The Four Peaks Post

Winter 2013-2014

National Weather Service — Phoenix, AZ

Winter Edition of The Four Peaks Post Newsletter!

By Charlotte Dewey, Meteorologist Intern

Winter in the Desert Southwest may have a completely different "feel" compared to the rest of the country; as we're not blanketed by snow storms or sub-zero temperatures, but by definition, winter is still here. Cooler (relative) temperatures, shorter daylight hours and so many outdoor activities are things we count on during the winter months in Arizona. The spring and summer months are on the horizon, though.

We look forward to many more newsletters coming out with great information that will hopefully be helpful and informative.

Image credit Dave Dilli Photography 2010

Inside this issue:

Office Leadership

Meteorologist in Charge

Gary Woodall

Warning Coordination Meteorologist

Ken Waters

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Vacant

Questions:

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Southwest Climate Corner:

By Mark O'Malley, Forecaster/Climate Science Program manager

While much of the nation has experienced a very harsh winter, the Southwest is closing out the season as one of the warmest and driest on record. For the meteorological winter season (defined as the months of Dec-Jan-Feb), both Phoenix and Yuma had their 2nd warmest winter seasons on record (since 1895 for Phoenix and 1876 for Yuma). This winter was characterized by prolonged warmer than average weather with numerous record highs, and very limited cold outbreaks and freeze threats.

Only a few storm systems affected the region through the entire winter season, and rainfall totals during the winter were 8th driest in Phoenix and 11th driest in Yuma. (Image on next page)

Phoenix Winter Season Temperatures

Avg Max T

Year	Dec	Jan	Feb	Season
1980-1981	74.9	70.4	74.6	73.3
2013-2014	67.6	73.1	76.8	72.5
2005-2006	68.9	70.4	74.8	71.4
1985-1986	67.6	74.2	72.1	71.3
1933-1934	69.0	69.2	74.6	70.9

Avg Min T

Year	Dec	Jan	Feb	Season
1991-1992	48.2	46.4	52.1	48.9
2004-2005	45.6	49.0	51.4	48.7
2002-2003	45.4	49.3	50.3	48.3
1992-1993	44.6	49.8	49.6	48.0
2013-2014	45.0	46.7	52.0	47.9

Avg Daily T

Year	Dec	Jan	Feb	Season
1980-1981	61.3	59.1	61.3	60.6
2013-2014	56.3	59.9	64.4	60.2
1985-1986	55.9	61.4	61.0	59.4
2002-2003	55.2	62.0	59.4	58.9
2005-2006	56.8	57.7	61.8	58.8

Yuma Winter Season Temperatures

Avg Max T

Year	Dec	Jan	Feb	Season
1980-1981	76.2	74.5	77.9	76.2
2013-2014	69.2	76.5	79.4	75.0
1985-1986	70.6	76.9	77.0	74.8
1958-1959	77.7	74.7	72.1	74.8
1950-1951	78.5	70.5	74.5	74.5

Avg Min T

Year	Dec	Jan	Feb	Season
2004-2005	48.5	50.3	53.0	50.6
2013-2014	47.2	49.8	53.2	50.1
1994-1995	45.7	48.0	55.0	49.6
1995-1996	48.1	46.8	53.5	49.5
1991-1992	47.7	47.3	53.5	49.5

Avg Daily T

Year	Dec	Jan	Feb	Season
1980-1981	62.7	61.9	63.3	62.6
2013-2014	58.2	63.1	66.3	62.5
1985-1986	58.2	63.8	63.6	61.9
1995-1996	59.9	59.6	64.8	61.4
1979-1980	59.6	59.9	63.9	61.1

(Continued next page)

Climate Corner (Continued)

