Will April rains bring May flames?

Lush grass cover sets stage for big fire season in Southwest

by Melanie Lenart

Lush ground cover is blurring the distinction between southwestern deserts and grasslands, sparking concern that big fires will spread through both ecosystems after the herbaceous growth dries out.

"Herbaceous fuel loading is the highest it's been in about 12 years," noted Chuck Maxwell, fire weather program manager for the Southwest Coordination Center, based in Albuquerque. "We expect more fire in the desert than in the timber this year, for a change."

The abundance of herbaceous or fine fuels—aka native grasses and weeds for those outside the fire community—in the nation's southwestern quadrant was the topic of many conversations during a March/April fire meeting. The National Seasonal Assessment Workshop for the Western States and Alaska drew 50 western fire managers, fuel specialists, climatologists, and fire meteorologists to hammer out predictions of fire potential for the 2005 season.

"It looks like Ireland to us. In places where we don't have grass growing, there's moss on the rocks," reported workshop participant Cindy Sidles, a fuels specialist based in Utah. Her words captured the sentiments of many southwestern resource managers and go far in explaining the region's swath of above-average fire potential on the outlook map (Figure 1). Meanwhile, forests are the main concern in the northwestern United States.

Participants at the workshop produced the outlook map after spending three days evaluating existing fuels conditions along with climate forecasts for the coming spring and summer. Input from climate experts included those based at the National Oceanic and Atmospheric Administration (NOAA) facility in Boulder, Colorado, where the workshop was held.

Ironically, the Southwest's near-record autumn and winter precipitation have increased fire risk in low-elevation deserts and grasslands even as the moisture reduced the risk in regional high-elevation forests.

May and June are usually the driest months for the Southwest and, not coincidentally, its peak fire season. Even monthly rainfall values 150 percent of average may tally less than an inch at many low-elevation Arizona and New Mexico sites during late spring. Because of this, many fuels specialists expect the knee-high, continuous grasslands now thriving in the Southwest to dry out soon and act as fine fuels able to carry fire for long distances.

This puts people in the lowest elevations in the Southwest at the highest risk this year, observed Rick Ochoa, vice chairman of the National Predictive Services Group. The group co-organized the fire workshop along with the Program for Climate, Ecosystem, and Fire Applications and the Climate Assessment for the Southwest (CLIMAS).

The forecast for deserts and grasslands fits in well with an analysis for southeastern Arizona's Climate Division 7 (which includes Tucson, Sierra Vista, and Safford) done by Michael Crimmins and Andrew Comrie of the University of Arizona and reported in the *International Journal of Wildland Fire* in 2004.

They found large low-elevation fires were more likely to occur in years of above-average precipitation in winter (December–March) and above-average temperature in spring (April–June). Together, these two factors explained

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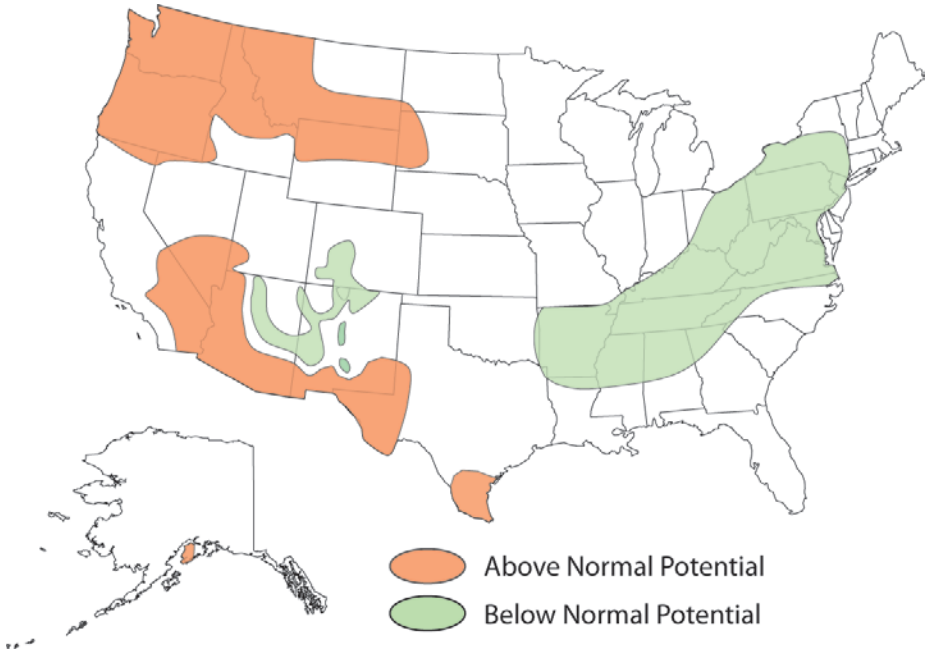

