MARCH 2023 WEATHER SUMMARY
FOR THE CENTRAL CALIFORNIA INTERIOR

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The month was very active with several events with abundant subtropical moisture that produced strong thunderstorms with heavy rain at times. In addition, there were back-to-back days of Severe Thunderstorm Warnings in the County Warning Area including reports of funnel clouds on the 11th and 12th. Towards the middle of March, some locations set daily record precipitation amounts. More precipitation events occurred until the 30th. The month ended with a dry break, but with relatively cool temperatures.

Table 1 – March 2023 Summary Statistics– NWS Hanford, CA ASOS Sites

Location	Monthly Average Temp (deg F)	Departure from Average (deg F)	Temperature Rank	Total Monthly Precipitation (inches)	Departure from Normal (inches)	Precipitation Rank
Bakersfield	53.5	-5.1	17th coldest	2.98	1.83	4th wettest
Fresno	53.4	-4.0	Tied 34th coldest	4.00	2.10	13th wettest
Hanford	51.3	-5.4	15th coldest	3.93	2.44	6th wettest
Madera	51.8	-4.3	13th coldest	3.11	1.13	21st wettest
Merced	51.0	-4.2	15th coldest	4.36	2.54	10th wettest

Number of Days with Temperatures at or below 32 degrees Fahrenheit

Bakersfield: 0 days (average 0 days for March); days since November 1st (average 10 days)
Fresno: 0 days (average 0 days for March); days since November 1st (average 11 days)
Hanford: 2 days (average 1 day for March); days since November 1st (average 27 days)
Madera: 1 day (average 1 day for March); days since November 1st (average 23 days)
Merced: 3 days (average 1 day for March); days since November 1st (average 25 days)

March began with rain in the San Joaquin Valley on the back end of the storms that ended the month of February. However, the pattern shifted on the 2nd and 3rd as temperatures were in the low to mid 30s before warming up into the upper 50s and up to the lower 60s and remained dry. A small system moved through on the night of the 4th through most of the 5th bringing pop up

showers to the San Joaquin Valley. This storm also brought strong winds which caused damage to several locations. In addition, a strong thunderstorm brought brief heavy rainfall with some accumulating small hail that was reported near Visalia on the afternoon of the 5th that caused some slowing of traffic and collisions on Highway 99 in this area. The 6th through the 8th saw a break with temperatures warming back up, although some light showers occurred at times with passing weak upper-level disturbances.

The 9th saw even more rain in the Valley as a strong plume of subtropical moisture began to pump moisture into the area along with warmer air. The 10th was the wettest day with rain totals ranging from half an inch to just above an inch in the Valley to higher values in the foothills and the Sierra Nevada. The 10th also saw large amounts of flooding in the San Joaquin Valley and the foothills due to the rain amounts in addition to the snow melting. The 11th was when temperatures cracked 70 degrees for most Valley locations for the first time this year. The 11th also brought convection due to the combination of warm air and moisture with several thunderstorms and funnel clouds being reported leading to the issuance of a Tornado Warning. The 12th was also a very warm and humid day in the San Joaquin Valley with temperatures again in the 70s. Additional thunderstorms developed in northern portions including a cell that lasted several hours as it moved from the Los Banos to Visalia that dropped 1.25 inch sized hail and produced more funnel clouds so that a Tornado Warning and multiple Severe Thunderstorm Warnings were issued.

More showers and thunderstorms developed in the afternoon and evening of the 13th as plenty of moisture and instability remained. The strongest storms produced heavy rain that exceeded one inch per hour, including in portions of Fresno County (such as Fowler, Selma, and Kingsburg), as well as Tulare County (such as Traver, Dinuba, Goshen, and Visalia). In addition, there was another round of Severe Thunderstorm Warnings issued, along with a Tornado Warning in Merced County near the Stanislaus County line. Another storm arrived on the 14th with a very warm and moist subtropical moisture plume and allowed snow levels to exceed 8,000 feet. This exacerbated flooding in areas where it was already occurring. Moderate to heavy showers with isolated thunderstorms returned on the 15th, mainly in Tulare and Kern Counties. There was a brief break between systems on the 16th through the 18th, though some afternoon instability showers that were mainly light in intensity formed over the Sierra Nevada during this period.

