September 2014 Regional Climate Summary

For the San Francisco Bay Area and Monterey Bay Area

Continued much warmer than normal sea surface temperatures near the California coast in September resulted in the second consecutive month of record nighttime warmth in some coastal areas**. Average overnight lows for September were the warmest on record at seven climate stations**, similar to what occurred in August. September 2014 was also notable for a significant precipitation event that occurred from late on the 24th through the 26th, producing widespread rainfall as well as scattered thunderstorms with hail. Rainfall with this system, and another rain event earlier in the month, resulted in monthly rainfall totals that were well above the September average in most locations.

September Precipitation Events

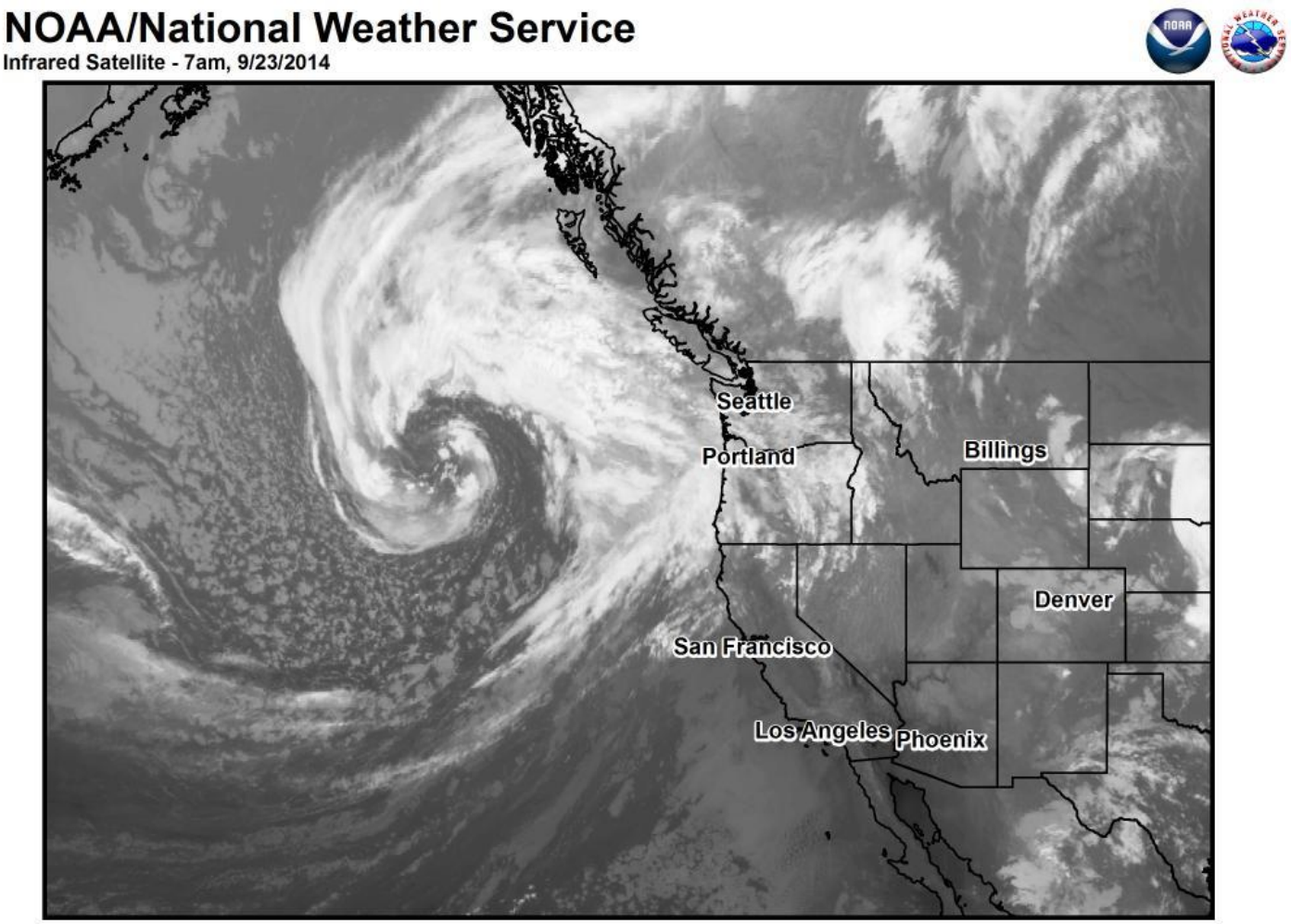
The first widespread rain event in September occurred from late on the 17th through the 18th as an upper level trough deepened along the California coast. This system was relatively weak and the bulk of the precipitation fell in orographically favored areas of the coastal mountain ranges. Highest rainfall amounts recorded at higher elevation locations included:

East Bay Hills:	one-quarter inch
Santa Lucia Range:	one-third inch
North Bay Hills:	two-thirds inch
Santa Cruz Mountains:	three-quarters inch

Rain totals near sea level were mostly less than a tenth of an inch except in western Sonoma County and in Santa Cruz where up to a third of an inch fell.

The system that brought rain to the region on September 17-18 continued to move south, forming a cutoff low near Point Conception. On September 20 that low then lifted to the north and triggered scattered showers and thunderstorms over Central California, mainly over the Sierra Nevada and Central Valley. But a few isolated showers managed to make their way into extreme northeast Contra Costa County on the evening of September 20.

A few days later, on Tuesday, September 23, an impressive storm system over the Northeast Pacific approached the West Coast.



