

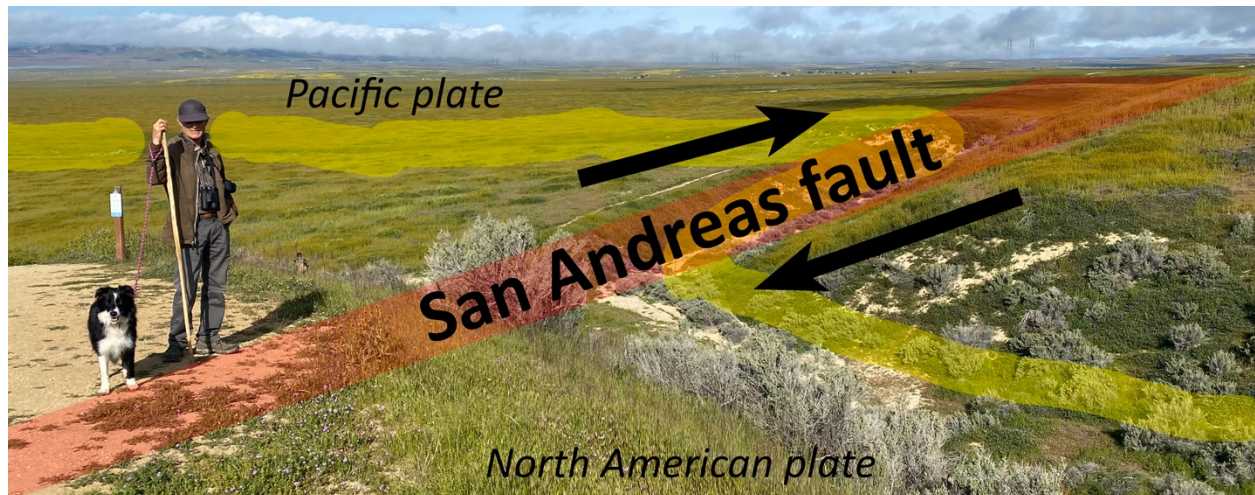
# Times Standard

## **Not My Fault: A Pilgrimage to the Carrizo Plain**

Lori Dengler for the Times-Standard

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*Tom Lisle and Pip at Wallace Creek in the Carrizo Plain. The San Andreas fault (orange line) separates the Pacific plate to the west and the North American plate to the east. Repeat earthquakes have offset the Wallace Creek channel (yellow).*

Geologists are story tellers. Whether searching for resources, identifying hazards, or siting structures, answers lie in millions, and sometime billions of years of geologic activity. For most people, landscapes are fixed, and bedrock means solid and unchanging. For geologists, the surface is always in transition. Unpacking the layers of rock and how they came to their present locations is fundamental to the discipline.

Two weeks ago, my husband Tom Lisle, border collie Pip, and I took a vacation to the Carrizo Plain in Central California. It's a place where even the novice can see a geologic story unfolding. It is smack dab in the center of the Nation's most populous state, yet relatively few Californians could point to it on a map.

There's a good reason. The Carrizo Plain is a destination location; it is not on the way to anywhere else. The nearly 250,000-acre Plain is almost entirely within Eastern San Luis Obispo County, hidden between populated coastal areas and the Central Valley. Only a few sections of road are paved and there are no motels, restaurants, or gas stations. Even the few campgrounds have no water. At roughly 2,200 feet above sea level, it is a geographic oddity, a closed basin perched between the Caliente and the Temblor Mountains, more than 1500 feet higher than the adjacent Central Valley.

The Carrizo Plain was populated by Native Peoples for at least 10,000 years. The Chumash, Salinan, and Yokut peoples all visited the Carrizo area adapting to the annual seasonal dry and

wet cycles. Peoples of European ancestry probably began herding sheep through the area in the early 1800s and attached the name Carrizo or Carrissa (wetland reed in Spanish) to the region.

