U.S. workshop participants presented their forecasts, including discussion of the assumptions behind the forecasts. During the afternoon of the third day, North American participants discussed the workshop process, the value of the workshop, prospects for future workshops (including multi-national protocols and intra-national procedures for gaining official sanction for a tri-national fire potential forecast product), and recommendations for improving future workshops.

D. Workshop Products and Results

The main product of the NASAW was an experimental map of significant fire potential for North America (Figure 1). *Candian and Mexican experimental fire potential outlook summaries are included in Appendices A and B, respectively.*

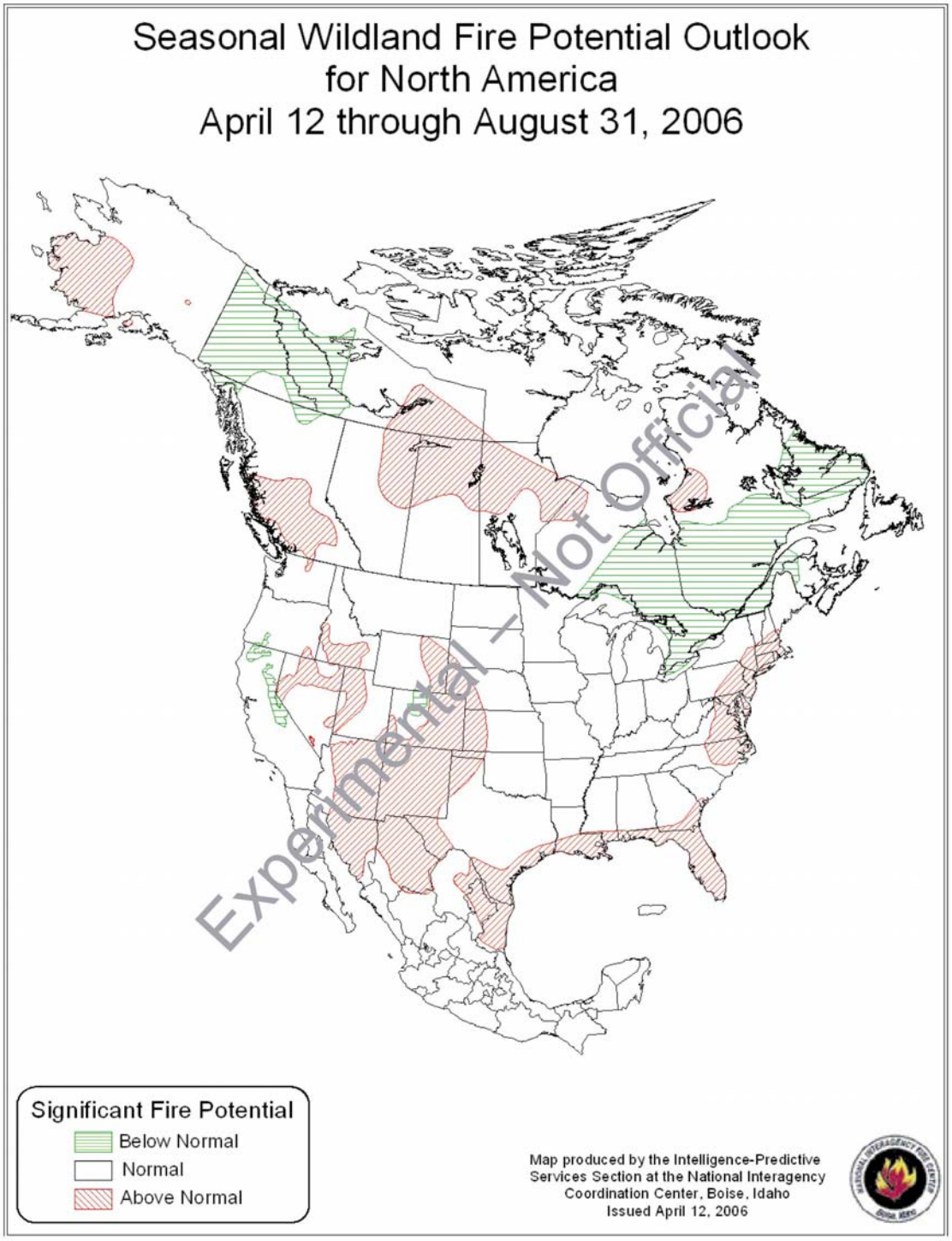

Figure 1. Experimental (unofficial) North American fire potential outlook map.

E. Tri-National Discussion and Recommendations

During the afternoon of the third day, North American participants discussed the workshop process, the value of the workshop, prospects for future workshops (including multi-national protocols and intra-national procedures for gaining official sanction for a tri-national fire potential forecast product), and recommendations for improving future workshops. The discussion was facilitated by Tim Brown of CEFA/Desert Research Institute. The most important concerns and recommendations from the tri-national discussion fall into four categories, as follows:

- What is the utility of the workshop and development of the North American fire potential map? (Summary of positive workshop outcomes, prospects, and potential opportunities.)
- Who needs to be at future workshops?
- What are your operational and procedural concerns and which of these may impede the use of North American fire potential forecasts?
- What are your recommendations for future North American Seasonal Assessment Workshops?

In general, Canadian and Mexican workshop participants were exceedingly enthusiastic about the workshop and expressed support for continuing the NASAWs. They also endorsed the value of the workshop for bringing together climate and fire specialists and for fostering proactive planning philosophies for fire management. Participants from both countries mentioned that they would like to emulate the NSAW process in their countries.

E.1. What is the utility of the workshop and development of the North American fire potential map? (Summary of positive workshop outcomes, prospects, and potential opportunities.)

