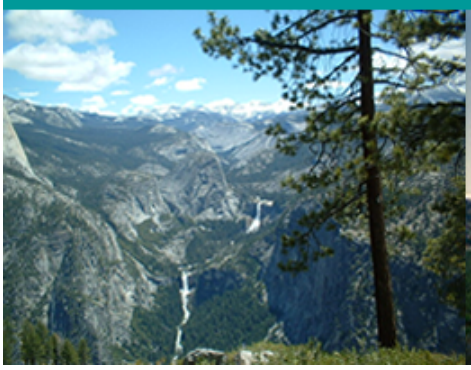
In The Clear

The Weather Newsletter For Interior Central California



Late Summer 2007 Edition | National Weather Service/Hanford, CA

Editor's Corner

Before I go any further, I'd like to thank the readers who submitted a number of comments on our previous edition of our office newsletter. Remember this newsletter is one of the many communications to serve you, our customers, better. Your feedback is valuable as it provides me with a way to further improve this newsletter.

Inside this edition, you'll find a look at some of the changes occurring to products we issue, a look back at some historical weather events from the past few months and past years as well as our continuing "series" on equipment to watch the weather at your own home or business. Also inside you'll find a variety of weather pictures from the past few months as well as scenes from various events our office has participated in.

Please continue to keep your comments coming and we look forward to hearing from you!

Sincerely,

Chris Stachelski
Newsletter Editor

A special thanks is extended to all of the staff members who contributed articles for this newsletter as well as to David Spector, the office webmaster. Lastly, a special thanks is also extended to Steve Mendenhall, Meteorologist In Charge, for his overview of this newsletter. All photos not credited within this issue were provided by the HNX staff.

The Vista Fire in Tulare County in late August 2007.

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Climate Services Changes

Chris Stachelski
Meteorologist Intern

Over the past few months, the Climate Services staffs, as well as our office webmaster, have been hard at work adding new and updated information to the local climate pages on our website. The biggest change that you may have noticed is the daily records for Bakersfield. Previously, the long standing historical records were based off of observations taken only at Meadows Field beginning in September 1928. However, daily observations of temperature and precipitation were maintained at the Santa Fe Rail Depot located at 14th Street and F Street from January of 1889 through September of 1937. Effective July 1, 2007 the historical database used to compile daily records for Bakersfield has been extended to include the data from the Santa Fe Rail Depot. This has resulted in a number of changes to the daily record values for Bakersfield as well as monthly and all-time extremes.

In addition, our website has also seen the addition of several new features. The Interior Central California Climate Calendar features 366 days worth of weather events across our area of responsibility. If you are curious about some of the more extreme weather events to impact our area this is a great place to check out and find out more information. Additionally, monthly precipitation tables have been complied to include data for all available years for Hanford, Merced, Madera, Visalia, Inyokern, Yosemite Valley and Lodgepole, with monthly snowfall data also available for the later two locations.

Air Quality Alert Products Begin Over the San Joaquin Valley

Steve Mendenhall
Meteorologist-In-Charge

The National Weather Service in Hanford recently expanded its partnership with the San Joaquin Valley Unified Air Pollution Control District. The forecast office began using the new Air Quality Alert (AQA) product header to relay health-related statements from the Valley Air District. Whenever an AQA is issued, it will appear on the National Weather Service in Hanford's office web site's clickable map as an area shaded in gray. The first such Alert went out on August 14th regarding smoke drifting across the central California interior from the Zaca and Tar Fires in Santa Barbara and Fresno Counties, respectively.

Here are some tips about what to do during an Air Quality Alert:

1. People with heart of lung diseases should follow their doctor's advice for dealing with episodes of unhealthy air quality.
2. Older adults and children should avoid prolonged exposure, strenuous activities, or heavy exertion as conditions dictate.

For more information on air quality, visit www.valleyair.org or call the nearest Valley Air District office at 559-230-6000 (Fresno) or 661-326-6900 (Bakersfield).

Implementation of Storm-Based Warnings in Central California

James Brotherton
Warning Coordination Meteorologist

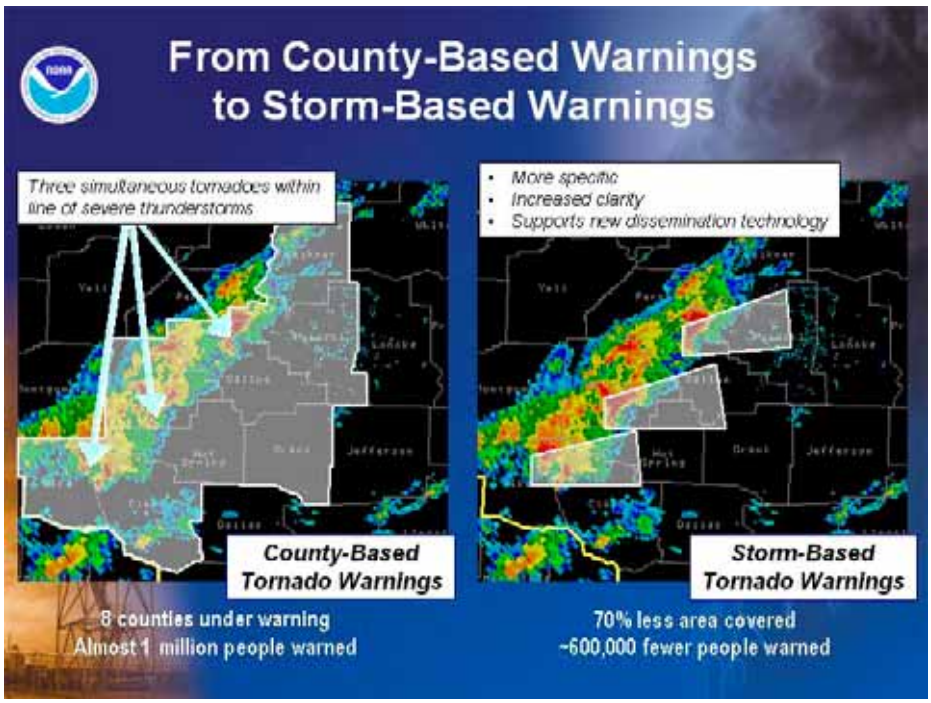
The National Weather Service Forecast Office in Hanford will officially implement a method of short-fused warnings called “storm-based warnings” on October 1, 2007. Training of the operations staff has been ongoing for the last few months so that every meteorologist is proficient in this new methodology.

This method of short-fused warnings (Tornado, Severe Thunderstorm, and Flash Flood Warnings) is rooted in the idea of issuing a warning based on the storm itself, versus the entire county (or counties) that the storm is expected to affect. This is accomplished by drawing a polygon in the expected path of the severe storm. The polygon represents an area where the maximum threat for severe weather exists and is defined by a shape with at least four sides. Prior to 2007, the NWS issued severe weather warnings based on counties only. For example, if a severe thunderstorm was going to move across southwest Tulare County, the entire county was placed in a severe thunderstorm warning. Under the polygon method, only the southeast section of the county would be in a warning. In addition, if the storm was also going to affect a small portion of northwest Kern County, that area would also be included. The important distinction is to recognize that a warning will be issued only for the specific area that will experience the related hazard, and not for the entire county.

Issuing storm based warnings offers several advantages. The graphic version of the warning allows you to clearly see the specific area that is under the threat for severe weather. Also, fewer people are needlessly warned for severe weather that will not affect their location. The new method of polygon warnings will be more geographically specific for these short-duration weather events. In partnership with the private sector, storm-based warnings will support a wider warning distribution through cell phone alerts, pagers, web-enabled Personal Data Assistants (PDA), etc. As depicted in the example on page 4, this change in warning operations will significantly improve the legitimacy and effectiveness of our warnings!

The polygons for storm based warnings are drawn by NWS Meteorologists based on where the greatest threat for severe weather is expected. The warning software then generates the text of the warning based on the polygon. Counties, cities, and other communities or landmarks affected by the warning are listed. The corners of the polygon are defined by a set of latitude and longitude points, and these points are displayed at the bottom of the text of the warning.