Phoenix Winter Season Rainfall

Total Precip

Year	Dec	Jan	Feb	Season
2005-2006	0.00	0.00	0.00	0.00
1999-2000	0.00	0.01	T	0.01
1911-1912	0.11	0.00	0.00	0.11
1963-1964	T	0.22	0.01	0.23
1899-1900	0.08	0.11	0.04	0.23
1920-1921	T	0.13	0.11	0.24
1960-1961	0.07	0.23	0.01	0.31
2013-2014	0.39	0.00	0.00	0.39
1971-1972	0.47	0.00	T	0.47
1903-1904	0.14	0.11	0.26	0.51

Yuma Winter Season Rainfall

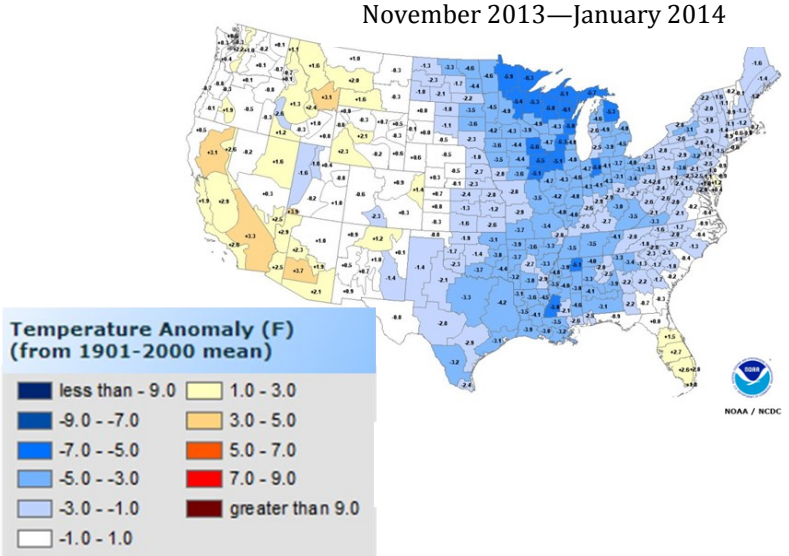
Total Precip

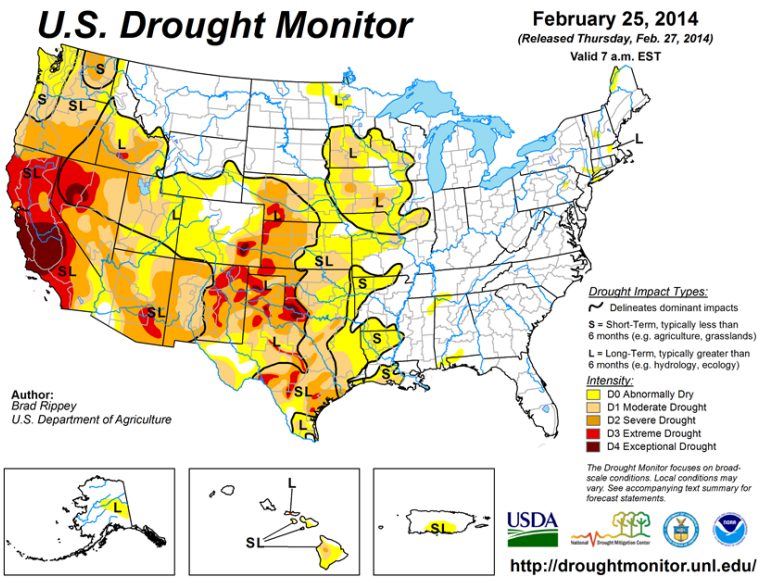
Year	Dec	Jan	Feb	Season
2006-2007	0.00	T	T	T
2005-2006	0.00	0.00	T	T
1911-1912	T	0.00	T	T
1903-1904	T	0.00	T	T
1884-1885	0.00	0.00	T	T
2001-2002	0.01	T	0.00	0.01
1875-1876	M	0.00	0.06	0.06
1970-1971	0.01	0.04	0.03	0.08
1955-1956	T	0.04	0.06	0.10
1953-1954	T	0.05	0.05	0.10
2013-2014	0.11	T	T	0.11

While some may lament about the lack of winter weather locally, it's likely much better than the alternative. Much of the rest of the United States was significantly colder than normal this winter as can be seen in the following map (bottom left). Temperature anomalies showing how "out of the norm" temperatures were across the nation.

