

# March 2024 Summary

This month, Arizona experienced average temperatures with above average precipitation in most counties. Multiple storm systems along with a cut-off low pressure system brought a statewide average of 1.73 inches of precipitation, ranking as the 24th wettest March on record. By March 31, snowpack was much above average in the Salt (443% median SWE), Verde (324% median SWE), and Little Colorado (232% median SWE) basins. For the water year to date (October-March), the state received an average amount of 6.40 inches of precipitation, which is 0.28 inches above the 1896-2024 mean of 6.12 inches.

A large trough over the western United States brought cooler temperatures and strong winds from March 2-3. Pipe Spring recorded 0.02 inches of precipitation, while a trace of precipitation was measured in Bullhead City, Page, and the Grand Canyon. On March 2, a 78 mph wind gust was measured at Tweed's Point, a mountain peak in Mohave County, and a 71 mph wind gust occurred at Winslow Airport.

Zonal flow over the state brought warmer temperatures from March 4-6.

A series of storm systems brought rain and mountain snow from March 7-9. Jerome received 1.40 inches of precipitation, Bagdad received 1.08 inches of precipitation, Green Valley received 0.74 inches of precipitation, Tucson received 0.55 inches of precipitation, Tempe received 0.44 inches of precipitation, Kingman received 0.35 inches of precipitation, and Phoenix received 0.25 inches of precipitation. Gusty showers were observed in Navajo County, and strong thunderstorms impacted portions of Maricopa, Pinal, and Yavapai counties. On March 7, the National Weather Service in Phoenix issued the first Severe Thunderstorm Warning of the year for Maricopa County. Pea-sized hail (0.25 inches in diameter) was reported near Laveen, Deer Valley, Peoria, Avondale, Ahwatukee, and Phoenix Mesa Gateway Airport, and around Cave Creek and Sun City on the 8th.

A ridge of high pressure built over Arizona from March 10-12, bringing dry and tranquil conditions.

Unsettled weather was prominent across the state from March 13-20 due to a cut-off low pressure system. Locations impacted include Payson (2.60 inches of precipitation), Natural Bridge State Park (2.49 inches of precipitation), Flagstaff (1.68 inches of precipitation), Carefree (1.39 inches of precipitation), Apache Junction (0.75 inches of precipitation), Kingman (0.62 inches of precipitation), Bullhead City (0.58 inches of precipitation), and East Mesa (0.53 inches of precipitation). Snow squalls were observed in portions of Coconino and Gila counties and bands of heavy snow moved through Apache County and the Flagstaff Metro Area. Strong thunderstorms also impacted portions of Coconino, Yavapai, Navajo, Apache, Gila, Maricopa, and Pinal counties. On March 13, the National Weather Service in Flagstaff issued the first Severe Thunderstorm Warning of the year for Coconino County; the last time that a Severe Thunderstorm Warning was issued in March by that office was in 2005. On March 15, pea-sized hail was observed near Maricopa, Queen Creek, and Buckeye. On March 18, pea-sized hail fell near Deer Valley, while locations around East Mesa and Apache Junction observed hail ranging from pea-sized to penny-sized (0.25 inches-0.75 inches in diameter), and areas close to Phoenix Mesa Gateway Airport received hail ranging from marble-sized to penny-sized (0.50 inches-0.75 inches in diameter).

Dr. Erinanne Saffell, Arizona State Climatologist Juliana Likourinou, Author <u>http://azclimate.asu.edu</u> © 2024 Arizona State Climate Office





On March 21, a weak shortwave triggered showers in Springerville (0.24 inches of precipitation), Show Low (0.02 inches of precipitation), and Window Rock (trace of precipitation). Elsewhere across the state, conditions were warmer and drier due to a ridge of high pressure, which lasted through March 22.