(Continued on Page 4).



Storm Based Warnings

Continued From Page 3

The integration of the storm-based warnings into our operations will be seamless. The only change you will note to the actual warning text will be at the end of the product, after the usual Latitude-Longitude information ("LAT-LON"), where there will be additional code that describes the tracking of the storm. If you have any questions about this change to our warning operations, please contact James Brotherton, the Warning Coordination Meteorologist, at 559-584-0583, ext 223. You can also read in more detail about this change at: http://www.weather.gov/sbwarnings/

1st Annual California Hazardous Weather Awareness Week, September 24-29

All six of the California NWS Weather Forecast Offices (Hanford, Sacramento, Eureka, Monterey, Oxnard, and San Diego), plus four surrounding offices (Phoenix, Medford, Las Vegas, and Reno) which are responsible for a portion of California, will be co-sponsoring the first-ever California Hazardous Weather Awareness Week.

The National Weather Service will be issuing Media notices daily, recording scripts on NOAA All-Hazards Weather Radio, as well as releasing flyers at community locations. Please encourage your local government office or agency to participate in this event by promoting the education of hazardous weather safety. Even though we live in California, we are not immune to the hazards of severe weather, winter storms, floods, tsunamis, extreme heat and extreme cold.

Through the Years…

A lot has changed over the years in the weather world from the instruments to the buildings used by the National Weather Service. Before our current office in Hanford opened in 1995 as part of a nationwide modernization project, the National Weather Service had offices in Fresno and Bakersfield. The history of the National Weather Service in Fresno can be traced back to 1887, when Sgt. J.R. Williams of the U.S. Signal Corps in Fort Davis, Texas proceeded on West to open what would become the National Weather Service office there. The observing site in Fresno was located downtown through the late 1800s and into the early 1900s before eventually moving to Maddux Field and later Chandler Field. It finally moved to the Fresno Air Terminal, which is now the Fresno Yosemite International Airport in 1949. In Bakersfield, weather observations by government personnel began in September 1928 when an office was established at Meadows Field to serve the growing needs of the aviation community. Today, weather observations are recorded by an ASOS, or automated service observing system at both locations and supplemented with human observation when needed.

Top left: This building at Meadows Field used to house the National Weather Service (then the U.S. Weather Bureau) in Bakersfield in April 1947. By January 1964, the office moved to a new building at the airport. In the left side of the middle photograph is a collection of weather instruments including a cotton region instrument shelter used to record temperature and two rain gauges (closer to the front). Bottom left: At the Fresno Air Terminal in January 1964, weather instruments can be seen in the center of the photograph just to the right of the small shed. An instrument shelter, rain gauge and wind vane are all noticeable in this picture. All photos in this picture were obtained from the archives of NCDC.

By mid-June, most of the Sierra's snowpack was gone and the patches left to be found were in the highest peaks along the crest. The above photo was taken not too far from Tioga Pass.

Dodging The Drops

2006-2007 Water Year Goes Into The Record Books As One Of The Driest On Record

Chris Stachelski
Meteorologist Intern

The final numbers are in and they confirm what has been apparent with precipitation trends over interior Central California over the past year: it's been a dry one. Precipitation totals across the area ranged from under 2 inches across parts of the Kern County deserts to just over 24 inches across portions of the southern Sierra Nevada. In the central and southern San Joaquin Valley, totals were generally between 3 and 6 inches. Overall, deficits were registered at all of the primary climate sites across the area with many locations seeing departures from normal of as much as 50 percent.

2006-2007 Water Season Totals

Location	Total
Auberry	13.03”
Bakersfield	3.06”
China Lake	1.68”
Coalinga	2.29”
Coarsegold	15.22”
Florence Lake	12.82”
Friant Dam	8.21”
Fresno	6.03”
Glennville	14.14”
Grant Grove	22.80”
Hanford	3.43”
Huntington Lake	28.72”
Inyokern	0.39”
Lemon Cove	8.65”
Lindsay	6.23”
Lodgepole	24.98”
Los Banos	3.62”
Madera	4.83”
Mariposa	20.55”
Merced	6.14”
North Fork	18.38”
Pine Flat Dam	10.57”
Three Rivers	12.82”
Wasco	3.05”

In Fresno, the total for the 2006-2007 water year was 6.03”, making it the eighth driest on record. Bakersfield recorded only 3.06”, which was the sixth driest water year ever. Hanford measured just 3.43” of rain for the water year, the 3rd driest ever.

Why were totals for the 2006-2007 water year so low? Monsoonal moisture, which is the primary source for precipitation in the summer months across the area, was scarce. Although some locations did see rainfall in July of 2006, August and September were dry in all places – with China Lake the lone exception as a trace of rain fell here in September. During the cool season when large scale storm systems are the primary source for precipitation across the area, factors still failed to come together to produce precipitation on more occasions than not. Often a dry northerly flow prevailed. Systems that approached were moisture-starved or high pressure built over the region allowing fair weather to dominate. Some shifts in the storm track occasionally occurred allowing for decent amounts of precipitation to finally fall across the region. This was the case in February 2007, when the snowpack in the Sierra was pushed to nearly 60 percent of normal as the storm track shifted further south. But overall the cool season ended much like it began, with March and April 2007 featuring many of the same reasons for a lack of precipitation the earlier part of the cool season had. At the close of April, snowpack in the Sierra was only 24 percent of normal. By the time April had ended the lack of precipitation across interior Central California had resulted in a wide variety of impacts. Businesses in the higher terrain dependant on the snow were forced to close operations early and the famed waterfalls in Yosemite Valley peaked about a month earlier than normal. By May, most areas saw their final precipitation of the water season, and in most spots outside of the mountains and foothills, only trace amounts were registered. Just how will the 2007-2008 water year turn out? Only time will tell.

Reports prepared by Kevin Durfee, the Hydrology Focal Point at NWS Hanford, were used to compose parts of this article.

Measuring Wind Speed: The Anemometer

Jim Dudley
Lead Forecaster

In the last issue, we talked about temperature sensors. This time we'll take on the topic of measuring wind speed and direction, by using the instrument with a "funny" name, the anemometer. Accurately measuring wind speed can be tricky depending on your weather station's location. The standard height for an anemometer is 10 meters or approximately 33 feet above ground level. Ideally, the instrument should be in an unobstructed location (i.e. not behind buildings or trees) where it can measure the surrounding wind flow. Both the height and exposure requirements can make the "perfect" installation very difficult, if not impossible for many people. My suggestion is to do the best you can given your situation. For my home weather station, I have the sensor height at 30 feet (two standard 10 foot antenna poles placed on my 10 foot high roof) and this seems to work just fine. I do have some trees about 25 feet away from my anemometer, but in lieu of cutting down my neighbor's trees, I really can't alter my wind exposure. Again, my best advice is to "Do the best you can with what you have". Below is a picture of an "ideal" anemometer installation from the Tehachapi area.