Infrared Satellite imagery of the northeast Pacific and western US taken at 7 am PDT on 9/23/14

This powerful storm produced very strong winds over the northeast Pacific which in turn generated large long-period ocean swell. This swell train arrived along the northern and central California coast on Wednesday, September 24 and resulted in dangerous rip currents at area beaches.

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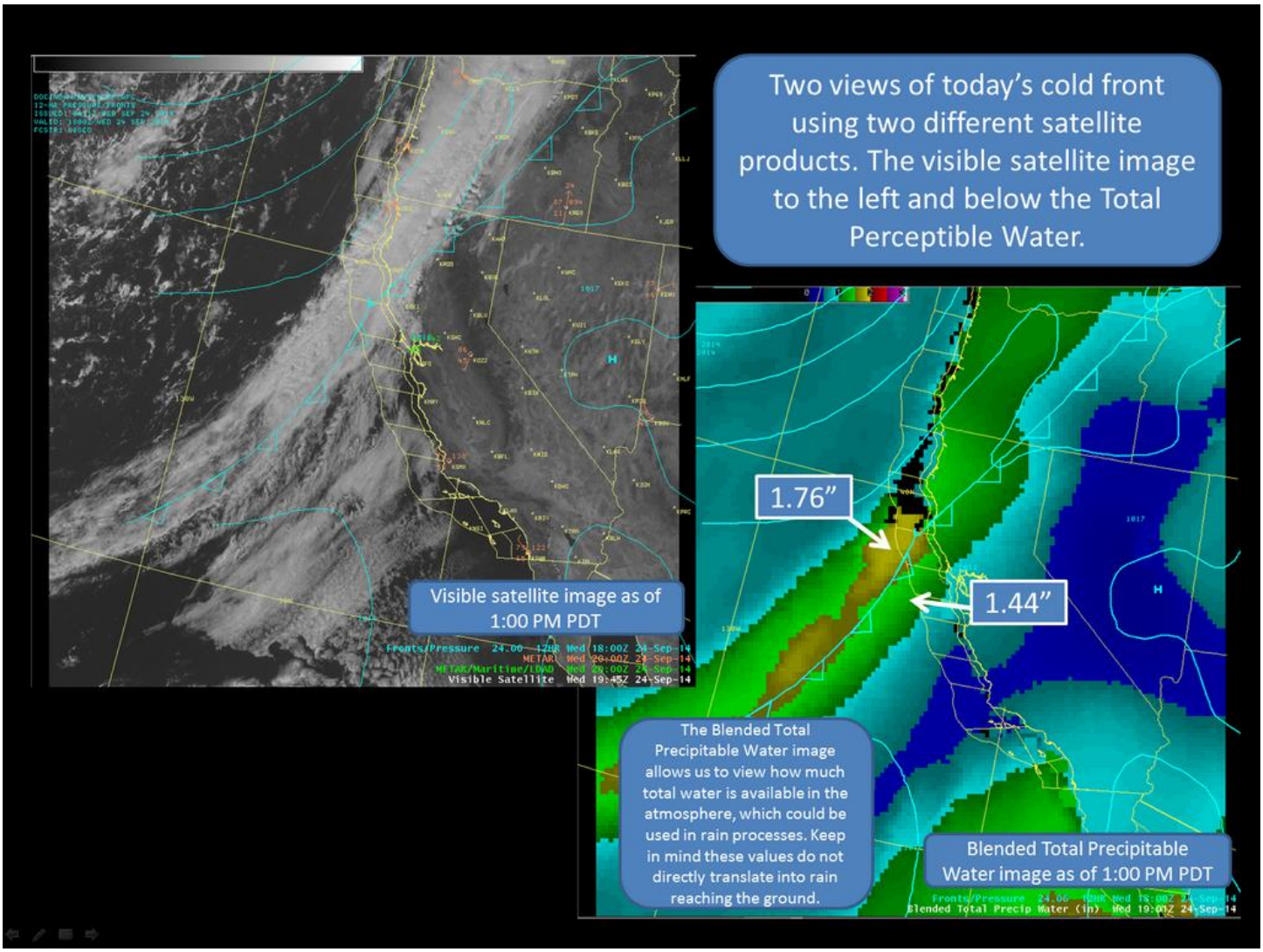
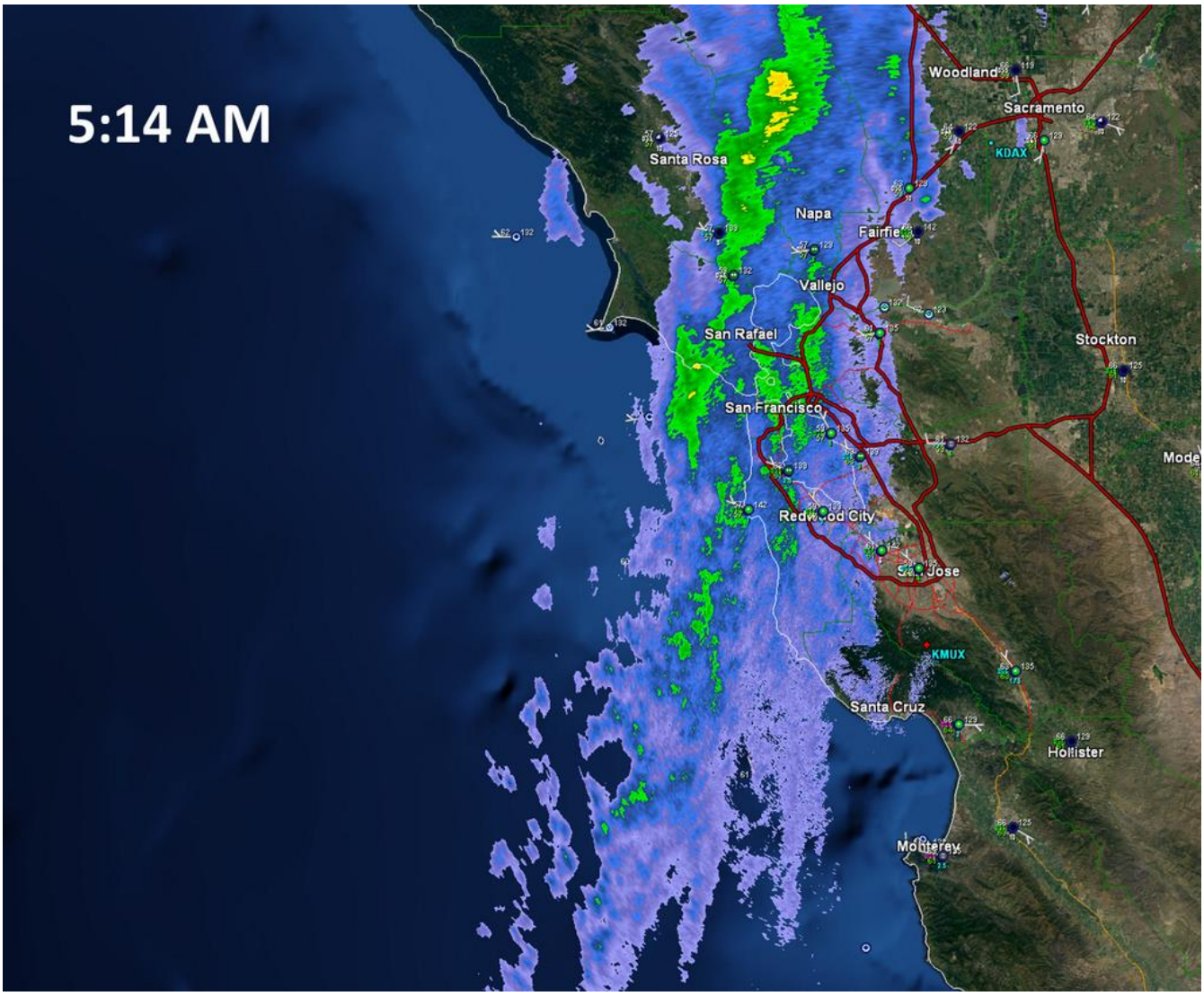
Photo taken near Stinson Beach on September 24, showing evidence of multiple rip currents just beyond the breaking waves.