Perhaps the most important benefit of co-producing the North American fire potential map (NAFP map), cited by Canadian and Mexican workshop participants, was the prospect of improving resource allocation decisions through the use of the map. For Mexico, the NAFP map could inform allocation of scarce resources, such as helicopters, as well as other budget decisions. Canadian participants mentioned economic benefits from moving air tankers and performing training exercises in advance, based on geographically specific expert assessments of fire potential.

Participants mentioned the fierce competition for resources among and within agencies; thus, pre-season fire potential assessments offer an edge on competitors for resources. These sentiments resonate with those made by participants in the 2001 Fire-Climate Workshop in Tucson, where 72% of participants surveyed mentioned that seasonal climate forecasts would be useful to support planning, and 62% of participants surveyed mentioned that forecasts would be useful to prioritize allocation of firefighting resources (Garfin and Morehouse, 2001). Canadian participants also mentioned the utility of the

NAFP map for getting agencies and the public oriented toward the fire season, and thus improving over all preparedness.

Participants from both countries suggested that the workshop process is valuable for improving communication across many agencies and jurisdictions that have responsibilities for fire management or that provide support for fire management. Canadian participants mentioned that the province of British Columbia is a leader in proactive management and, in particular, use of forecasts. The NAFP could serve as a vehicle to improve proactive planning and forecast use by other provinces and jurisdictions. They also mentioned that Parks Canada (the Canadian equivalent of the U.S. National Park Service) is interested in knowing the potential for conducting prescribed fires; a well-coordinated NAFP map could provide valuable insights regarding prescribed fire opportunities and priorities. Mexican participants indicated that the workshop was an excellent way to bring many agencies together by focusing on multidisciplinary collaboration to solve a problem, wildland fire management, of mutual interest. They cited the tangible improvement in information flow and enhanced collective insights through cooperation between the SMN meteorologists and remote sensing specialists and CONAFOR (Comision Nácional Forestal – National Forest Commission) fire management specialists at the April 2006 workshop. Though not explicitly mentioned by participants, the NASAW might serve as neutral ground for agencies to build bridges, improve communication, and work out agreements. Mexican participants also mentioned that Proteccion Civil (Mexican emergency management) is interested in hazard forecasts. Previously, Mexican agencies provided monitoring of current conditions pertaining to fire management decisions, but not forecasts.

All participants agreed that the NASAW provided a valuable platform for cross-border cooperation and enhanced information flows. They suggested that the NASAW fit well with previous efforts, such as bi-national agreements to provide training through exchanges of fire fighting crews. (N.B. – Two-way agreements exist between all combinations of the three countries, as well as through a North American Forestry Commission). Participants indicated that further cooperation established during the 2006 NASAW benefits existing mutual aid agreements and augments operational agreements for cross-border fire suppression efforts. Canadian participants mentioned the good fit between the NASAW and tracking of cooperation by the Canadian Interagency Forest Fire Center (CIFC) and the U.S. National Interagency Fire Center (NIFC). Mexican participants mentioned the success of tri-national cooperation to produce the North American Drought Monitor, and cited the NADM as an example of how the three countries could operationalize a NAFP product.

E.2. Who needs to be at future workshops?

The NASAW participants suggested that future workshops would be improved by broadening participation from Canada and Mexico. The Canadian participants specifically mentioned participation by CIFC, as well as representation at the workshop by a greater number of provinces and management agencies. A key Canadian fire forecaster, Mike Flannigan, was unable to attend the NASAW; participants conveyed his

enthusiasm for the workshop idea. Mexican participants indicated that future NASAWs would be improved by participation from fire specialists in the Mexican states bordering the U.S., as well as by participation from Florida, which has a climate and ecosystems similar to northeastern Mexico. They mentioned that participation by the Mexican natural resources agency SEMARNAT (Secretaría del Medio Ambiente y Recursos Naturales – Mexican Secretariat of the Environment and Natural Resources) would also enhance fire potential map discussions. Mexican participants were very enthusiastic about the process of bringing together climatologists and fire specialists, and they suggested that a pre-NASAW Mexico workshop would help them to provide better information and a more thorough understanding of conditions evaluated to produce the NAFP map.

E.3. What are your operational and procedural concerns and which of these may impede the use of North American fire potential forecasts?

Participants from Canada and Mexico agreed upon the need to emulate the U.S. NSAW process, in order to improve input to the NASAW NAFP map, and to foster better buy-in from agencies in Canada and Mexico. All participants mentioned that greater resources are needed to ensure participation in within-country assessments, NASAWs, and to foster multi-agency and multi-jurisdictional acceptance of the fire potential forecasts. In Canada, CIFC does not have sufficient resources to make pre-season resource allocation a priority. Within Mexico, operational fire management agencies (e.g., CONAFOR) have a collective annual meeting, but they do not coordinate with climate forecasters. Mexican participants also mentioned the need for resources to improve fire potential forecasts for regions; their experimental approach used in the 2006 NASAW was deemed broad-brush. They also cited the need for a clear lead agency for fire potential forecasts in Mexico, in order to garner official sanction for the NAFP map and to clarify roles and responsibilities in forecast creation and dissemination.

For Canada, official sanction is necessary at the highest (federal) levels for dissemination of the NAFP map. (N.B. – Canadian participants requested that NASAW organizers not post the NAFP map on the Internet, and that the map be labeled “experimental” in this report). Canadian participants indicated that federal, provincial, and agency managers have different fire management concerns; even within provinces each agency may have different protocols for indicating hazardous conditions. Moreover, each province takes responsibility for operational decisions; thus improved coordination at all levels is necessary for adoption of the NASAW process and use of the NAFP map. Canadians suggested that a within-country workshop would help build bridges for the expert assessments used in the NASAW. They also mentioned a Canadian process called the “National Conversations,” that could help foster acceptance of a NAFP map. The National Conversations are a countrywide forum on key issues, whereby a presentation (e.g., PowerPoint) on a worthy topic is posted on the Internet and, for a limited period of time, citizens can comment on the topic and the worthiness of allocating resources for projects of regional and national interest. Canadian participants also suggested that more research is needed to determine who will use the NAFP product(s), and to determine the best spatial and temporal scales for the information.