Questions? E-mail me at james.dudley@noaa.gov

Sights of Smoke

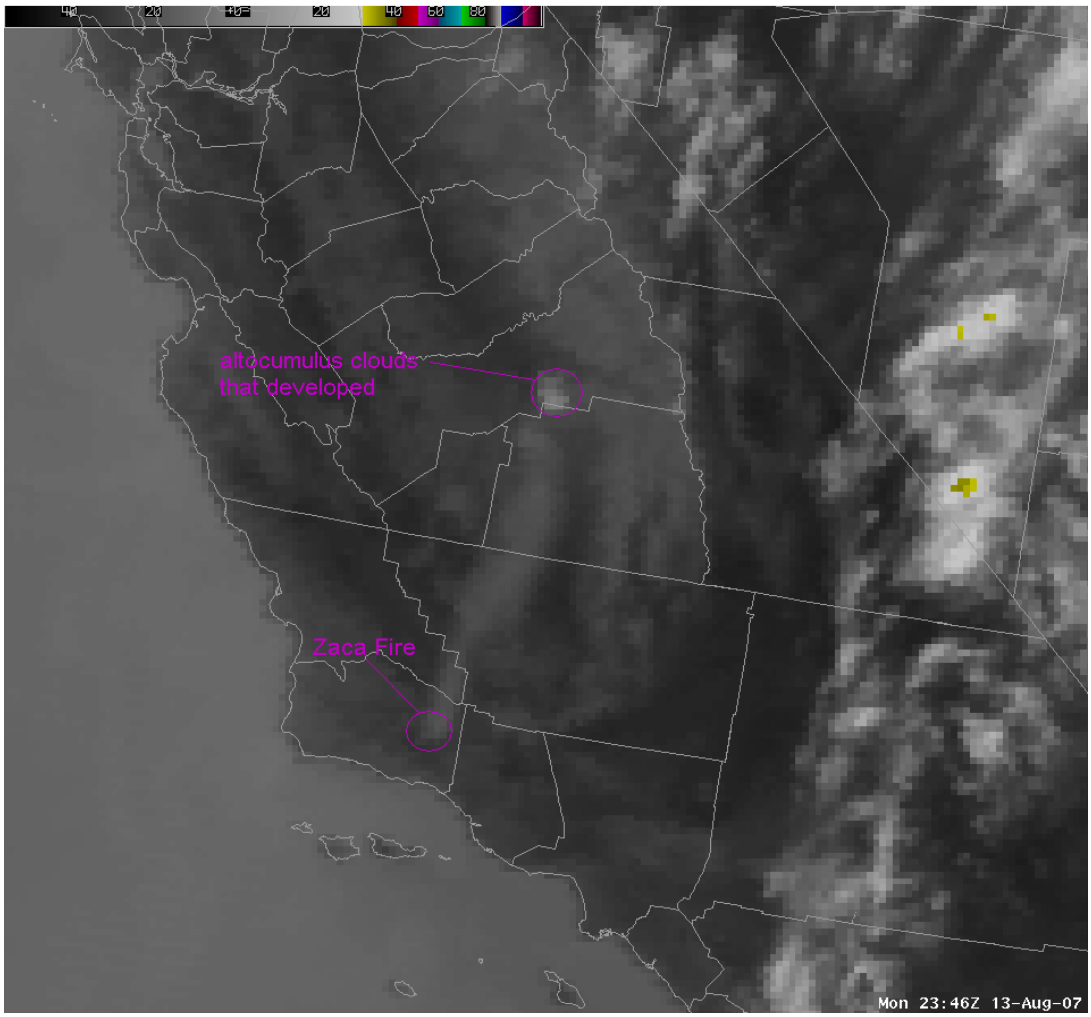
Chris Stachelski
Meteorologist Intern

During mid-August 2007, the sky over the central and southern San Joaquin Valley often had an eclectic mix of colors as the smoke plume from the Zaca Fire drifted northeastward. The above photo was taken around sunset in Northwest Fresno.

The typical sunny summertime sky over the San Joaquin Valley took on a different appearance during several afternoons and evenings in mid-August as smoke from the Zaca Fire drifted into the area. Although the Zaca Fire is located in Santa Barbara County, southwest winds in the upper levels of the atmosphere transported the smoke plume northeastward across the Temblor Range and pushed it into the sky over the central and southern San Joaquin Valley. This smoke plume often was more pronounced during the afternoon and evening hours as the fire flared up with heating of the day.

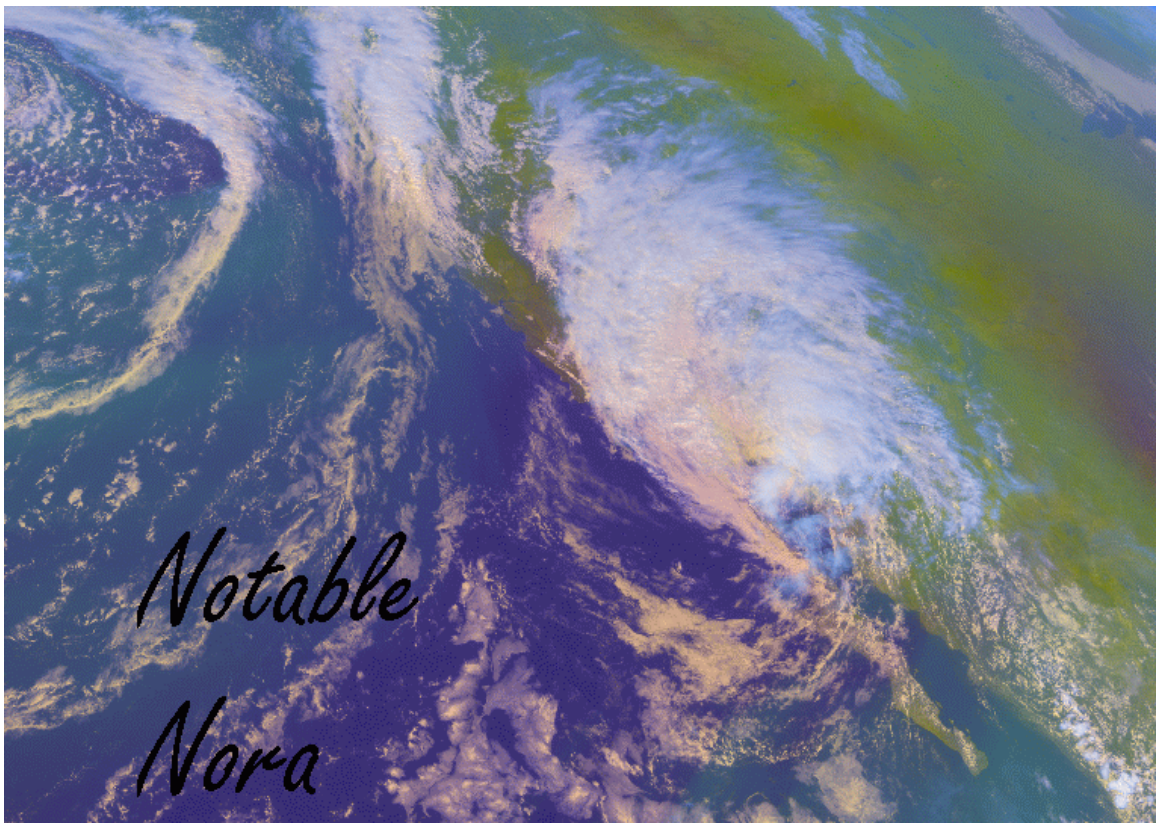
With the smoke plume typically above 12,000 feet, and occasionally as low as 8,000 feet, it often took on the appearance of cirrus clouds, which are high level clouds. However, the color of the plume, often brownish in appearance, was an indicator that the sky over the valley was being obscured by smoke.

During the afternoon and evening of August 13th, however, there was more than just smoke in the sky over the central and southern San Joaquin Valley. A pocket of moisture, or water vapor, was also present in the upper levels of the atmosphere. When the smoke plume reached the layer where this moisture was



Visible satellite picture of the Zaca Fire smoke plume and smoke induced altocumulus clouds.

located, it resulted in the water vapor condensating on the smoke particles and resulted in the development of clouds. With the above set-up occurring during the peak heating of the day, all of the ingredients came together for smoke induced altocumulus clouds to develop over the central San Joaquin Valley. These altocumulus clouds are shown on the visible satellite image (above) over southern Fresno County and could be seen in the distance looking northward from the National Weather Service Office in Hanford (photo at the right).



Chris Stachelski
Meteorologist Intern

In September 1997 the state of California was visited by an unusual tourist from the tropics. Tropical Storm Nora moved across the lower deserts of the Golden State bringing gusty winds and soaking rains. Although impacts were minimal from Nora across interior Central California, it still ranks as one of the more unusual weather events in the state.

