

# Two-Mile Pond Geologic Assessment



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## Introduction

The Two-Mile Pond is located east of Santa Fe, in the southwestern Sangre de Cristo Mountains. A discussion has been developed by the Santa Fe Canyon Preservation Association (SFCPA) and Canyon Neighborhood Association (CNA) regarding various pathways to restore the pond to provide a wetland sanctuary for native and migratory flora and fauna, enhance the existing river and associated riparian and wetland areas, stabilize local surface water supplies, and provide a space for education, recreation, and ecotourism (“Canyon Partners” white paper, 2025). Concerns have been raised regarding the presence of a “critical fault” that could impact the integrity of the berm that was built in the late 1800s. Here we provide a review of the regional and local geology, documented earthquake data, and the results of a site visit to examine the local outcrops.



**Figure 1. Location of Two-Mile Pond.**

## Regional and Local Geology

Two-Mile Pond is situated on the southwestern flank of the Sangre de Cristo Mountains, the southernmost extension of the Rocky Mountains, which are the result of the Laramide mountain-building event that took place during the Late Cretaceous to Early Tertiary (Cather, 2004). To the east lies the Great Plains physiographic province and to the west the Rio Grande Rift (Figure 2). The Sangre de Cristo Mountains are composed of Precambrian granite as well as metasedimentary and metavolcanic rocks uplifted as the mountains formed. To the west is the southern Española Basin, part of the Rio Grande Rift, which includes thick sequences of basin-fill sediments of the Miocene-Pliocene Santa Fe Group.