Our local winter dryness was actually very common across the majority of the western United States. This lack of precipitation has pushed the drought measure into the severe to exceptional category across California, with healthy amounts of snowfall mainly limited to the Rockies of Colorado, Wyoming, and Montana.

Divisional Temperature Anomalies
November 2013—January 2014





Preparedness and Awareness Events

By Charlotte Dewey, Meteorologist

From now through the start of our Monsoon Season (June 15th), there are numerous Preparedness and Awareness campaigns running to help educate on how to prepare, plan for and learn the warning signs for severe weather events when they occur.

"NOAA's Weather-Ready Nation initiative is about building community resilience in the face of increasing vulnerability to extreme weather and water events. As part of the Weather-Ready Nation initiative, NOAA, along with partners such as the Federal Emergency Management Agency (FEMA), wants to motivate individuals and communities to take actions that will prepare them in the event of a weather disaster and to share their preparedness steps with others. These actions can save lives anywhere - at home, in schools, and in the workplace before tornadoes, hurricanes, and other extreme types of weather strike. " -NOAA's Weather Ready Nation Initiative

Mark your calendars so you can learn and spread the word.

National Severe Weather Preparedness Week: March 2-8, 2014
National Flood Awareness Week: March 16-22, 2014
Arizona Wildfire Awareness Week: March 30—April 4, 2014
Air Quality Awareness Week: April 28—May 2, 2014
National Heat Awareness Day: May 23, 2014
Arizona Monsoon Awareness Week: June 8 –13, 2014
National Lightning Safety Awareness Week: June 22-28, 2014

Check out this link, which has a weather preparedness events calendar both nationwide and on a state scale: http://www.nws.noaa.gov/om/severeweather/severewxcal.shtml

Skywarn Spotter Training

By Austin Jamison, Forecaster/Spotter Focal Point

Skywarn is a partnership between the National Weather Service and citizen volunteers. Spotters are volunteers that provide highly valuable information that is not available from any other source. Though we have sophisticated technology such as Doppler radar, satellites, and computer models, those have limitations. Using these tools, we can infer that hazardous weather is occurring but we don't know for sure what is happening on the ground. For instance, we can infer that a thunderstorm is producing wind damage but without a Spotter report we don't know what the extent of the damage is or even if the winds were strong enough to cause damage at all. Thus, the Spotters provide us with ground truth information. We use this information as part of the warning decision process. By issuing warnings, we alert the public to dangerous situations so they can take measures to protect life and property.

Prior meteorological training is not necessary in order to become a Spotter. The free, two hour class will teach attendees everything they need to know in order to be successful. Spotters are typically adults but can be as young as high school age. People who enjoy paying attention to the weather or who are outdoors a lot are encouraged to become volunteer Skywarn Storm Spotters.

We have posted a schedule of the training classes in our forecast area. Most offerings have been finalized but we may add a few more. Keep checking periodically to see where we have added classes. You can find that schedule on our website, weather.gov/phoenix. It lists the dates, times, locations, and pre-registration requirements. You can find it by accessing the "Skywarn" link on the left hand side toward the bottom or by going directly to the URL below.

The majority of classes will be Standard/Basic classes and are suitable both for new Spotters and as refresher training for those that have attended a class previously. Topics covered in the Spotter classes include how thunderstorms work, the Monsoon, properly identifying visual clues to hazardous weather, various safety topics, and procedures to report severe weather to the National Weather Service. Spotters need to attend a class once every two years to stay current. If so, they are eligible to attend one of the Advanced classes which explores the underlying meteorological science of severe storms.