In a state where sunshine, fog and low clouds are often the most associated images when one mentions the word “weather”, it’s hard to imagine that a tropical storm would be something Californians would ever have to deal with. However, historical records show that the state of California is not as immune to tropical weather systems as one may think. During the months of August, September and October, several systems have moved into the state or passed close enough to spread in rainfall and in some instances bring gusty winds. The majority of these systems were either tropical depressions or storms that were once tropical in nature but had since lost their tropical characteristics and were thus extratropical in nature.

In 1939, a tropical storm (tropical storms and hurricanes were not named back then) made landfall at Long Beach, California with maximum sustained winds of 50 mph. This is the only known instance since reliable weather records began of a tropical storm making a direct landfall in the state of California. The storm dropped over 5 inches of rain in Los Angeles and caused damaging floods in

the L.A. Basin. Although, no hurricanes have directly struck California, historical research by NOAA meteorologists at the Hurricane Research Division in Miami, Florida has shown that a hurricane in all likelihood came close enough to bring damaging winds and heavy rains to Southern California in early October 1858 but remained offshore the entire time. Rainfall from this hurricane reached into the San Joaquin Valley with rain falling at a rate that was “unusually great” and totaling some 7 inches at Tejon.

In the middle of September 1997, a weather disturbance was located about 285 miles southwest of Acapulco, Mexico. This disturbance became better organized and eventually strengthened into Hurricane Nora by September 18th as it moved northwest. Although Nora would see fluctuations in intensity before making landfall, much of this was due to moving over areas of cooler and warmer water temperatures. Nora eventually was turned more towards the north by the upper level steering flow in the atmosphere and eventually made a series of landfalls in Baja California as a hurricane on September 25th. Although Nora gradually weakened as the system moved northward across Baja California, it still was a tropical storm when it moved across the United States-Mexico border on the 25th. Nora continued to weaken as the system moved further north and was cut off from its energy source of warmer water and into a more hostile upper level wind environment. By the time Nora had reached a position between Blythe and Needles, the system was downgraded to a tropical depression. However, Nora is still only the second tropical storm ever to move across a land area within the state boundaries of California. Nora eventually weakened further as the center of the system moved northeastward across the southwestern United States.

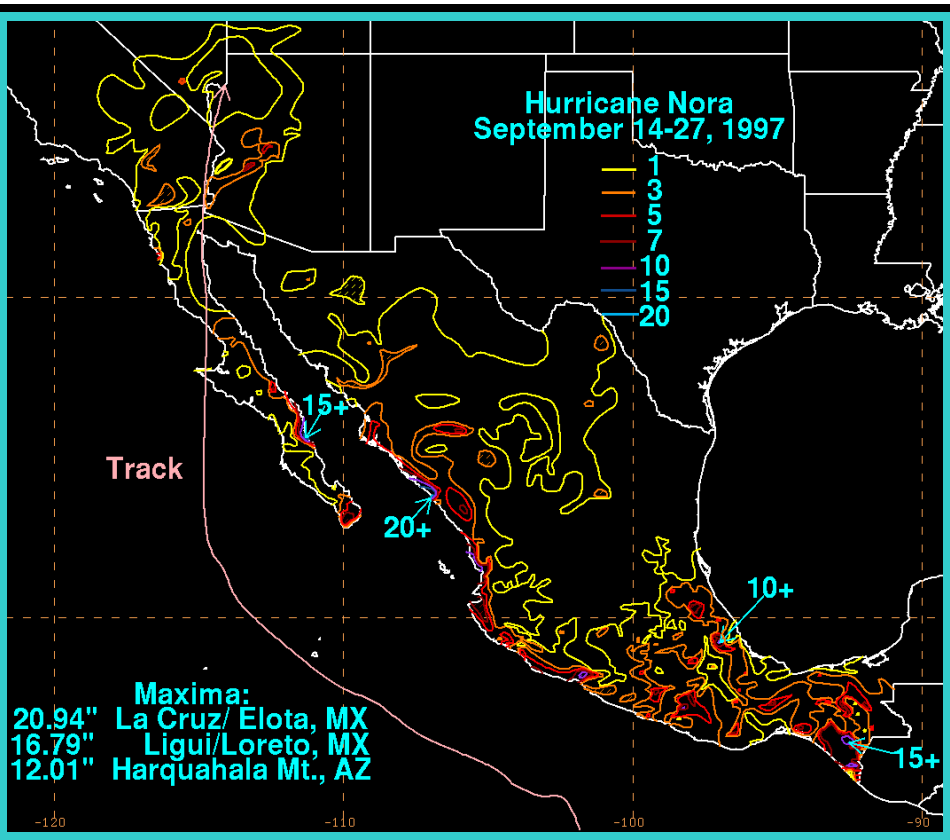
Across interior Central California, the effects of Nora were most noticed in southern and eastern portions of the region. Over an inch of rain fell in parts of the Kern County deserts and caused some minor street flooding in the China Lake area. Rainfall was reported in the central and southern San Joaquin Valley where only a few hundredths of an inch fell. Amounts were generally between a tenth and a half of an inch over the higher terrain areas.

Nora’s effects were much more pronounced further south in California. About 125,000 people lost power in the Los Angeles area and street flooding occurred in the San Diego, El Centro, Indio and Palm Springs areas. A few roads were either washed out or closed due to high water in Death Valley National Park and about $4.5 million in damage was suffered by crops alone in Imperial County.

Although Nora was an unusual weather event, moisture associated with tropical systems getting into southern and central California is not that uncommon. This moisture can bring rainfall to interior Central California at a time of the year when large scale weather systems, such as fronts, are absent at this latitude and bring hefty rates in a short period of time under the right circumstances.

Overall, a variety of meteorological factors are in place that work against tropical storms and hurricanes being able to make landfall in California. Water temperatures, the primary source needed to maintain tropical systems are often much to cool off the coast of California. Typically, water temperatures of at least 80 degrees are needed to maintain a tropical system, and ocean water temperatures off the coast of Southern California typically at best are in the lower 70s. In addition, the upper level steering winds in the atmosphere that guide hurricanes usually points them away from the state in a westward direction. In the

case of Nora, the right conditions of water temperatures and upper level winds were in place at the right time to allow the system to make it into the state. However, most often the cooler water temperatures and unfavorable winds aloft in the atmosphere create an environment that is hostile for tropical systems to survive in, and thus the few tropical systems that have approached California have all either been in a weakening state or transitioned to extratropical status.



Track and rainfall of Hurricane Nora (courtesy HPC).

It is important for residents in interior Central California to realize that the primary threat from tropical systems is much like that of the monsoon – heavy rainfall that could in the right situations induce flash flooding. While other elements associated with severe weather – strong winds or tornadoes are even possible in the right conditions, the threat of flooding in interior areas remains the greatest threat to lives and property. While the overall odds of a named tropical system affecting the state of California is extremely low in any given year, history shows it has happened before and what has happened in the past is often a valuable tool in planning and preparing for the future.

Historical information in this report was obtained from the National Weather Service in Oxnard's website, the Tropical Prediction Center's website and NCDC.

Rainfall Totals Associated with Tropical Storm Nora September 25-26, 1997

China Lake Naval Air Station	1.49”
Edwards Air Force Base	1.45”
Inyokern	1.32”
Mojave	0.77”
Tehachapi	0.45”
Lebec	0.32”
Lodgepole	0.29”
Grant Grove	0.11”
Tejon Ranch	0.10”
Bakersfield	0.05”
Porterville	0.03”
Fresno	0.02”

Out and About…

Over the past few months several members of our staff took place in a variety of outreach events across the area from spotter talks to presentations to school groups. These events help the National Weather Service in serving our mission. For information on becoming a Skywarn Spotter, contact Jim Dudley at James.Dudley@noaa.gov or James Brotherton, our Warning Coordination Meteorologist, at James.Brotherton@noaa.gov.

Above top: Jim Dudley leads a Skywarn Spotter presentation in Bakersfield in late July. Below: Kern County residents learn about severe weather and how to report it.