Another strong storm arrived on the 19th and brought another round of moderate to heavy rain to the lower elevations and into the Sierra Nevada up to around 6,000 feet. Around 1.00 inch to over 2.00 inches fell in portions of the Sierra Nevada from Mariposa to Fresno County, while lesser amounts occurred elsewhere. About one to two feet of snow fell in the higher elevations above 6,000 feet. Otherwise, relatively light precipitation occurred in the Central Valley (or about 0.10 to 0.25 inch).

A cold storm arrived on the night of the 20th and continued into the 22nd. Snow levels began at around 5,500 feet and lowered to 4,000 feet on the evening of the 21st into the morning of the 22nd. Most of the precipitation occurred on the 21st, as more moderate to heavy rain with afternoon thunderstorms returned by that morning and continued into the afternoon and evening. The strongest storms produced brief heavy rain, gusty winds around 40 to 50 mph, and hail around ¼ to ½ inch. Precipitation amounts on the 21st were fairly light in the San Joaquin Valley, or 0.10 to 0.50 inch. Rainfall amounts in the higher terrain were notably heavier, or about one to two inches in the lower elevations of the Sierra Nevada into the adjacent foothills, and snow amounts were anywhere from about one to three feet. The rain happened briefly on the 23rd, although it was showery.

From the 24th until the 27th, dry conditions made a brief return. In that stretch, the high temperatures rose into the 60s at the warmest locations but remained mostly below average. On the mornings of the 26th and 27th, some Central Valley locations reached near or below freezing.

The next period with precipitation occurred from the 28th until the 30th. The 28th brought in another storm with rain to the San Joaquin Valley and several feet of snow in the Sierra Nevada. The rain continued on the 29th in the form of showers and thunderstorms with snow over the Sierra Nevada and later over the Grapevine, and some lingering showers persisted until the morning of the 30th. Temperatures were mostly below average during the storm with the exception of Bakersfield. The afternoon and evening of the 30th, as well as the 31st were mainly dry and temperatures started to climb back up into the 60s.

Overall, the month was much cooler than average (Fig 1) with mainly much above average precipitation (Fig 2). The precipitation did, unfortunately, lead to flooding in quite a few areas in the coastal ranges along the west side of the San Joaquin Valley, many portions of the San Joaquin Valley along creeks and rivers, as well as the Tulare Lake Basin, and the Sierra Nevada. Dam operators increased releases along many of the main stem rivers for much of the month due to the increased runoff. Some of this runoff resulted due to the warmer storm systems that produced heavy rain on top of snowpack up to elevations around 8,000 feet at times. Much of this water ended up in the San Joaquin Valley and caused additional flooding after the precipitation occurred.

Table 2 – Seasonal Precipitation for ASOS locations (ending on March 31st)						
Location	**Since Jan 1st (inches)**	**Departure From Average (inches)**	**Since Jul 1st (inches)**	**Departure From Average (inches)**	**Since Oct 1st (inches)**	**Departure From Normal (inches)**
Bakersfield	7.39	+1.87	9.74	+4.28	9.74	+4.33
Fresno	12.23	+6.24	17.59	+8.30	17.48	+8.27
Hanford	10.83	+6.34	14.52	+7.53	14.48	+7.55
Madera	7.94	+1.89	11.37	+2.10	10.83	+1.60
Merced	13.83	+6.44	20.24	+10.23	20.04	+10.08

Table 3 – Warmest High Temperatures and Coolest Low Temperatures of the Month for ASOS locations				
Location	**High**	**Date(s)**	**Low**	**Date(s)**
Bakersfield	74	18th	36	3rd, 8th and 26th
Fresno	71	11th & 13th	34	2nd
Hanford	71	17th & 18th	31	2nd
Madera	70	11th and 13th	30	2nd
Merced	70	13th	31	27th

Daily Records Set During March 2023

Bakersfield – 16th: 0.94 inches of rain fell breaking the record of 0.60 inches set in 1960.

Fresno – No daily records set.

Hanford – No daily records set.

Madera – No daily records set.