Also on September 24, as the storm system and associated cold front approached the California coast, satellite sensors indicated there was significant moisture along the frontal boundary:



Left: Visible satellite imagery at 1 pm on September 24, showing a cold front moving into northwest California.
Right: Satellite estimates of precipitable water along the cold front.

The frontal rain band moved through the San Francisco Bay Area during the early morning hours of September 25:



NWS San Francisco Bay Area radar image showing widespread light to moderate rainfall associated with a cold front moving through the San Francisco Bay Area during the pre-dawn hours of Thursday, September 25, 2014.

The front produced a half inch of rain in downtown San Francisco, the highest one-day rain total in San Francisco since 0.74 inches fell back on March 31. Most locations picked up between a quarter and half inch of rain on the 25th. The exceptions: some of the southern interior valleys received less than a tenth of an inch and as much as 0.80 fell across isolated portions of the Santa Cruz Mountains.

A cold upper trough following the front generated significant instability across the region on Friday, September 26. Isolated showers developed early that morning. But it wasn't until mid to late afternoon that widespread shower and thunderstorm activity got underway. Thunderstorm activity initially developed around midafternoon over the mountains of eastern Santa Clara County, over the Santa Cruz Mountains, and also near the city of Santa Cruz. The thunderstorm in Santa Cruz produced small hail.

Photo taken from the NWS office in Monterey, looking north across Monterey Bay at a thunderstorm that had developed near Santa Cruz at approximately 3:30 pm on Friday, September 26. Photo: Logan Johnson

By late afternoon widespread shower and thunderstorm activity blossomed across the North Bay. Several volunteer weather spotters across the North Bay, as well as law enforcement, reported heavy rain, hail and thunder late that afternoon and early evening:

Location	**Time**	**Report**
4 miles ENE of Larkfield-Wikiup	4:25 pm	pea sized hail
3 miles E of St Helena	5:05 pm	0.20 inches of rain in 20 minutes
1 mile NNW of Napa*	5:35 pm	pea sized hail falling for 20 minutes, accompanied by lightning and thunder.
Healdsburg	5:40 pm	pea sized hail and heavy rain
Napa* (downtown)	5:45 pm	hail ½ inch in diameter
Sebastopol	6:30 pm	0.20 inches of rain in only five minutes. Also, small hail and thunder