For more information, and a schedule of our upcoming classes please visit:

http://www.wrh.noaa.gov/psr/general/skywarn/index.php

For any questions about the program, send an email to austin.jamison@noaa.gov or ken.waters@noaa.gov or call 602-275-0073 (option 5).

Polygons for River Flood Warnings

By Mike McLane, Senior Service Hydrologist

The National Weather Service Phoenix Forecast Office recently implemented a change that will affect how river flood warnings are displayed on our watch, warning, and advisory (WWA) map. The WWA map is the graphic initially displayed when you go to the home page of our website (www.weather.gov/phoenix). Up until now, if there was river flooding, the entire county would be highlighted in green on the WWA map. This is shown in the graphic on the left in figure 1 below. Typically, however, the area affected by river flooding is significantly less than the geographic area highlighted.

NWS Phoenix river flood warnings and river flood statements issued from now on will include latitude and longitude coordinates that will define a polygon outlining the area where river flooding is expected. Polygons are already included in other NWS warning products, such as flash flood and severe thunderstorm warnings. The polygon will display on the WWA map as a short green ribbon. This is shown inside the red oval and in the inset on the right graphic in figure 1 below. Using polygons, we will now be able to better depict where flooding is occurring or is expected to occur within a county.

Figure 1 - Old vs New Way of Depicting River Flood Warnings on NWS Phoenix Watch, Warning, and Advisory (WWA) Map

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Polygon Flood Warnings (Continued)

Polygon information will be appended as latitude and longitude pairs at the bottom of river flood warnings and statements as seen in the green rectangle in figure 2 below. Latitude and longitude are displayed in hundredths of a degree, with the decimal point omitted. For instance, in the warning below the first set of coordinates represent a point at 34.05N and 112.08W. North latitude and west longitude are assumed in the coordinate entries.

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AZC013-220925-
/O.NEW.KPSR.FL.W.0001.100121T2125Z-100123T0844Z/
/AFRA3.3.ER.100121T2108Z.100122T1100Z.100123T0244Z.NR/
225 PM MST THU JAN 21 2010

THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A

* FLOOD WARNING FOR
  THE AGUA FRIA RIVER ABOVE ROCK SPRINGS.
* UNTIL LATE FRIDAY NIGHT...OR UNTIL THE WARNING IS CANCELLED.
* AT  2:00 PM THURSDAY THE STAGE WAS 15.6 FEET.
* FLOOD STAGE IS 16.0 FEET.
* RECORD FLOODING IS FORECAST.

&&

                FLD   OBSERVED          FORECAST 7AM
LOCATION        STG   STG  DAY TIME     FRI     SAT     SUN

AGUA FRIA RIVER
  ROCK SPRINGS  16  15.6 THU 02 PM    30.7     9.8     7.2

&&

LAT...LON 3405 11218 3404 11211 3389 11222 3393 11229
      3399 11223

$$
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Figure 2 – Portion of NWS River Flood Warning Showing Polygon Latitude / Longitude Coordinates