Another storm system brought cold temperatures, gusty winds, rain, and high elevation snow from the evening of March 23-26. Payson received 1.69 inches of precipitation, Alpine received 1.65 inches of precipitation, Globe received 1.23 inches of precipitation, Bellemont received 1.16 inches of precipitation, Apache Junction received 0.58 inches of precipitation, Safford Municipal Airport received 0.49 inches of precipitation, Tucson received 0.41 inches of precipitation, and Phoenix received 0.37 inches of precipitation. Bands of heavy snow were observed in portions of Coconino and Yavapai counties, and strong thunderstorms affected portions of Coconino, Yavapai, Apache, Navajo, Gila, Maricopa, and Pinal counties. On the 24th, small hail was observed near Tempe and Sun Lakes, and on the 26th, small hail fell near Globe.

Warmer temperatures and drier conditions returned from March 27-28 due to an area of high pressure over Arizona.

Gusty winds developed across the state on March 29 in response to an approaching upper-level low pressure system and attendant cold front, which brought cold temperatures, rain, and mountain snow from the afternoon of March 30 through the morning of April 1. On March 30, Kingman set a record rainfall amount of 0.45 inches, breaking the previous record of 0.07 inches that was set in 1973, and Yuma Marine Corps Air Station reached a record rainfall amount of 0.22 inches, breaking the prior record of 0.08 inches that was set in 1992. On March 31, Ajo received 0.80 inches of precipitation, Scottsdale received 0.75 inches of precipitation, Organ Pipe Cactus received 0.70 inches of precipitation, Flagstaff received 0.69 inches of precipitation, Payson received 0.67 inches of precipitation, East Mesa received 0.64 inches of precipitation, and Deer Valley received 0.56 inches of precipitation. Phoenix received a record rainfall amount of 0.50 inches, breaking the former record of 0.27 inches that was set in 1949. Flagstaff Pulliam Airport set a new record snowfall amount of 7.1 inches, breaking the previous record of 6.9 inches that was set in 1970. Rainfall amounts up to 2 inches were reported in areas throughout east central La Paz County, resulting in flash flooding. Excess rainfall and snowmelt led to rapidly rising water levels in Tonto Creek, prompting the National Weather Service in Phoenix to issue a Flood Warning.

**Data are preliminary** and are from NOAA/NCEI, the Northeast Regional Climate Center, the Southeast Regional Climate Center, and the National Weather Service Forecast Offices in Flagstaff, Phoenix, Tucson, and Las Vegas.

<u>Note</u>: Weather stations across the state have different reporting times. Official daily temperature and precipitation values are recorded at the airports from midnight to midnight, while statewide observations are taken at varying times throughout the day.

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The average state temperature for March was 50.4°F, ranking as the 59<sup>th</sup> warmest March within the period of record. The 1895-2024 mean average state temperature for March was 50.0°F, resulting in an anomaly of +0.4°F.

	0		0
County	Average Temperature	Rank (130 Years)	Anomaly From the 1895-2024 mean
Apache	41.3°F	47 <sup>th</sup> warmest	+1.0°F
Cochise	51.7°F	61 <sup>st</sup> coldest	-0.2°F
Coconino	43.7°F	44 <sup>th</sup> warmest	+1.3°F
Gila	48.6°F	54 <sup>th</sup> coldest	-0.6°F
Graham	51.1°F	61 <sup>st</sup> warmest	0.0°F
Greenlee	46.7°F	64 <sup>th</sup> warmest	-0.2°F
La Paz	61.2°F	61 <sup>st</sup> warmest	+0.3°F
Maricopa	59.8°F	65 <sup>th</sup> warmest	+0.1°F
Mohave	51.8°F	58 <sup>th</sup> warmest	+0.5°F
Navajo	42.6°F	50 <sup>th</sup> warmest	+0.8°F
Pima	57.2°F	63 <sup>rd</sup> coldest	-0.1°F
Pinal	58.1°F	65 <sup>th</sup> warmest	+0.1°F
Santa Cruz	50.6°F	51 <sup>st</sup> coldest	-0.7°F
Yavapai	48.5°F	61 <sup>st</sup> coldest	-0.2°F
Yuma	62.2°F	62 <sup>nd</sup> warmest	0.0°F

Period of record: 1895-2024

March 2024



March 2024

The average maximum state temperature for March was 62.9°F, ranking as the 56<sup>th</sup> coldest March within the period of record. The 1895-2024 mean maximum state temperature for March was 63.7°F, resulting in an anomaly of -0.8°F.