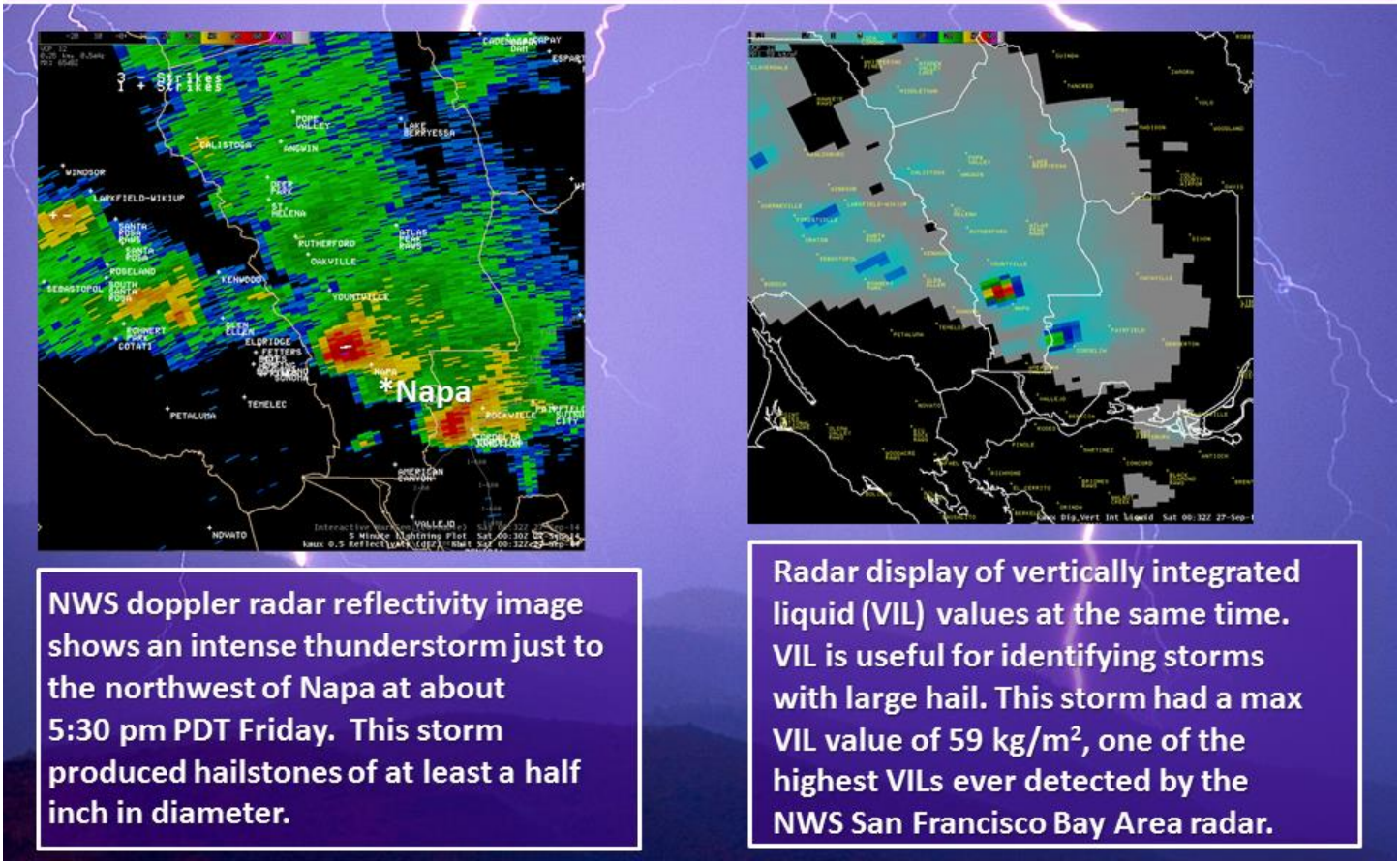
* The most intense thunderstorm cell developed just north of Napa late in the afternoon. This storm moved very slowly across the northwest portion of Napa and produced heavy rain and hail that lasted up to 20 minutes. Hail accumulated to a depth of up to six inches along Browns Valley Road. One resident of Napa said, “In the 49 years I’ve lived here, I’ve never seen anything like this ever.” Another resident in the western part of Napa said “My backyard garden was completely devastated by the hail. We still had ice out in front of our front door two days later.” News stories noted that this unusual weather event occurred in Napa just one month after the city was rattled by a 6.0 earthquake. Fortunately for the wine community, most of the hail was confined to urban areas and did not adversely affect most area vineyards.

Footprints in the hail: Hail accumulated up to six inches deep in Northwest Napa on Friday, September 26.

Close-up photo of hailstones that fell in northwest Napa on September 26. Photo credit: Jeni Olsen

Hail covering the ground along Browns Valley Road in Napa on September 26. Photo credit: Robin McKee-Cant

Strong Thunderstorm in Napa County late Friday afternoon.



Radar data depicting strong thunderstorm on the northwest side of Napa during the late afternoon of Friday, September 26.

A video of the Napa hailstorm can be viewed by following this link:
https://www.youtube.com/watch?feature=player_embedded&v=PSi4QvbaMNU
(video credit: Lauren Mallin)

Numerous cloud-to-ground lightning strikes were detected during the afternoon and early evening hours of September 26. Cloud-to-ground strike totals, by county, are listed below. Note: these totals do not include cloud-to-cloud lightning strikes.