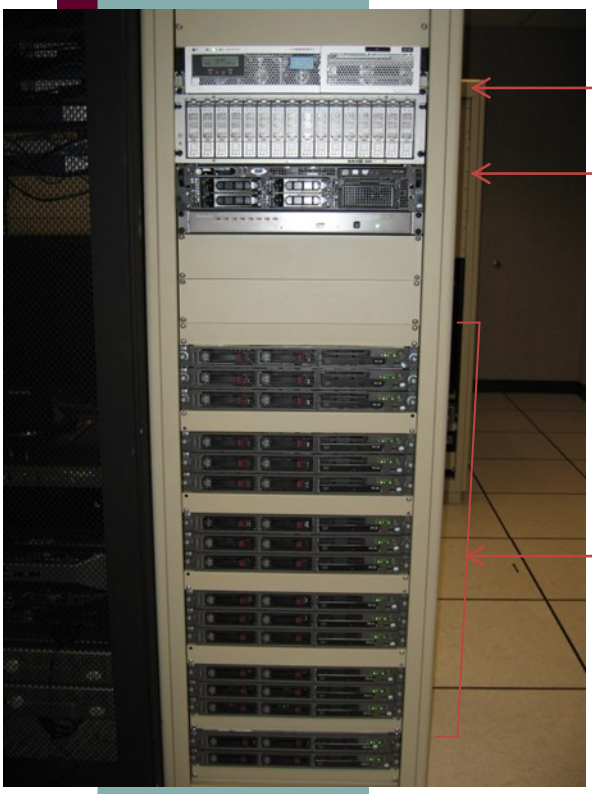
River flood warnings can currently only include a maximum of six latitude / longitude pairs. Due to this restriction, polygons will sometimes need to be larger than the area where flooding is occurring or is anticipated to ensure they include the entire area where the flood threat is expected. This is especially true where the river is not straight, i.e. has many bends. Polygons will also, by necessity, need to be made artificially large to ensure they remain visible on the WWA map. Despite these restrictions, the benefit from this change should be less highlighting on the WWA map, with the area affected by river flooding better identified.

Please contact the National Weather Service Phoenix Forecast Office if you have any questions or concerns with this change in our hydrological services.

Phoenix WFO Beowulf Cluster Project

By Mike Schumacher, Electronics Technician

We started the Beowulf server cluster project to see if local modeling processing time could be shortened. A Beowulf cluster is a group of identical computers that are networked into a smaller, local area network that allow processing to be shared among them. It also has the future ability to run a localized area DSS support modeling. Tony Harper, Mike Schumacher, and Walt Jameson worked on the design, building, and installation of the hardware using surplussed AWIPS (Advanced Weather Interactive Processing System) equipment and hardware so there was minimal cost to the Office budget. Dave Brown, Dan Leins and Charlotte Dewey are performing the software configuration and modeling testing. The cluster consists of: 1 Master server (8-xeon processors), 17 Slave servers (2-xeon processors each, 34 total processors) and 1 NAS (network attached storage) storage server [12-500mb hard drives configured for 6GB storage, 4 500mb drives for spares).



The Beowulf cluster philosophy brings multi-tasking to new levels: The Master breaks down the tasks and assigns them to its processors and Slave processors to do the work. When completed, the Slaves send their results back to the Master for storage and use. Our system could theoretically do 43 tasks at 1 time.

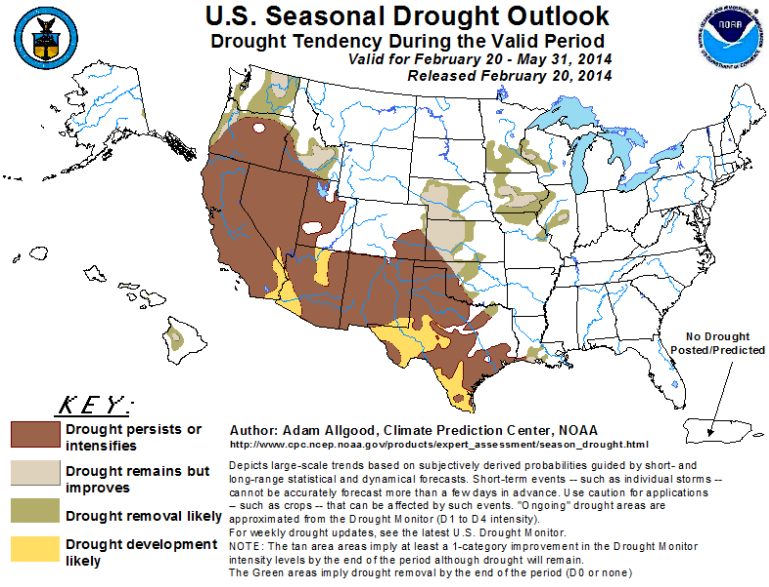
Initial full model test runs so far have shown an improvement by a factor of 3 (50+ min. down to approximately 16 minutes) using only 7 of the 18 servers(19 processors out of 42 processors available). Due to using an older and slower network switch, we are limited in this testing phase but we are planning on purchasing a newer and faster switch which should increase processing time.