County	Maximum Temperature	Rank (130 Years)	Anomaly From the 1895-2024 mean
Apache	53.7°F	63 <sup>rd</sup> coldest	-0.4°F
Cochise	66.2°F	51 <sup>st</sup> coldest	-1.1°F
Coconino	55.8°F	62 <sup>nd</sup> coldest	+0.1°F
Gila	60.8°F	50 <sup>th</sup> coldest	-1.7°F
Graham	63.3°F	55 <sup>th</sup> coldest	-1.2°F
Greenlee	58.5°F	44 <sup>th</sup> coldest	-2.0°F
La Paz	73.5°F	54 <sup>th</sup> coldest	-1.2°F
Maricopa	72.7°F	56 <sup>th</sup> coldest	-1.2°F
Mohave	62.8°F	58 <sup>th</sup> coldest	-0.7°F
Navajo	55.4°F	63 <sup>rd</sup> coldest	-0.2°F
Pima	70.9°F	53 <sup>rd</sup> coldest	-1.1°F
Pinal	71.4°F	59 <sup>th</sup> coldest	-0.6°F
Santa Cruz	64.8°F	49 <sup>th</sup> coldest	-1.5°F
Yavapai	60.7°F	48 <sup>th</sup> coldest	-1.8°F
Yuma	75.6°F	53 <sup>rd</sup> coldest	-1.4°F

Period of record: 1895-2024



March 2024

The average minimum state temperature for March was 37.8°F, ranking as the  $41^{st}$  warmest March within the period of record. The 1895-2024 mean minimum state temperature for March was 36.2°F, resulting in an anomaly of  $+1.6^{\circ}$ F.

County	Minimum Temperature	Rank (130 Years)	Anomaly
			From the 1895-2024 mean
Apache	28.8°F	26 <sup>th</sup> warmest	+2.3°F
Cochise	37.2°F	54 <sup>th</sup> warmest	+0.8°F
Coconino	31.6°F	27 <sup>th</sup> warmest	+2.5°F
Gila	36.4°F	52 <sup>nd</sup> warmest	+0.6°F
Graham	38.9°F	40 <sup>th</sup> warmest	+1.3°F
Greenlee	34.8°F	36 <sup>th</sup> warmest	+1.6°F
La Paz	48.8°F	32 <sup>nd</sup> warmest	+1.7°F
Maricopa	46.8°F	45 <sup>th</sup> warmest	+1.3°F
Mohave	40.7°F	38 <sup>th</sup> warmest	+1.5°F
Navajo	29.9°F	36 <sup>th</sup> warmest	+1.8°F
Pima	43.4°F	48 <sup>th</sup> warmest	+0.8°F
Pinal	44.7°F	52 <sup>nd</sup> warmest	+0.7°F
Santa Cruz	36.3°F	64 <sup>th</sup> warmest	+0.1°F
Yavapai	36.2°F	45 <sup>th</sup> warmest	+1.4°F
Yuma	48.8°F	44 <sup>th</sup> warmest	+1.4°F

### Period of record: 1895-2024



The average state precipitation for March was 1.73 inches, ranking as the 24<sup>th</sup> wettest March within the period of record. The 1895-2024 mean state precipitation for March was 1.04 inches, resulting in an anomaly of +0.69 inches.