Participants from both countries mentioned that, at present, most management decisions and resource requests are made within short-term decision windows. Mexican participants suggested that short-term forecasts are perceived as most important by fire managers. Canadian participants mentioned that budget requests are currently made within the fire season, and that some agencies use a 3-day window for resource requests. Without a shift toward a proactive management philosophy, the NAFP map may be seen by Mexican and Canadian land managers as having little utility. However, such attitudes were common in the U.S. prior to the 2000 fire season, the development of the National Fire Plan, and the creation of the National Interagency Coordination Center's Predictive Services and Geographic Area Coordination Centers. Mexican participants mentioned that CONAFOR has requested a team to support fire management activities at the national level, and the NASAW and NAFP map might provide needed perspective and support.

E.4. What are your recommendations for future North American Seasonal Assessment Workshops?

- All participants agreed that future NASAWs would be improved by more detailed analyses from Canada and Mexico. Participants suggested that this could be achieved through a variety of means, including within-country workshops to garner regional input, additional resources to bring more participants to the NASAW, and longer lead time to prepare for the next workshop. The latter would partly be facilitated by the experience gained by participants in the 2006 NASAW as to what data and information are needed to predict fire potential.
- Workshop participants recommended that climatologists bring information and forecasts on parameters other than temperature and precipitation in order to make more accurate pre-season assessments. One Mexican participant especially recommended information about winds.
- Mexican participants also suggested that their contributions to NASAW would be enhanced by training to learn methods, programs, and models developed by U.S. and Canadian colleagues for their predictions.
- Given the current emphasis on short-term predictions in Canada and Mexico, U.S. participants suggested that NOAA Climate Diagnostics Center medium-range forecasts might provide additional insights.
- Participants recommended the establishment of a process to develop procedures and protocols for a tri-national NAFP product.

F. Next Steps

Workshop participants expressed strong support for continuing the NASAW process. They indicated a need for cross-border knowledge and information sharing in order to better assess areas where there may be significant fire impacts. They suggested that broad-scale issues, such as air quality and smoke, international resource sharing, and collaborative operational agreements to suppress fires across borders, are sufficient to garner the attention of decision-makers. They recommended the establishment of official

protocols for future workshop products and suggested that there would a high level of interest from the North American Forestry Commission.

Action items for future NASAWs include:

1. Pre-workshop tri-national NASAW organizational conference call during early fall, 2006.
2. Each country should meet prior to the NASAW, in order to prepare more detailed assessments. By garnering input within each country, only a few representatives would need to attend the NASAW – thus lowering workshop travel resource needs.
3. Meetings of U.S. and Canadian fire program directors should be used as venues to promote NASAW and to establish protocols for an official NAFP map.
4. All participants will contact participants necessary to enhance future fire potential outlooks and will seek funding for continued participation.

G. References

Garfin, G. M., and B. J. Morehouse. 2001. Facilitating Use of Climate Information for Wildfire Decision-Making in the U.S. Southwest. *Proceedings of the Fourth Symposium on Fire and Forest Meteorology, Reno, NV*. Boston, American Meteorological Society, pp. 116-122.

Acknowledgments
Funding for the North American Seasonal Assessment Workshop was kindly provided by the NOAA Climate Program Office and the Bureau of Land Management International Fire and Aviation Program. Additional funding and support, associated with the National Seasonal Assessment Workshop, was provided by the National Interagency Coordination Center, NOAA Climate Program Office, and NOAA Climate Prediction Program for the Americas. Robyn Heffernan, Rick Ochoa, and Tom Wordell of the National Interagency Coordination Center and Tim Brown of the Desert Research Institute (and California Applications Program) contributed substantially to the design, implementation, and success of both workshops. Niina Haas and Ben Crawford of CLIMAS provided workshop assistance and facilitated pre-workshop translation and communication with Mexican colleagues. More information on the National Seasonal Assessment Workshop, including a list of participants in NSAW and NASAW, can be found in a workshop proceedings:
http://www.ispe.arizona.edu/climas/conferences/NSAW/publications/NSAWproceedings_06.pdf

APPENDIX A: EXPERIMENTAL FIRE POTENTIAL OUTLOOK FOR CANADA

South-central British Columbia and northeastern Alberta/southern Northwest Territories through northern Manitoba will see higher than average fire severity this season. The Yukon, southeastern Ontario, Southern Quebec and Labrador show lower than average seasonal severity.

Highest confidence is in the area through the southern Northwest Territories to northern Manitoba, which are expected to experience above normal temperatures and below normal precipitation in the spring and summer.

