



CLIMATE OF THE EASTERN SIERRA

A basic knowledge of Eastern Sierra climate is essential for understanding and appreciating the region's unusual mix of plant communities, mammals, and birds, as well as the underlying geological processes that shaped the landscape. The climate or general weather pattern of the Eastern Sierra is largely determined by its location, especially its latitude, topography, orientation, and proximity to the Pacific Ocean.

The Sierra Nevada Mountain Range is located in the mid-latitudes of the northern hemisphere, in the path of moist western winds blowing off the Pacific Ocean. Because large bodies of water like the Pacific Ocean tend to moderate weather patterns, the Sierra Nevada Mountains experience more moderate temperatures, drier summers, and warmer winters than further inland. The wet winters and dry summers are known as a Mediterranean climate, with distinctive precipitation patterns influencing plant and animal distributions.

Precipitation is largely controlled by elevation and the north-south alignment of the Sierra Nevada, which intercepts the moisture-laden west winds forcing them up and over the crest. As the air rises, it cools and condenses into clouds and the moisture eventually drops out as precipitation (rain or snow), with the majority falling on the western slope. As a result, higher elevations tend to receive more precipitation. The air is lighter and drier after the moisture is released, allowing it to flow up and over the crest of the Sierra. As the dry air flows down the eastern escarpment, it warms and absorbs moisture as it enters the eastern basin, promoting evaporation. The increased evaporation and reduced precipitation causes the eastern basin to be dry and desert-like, a phenomenon called the "rainshadow" effect.

Mammoth Mountain is located on the eastern side of the Sierra Nevada crest, but receives an annual average of 32 feet of snow despite the rainshadow effect. This unusually high amount of precipitation is due to the San Joaquin River Valley, which channels moist air from the Pacific up into Mammoth Pass where a low section in the Sierra Nevada crest allows moisture-laden air to cross to the east side. As the moist air encounters Mammoth Mountain, it rises, condenses, and drops an enormous amount of snow on the ski area and surrounding areas. The dry air then continues flowing down the east side, promoting evaporation and resulting in the high desert and sagebrush landscape near Highway 395.



References

1. Powell, D., and J. Klieforth. 2000. "Weather and Climate" in G. Smith (ed.), *Sierra East: Edge of the Great Basin*. University of California Press, Los Angeles, pp. 70-93.
2. Irwin, S. 2002. *California's Eastern Sierra: A Visitor's Guide*. Cachuma Press and the Eastern Sierra Interpretive Association, Los Olivos, California, 144 pages.

