

# Climate of New Mexico

## Introduction

This publication consists of a narrative that describes some of the principal climatic features and a number of climatological summaries for stations in various geographic regions of the State. The detailed information presented should be sufficient for general use; however, some users may require additional information.

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Unpublished climatological summaries have been prepared for a wide variety of users to fit specific applications. These include wind and temperature studies at airports, heating and cooling degree day information for energy studies, and many others. Tabulations produced as by-products of major products often contain information useful for unrelated special problems.

The Means and Extremes of meteorological variables in the Climatography of the U.S. No.20 series are recorded by observers in the cooperative network. The Normals, Means and Extremes in the Local Climatological Data, annuals are computed from observations taken primarily at airports.

The editor of this publication expresses his thanks to those State Climatologists, who, over the years, have made significant and lasting contributions toward the development of this very useful series.

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## **Climate of New Mexico**

Topographic Features- New Mexico, fifth largest state in the Union with a total area of 121,666 square miles, is approximately 350 square miles and lies mostly between latitudes 32 and 37° North and longitudes 103 and 109° West. The State's topography consists mainly of high plateaus of mesas, with numerous mountain ranges, canyons, valleys and normally dry arroyos. Average elevation is about 4,700 feet above sea level. The lowest point is just above the Red Bluff Reservoir at 2,817 feet where the Pecos River flows into Texas. The highest point is Wheeler Peak at 13,161 feet. The principal sources of moisture for the scant rains and snows that fall on the State are the Pacific Ocean, 500 miles to the west and the Gulf of Mexico, 500 miles to the southeast. New Mexico has a mild, arid or semiarid, continental climate characterized by light precipitation totals, abundant sunshine, low relative humidity, and a relatively large annual and diurnal temperature range. The highest mountains have climate characteristics common of the high Rocky Mountains.

The State is divided into three major areas by mountain ranges and highlands, oriented in a general north-south direction, which merge in the north. The Northern Mountains and Central Mountains are between longitude 105 and 106° West. They are the western boundary of the Northeastern and Southeastern Plains which slope gradually eastward and southeastward. The northern part of these eastern plains lies within the Arkansas River Basin and is drained mostly by the Canadian River, which flows southward then eastward into Oklahoma to its confluence with the Arkansas, and the Cimarron River in the extreme northeastern corner. The Pecos River rises in the Sangre de Cristo Mountains and flows southward through the Southeastern Plains into Texas, and then southeastward to join the Rio Grande. West of the mountain ranges that forms the Continental Divide, whose height decreases to a markedly lower elevation in southern New Mexico, rivers drain into the Gulf of California through the Colorado River system. Principal tributaries flowing westward into Colorado River are the San Juan River in the north, the Gila River in the south, and the San Francisco tributary of the Gila and other headwater streams of the Little Colorado River in the west-central area. The largest closed basins in the west are the Plains of St. Augustine in Catron County and the Rio Mimbres Basin in Grant and Luna Counties. Between the Northern Mountains and the Central Highland system and the Continental Divide system is the Rio Grand Valley which widens toward the south. The Rio Grande rises in the San Juan Mountains of southern Colorado, flows southward through New Mexico, then southeastward along the Texas-Mexico border into the Gulf of Mexico. The closed Tularosa Basin in southern New Mexico is in an intermountain area east of the Central valley.

Temperature- Mean annual temperatures range from 64 degrees Fahrenheit (° F) in the extreme southeast to less than 40 in the high mountains and valleys of the north; elevation is a greater factor in determining the temperature of any specific location than its latitude. This is shown by only a three degree difference in mean temperature between stations at similar elevations, one in the extreme northeast and the other in the extreme southwest; however at two stations only 15 miles apart, but differing in elevation by 4,700 feet, the mean annual temperatures are 61 and 45°

F-a difference of 16 degrees or a little more than three degrees decrease in temperature for each 1,000 foot increase in elevation.

During the summer months, individual daytime temperatures quite often exceed 100° F at elevations below 5,000 feet; but the average monthly maximum temperatures during July, the warmest month, range from slightly above 90°F at lower elevations to the upper 70s at high elevations. Warmest days quite often occur in June. The highest temperature of record in New Mexico is 122° F set at the Waste Isolation Pilot Plant (Eddy County) on June 27, 1994. A preponderance of clear skies and low relative humidity permit rapid cooling by radiation from the earth after sundown; consequently nights are usually comfortable in summer. The average range between daily high and low temperatures is from 25 to 35 degrees.