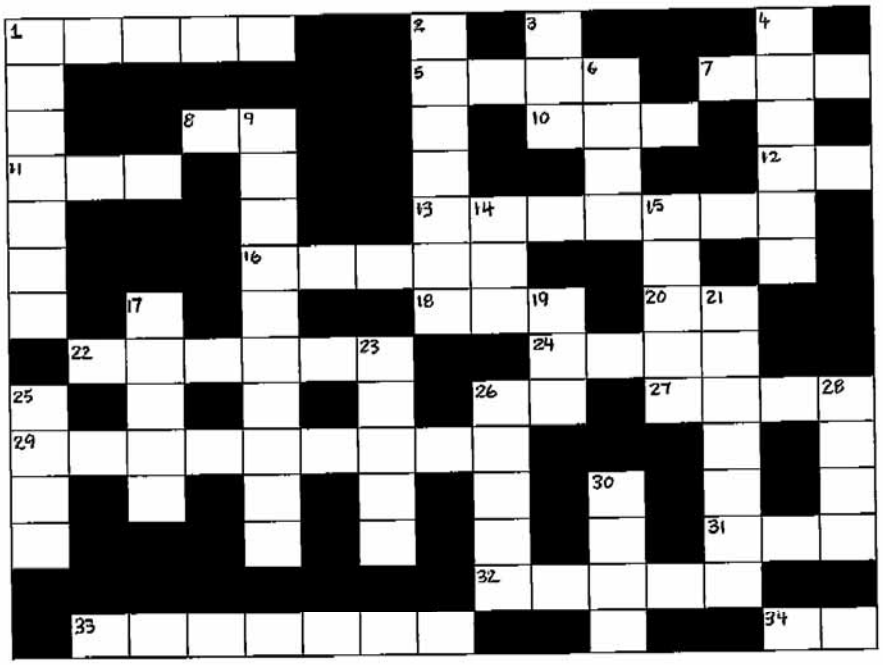
Science on a Sphere®

There was quite a sight to see at this year's California State Fair in Sacramento. A variety of indoor exhibits were located in Building B at the Cal Expo and among them was the National Oceanic and Atmospheric Administration's Science on a Sphere® display. This exhibit was organized as a joint effort between the parent agency of the National Weather Service, NOAA, and the California Department of Water Resources. Under the invitation of the National Weather Service office in Sacramento and the California-Nevada River Forecast Center, four meteorologists made the trip from the National Weather Service office here in Hanford to assist with this unique exhibit. Science on a Sphere® offers a three dimensional view of the earth with a variety of data sets displayed on it via a system a projectors. Data sets include satellite images, ocean water temperatures, temperature changes, wave action from the 2004 southeast Asia tsunami and the planets. A special thanks is extended to the staff from the National Weather Service in Sacramento, the California-Nevada River Forecast Center and the California Department of Water Resources for organizing this event and inviting us to be a part of it!

Weather Words

Kevin Durfee

(see solution on page 18)



ACROSS

1. A harmless whirlwind composed of dust is a dust _____.
5. liquid precipitation
7. A warm, dry offshore wind in southern CA commonly known as a Santa____.
8. abbreviation for time of day
10. A book used for keeping records
11. Ultraviolet wavelength
12. Abbreviation for Los Angeles
13. Another name for twister
16. weather instrument used to detect precipitation
18. The side away from the direction from which the wind blows.
20. abbreviation for Virginia
22. A uniformly gray rain cloud
24. liquid precipitation
26. abbreviation for Arkansas
27. A body of water
29. A type of severe thunderstorm
31. A public park where live animals are kept on display.
32. non-measurable precipitation report
33. A season characterized by tropical moisture in the Desert Southwest
34. abbreviation for California

DOWN

1. An extremely long period marked by a large deficit of rain.
2. Pertaining to a boundary between 2 different airmasses
3. Does not mix well with vinegar
4. Air flowing into a region
6. 12 PM
9. violent horizontal gust of wind associated with a severe thunderstorm
14. A mineral
15. The top portion of a mature thunderstorm cloud.
17. slang for biting cold
19. to make a mistake
21. To separate into elemental parts or basic principles
23. Change in wind direction with height
25. A small island
26. In a high place
28. A reflected signal received by radar
30. Intense or excessive warmth

Wild Weather

The Rosamond Tornado on September 1st.

The closing days of August and first few days of September featured a rather active weather pattern across interior Central California. Monsoonal moisture spreading northward triggered off showers and thunderstorms on several days, which resulted in localized flooding, gusty winds and even a tornado. The first notable event happened on August 29th when monsoonal moisture spreading northward interacted with an upper level disturbance to produce showers and thunderstorms much of interior Central California. Fresno recorded 0.02 inches of rain, making August 2007 only the 18th August since the start of precipitation records in 1878 to receive measurable precipitation. Rainfall amounts were higher in Northwest Fresno, with one ground report of 0.09 inches.

Although this upper level disturbance moved northeast of Central California by the morning of the 30th, enough rich monsoonal moisture was still around to result in thunderstorms developing over the Kern County deserts each afternoon and evening between August 30th and September 3rd. The most active day was September 1st when several thunderstorms triggered severe weather. An EF0 tornado with wind speeds of 65 to 85 mph touched down in the Rosamond area around 4:12PM and skipped along a twelve mile path. Damage included trees and fences blown down, numerous utility poles being knocked over and property damage to some mobile homes.

Another intense thunderstorm struck the Kern County deserts on the afternoon of the 3rd. Winds gusted to 83 mph at the Mojave Spaceport, half inch diameter hail was reported in Boron, and flooding was reported in Mojave.

The active weather above is proof of how valuable spotter reports can be! Much of the information used to issue and verify warnings came from our network of storm spotters. The National Weather Service in Hanford would like to thank those spotters who provided us with reports of severe weather.

Information used in this article was compiled by James Brotherton, Warning Coordination Meteorologist, Lead Forecasters Jeff Barlow and Jim Dudley, Forecaster Kevin Durfee and Meteorologist Intern Chris Stachelski.

Radars can help forecasters to issue warnings...but once one is issued the next important step is making sure this information gets out to the public.

Getting The Word Out

Chris Stachelski
Meteorologist Intern

We strive to make our weather forecasts and warnings as accurate as possible. However, if methods to disseminate such information are inadequate or untimely, they greatly reduce the value or overall purpose of any weather product. The ways in which weather information is now available for access today is more varied than ever and with increasing advances in technology, more ways than ever now exist to make information available to the public.

In the early days of the National Weather Service, especially prior to 1900, one of the primary methods for disseminating weather information to the public was through the use of flags. A tower or flagpole was often located at a given weather office and flags of various colors or shapes were displayed to alert the public as to what upcoming weather hazard was expected. We no longer use flags. Instead, there are several ways you can access weather information from your National Weather Service in Hanford both directly and indirectly:

NOAA Weather Radio

NOAA Weather Radio broadcasts 24 hours a day, every day of the year. It provides current weather observations, forecasts, advisories, watches, warnings and special statements for a designated area. Special receivers are specially designed to pick up the designated frequencies they are broadcasted on. Many devices feature an alarm that will alert you if any alerts are issued for hazardous weather. In addition, many NOAA Weather Radios also are equipped with an area to insert a battery in case you want to travel or power fails at your residence. More information on NOAA Weather Radio is available on our website at: http://www.wrh.noaa.gov/hnx/wxradio.php

In the early days, towers displaying flags were used as a means of communicating warnings and advisories to people. The above photo is a restored US Weather Bureau flag tower in Manteo, NC.

The World Wide Web

Your National Weather Service in Hanford's website is loaded with weather information. Observations from around the area, both current and recent, are available along with routine forecasts, advisories, watches and warnings. This information is all available in textual format and in graphical format as well for a number of parameters. In addition, radar and satellite images are available in both still form and loops.

Our website also provides detailed information on our area's climate as well as information for specialized programs such as aviation and hydrology. In addition, you can easily link to other National Weather Service office webpages to get additional information if you are traveling anywhere else in the United States.