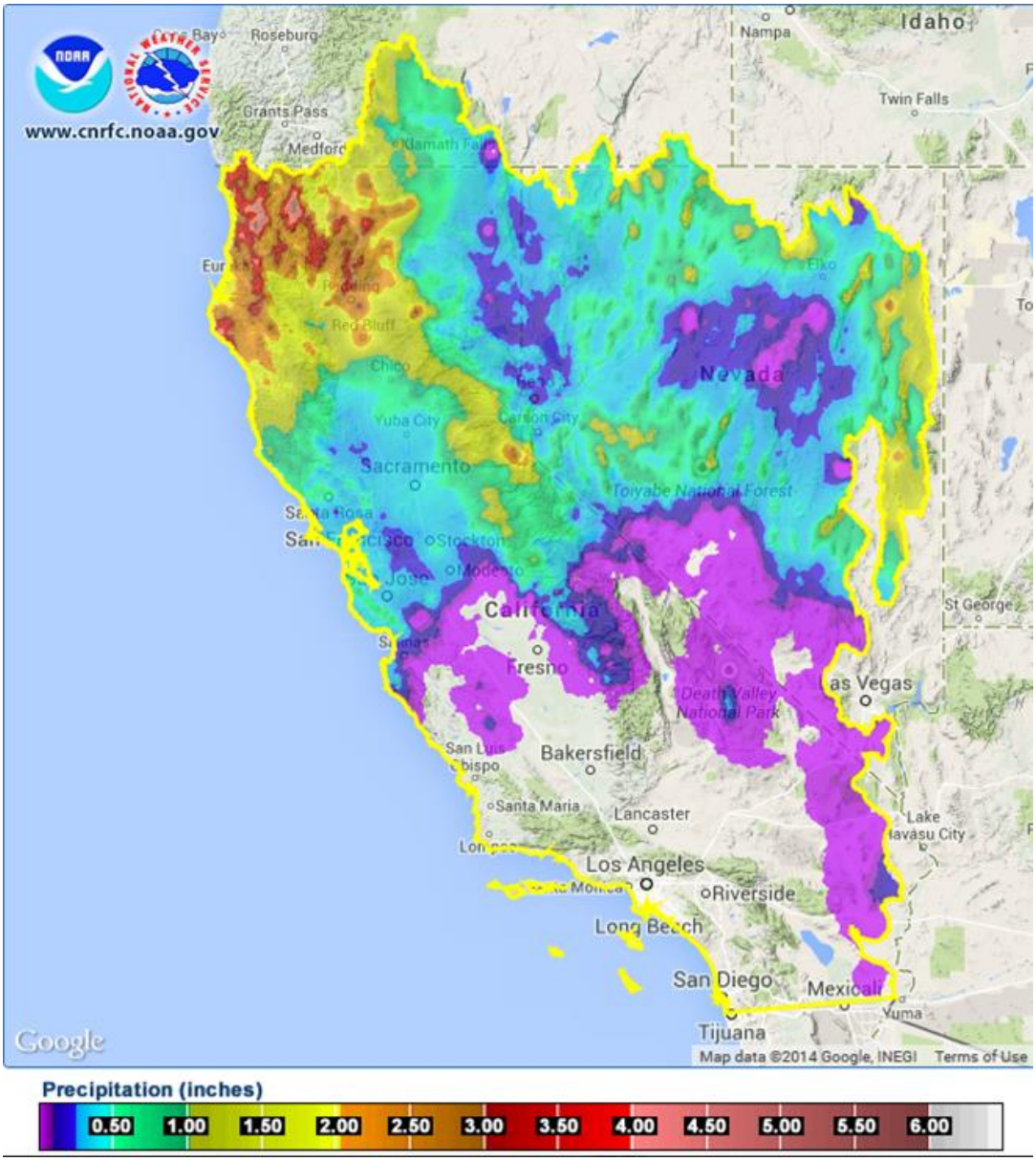
Sonoma – 60 lightning strikes
Napa – 43
Santa Clara - 10
Alameda – 3
Marin – 1
Santa Cruz – 1
San Francisco Bay – 1

Rainfall totals with the September 26 convective event varied considerably, with the most widespread precipitation as well as heaviest rainfall occurring in Sonoma, Napa and Santa Cruz counties.
Some of the heaviest rain totals on the 26th included:

Location	County	Amount (inches)
Capitola	Santa Cruz	0.68
6 ENE of Yountville	Napa	0.60
Sonoma County Airport	Sonoma	0.55
4 ENE of Larkfield-Wikiup	Sonoma	0.50
3 WNW of Felton	Santa Cruz	0.47
Mount George	Napa	0.43
2 W of Graton	Sonoma	0.40
2 SE of Angwin	Napa	0.40
2 E of Aptos	Santa Cruz	0.39
Lake Sonoma Rec Area	Sonoma	0.37
Conn Dam	Napa	0.27

All other locations with measurable rain on the 26th picked up less than a quarter of an inch.

Seven-day rain totals from September 22-28 across Northern California were impressive for September, as can be seen in the graphic below. Some locations in Northwest California accumulated more than 4 inches of rain during this week-long period.



September rain totals across the San Francisco Bay Area were above the 30-year average at most climate stations and well above normal at several. Farther to the south, in Monterey and San Benito counties, September rain totals were not nearly so impressive, falling short of normal at the majority of climate stations.

September Regional Precipitation Summary:

Location	September Rainfall	Normal Sep Rainfall	Percent of Normal
North Bay			
Angwin	0.81	0.46	176
Calistoga	0.80	0.32	250
Kentfield	0.42	0.26	162
Muir Woods	0.50	0.36	139
Napa	0.49	0.30	163
Napa Airport	0.31	0.32	97
Occidental	0.74	0.42	176
Petaluma	0.42	0.21	200
San Rafael	0.34	0.21	162
Sonoma County Airport	0.84	0.35	240
San Francisco Peninsula			
Half Moon Bay	0.52	0.37	141
Redwood City	0.60	0.16	375
San Francisco Airport	0.42	0.17	247
San Francisco Downtown	0.55	0.21	262
East Bay			
Antioch	0.25	0.18	139
Concord	0.36	0.10	360
Concord Airport	0.28	0.16	175
Fremont	0.40	0.21	190
Hayward Airport	0.37	0.32	116
Livermore	0.22	0.22	100
Livermore Airport	0.21	0.22	95
Martinez	0.28	0.18	156
Mount Diablo Junction	0.57	0.28	204
Newark	0.40	0.17	235
Oakland	0.49	0.25	196
Oakland Airport	0.44	0.22	200
Richmond	0.14	0.16	88
South Bay & Santa Cruz County			
Ben Lomond	0.86	0.27	319
Los Gatos	0.55	0.18	306
Moffett Federal Airfield	0.41	0.18	228
Mount Hamilton	0.35	0.38	92
San Jose	0.36	0.18	200
Santa Cruz	0.92	0.27	341
Watsonville	0.31	0.21	148
Watsonville Airport	0.41	0.23	178