Figure 1. The western portion of the seasonal wildland fire potential map (April–August 2005) was produced during a workshop that ended on April 1. It highlights areas that fire specialists from a variety of geographic areas in the West consider to have either above-average or below-average fire potential during the coming season based on climate conditions and forecasts.

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about half the division's variation in fire size for grasslands and oak scrub at low elevations (below roughly 5,000 feet).

Meanwhile, winter precipitation falling as snow in higher elevations can provide moisture for months, depending on temperatures. As of mid-April, it seemed likely that most southwestern forests would have enough moisture to limit fire potential until the monsoon arrived, Maxwell said.

"Timber fuels are already very wet. It would take an act of God to melt the snow off in time to have an above-average season in the Southwest," said Maxwell, calling the period that began on October 1 an "epic water year" for Arizona and New Mexico. "Not that it couldn't happen—but it just doesn't seem likely that it would happen."

Southwest Coordination Center fire specialists will be keeping their eyes on forested areas that have succumbed to bug kill in recent years, however, especially in places where continuous grasses around the stands could import flames, he said. Although the bark beetle epidemic tapered off in much of Arizona last year compared to 2003, the bugs continued to wreak havoc on several national forests in New Mexico in 2004, especially around Santa Fe and Albuquerque. Given recent moisture, the downward trend for beetle mortality seems likely to continue during the 2005 season, which begins about now.

Maxwell reiterated that the workshop forecast relates specifically to "fire potential," with a myriad of other factors also affecting the total number of fires, the numbers of acres burned and the demand for firefighting resources.

The highest forest fire potential in the West lies within the northwestern quadrant of the country, fire specialists agreed. Ongoing long-term drought deepened its hold over the winter, particularly in Oregon, Washington, and Montana. Some mountains in the region set new record lows for snowpack. Oregon's Mt. Hood, for instance, had collected only 12 inches of its usual 52 inches of snow by mid-March. A heavy snowpack tends to melt gradually, keeping forests moist long after winter has ended.

"It has the same effect as raining every day," noted workshop participant Paul Werth, a consultant for the Northwest Interagency Coordination Center. "We won't have that this year."

Concerns about an early northern start have been allayed somewhat by April rains, at least.

"We've had some decent rain this spring west of the Cascades in the Pacific Northwest," Ochoa said last week, referring to this past month. "The rains that we're getting right now may help push back the start of fire season. I'm thinking right now that the Southwest fire season will begin to wane in July as the Pacific Northwest fire season starts to heat up."

Maxwell expressed similar sentiments, saying he hoped the Southwest Area Coordination Center could share resources with the Northwest by sometime in July. Resources include firefighting personnel and equipment.

Precipitation patterns since about autumn fit in well with expectations for El Niño years. However, this year's El Niño was weak enough that the strength of the signature surprised some climate experts, who attributed many of the details to other causes. (For more on this, see last month's *Southwest Climate Outlook* feature story).

In El Niño years, the southwestern United States tends to be wetter than average during autumn and winter, typically at the expense of the northwestern United States—at least until about spring. In April, even some northwestern states tend to have above-average precipitation, based on a workshop comparison to other weak El Niño years. This pattern holds during strong El Niño years, based on a comparison posted on the National Weather Service's Climate Prediction Center website (see web links box).

Temperatures during strong El Niño years, meanwhile, tend to be warmer across the northern half to two-thirds of the West, particularly from December through June. Climate Prediction Center forecasts generally called for an increased likelihood of above-average temperatures for spring and summer, with some of this expectation based on the ongoing trend toward warming temperatures in the West since about the mid-1970s.