Our website can be found at:
http://www.weather.gov/hanford/

Mobile Devices

A variety of commercial providers make weather information available via upgraded packages offered with the purchase of a portable electronic device. Often this weather information will be from a commercial weather company, which will provide their own forecasts and offer products from their own operations along with severe weather bulletins issued directly by the National Weather Service. Contact your local sales representative for more information on any packages or programs they have to offer.

The Media

Your National Weather Service works with local television and radio stations to disseminate weather information and often receives inquiries from local newspapers for weather information as well. Many local newspapers will, depending on the timeliness of the information, pass it along through articles in their print editions or through their websites. Local television and radio stations directly receive weather warnings, watches and advisories when they are issued and will use their own staff to tailor the information to meet the needs of their viewers.

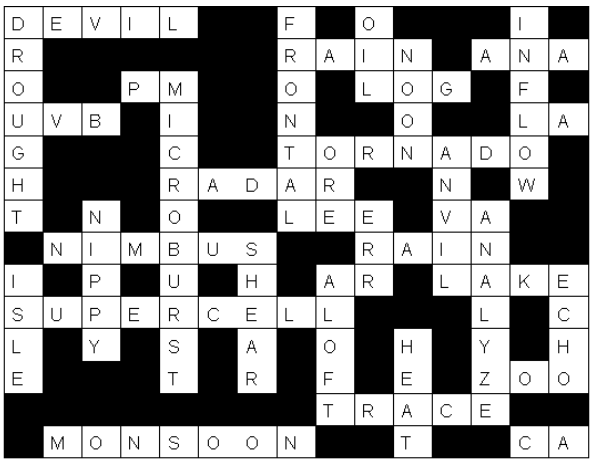
NOAA Weather Radio Transmitters Operated By NWS Hanford:

KIH-62 162.40 MHz
Broadcasts are tailored to the needs of the people living in the **Central San Joaquin Valley & Central Sierra Nevada**.

WXL-89 162.55 MHz
Broadcasts are tailored to the needs of the people living in the **Southern San Joaquin Valley and Kern Mountains**.

WNG-659 162.425 MHz
Broadcasts are tailored to the needs of the people living in the **Antelope and Indian Wells Valleys**.

KAD-94 162.450 MHz
Broadcasts are tailored to the needs of the people traveling through or camping in **Yosemite National Park**



Weather Words Answer Key

Weather Fact:

Bakersfield had 76 days with triple digit high temperatures in 1917 – the most ever on record. In Fresno, the record for the most triple digit high temperatures ever in a year is 63 set in 1984.

Attention!

Do you have a home weather station? The National Weather Service in Hanford has a Mesonet in which you can share your weather information with us easily and continuously. Contact our Mesonet Focal Point, Jim Dudley by e-mail at:
james.dudley@noaa.gov
with any questions you may have about joining our Mesonet.

Summer's Swelter

Just how much roasting and toasting did you endure this summer? Here's a list of the hottest temperature for selected locations across the area. All of these were reached during the heat wave of July 5th-6th:

Arvin	**114**
Auberry	**107**
Bakersfield (Meadows Field)	**111**
Bass Lake	**109**
China Lake Naval Air Station	**116**
Chowchilla	**111**
Clovis	**110**
Coalinga	**112**
Delano	**112**
Edwards Air Force Base	**115**
Fresno (Fresno-Yosemite Int'l)	**111**
Hanford	**110**
Inyokern	**115**
Kettleman City	**112**
Lemon Cove	**113**
Lemoore	**110**
Madera	**109**
Mariposa	**107**
Merced	**106**
Mojave	**108**
Oakhurst	**105**
Pine Flat Dam	**113**
Porterville	**109**
Randsburg	**109**
Rosamond	**112**
Taft	**110**
Tehachapi	**101**
Three Rivers	**118**
Visalia	**108**
Wasco	**114**
Yosemite Valley	**102**

The Coalinga Fire Department was recently presented an award for 50 years of service as a cooperative observer for the National Weather Service by Cooperative Program Assistant Chris Stachelski (far left in above left photo) and Warning Coordination Meteorologist James Brotherton (second from left in above left photo).

Coalinga Fire Department Celebrates 50 years as a National Weather Service Observer

Paul Jones
Cooperative Program Manager
Operational Program Leader

The National Weather Service Forecast Office in Hanford recently presented a 50 Year Institutional Award to the Fire Department in Coalinga.

This station has provided weather observations since July of 1957. The weather data from the Coalinga area was started in December of 1929 alternating from the airport to the old fire station at 8th and Elm. Mr. Milton H. Turner was the first registered Airways Observer taking observations 4 times daily. Mr. Turner retired from that position in 1937 and Mr. James R. Gunter took over still alternating from the airport to the Fire Station at 8th and Elm. In January of 1942 the observation site was moved to the new Fire Station of the Municipal Fire Department and civil volunteers took the observation duties with one observation per day until July of 1957 when a permanent fire crew was assigned and they took the observations from that time on.

The National Weather Service Cooperative Observer Program is the Nation's weather and climate observing network of, by and for the people. More than 11,000 volunteers take observations on farms, in urban and suburban areas, National Parks, seashores and mountaintops. The data is truly representative of where people live, work and play.

(Continued on Page 27).

Monthly Memoirs

By Gary Sanger
Climate Services Focal Point

MAY 2007 WEATHER SUMMARY

The upper-level trough that reached the Pacific coast on May 1st brought cooler temperatures to the region, and some light rain and mountain snow to the northern sections of the Hanford warning/forecast area. After the record heat of April 28th, temperatures fell to near normal on May 2nd. As the cold front associated with the trough moved through the central California interior, it triggered afternoon and evening thunderstorms over the northern half of the region. By mid afternoon, a line of thunderstorms stretched from Five Points and Mendota in western Fresno County, across Madera County, to Lake McClure in western Mariposa County. A strong jet stream moving into California quickly brought another trough to California, with even colder temperatures to the region on the 3rd and 4th, and more episodes of measurable rain to parts of the region. In the mountains, snowfall amounts were light, with Lodgepole and Grant Grove only reporting an inch of new snow.

High pressure aloft built into California behind the storm, with temperatures warming 10-12 degrees from May 4th to the 5th. The exception to this warming was the south end of the San Joaquin Valley, where cold air was trapped by the surrounding mountains and delayed the warming by a day. Temperatures climbed into the mid to upper 90s in the central and southern San Joaquin Valley on the 8th and 9th, but stayed below triple digits.

The ridge moved inland on May 10th, into the Four-Corners Region. This allowed the surface flow pattern to become onshore, with coastal marine air pushing into the San Joaquin Valley. Despite several degrees of cooling from May 9th to the 10th, temperatures remained around 8 degrees above normal.

A dry trough reached California on the 12th, bringing gusty winds to the region and a stronger push of marine air to the San Joaquin Valley. High temperatures at both Fresno and Bakersfield on the 12th matched the normal highs for the date; the last time high temperatures had been within a degree or two of normal for either city had been on the 6th.

Another short-lived upper-level high-pressure ridge moved over California on May 14th, bringing a brief warming trend. Moisture from melting snow over the high country of the Southern Sierra Nevada triggered the development of cumulus clouds, and even a couple of thunderstorms, during the afternoon of the 15th, and again the next day. An upper-level low approached the Pacific Northwest on the 17th through the 19th, turning the surface pressure pattern onshore. This allowed coastal marine air to push through the Sacramento Delta into the San Joaquin Valley. The surges of marine air brought a few local gusts to 30 mph on the Valley floor, and even stronger winds (to around 45 mph) through the Tehachapi Passes and below the pass into the Kern County Desert.