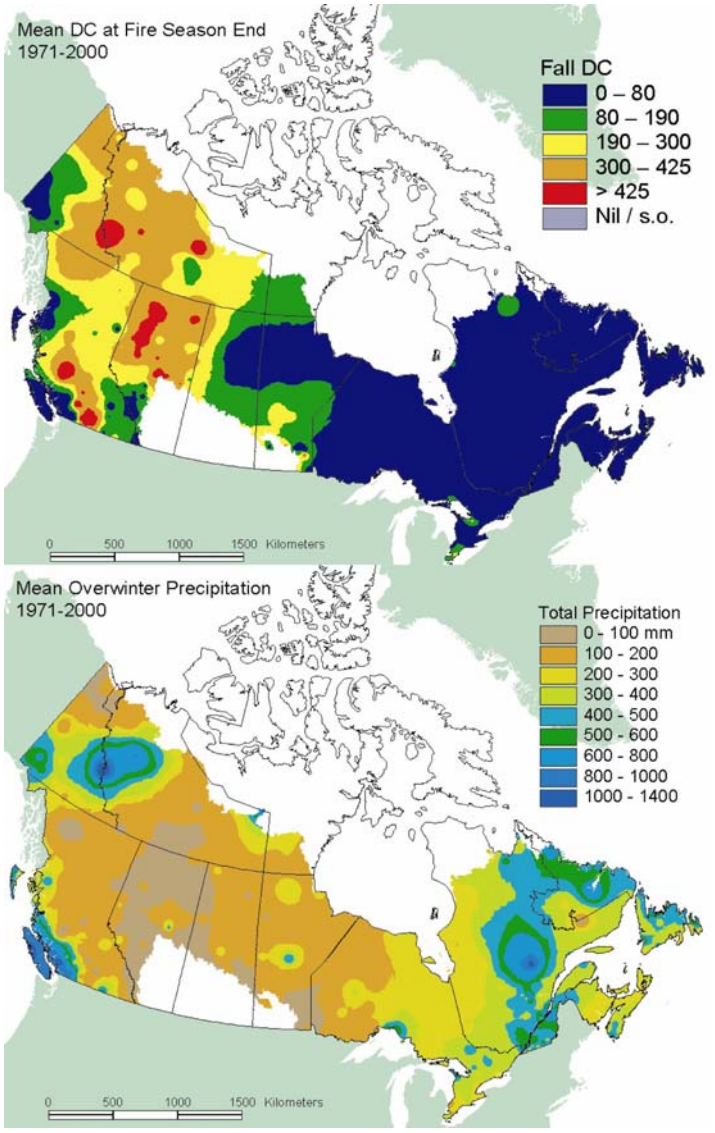

Figure 2. (Top) Canadian drought code (DC), portraying drought conditions at the end of the 2005 fire season. (Bottom) Average total precipitation for the winter months. These maps were useful for gauging conditions going into the 2006 fire season.

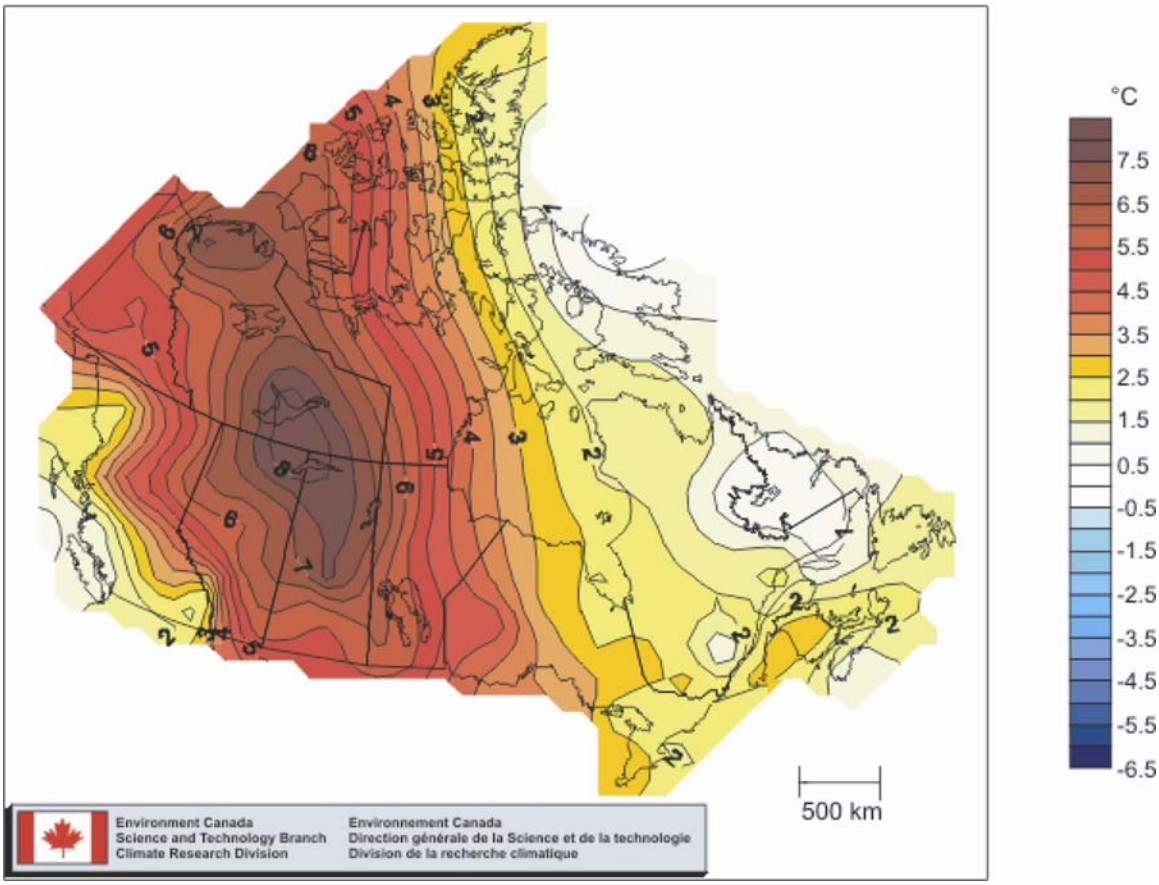

Figure 3. Winter 2005-06 temperature anomalies.