County	Precipitation	Rank (130 Years)	Anomaly
			From the 1895-2024 mean
Apache	2.43"	8 <sup>th</sup> wettest	+1.38''
Cochise	0.61"	56 <sup>th</sup> wettest	-0.13''
Coconino	1.73"	32 <sup>nd</sup> wettest	+0.50''
Gila	3.72"	15 <sup>th</sup> wettest	+1.78''
Graham	1.76"	24 <sup>th</sup> wettest	+0.67''
Greenlee	2.27"	10 <sup>th</sup> wettest	+1.16''
La Paz	0.67"	34 <sup>th</sup> wettest	+0.16''
Maricopa	1.37"	27 <sup>th</sup> wettest	+0.49''
Mohave	1.76"	25 <sup>th</sup> wettest	+0.70''
Navajo	2.25"	9 <sup>th</sup> wettest	+1.29''
Pima	1.17"	34 <sup>th</sup> wettest	+0.37''
Pinal	1.55"	29 <sup>th</sup> wettest	+0.49''
Santa Cruz	1.14"	42 <sup>nd</sup> wettest	+0.16''
Yavapai	2.36"	27 <sup>th</sup> wettest	+0.84''
Yuma	0.34"	54 <sup>th</sup> wettest	-0.07''

Period of record: 1895-2024

Data are from the National Centers for Environmental Information and are preliminary.

March 2024

#### March Statewide Precipitation (1895 to date)



Period of record: 1895-2024

This chart shows average Arizona precipitation each March through the period of record (1895 to present). March 2024 ranked as the 24<sup>th</sup> wettest with an average of 1.73 inches, which is 0.69 inches above the 1895-2024 average of 1.04 inches.

### **Flagstaff Climate Statistics**

#### March 2024

This ranked as the 60<sup>th</sup> warmest March on recordHe(1898-2024). With 3.14 inches of precipitation, itCoranked as the 25<sup>th</sup> wettest March on record.De

Avg Max Temp:47.6°FNormal:52.2°FAvg Min Temp:26.6°FNormal:23.8°FAvg Mean Temp:37.1°FNormal:38.0°F

Highest Monthly Avg Temp: 44.9°F in 1934 Lowest Monthly Avg Temp: 26.8°F in 1973

Highest Temp this month: 58°F on 21<sup>st</sup> Lowest Temp this month: 18°F on 9<sup>th</sup>, 17<sup>th</sup>, 27<sup>th</sup>

Record High: 73°F on 3/17/2007, 3/26/1988, 3/31/1966 Record Low: -16°F on 3/4/1966

<u>Temperature or precipitation records this month:</u> Snow: 7.1" on 3/31/2024, previous record 6.9" on 3/31/1970

Flagstaff Number of Days of:	
Minimum Temp 32°F or lower	28
Minimum Temp 0°F or lower	0
Maximum Temp 90°F or higher	0
Maximum Temp 32°F or lower	0

Heating Degree Days: 856 Normal: 837 Cooling Degree Days: 0 Normal: 0 Degree base 65°F

Total March Precipitation:3.14"Normal March Precipitation:1.88"Departure from Normal:+1.26"Greatest 24-Hr Precip:0.86" from 14<sup>th</sup> – 15<sup>th</sup>

Total Precipitation Year-to-Date:8.73"Departure from Normal:+2.63"Total Precip Year-to-Date (Last Year):16.16"

Total March Snowfall: 30.2" Normal: 15.6" Record March Snowfall: 79.4" in 1991

Greatest March Precipitation:7.27" in 2023Least March Precipitation:0.00" in 1972

Number of Days:

Clear	16
Partly Cloudy	10
Cloudy	5

Average Wind Speed: 9.1 mph Highest Peak Gust: 59 mph from 220° on 2<sup>nd</sup>

Data are from NOAA, the Northeast Regional Climate Center, and the Southeast Regional Climate Center and are **preliminary.** 

Normals on this page are from 1991-2020

MARCH 2024 FLAGSTAFF AVERA GE DAILY TEMPERATURE								
ABOVE AVERAGE BELOW +/- 0.5°F								
S	М	т	W	Th	F	S		
					1	2		
3	4	5	6	7	8	9		
10	11	12	13	14	15	<b>16</b>		
17	18	19	20	21	22	23		
24	25	26	27	28	29	30		
31								

Flagstaff experienced an equal number of days of above average and below average temperatures (14 days) and 3 days of average temperatures.