The upper-level trough moved into California on May 20th-21st. The associated cold front brought a few light showers to the Southern Sierra Nevada crest, but measurable rainfall was sparse and confined to the high country. The main impact of this system was gusty winds over parts of the Kern County mountains and deserts, where gusts to 35 mph were common and a few of the normally windy spots saw a few gusts over 50 mph. In the central and southern San Joaquin Valley, gusts to 30 mph were widespread, with stronger gusts over the west side of the Valley. These gusty winds brought reinforcing pushes of marine air that kept central San Joaquin Valley temperatures near normal, while the south end of the Valley (where the marine air remained pooled) saw temperatures a couple of degrees below normal.

High pressure built into California behind the trough, bringing a brief, but pronounced, warming trend to the region. By May 24th, the central and southern San Joaquin Valley had warmed into the mid to upper 90s, and most locations remained in the 90s through the Memorial Day weekend. However, a weak upper-level trough that reached the California coast on May 26th deepened the marine layer. Stratus pushed into the coastal valleys, and marine air spilled through Pacheco Pass into Merced County. This marine air spill cooled parts of the county back into the 80s, and also generated gusty winds across the San Luis Reservoir. The National Weather Service issued a Lake Wind Advisory for the Reservoir on May 27th, for gusts between 35 and 40 mph.

The trough moved inland over the central California interior on May 30th, setting up an onshore flow pattern at the surface. As a result, marine air spilled through the Sacramento River Delta, and into the San Joaquin Valley. This cooled temperatures to near normal for the last two days of the month.

Even though neither Fresno nor Bakersfield recorded any triple-digit temperatures during May, Fresno did have its 14th warmest May on record. Bakersfield tied for its 16th warmest May since observations began at Meadows Field.

JUNE 2007 WEATHER SUMMARY

The upper-level trough that moved through central California at the end of May was replaced by an upper-level ridge of high pressure the first days of June. Temperatures in the central and southern San Joaquin Valley warmed into the mid 90s by the 2nd, with the above-normal temperatures continuing through June 4th.

A strong, but mostly dry, Pacific storm reached the region on June 5th, bringing gusty winds to the San Joaquin Valley as well as the mountains and the Kern County deserts. Precipitation was confined to the Southern Sierra Nevada, with snow falling on Tioga Pass on the 5th, and on the Kern Plateau the next day. A thunderstorm on the 5th dropped hail on Camp Nelson. Winds gusted to 35 mph at Fresno on June 5th, and to 32 mph the next day. Bakersfield also saw gusts to 35 mph on the 5th, as did NAS Lemoore. In the Kern County deserts, winds gusted to 52 mph, and one gust to 82 mph was recorded in the south end of the Sierra Nevada at Indian Wells Canyon.

The storm brought a surge of marine air into the San Joaquin Valley that kept temperatures below normal through June 7th. The marine air mixed out rapidly, with Fresno warming 7 degrees from the 7th to the 8th, then another 7 degrees warming on the 9th as high pressure squashed any linger marine air on the Valley floor. Although temperatures rose into the 90s by June 9th, temperatures did not reach triple digits until the 14th, when Bakersfield had a

high of 101 and Fresno hit 103. Even warmer temperatures occurred the next day, with Bakersfield reaching 106 degrees, and Fresno a degree cooler.

The warm temperatures caused further melting of the remnant snow pack. This increased the moisture near the Southern Sierra Nevada crest, and triggered the development of afternoon cumulus. Isolated thunderstorms were observed along the crest on June 11th, and again on the 12th.

Sunset on a typical June evening in Fresno.

An upper-level trough dropped out of the Gulf of Alaska and reached central California the night of June 15th-16th. This trough, although dry, did deepen the marine layer sufficiently that the onshore flow through the Sacramento Delta brought cooler marine air into the central and southern San Joaquin Valley. This marine air cooled the Valley floor by as much as 9 degrees, with the majority of stations south of Madera having a uniform high of 97 degrees on the 16th. The trough also caused gusts to 45-50 mph in the Kern County mountains and deserts during the afternoon of the 16th.

Marine air filled the San Joaquin Valley on the 17th, dropping temperatures into the lower to mid 90s. This respite from the triple digit heat did not last long, as high pressure centered over the Four-Corners region pushed west into California. Fresno warmed from a high of 93 on the 17th to 101 on the 18th, and temperatures at Hanford Municipal Airport also warmed 8 degrees, from 92 on June 17th to 100 degrees the next day.

The weather continued dry through the end of the month. A pair of upper-level troughs dropped temperatures to near normal by June 24th, and again on the 29th and 30th. Between the troughs, Fresno warmed to a high of 99 on the 26th, and Bakersfield reached a high of 97. These were the warmest temperatures for the latter part of the month. Bakersfield had only three days in June with high temperatures of 100 or higher, while Fresno had four days in triple digits. For comparison, Fresno had 12 days at 100 or higher in June 2006, and Bakersfield had 9 days at triple digits.

JULY 2007 WEATHER SUMMARY

Strong high pressure aloft developed over the Desert Southwest at the beginning of July, and built westward into California. This brought a warming trend to the central California interior, with temperatures in the central and southern San Joaquin Valley reaching triple digits on Independence Day. (Coalinga had a high of 100 on July 3rd. All other Valley stations remained in the mid to upper 90s.)

Temperatures across central California warmed 7-10 degrees from July 3rd to the 4th, and again from the 4th to the 5th. The Southern Sierra Nevada and the Kern County deserts saw temperatures below 5000 feet push into the triple digits, with Yosemite Valley reaching into the triple digits on the 4th and 5th with highs of 101 and 102 degrees respectively. Lake Isabella had a high of 103 on July 3rd, rising to 112 degrees Independence Day, with the

same high the next day. On the San Joaquin Valley floor, Fresno had a high of 104 on the 4th, followed by 111 on the 5th; and Bakersfield warmed from an Independence Day high of 100 degrees to a high of 108 the next day. In the Indian Wells Valley, the China Lake Naval Weapons Test Center had a high of 110 degrees or greater on each of the first five days of July.

High temperatures like the one seen above were common in the days shortly after Fourth of July in the San Joaquin Valley, Sierra foothills and Kern County deserts.

The unseasonable heat caused the development of cumulus clouds over the Southern Sierra Nevada crest on July 5th, despite the dry nature of the airmass, as the heated air rose and cooled to the saturation point. One thunderstorm formed over the Tulare County mountains north of Mount Whitney during the mid-afternoon.

A weak upper-level trough moved into northern California on July 6th, triggering isolated thunderstorms over the northern Sierra Nevada and east into northwestern Nevada. The trough did not alleviate the continued hot weather, as both Fresno and Bakersfield had highs of 11 degrees on the 6th. Fresno tied its record high for the date (set in 1984), while Bakersfield had its warmest July 6th since observations began at Meadows Field, but well short of its record high of 116 degrees in 1913. Fresno also had a record high minimum temperature of 78 degrees on July 6th, breaking the old record (also set in 1984) by 1 degree.

The coastal marine layer deepened on July 7th, and gusty winds through the Sacramento Delta brought a surge of marine air into the San Joaquin Valley. Temperatures dropped 9-11 degrees from the 6th to the 7th, although Bakersfield and Fresno remained in triple digits, at 102 and 101, respectively. Marine air spilling through the Coastal Range during the night of July 7th-8th caused wind gusts to 38 mph over the San Luis Reservoir.

An upper-level low developed off the central California coast on the 9th. Circulation around this low, combined with the flow around the upper-level ridge over the Desert Southwest, funneled some monsoonal moisture into the region from the south. The warm, moist airmass resulted in a severe thunderstorm that formed over the high country in Yosemite National Park. Hail ranging in size from 0.50 to just over 0.75 inch in diameter fell during a 5-minute period. The moist airmass also resulted in a few sprinkles over the central and southern San Joaquin Valley, with Bakersfield seeing its first (few) raindrops of the season on July 10th.

Clouds associated with the monsoonal airmass helped cool the central California interior several degrees, with temperatures falling below normal from July 10th through the 12th. High pressure aloft over the Desert Southwest built into California, warming temperatures to near normal by the weekend of the 14th-15th, as well as bringing another push of monsoonal moisture into the region. Strong thunderstorms developed over the Southern Sierra Nevada crest during the late afternoon of July 15th, but no damage was reported.