Monterey and San Benito Counties			
Big Sur Station	0.33	0.42	79
Carmel Valley	0.12	0.23	52
Hollister	0.26	0.21	124
King City	0.01	0.15	7
Monterey	0.33	0.24	138
Monterey Airport	0.32	0.20	160
Pinnacles National Park	0.00	0.23	0
Salinas	0.15	0.19	79
Salinas Airport	0.10	0.17	59

September Temperatures - Second consecutive month of record warm average lows

Much like in August, average high temperatures for September were within a few degrees of normal (plus or minus) at nearly all climate stations. And, like in August, no daily high temperature records were set in September. September was much like August in one other respect - average overnight lows during September were almost universally above normal, and significantly above normal at coastal climate stations. Warmer than normal nights were due primarily to much above normal sea surface temperatures (SSTs) along the California coast, a phenomena that began in July, and then continued through August and on into September. Average September overnight lows at coastal climate stations were 3 to 7 degrees above normal. Most inland areas also experienced warmer than normal overnight lows in September, but their departures from normal were generally of a smaller magnitude compared to coastal areas. Average overnight lows for September 2014 were the warmest on record at seven climate stations across the region:

Location	Sept 2014 Average Low Temperature	Normal Sept Low	Departure from Normal	Previous Sept record warm low temp and year
Half Moon Bay	57.3	49.8	+7.5	55.4 in 1983
Petaluma Airport	55.7	51.2	+4.5	55.0 in 1953
Redwood City	56.9	54.0	+2.9	56.3 in 2003
San Francisco Downtown	59.2	55.1	+4.1	59.2 in 1940
San Francisco Airport	61.0	55.8	+5.2	59.6 in 1997
Santa Cruz	56.1	53.0	+3.1	55.7 in 1983
Watsonville	57.5	52.5	+5.0	57.3 in 1983

In addition, five other climate stations - Calistoga, Salinas, San Rafael, Hollister and King City – recorded their second warmest average September low temperature. And, an additional four climate stations – Oakland Airport, Kentfield, Monterey and Salinas – had their third warmest.