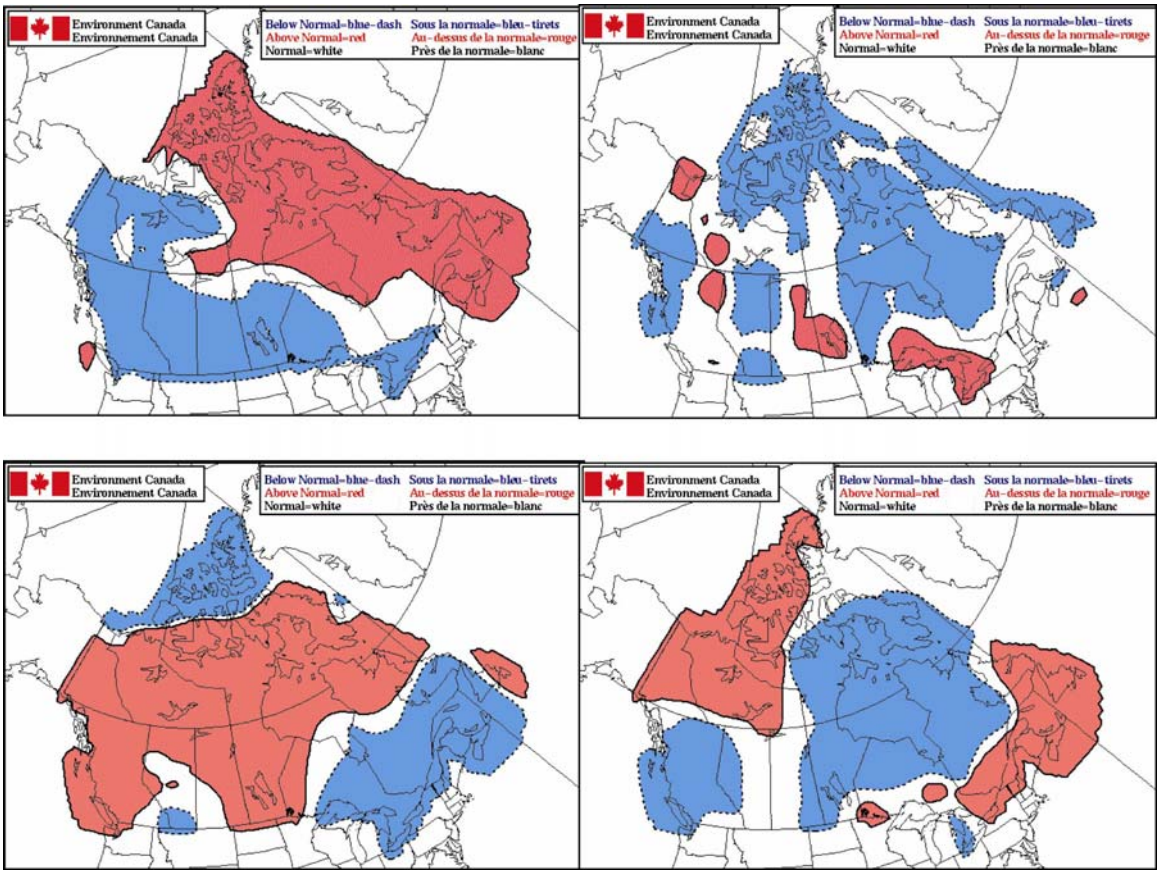

Figure 4. 2006 official Environment Canada spring (top) and summer (bottom) temperature (left) and precipitation (right) forecasts. Areas shown in blue depict above normal temperatures/precipitation; areas shown in red depict below normal temperatures/precipitation; areas shown in white depict temperatures or precipitation within the normal range.