Merced – 15th: 1.42 inches of rain fell breaking the record of 1.15 inches set in 1906.

Fig 1 – Departure from Average Temperature for March 2023

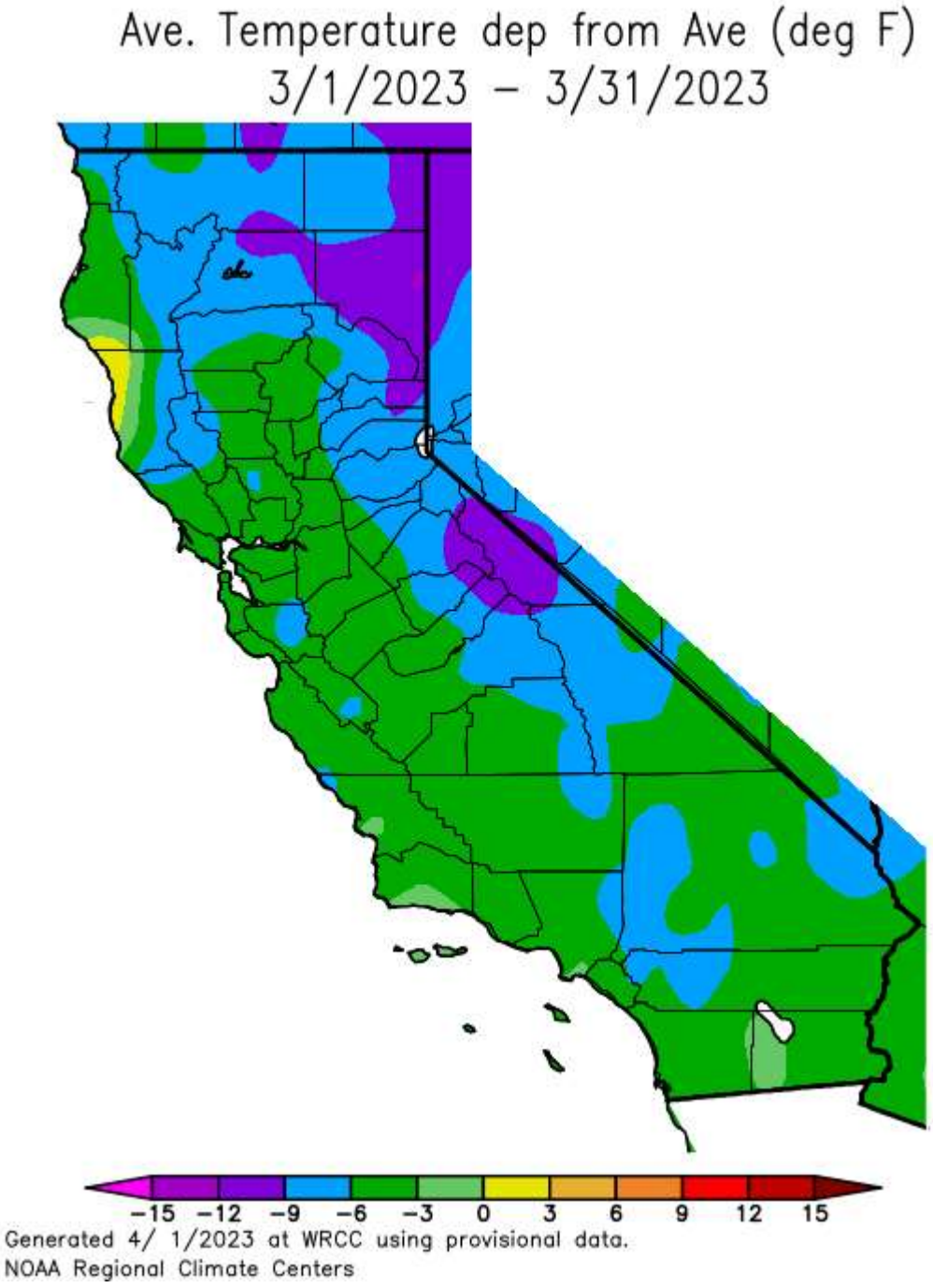

Fig 2 – Percent of Average Precipitation for March 2023