September Regional Temperature Summary

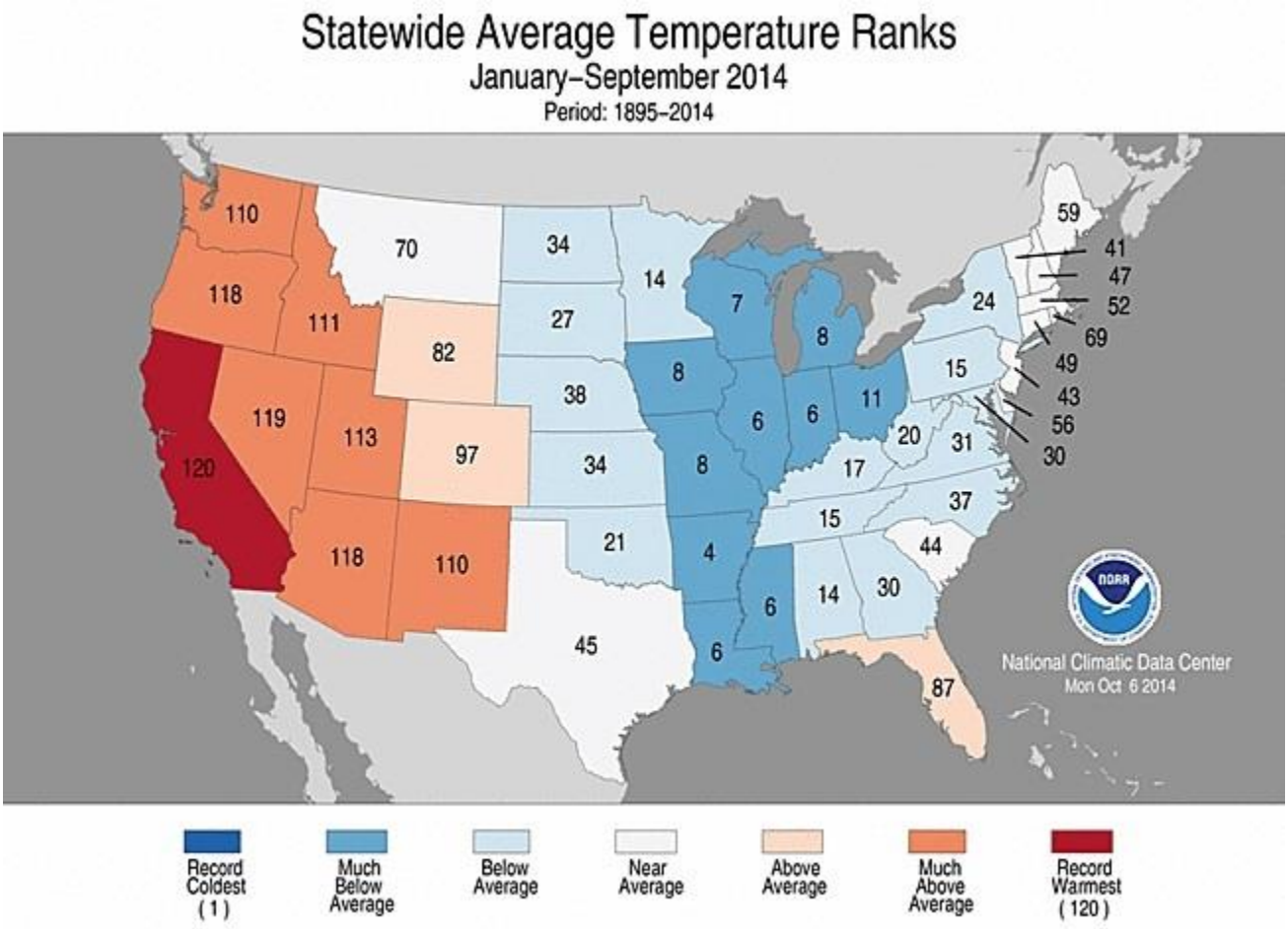
Location	Average High	Normal High	Departure from Normal	Average Low	Normal Low	Departure from Normal
North Bay						
Angwin	80.7	81.7	-1.0	53.4	53.8	-0.4
Calistoga	83.7	87.9	-4.2	54.6	50.2	4.4
Kentfield	81.5	81.2	0.3	54.9	52.2	2.7
Napa	83.7	82.9	0.8	55.4	53.2	2.2
Napa Airport	79.6	79.7	-0.1	52.6	49.2	3.4
Occidental	74.4	76.9	-2.5	53.5	53.6	-0.1
Petaluma Airport	80.4	81.7	-1.3	55.7	51.2	4.5
Saint Helena	86.4	86.0	0.4	56.0	52.3	3.7
San Rafael	80.9	78.7	2.2	57.0	54.2	2.8
Sonoma County Airport	81.3	83.2	-1.9	53.1	49.3	3.8
San Francisco Peninsula						
Half Moon Bay	69.1	66.4	2.7	57.3	49.8	7.5
Redwood City	79.2	79.7	-0.5	56.9	54.0	2.9
San Francisco Airport	75.8	73.6	2.2	61.0	55.8	5.2
San Francisco Downtown	69.9	70.2	-0.3	59.2	55.1	4.1
Woodside	85.0	86.4	-1.4	54.4	49.8	4.6
East Bay						
Antioch	86.0	86.0	0.0	59.6	57.3	2.3
Concord	84.7	85.3	-0.6	60.4	57.0	3.4
Concord Airport	84.8	84.1	0.7	58.5	56.1	2.4
Fremont	78.3	78.3	0.0	59.0	55.5	3.5
Hayward Airport	78.1	75.6	2.5	62.3	57.1	5.2
Livermore	87.1	85.5	1.6	57.7	54.9	2.8
Livermore Airport	86.4	84.3	2.1	58.7	55.5	3.2
Martinez	83.6	84.4	-0.8	48.4	49.9	-1.5
Mount Diablo Junction	79.4	81.7	-2.3	60.4	57.8	2.6
Newark	77.1	77.1	0.0	59.8	57.5	2.3
Oakland	75.5	74.1	1.4	60.1	57.1	3.0
Oakland Airport	74.4	74.6	-0.2	59.6	54.4	5.2
Richmond	72.9	74.1	-1.2	58.8	56.2	2.6
South Bay and Santa Cruz County						
Gilroy	88.2	85.5	2.7	56.9	52.8	4.1
Moffett Federal Airfield	77.6	77.5	0.1	60.0	57.7	2.3
Mount Hamilton	74.6	73.3	1.3	61.3	59.4	1.9
San Jose	78.2	80.1	-1.9	58.6	56.8	1.8
Santa Cruz	77.5	76.4	1.1	56.1	53.0	3.1
Watsonville	73.3	73.6	-0.3	57.5	52.5	5.0
Watsonville Airport	75.0	75.1	-0.1	58.2	51.8	6.4

Monterey and San Benito Counties						
Carmel Valley	79.9	81.3	-1.4	51.4	51.0	0.4
Hollister	79.1	81.4	-2.3	55.7	52.2	3.5
King City	83.8	85.5	-1.7	54.9	51.1	3.8
Monterey	70.2	69.6	0.6	56.2	52.8	3.4
Monterey Airport	70.7	69.3	1.4	57.6	53.1	4.5
Salinas	74.5	74.0	0.5	56.8	52.2	4.6
Salinas Airport	73.7	74.1	-0.4	58.2	54.3	3.9

No Daily Temperature Records for September 2014

Year-to-Date Climate Highlight: Warmest January-September period on record in California

The National Climatic Data Center (NCDC) announced that California was record warm for January-September, with an average temperature for the first nine months of the year that was 4.1 deg F above its 20th century average.



Nationwide graphic of statewide average temperature ranks for the first nine months of the year, showing California experiencing its warmest January-September in 120 years. Source: NCDC

Miscellaneous August Climate Information

Monthly Ranks for Downtown San Francisco		
Average High Temperature	69.9 deg	53rd warmest September out of 140 years
Average Low Temperature	59.2 deg	**Warmest September** out of 140 years
Average Temperature	64.6 deg	17th warmest September out of 140 years
Precipitation	0.55 in	23rd wettest September out of 165 years