An upper-level trough deepened off the California coast, turning the flow aloft southwest and keeping convection east of the Southern Sierra Nevada on the 16th. At the surface, the flow turned onshore, allowing marine air to push through the Sacramento Delta into the San Joaquin Valley. Temperatures dropped several degrees from July 16th to the 17th, with temperatures running below normal for the 17th-21st.

With the upper-level trough off the coast and high pressure over the western United States building back into California, temperatures warmed back to near normal on July 22nd. The flow aloft turned southerly, bringing an increase of monsoonal moisture into southern California. Thunderstorms developed as far north as San Bernardino County on the 21st, 22nd and 23rd, and spread into the Southern Sierra Nevada on the 24th with strong thunderstorms over Tulare County near Mineral King and over Mariposa County near Ostrander Lake. Temperatures warmed to above normal on the 24th, with Fresno hitting a high of 100 degrees for the first time since July 9th, and remaining at or above 100 for the remainder of the month. Bakersfield hit 102 on July 25th, for its first triple-digit day since July 9th. Bakersfield remained in triple digits through the end of the month except for the 30th, when the high reached only 99 degrees.

AUGUST 2007 WEATHER SUMMARY

A strong ridge of high pressure aloft over California and the Desert Southwest kept temperatures well above normal the first 4 days of the month. An upper-level low-pressure trough dropping out of the Gulf of Alaska weakened the ridge, cooling temperatures to near normal on the 5th, with much stronger cooling the next day as the surface flow turned onshore and a deep layer of marine air flooded the San Joaquin Valley. At one point on the 6th, profilers at Chowchilla and Lost Hills indicated that the marine air pool over the central and southern San Joaquin Valley was in excess of 5000 feet deep. High temperatures cooled 12 degrees from August 5th to the 6th at both Fresno and Bakersfield, with little change on the 7th. The low-pressure trough lifted to the northeast on the 8th as the upper-level ridge expanded back into California. The marine air pool moderated from the north beginning on August 8th, with Fresno warming 5 degrees. The remnant marine air remained trapped in the south end of the San Joaquin Valley, and Bakersfield only warmed 3 degrees from the 7th to the 8th, and again to the 9th; Bakersfield warmed from 92 to 96 on August 10th as the last of the marine air mixed out, finally warming back to normal.

Temperatures continued to warm through the middle of August, with Fresno hitting triple digits on the 15th. However, an upper-level trough developed off the Pacific Northwest, and the interaction of the trough and the high-pressure ridge over the southwestern U.S. resulted in a strong southwest flow aloft over the central California interior. This flow brought smoke from the Zaca wildfire (in eastern Santa Barbara County) into the Hanford warning/forecast area, with the thickest smoke over the southern half of the region. As a result, Bakersfield experienced significant cooling, with high temperatures on August 15th and 16th only reaching 87 degrees, 8 degrees below normal.

High pressure built back into California for the last 10 days of the month, bringing a return of triple-digit heat to the central and southern San Joaquin Valley. Mid-level moisture from the remnants of Hurricane Dean was caught in the circulation around the upper-level ridge, bringing scattered thunderstorms to the Southern Sierra Nevada and the Tehachapi

Smoke plume from the Zaca Fire around sunset in Northwest Fresno on August 11, 2007.

Mountains. Some of this tropical moisture moved over the central and southern San Joaquin Valley during the early morning of August 26th, triggering nocturnal thunderstorms along a line from western Kern County northeast through Hanford, Visalia and Tulare, to Sanger in east-central Fresno County and Coarsegold and North Fork in eastern Madera County. Strong thunderstorms developed in the Sierra Nevada in Madera County during the afternoon of the 26th, and again on the 28th. These storms were slow moving, and radar indicated the potential for locally heavy rainfall, prompting Flash Flood Warnings for parts of Madera and Mariposa Counties near the thunderstorms.

Temperatures warmed to near-record levels the last few days of the month as the upper-level ridge continued to strengthen. The combination of the heat and the increase in humidity from the tropical moisture raised heat indexes to dangerous levels in the afternoons, prompting the issuance of a Heat Advisory for the central and southern San Joaquin Valley and the adjacent foothills for the last two days of the month. New record high minimum temperatures were set at both Bakersfield and Fresno on the 30th and 31st. The low of 81 degrees on August 30th in Fresno was the latest occurrence ever of a low temperature of 80 degrees or better in the year, breaking the old record which was set on August 24, 1913.

The influx of tropical moisture teamed up with an upper level disturbance resulting in shower and thunderstorm activity across the area the 29th. Vivid lightning displays were seen across the central San Joaquin Valley especially in the morning hours. Rainfall amounts were generally under a tenth of an inch in the San Joaquin Valley except at Coalinga which received 0.15 inches. Locally heavier amounts were recorded in the Sierra Nevada and the Kern County mountains and deserts.

Coalinga Celebration

Continued From Page 21

The Coop program was created in 1890 under the Organic Act. Its mission is twofold:

(1) To provide observational meteorological data, including minimum temperatures, snowfall, and 24-hour precipitation totals needed to define the U.S. Climate and help measure long-term climate changes, and (2) to provide observational meteorological data in near real time to help support forecast, warning and other public service programs of the NWS.

The firemen at the Coalinga Fire Station, as well as the citizens of Coalinga, should be proud of the time each day that the firemen perform this extra public service. Congratulations to the Coalinga Fire Department on a job well done. Thanks!

Runnin' the Numbers		Fresno				Bakersfield			
		MAY	JUNE	JULY	AUG.	MAY	JUNE	JULY	AUG.
TEMPERATURE (°F)	Average Maximum	86.8	93.7	98.6	98.4	86.4	92.5	96.6	95.9
	Average Monthly	71.5	78.0	83.2	82.8	72.8	78.9	83.5	83.0
	Departure from Normal	2.7	1.9	1.8	2.9	2.5	1.2	0.4	1.1
	Average Minimum	56.1	62.2	67.8	67.2	59.1	65.3	70.4	70.0
	Maximum	97	105	111	108	98	106	111	106
	Date(s)	8th	15th	5th, 6th	4th	9th	15th	6th	31st
	Minimum	46	52	59	58	49	53	63	59
	Date(s)	5th	6th, 7th	2nd	6th, 7th	3rd, 5th	6th, 7th	2nd	7th
	Number of Days Max ∃90	12	26	31	29	12	23	30	26
	Number of Days Max ≥100	0	4	14	14	0	3	12	10
	Number of days Min #32	0	0	0	0	0	0	0	0
PRECIPITATION (In.)	Total	0.05	0	T	0.02	T	0	T	0
	Departure from Normal	-0.34	-0.23	-0.01	0.01	-0.24	-0.12	T	-0.08
	Greatest in 24 hrs	0.05	--	T	0.02	T	--	T	--
	Date(s)	4th	--	23rd	30th	4th	--	10th, 23rd	--
	Number days w/precip.	2	0	1	1	1	0	2	0
	Seasonal Total	6.03	6.03	T	0.02	3.06	3.06	T	T
	Departure from Normal	-4.97	-5.20	-0.01	0.01	-3.31	-3.43	T	-0.08
	Compared to Normal	54.8%	53.7%	0%	100.0%	48.0%	47.1%	0%	0%
WIND (mph)	Peak Speed	38	35	33	33	35	35	26	26
	Direction	NW	NW	E	SE	NW	N	NW	NW
	Date(s)	5th	5th	19th	30th	2nd	5th	11th	5th
PRESS (in.)	Highest	30.10	30.04	30.05	30.02	30.11	30.03	30.06	30.02
	Date	3rd	20th	13th	13th	3rd	29th	13th	13th
	Lowest	29.73	29.68	29.68	29.57	29.72	29.66	29.67	29.57
	Date	21st	15th	30th	12th	21st	15th	30th	23rd

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