### **Phoenix Climate Statistics**

### March 2024

This ranked as the 29 <sup>th</sup> warmest Mar (1895-2024). With 1.34 inches of pre ranked as the 27 <sup>th</sup> wettest March on	rch on record ecipitation, it record.	Heating Degree Day Cooling Degree Day Degree base 65°F	s: 50 I s: 61 N	Normal: 65 Normal: 105
Avg Max Temp: 76.4°F Normal: Avg Min Temp: 53.8°F Normal: Avg Mean Temp: 65.1°F Normal:	78.1°F 54.5°F 66.3°F	Total March Precipit Normal March Preci Departure from Nor Greatest 24-Hr Prec	:ation: pitation: mal: ip: 0.5	1.34'' 0.83'' +0.51'' 50'' on 31 <sup>st</sup>
Highest Monthly Avg Temp: 72.3°F i Lowest Monthly Avg Temp: 54.3°F Highest Temp this month: 87°F on 3	in 2004 in 1897 80 <sup>th</sup>	Total Precipitation Y Departure from Nor Total Precip Year-to	'ear-to-Da mal: -Date (Las	te: 3.39" +0.82" t Year): 2.88"
Record High: 100°F on 3/26/1988 Record Low: 25°F on 3/4/1966	6 <sup></sup>	Greatest March Pred Least March Precipi	cipitation: tation:	4.82" in 1941 0.00" in 2016 and 12 other years
Temperature or precipitation record Precip: 0.50" on 3/31/2024, previous record 0.27" on 3/31/1949	ls this month:	Number of Days:Clear12Partly Cloudy16Cloudy3		
<u>Phoenix Number of Days of:</u> Minimum Temp 32°F or lower	0	Average Wind Speed Highest Peak Gust:	d: 6.6 mp 41 mph	h 1 from 30° on 26 <sup>th</sup>
Minimum Temp 0°F or lower Maximum Temp 90°F or higher Maximum Temp 32°F or lower	0 0 0	Data are from NOAA Center, and the Sou and are <b>preliminary</b>	،, the Nort theast Re <sub>٤</sub> ،	theast Regional Climate gional Climate Center

Normals on this page are from 1991-2020

		IAR PI	CH HOEN DAILY TI	202 IIX	<b>4</b>			
ABC	ABOVE AVERAGE BELOW +/- 0.5°F							
S	М	т	W	Th	F	S		
					1	2		
3	4	5	6	7	8	9		
10	11	12	13	14	15	16		
17	18	19	20	21	22	23		
24	25	26	27	28	29	30		
31								

Like Flagstaff, Phoenix also recorded an equal number of days of above average and below average temperatures (14 days) along with 3 days of average temperatures.