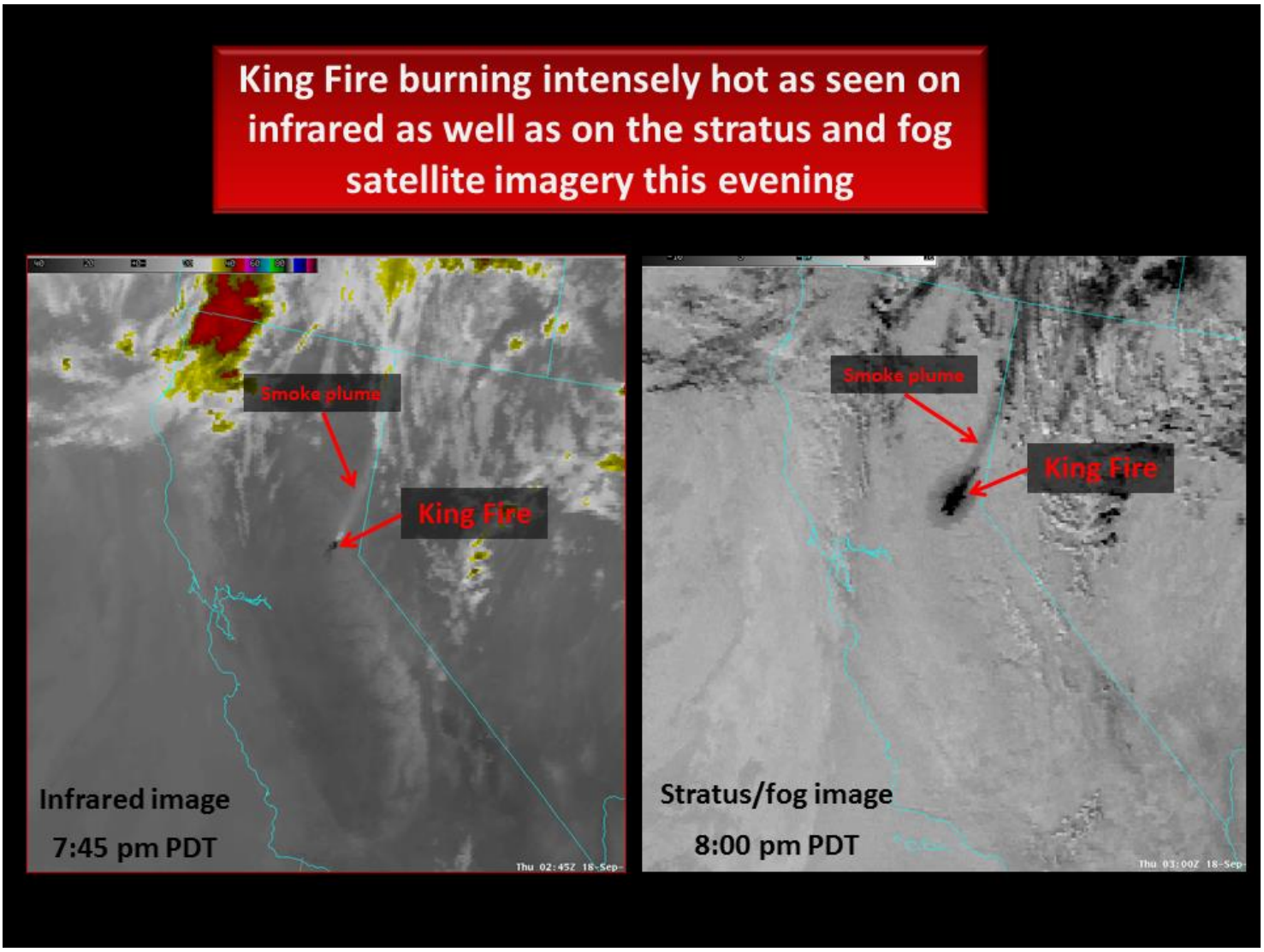
Monthly Extremes for Select Locations			
Location	Max Temp: Warmest Day(s)	Min Temp: Coolest Day(s)	Precipitation: Wettest Day(s)
Sonoma County Airport	9/01, 9/10, 9/11	9/23, 9/30	9/26
	96 degrees	48 degrees	0.55 inches
San Francisco	9/10	9/11, 9/12, 9/13	9/25
	80 degrees	56 degrees	0.47 inches
Livermore Airport	9/11, 9/12	9/10	9/25
	101 degrees	53 degrees	0.21 inches
San Jose	9/11	9/09, 9/30	9/25
	89 degrees	54 degrees	0.36 inches
Salinas Airport	9/10	9/29	9/25
	85 degrees	52 degrees	0.09 inches

September Fog and Smoke

A very shallow marine layer during a brief warm spell on September 10 and 11 resulted in areas of dense fog near the coast. During the morning of Wednesday, September 10, the visibility at the San Francisco Airport fell to ¾ of a mile. Visibility dropped to ½ mile or less that morning at several coastal locations including Half Moon Bay, Watsonville and Monterey. Patchy dense fog was reported near the coast again on the morning of the 11th. Fog was generally not an issue again until late in the month when patchy dense fog developed near the coast and in some valleys during the early morning hours of September 29.

A wildfire ignited near Pollack Pines in El Dorado County on September 13. This fire, called the King Fire, generated tremendous heat which produced pyrocumulus clouds that were visible as far away as the San Francisco Bay Area late on September 17.

"King Fire" pyrocumulus as seen from Skyline Boulevard above Palo Alto (140 miles away) at sunset on September 17. Photo: Jan Null



Satellite images of the King Fire on the evening of September 17.

"King Fire" as seen from Lake Tahoe. Photo: Wildland Fire Association

The upper level flow turned easterly by the 19th, causing smoke from the King Fire to drift as far west as the San Francisco Bay Area.

Smokey sunset over the Bay Area on the evening of September 19

Note: Climatological data included in this document is preliminary. For official certified climatological data please contact the National Climatic Data Center at 828-271-4800 or http://www.ncdc.noaa.gov.
Official values as determined at the above web site may take several months for authentication and publication.