What this all means for us on the operations floor: benefits include faster access to local model output when creating the forecast and assistance with the forecast process and decision support, are just a few.

Arizona Fire Season 2014

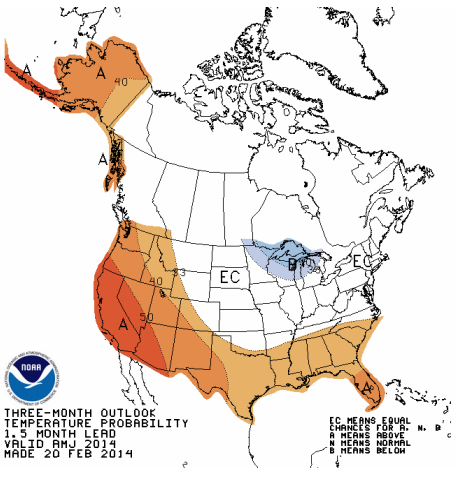
By Valerie Meyers, Incident Meteorologist/Forecaster

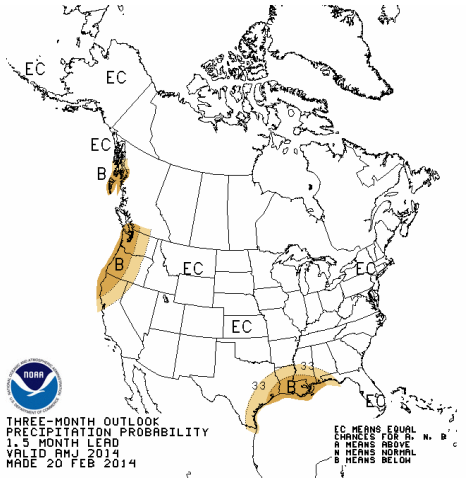
This year has the potential to be another above average fire season for many portions of Arizona. There are several key elements that support a critical 2014 fire season. These factors include a lack of precipitation and snow pack, the overabundance of cured (dead) grasses and small shrubs from previous years, the heavy loading of dead and downed vegetation resulting from over a decade of persistent drought, and finally the rapid onset of warmer temperatures across the region that will continue to stress many areas in the state before the onset of the summer monsoon.



Over the past year or two, the El Niño-Southern Oscillation (ENSO) pattern has gradually transitioned from a persistent La Nina influence to one that is more neutral. This has allowed for some intermittent periods of significant precipitation to fall across the region, but overall yearly precipitation totals have remained well below normal and continue to exacerbate the drought status across the southwest United States, especially in California.

Even though the first part of March has been cooler and moist, the current trend and outlook from the Climate Prediction Center for April through June (shown below) points to a re-establishment of very warm and dry conditions with high pressure strongly establishing itself over the southwest United States. Under this pattern, the jet stream and associated low pressure systems would generally remain well north of our area, thus leading to fewer windy episodes and much warmer temperatures.





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Arizona Fire Season 2014 (Continued)

With lighter wind, the potential for any fire to rapidly spread and grow would be somewhat less. But that one factor alone doesn't mitigate the fire danger, or change the fire season outlook. The short-term benefits of recent precipitation could have detrimental effects in the long term as increased soil moisture and warmer weather will promote grass and brush growth, creating a heavier and more continuous fuel bed going into the summer months.

Keep in mind, May and June is usually a transition period across the desert Southwest before the onset of the summer monsoon. This year it is more complicated to forecast as the longer term climate signal is now beginning to shift from an ENSO neutral pattern toward an El Nino phase of unknown strength. Right now the atmospheric circulation patterns that impact the West Coast are still not being driven by one climate forcing mechanism or another.

The graphics shown below issued by the National Interagency Coordination Center illustrate this uncertainty in significant fire potential for Arizona through June.