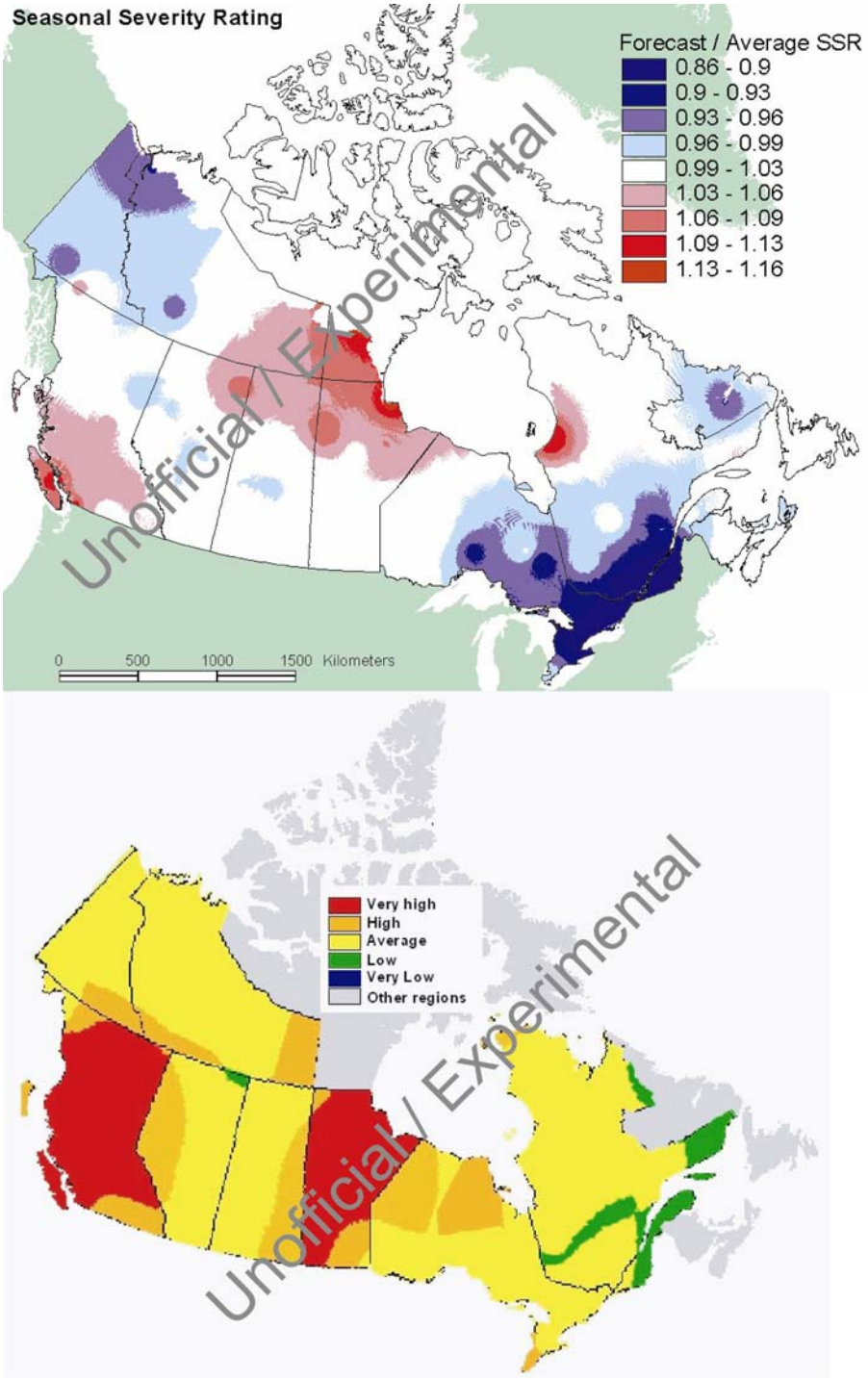

Figure 5. Experimental fire season severity rating for Canada, (top) based on a method developed by Kerry Anderson (Canadian Forest Service), and (bottom) based on a method devoloped by Mike Flannigan (Canadian Forest Service). Flannigan's method uses an ensemble of forecasts developed from SST projections and from dynamical forecast models.

APPENDIX B: EXPERIMENTAL FIRE POTENTIAL OUTLOOK FOR MEXICO

Current Trends And Conditions For Northern Mexico

A. Drought, Precipitation and Temperature

At the national level, Mexico is experiencing a very dry winter, particularly in the Northwest. The Mexican National Meteorological Service reported that the period of November to February was the third driest since 1941. By the end of March, light rainfall was reported in small areas of the northern states. However, the rainfall reported was not significant enough to impact the dry conditions. Different indexes used to construct the North American Drought Monitor indicate that the most affected areas are located along the U.S. border in parts of Sonora, Sinaloa, Chihuahua, and in a narrower strip in the eastern states of Tamaulipas and Nuevo Leon. There are several reports that this drought is having an impact on ranching activities. Figures from the National Water Commission show that most dam levels in the northwest are below 50% capacity. This situation is of concern because April and May are the hottest months in the northwestern states.

B. Fire Occurrences

While Mexico´s fire season begins in January, the fire season in Northern Mexico begins around March. So far this year, there have been 3,348 fires in 30 states that affected 40,745.88 hectares, of which 90.96% was grasslands and brush, and 9.4% was forest. To date, there have been fewer than 100 fire occurrences in each of the northern states except Chihuahua, where there have already been 184 fires that affected 5,821.96 hectares.

C. Outlook

Above normal fire potential is expected for most of Northern Mexico, with the exception of northern Baja California and a small area of northern Coahuila. The regions of above normal potential have experienced an exceedingly dry winter in 2005-2006. These dry conditions follow an average summer monsoon season in 2005 and a wet winter season in 2004-2005, both of which contributed to increased fine fuels and shrubs. Forecasts for April indicate good chances of below average precipitation in northern Mexico; normal precipitation, i.e., seasonally dry conditions, is expected for May. An approximately average 2005-2006 winter in northern Baja California, especially during March, contributed to normal fire potential in that part of Mexico. Despite slightly below average precipitation in northern Coahuila, average fire potential is expected. Fire potential is partly dependent on human-caused ignitions, which are a particularly important source of fire ignitions. Consequently, fire activity can increase dramatically, based on factors not related to climate or fuel condition. In addition, northern Baja California is subject to high lightning occurrence in July-September, which can be a major source of ignitions.