# **Tucson Climate Statistics**

# March 2024

This ranked as the 54 <sup>th</sup> warmest March on (1894-2024). With 1.25 inches of precipitat ranked as the 24 <sup>th</sup> wettest March on record	record Heating Degree Days: 163 Normal: 138 tion, it Cooling Degree Days: 9 Normal: 42 d. Degree base 65°F
Avg Max Temp: 72.1°F Normal: 75.8°	F Total March Precipitation: 1.25"
Avg Min Temp: 47.3°F Normal: 48.0°	F Normal March Precipitation: 0.56"
Avg Mean Temp: 59.7°F Normal: 61.9°	FDeparture from Normal:+0.69''Greatest 24-Hr Precip:0.52'' from 7th - 8th
Highest Monthly Avg Temp: 67.9°F in 2017	7
Lowest Monthly Avg Temp: 51.5°F in 1973	3 Total Precipitation Year-to-Date: 4.41"
	Departure from Normal: +2.17"
Highest Temp this month: 82°F on 29 <sup>th</sup> , 30 Lowest Temp this month: 41°F on 18 <sup>th</sup>	Total Precip Year-to-Date (Last Year): 3.01"
	Greatest March Precipitation: 3.88" in 1905
	Least March Precipitation: 0.00" in 2018
Record High: 99°F on 3/26/1988	and 8 other years
Record Low: 20°F on 3/4/1965	
	Number of Days:
	Clear 19
No temperature or precipitation records	Partly Cloudy 8
this month.	Cloudy 4
	Average Wind Speed: 6.9 mph
Tucson Number of Days of:	Highest Peak Gust: 45 mph from 260° on 24 <sup>th</sup>
Minimum Temp 32°F or lower 0	
Minimum Temp 0°F or lower 0	
Maximum Temp 90°F or higher 0	Data are from NOAA, the Northeast Regional Climate
Maximum Temp 32°F or lower 0	Center, and the Southeast Regional Climate Center

Normals on this page are from 1991-2020

and are preliminary.

		M	IAR T	CH UCSC DAILY TI	202 N EMPERA	<b>4</b>		
	ABOVE AVERAGE BELOW +/- 0.5°F							
	S	Μ	т	W	Th	F	S	
						1	2	
	3	4	5	6	7	8	9	
	10	11	12	13	14	15	16	
	17	18	19	20	21	22	23	mate
	24	25	26	27	28	29	30	uteCli
Data are fi	<b>31</b>	al Weather Ser	vice office in Tu	icson and are p	reliminary.			@47Sto

Compared to Flagstaff and Phoenix, Tucson observed a greater number of days of below average temperatures (19 days) and a lesser number of days of above average (10 days) and average temperatures (2 days).

#### Cumulative Statewide Precipitation per Water Year (Oct 2023-Sept 2024)





The average state cumulative Water Year precipitation was 6.40 inches at the end of March, which is 0.28 inches above the October-March average of 6.12 inches.

Data are from the National Centers for Environmental Information and are preliminary.









Av. Min. Temperature (deg. F) 3/1/2024 - 3/31/2024



25 30 35 40 45 50 55 60 65 70 75 Generated 4/ 1/2024 at WRCC using provisional data. NOAR Regional Climate Centers



Generated 4/ 1/2024 at WRCC using provisional data. NOAA Regional Climate Centers

Precipitation Departure from Average (in.) 3/1/2024 - 3/31/2024



-7.5 -6 -4.5 -3 -1.5 0 1.5 3 4.5 6 7.5 Generated 4/ 1/2024 at WRCC using provisional data. NOAA Regional Climate Centers



2 6 8 10 12 14 16 18 20 22 Generated 4/ 1/2024 ot WRCC using provisional data. NOAA Regional Climate Centers

Percent of Average Precipitation (%) 3/1/2024 - 3/31/2024



2 5 25 50 75 100 125 150 200 400 800 Generated 4/ 1/2024 at WRCC using provisional data. NOAA Regional Climate Centers



Temperatures were near normal across much of the state, with portions of western, central, and southeastern counties experiencing below normal temperatures.



Above normal precipitation was measured in most counties across the state, with portions of Coconino, Navajo, Apache, and Greenlee counties receiving much above normal precipitation.



This map shows the standardized precipitation evapotranspiration index (SPEI) across Arizona. March precipitation and evapotranspiration totals are measured across the state and are compared to previous March precipitation and evapotranspiration totals through the period of record (1895-present). Positive values represent wet conditions, while negative values represent dry conditions.

## Short-term Drought



March saw slight improvement in all measures of drought, except for Extreme (D3) short-term drought, which remained entrenched in southeastern Arizona (2% of state). Areas without drought or only with Abnormally Dry (D0) conditions extended across 57% of the state. Moderate (D1) and Severe (D2) short-term drought covered 41% of the state, largely in northwestern, central, and southeastern portions of the state.