Warm temperatures this past winter may have contributed to the herbaceous growth that is increasing the Southwest's fire risk. Without cooler temperatures to keep Sahara mustard populations at bay, it can shade out natives, explained Mark Dimmitt, the natural history director at the Arizona-Sonora Desert Museum.

New Mexico's average temperature from January–March was 41.6 degrees Fahrenheit, several degrees higher than the mean of 38.8 for this three-month time frame, according to a National Climate Data Center website tool that uses pro-

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visional data for comparisons to instrumental records going back to 1895.

Similarly, Arizona's average temperature during this time frame was 48.1 degrees, compared to the long-term average of 45.7 degrees.

Land managers worry about the ubiquitous spread of invasives like Sahara mustard and red brome into desert ecosystems. The fire they import can be lethal to saguaros, especially young ones.

Besides influencing plant distribution, high temperatures can influence fire regimes by increasing evaporation rates. Higher rates speed up the desiccation of plants and logs, making them more flammable. Managers often measure moisture levels of logs to gauge fire risk.

On a positive note, the high temperatures and sparse rainfall of May and June create a temperature gradient that helps pull the North American Monsoon system into the Southwest. While some research links abundant southwestern snowpack to weaker monsoons, other research links low Pacific Northwest snowpack to stronger monsoons. Combining the two studies would create a mixed signal for this year. There's also a slight correlation between El Niño years and somewhat weak monsoons.

Sahara mustard *(Brassica tournefortii)* has invaded many southwestern deserts this spring, such as the Bouse Dunes in western Arizona (left) where wildflowers used to bloom. The yellow-flowered plant is most common in wind-blown sand deposits and in disturbed sites such as roadsides. Sahara mustard grows faster and larger than native annuals and shades out most of them, such as the sand verbena (right, *Abronia villosa*). Photos by Mark Dimmit.

Still, summer precipitation patterns—including the timing and strength of the monsoon—remain notoriously difficult to predict. Many climatologists call this the "spring barrier," referring to the challenge of making a skillful summer climate forecast in spring.

The main problem stems from the importance of El Niño to skillful forecasting, and the unpredictability of what this system will do after the transition season of spring, explained Kelly Redmond, a climatologist with the Western Regional Climate Center in Reno, Nevada.

"It's a little bit like a clock getting reset, where the memory of what happened before tends to get lost," Redmond said. "Each year you've got to go through it again. So it's least possible to predict periods where the spring is one of the intervening seasons."

At any rate, fire managers will be updating outlooks on fire potential throughout the season to take into account evolving climate and weather conditions. Updates and the complete fire potential outlook for the Southwest can be accessed at the Southwest Coordination Center website, and the National Predictive Services Group website provides national updates and links to regional reports (see box for addresses).

The annual National Seasonal Assessment Workshop was co-hosted by the NOAA-CIRES Climate Diagnostics Center and the Western Water Association (WWA). The California Applications Program (CAP) also contributed to the workshop. The WWA, CAP, and CLIMAS all operate under NOAA's Regional Integrated Sciences and Assessments program, designed to improve the link between climate sciences and society.

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Resources on the Web

- Arizona-Sonora Desert Museum photos and information on Sahara mustard: http://www.desertmuseum.org/programs/flora_bratou-gallery.htm
- National Climatic Data Center web-based tool for climate comparisons: http://www.ncdc.noaa.gov/oa/climate/research/cag3/state.html
- National Predictive Services Group website: http://www.nifc.gov/news/pred_services/Main_page.htm
- Climate Prediction Center comparison of El Niño and La Niña years in the West: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/states/AZ.html
- National Seasonal Assessment Workshop website (proceedings from the workshop should be available as a pdf by the end of May): http://www.ispe.arizona.edu/climas/conferences/NSAW/details.html
- Southwest Climate Outlook feature article archive: http://www.ispe.arizona.edu/climas/forecasts/swarticles.html
- For Southwest Coordination Center full report of 2005 fire potential: http://www.fs.fed.us/r3/fire/swapredictive/swaoutlooks/swaoutlooks.htm