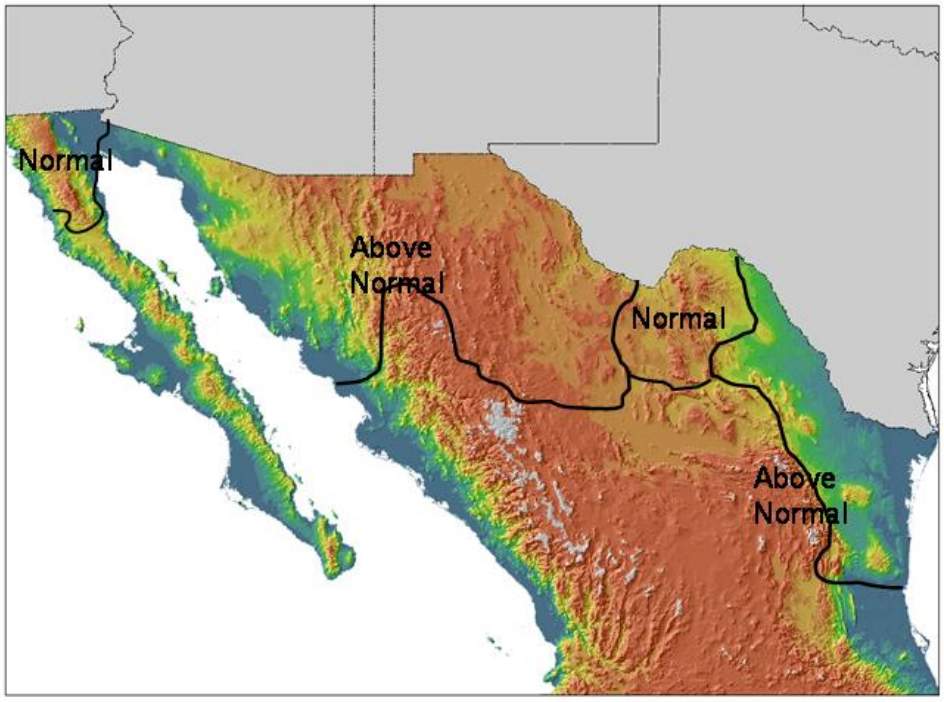

Figure 6. Experimental fire potential outlook for the 2006 fire season, Mexico.

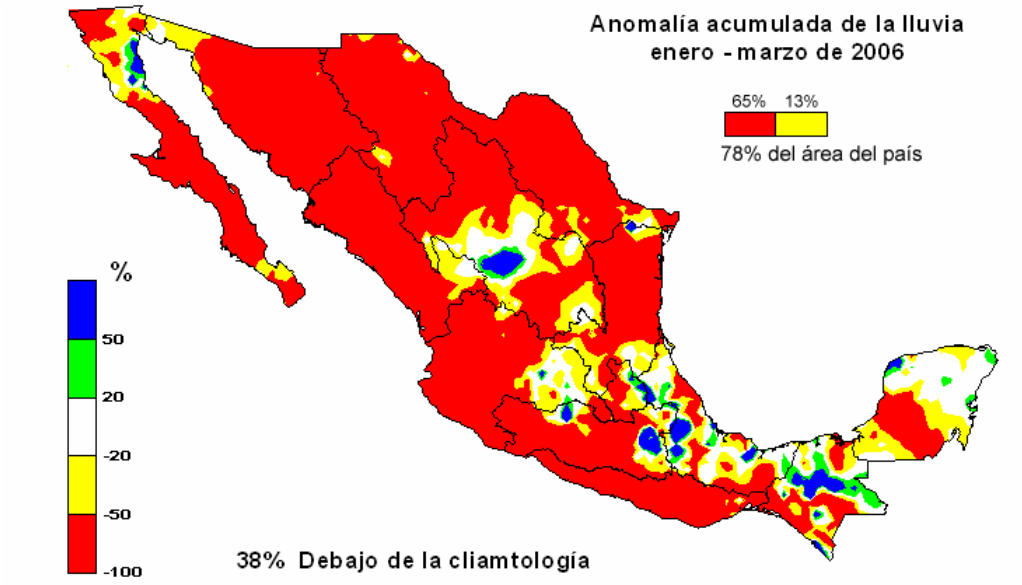

Figure 7. Percent of average January-March, 2006 precipitation, Mexico. Source: Servicio Meteorologico Nácional.