In January, the coldest month, average daytime temperatures range from the middle 50s in the southern and central valleys to the middle 30s in the higher elevations of the north. Minimum temperatures below freezing are common in all sections of the State during the winter, but subzero Fahrenheit temperatures are rare except in the mountains. The lowest temperature recorded at regular observing stations in the State was -50° F at Gavilan (Rio Arriba County) on February 1, 1951.

The freeze-free season ranges from more than 200 days in the southern valleys to less than 80 days in the northern mountains where some high mountain valleys have freezes in summer months.

Precipitation- Average annual precipitation ranges from less than 10 inches over much of the southern desert and the Rio Grande and San Juan valleys to more than 20 inches at the higher elevations in the State. A wide variation in annual totals is characteristic of arid and semiarid climates as illustrated by annual extremes of 2.95 inches and 33.94 inches at Carlsbad during a period of more than 71 years.

Summer rains fall almost entirely during brief, but frequently intense thunderstorms. The general southeasterly circulation from the Gulf of Mexico brings moisture for these storms into the State, and strong surface heating combined with orographic lifting as the air moves over higher terrain causes air currents and condensation. July and August are the rainiest months over most of the State with from 30 to 40 percent of the year's total moisture falling during these months. The San Juan valley area is least affected by this summer circulation, receiving about 25 percent of its annual rainfall during July and August. During the warmest six months of the year, May through October, total precipitation averages 60 percent of the annual total in the eastern plains.

Winter precipitation is caused mainly by frontal activity associated with the general movement of Pacific Ocean storms across the country from west to east. As these storms move inland, much of the moisture is precipitated over the coastal and inland mountain ranges of California, Nevada, Arizona and Utah. Much of the remaining moisture falls on the western slope of the Continental Divide. This dryness is most noticeable in the Central Valley and on eastern slopes of the mountains.

Much of winter's precipitation falls as snow in the mountain areas, but rain or snow may occur in the valleys. Average annual snowfall ranges from about three inches at southern desert and southeastern plains sites to well over 100 inches at northern mountain stations. It may exceed 300 inches in the highest mountains of the north.

General floods are seldom widespread in New Mexico. Heavy thunderstorms may bring several inches of rain to small areas in a short time. Because of the rough terrain and sparse vegetation in many areas, runoff from these storms frequently causes local flash floods. Normally dry arroyos may overflow their banks for several hours, halting traffic where water crosses highways; damaging bridges, culverts and roadways; and if in an urban area, possibly causing considerable property damage. Snowmelt during April to June, especially in combination with a warm rain, and heavy general rains during August to October may occasionally cause flooding of the larger rivers. Although streams in New Mexico have risen substantially during several floods, the overflows cannot be termed disastrous because comparatively little real property damage has resulted in this lightly industrialized and sparsely populated State. During spring snowmelt, main rivers may exceed flood stage and cause damage to property along their banks.

On rare occasions, tropical system remnants will dump rains on New Mexico as it moves through or close to the State. Wind is of little concern from these remnants. These systems came ashore at either the Gulf of Mexico or the Gulf of California.

Tornadoes are occasionally reported in New Mexico, most frequently during the afternoon and early evening hours from May through August. There is an average of nine tornadoes a year, but damage has been light because most occur over open, sparsely populated country. The tornadoes causing the most loss of life and injuries occurred in 1930 at Wagon Mound with three deaths and 19 injuries.

New Mexico has plenty of sunshine throughout the year, with 75 to 80 percent of the possible sunshine being received. In winter, this is particularly noticeable with from 70 to 75 percent of the possible sunshine being received. The sunshine combined with relatively low humidity often makes for very comfortable weather.

Climate and the Economy- The principal industries of New Mexico are agriculture, mining, lumbering, recreation and gas and oil production. Of these, the influence of climate upon agriculture and recreation is of major importance. Less than four percent of the State's area is under cultivation, and about one-third of this area is irrigated. Farming on this latter portion is intensive. More than one-half of the area of the State is pastureland, about 28 percent is woodland. The remainder is generally classified as wasteland and urban. Most irrigated land is in the southern valleys, although some is found in the middle of the Rio Grande Valley, the Canadian Valley in the northeast, the San Juan Valley in the northwest, and in east-central counties. These irrigated lands draw on stored surface water as well as underground water supplies for irrigation. Most dryland farming is in the eastern plains, but short-season dryland summer crops are grown in some small areas in the Central Highlands. All of the crops of New Mexico depend on water from snowmelt to meet their needs for crop growth.