By the 1870s permanent settlements dotted the Plains with families establishing ranches and farms. Relatively wetter years in the early 20th century and high prices for wheat and beef in World War II supported a number of communities. But dryer climates and increased costs of ranching and farming took a toll and populations dwindled. The Nature Conservancy and the federal government bought up parcels of land and in 2001 it became the Carrizo Plain National Monument.

There are many reasons why the Carrizo Plains merits National Monument status. This winter it has received national and international attention for the super bloom, vast fields of yellow, orange and purple that can be seen from space (<https://earthobservatory.nasa.gov/.../a-flood-of-wildflowers>). The richness of native flora and fauna gives a glimpse of what much of the Central California ecosystem may have looked like prior to human development.

I admit to having a fondness for wildflowers but it's the geology that really warms my heart. Slicing along the base of the aptly named Temblor Range is the San Andreas fault. The San Andreas played a major role in producing the geography of today's Carrizo Plain.

It is unfortunate that there are almost no written records from the middle part of the 1800s in the Carrizo Plain. If there were, we would know more about what happened at 8:20 AM on January 9, 1857. An earthquake estimated at magnitude 7.9 ruptured about 220 miles the San Andreas fault from the town of Parkfield in Central California to Cajon Pass in SW San Bernardino County.

The San Andreas fault generally conjures an image of San Francisco and the devastation of 1906. Last Tuesday marked 117 years since what I like to call the Great Northern San Andreas earthquake. Calling it the San Francisco earthquake diminishes the event that ruptured 250 miles of the San Andreas fault from Santa Cruz to Humboldt County.

The 1906 earthquake provides a picture of what happened on the south-central segment of the San Andreas in 1857. Both were about M7.9 and produced surface fault rupture for at least 200 miles. Both were strike-slip earthquakes with maximum offsets of over 20 feet: rock to the west side of the fault slipped 15 to 20 feet to the north relative to the rocks to the east.

The Carrizo plain provides the best record of the 1857 fault slip. That sudden jolt did not just produce shaking felt as far away as San Diego and Sacramento. The rupture offset everything that crossed the fault, and in the Carrizo area, that meant hundreds of small streams and channels.

Wallace Creek is the best known of these offsets. It is easily accessible from a parking lot on Elkhorn Road and the Bureau of Land Management provides interpretive signage and a fault trail map. The ephemeral stream features a 425-foot dogleg where it crosses the fault. Scientists studying the area more than a century after the earthquake were able to measure the 23-foot contribution to the dogleg produced in 1857.

To get 425 feet of offset, we need roughly 20 earthquakes of similar offset to 1857. Paleoseismologists using backhoes and shovels have excavated Wallace Creek and other offset channels to produce a record of offsets for the past 13,000 years. It's hard to unravel each earthquake event as later events offset earlier ones and erosion removes evidence in between, but the previous five before 1857 show roughly similar offsets and are likely to be in the M7.5 to M8 range. Unfortunately, spacing between quakes is irregular and can't be used to predict the next one, but it could happen in your lifetime.

The San Andreas fault is responsible for the present-day geography of the Carrizo Plain. Born about 30 million years ago when a giant reorganization of plate boundaries began, the San Andreas fault has been slowly changing a subduction zone boundary into a transform boundary ever since.

Since its birth somewhere near present-day Los Angeles, the San Andreas has grown, the northern terminus reaching what is now Central California roughly 20 million years ago. Before then, the Carrizo Plain was part of the Great Valley, but the arrival of the San Andreas fault caused slight compression, creating the Temblor Range, and uplifting and isolating the Plain. The San Andreas fault is only the most recent part of the history of the Carrizo Plain. A hike into the Caliente Mountains on the west reveals thick ash deposits and volcanic dikes, dating back to a pre-San Andreas past. But that's a different chapter in the story.

Note: Thanks to the Santa Margarita Historical Society

<https://santamargaritahistoricalociety.org/> and David Chipping's book on the Geology of San Luis Obispo County <https://cnpsslo.org/shop/the-geology-of-san-luis-obispo-county/> for background information. For a much more thorough overview of the San Andreas fault in the Carrizo Plain see <http://activetectonics.asu.edu/carrizo/cargeo.html>.

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