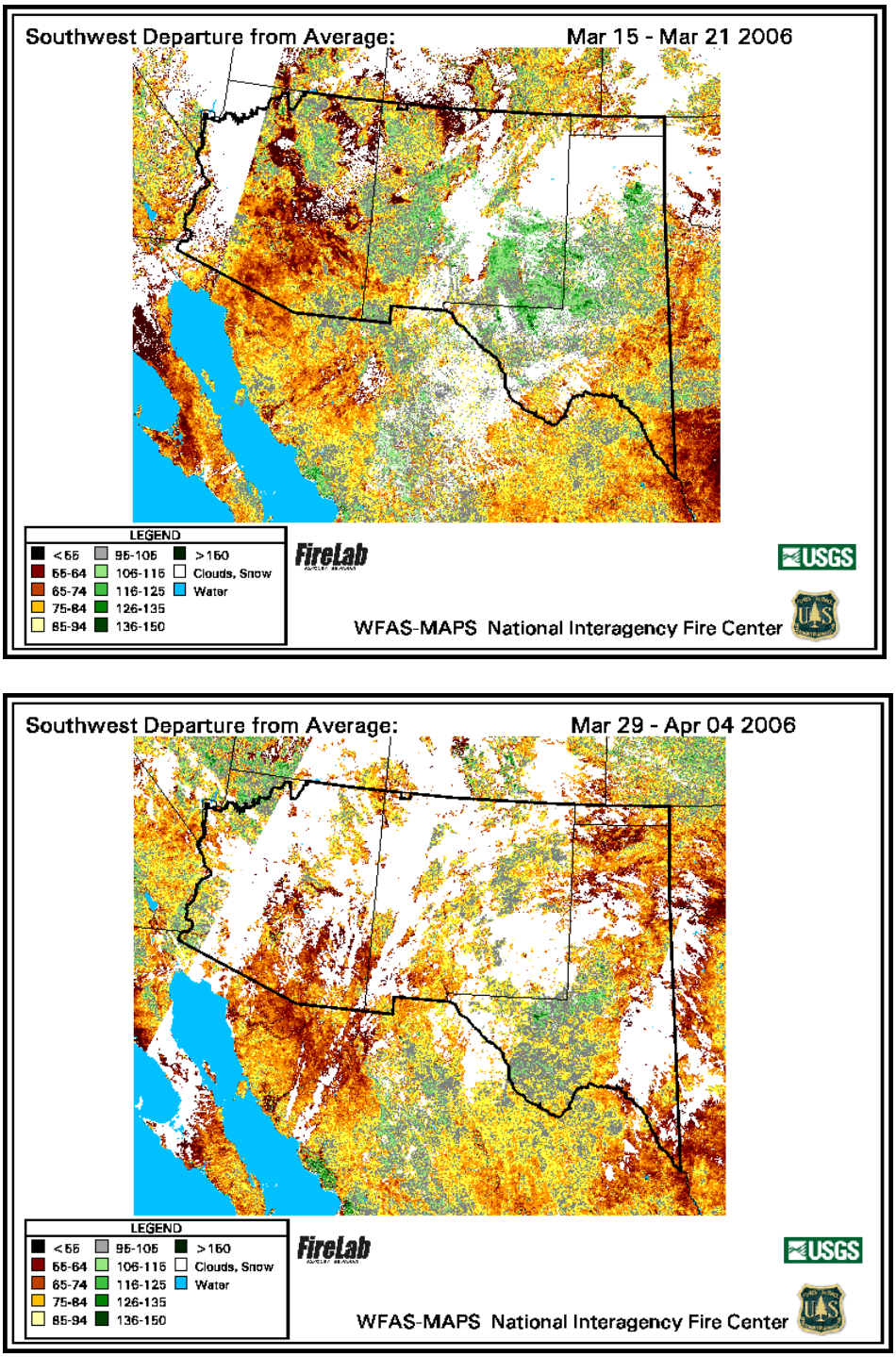

Figure 8. Normalized Difference Vegetation Index (NDVI) departure from average for the Southwest Geographic Area (heavy black outline) and northern Mexico for two periods leading up to and encompassing the workshop. White areas lack data, due to cloud cover. Source: Wildland Fire Assessment System (WFAS).

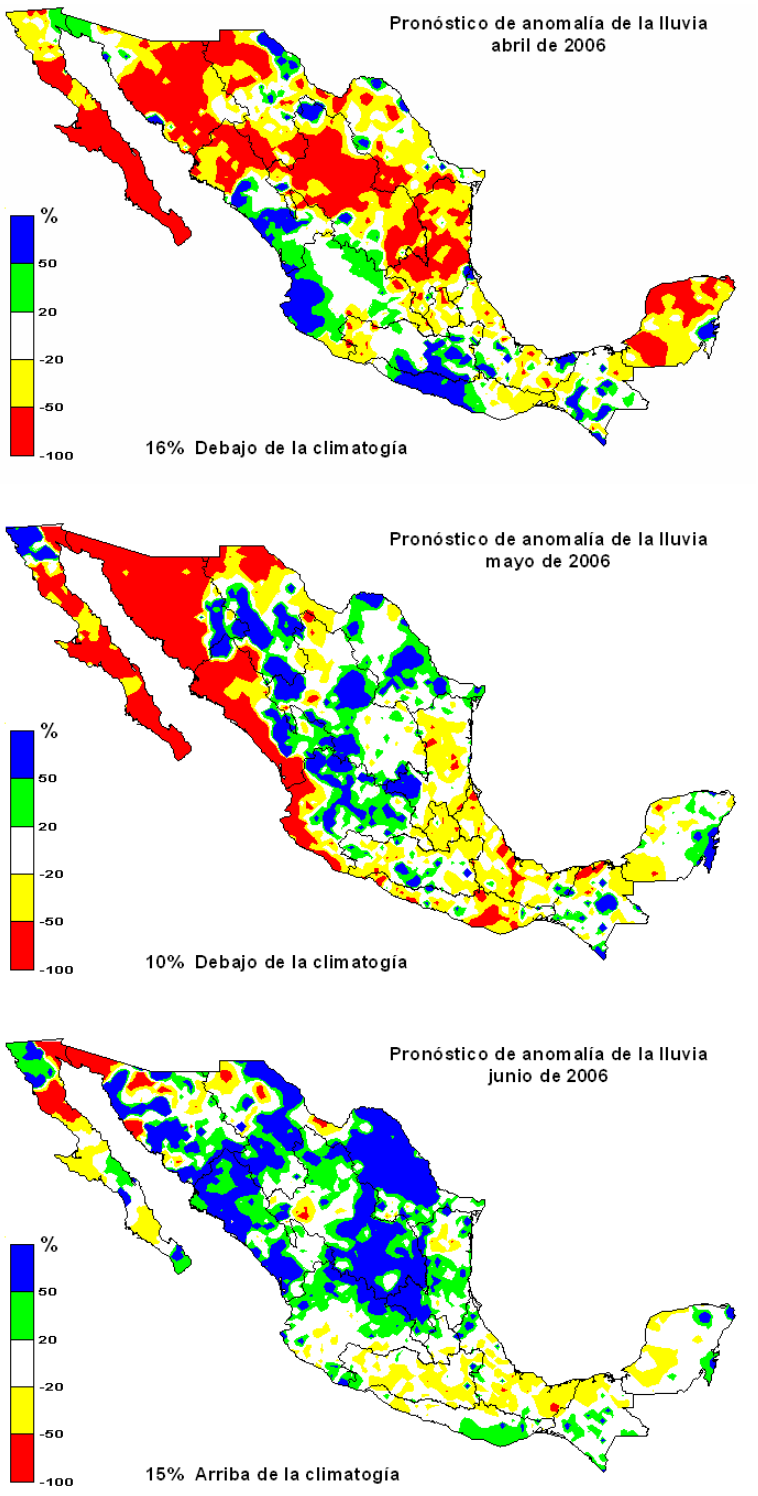

Figure 9. Deterministic precipitation forecasts for April, May, June. Source: Servicio Meteorologico Nácional.