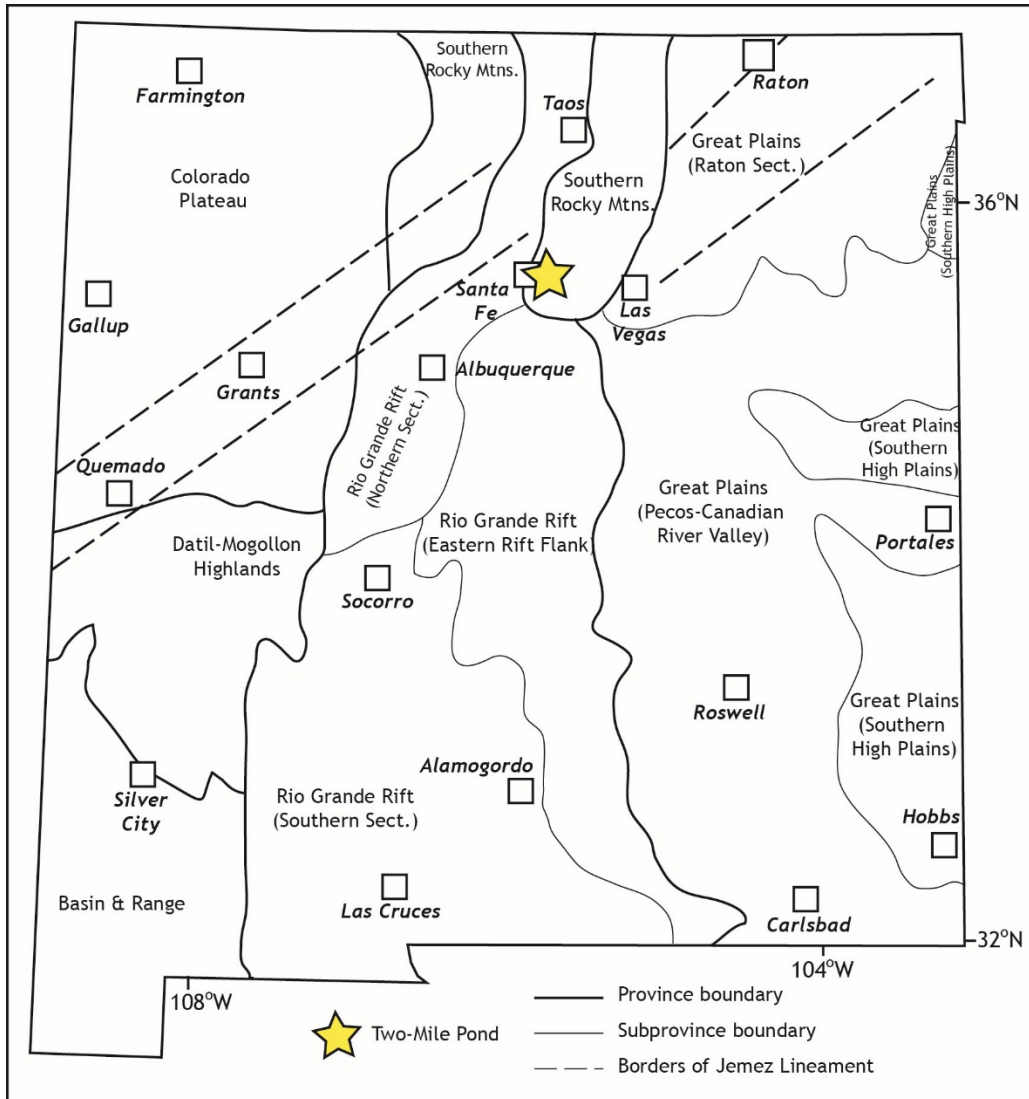
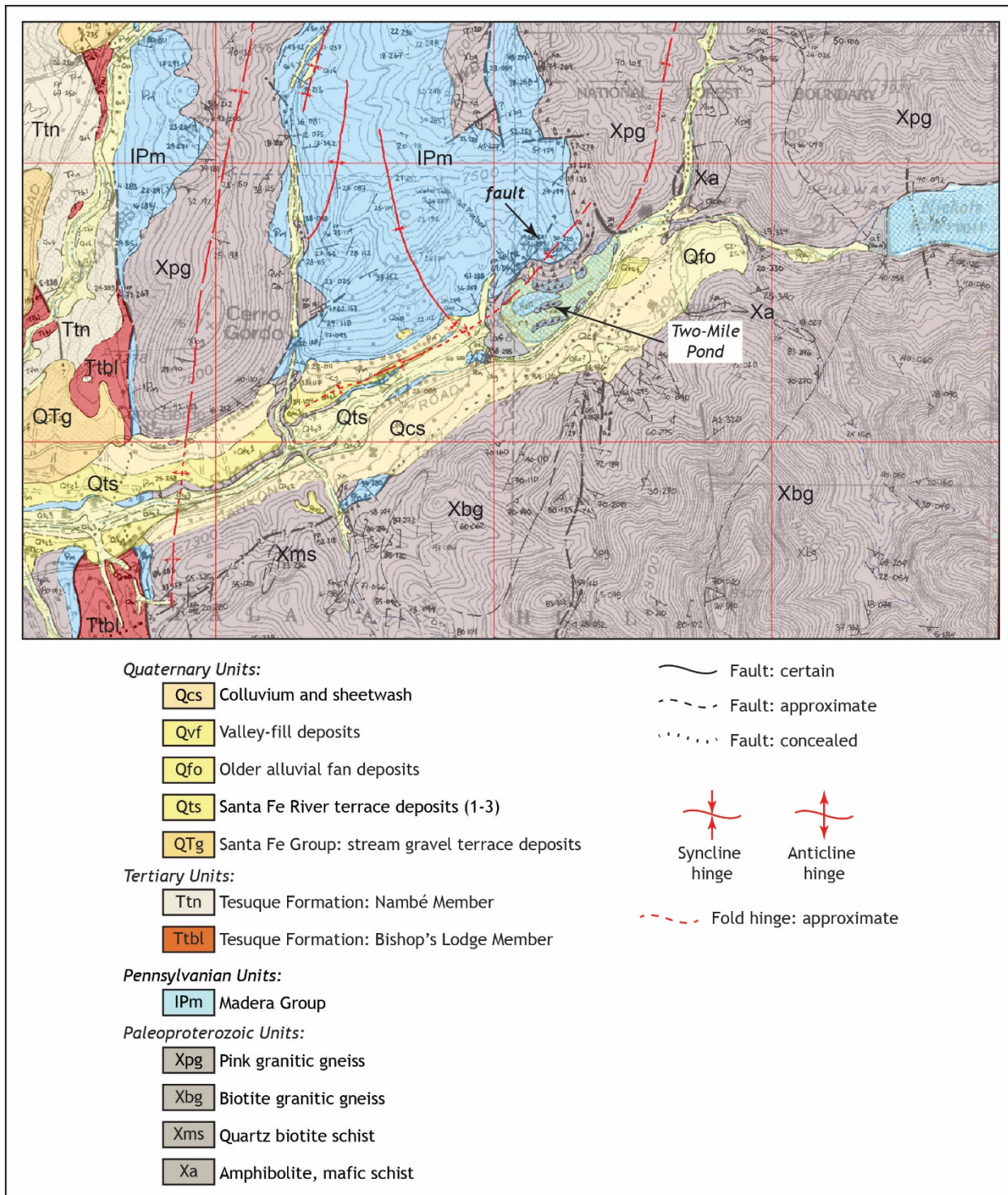


Figure 2. Physiographic provinces of New Mexico (after Pazzaglia and Hawley, 2004).

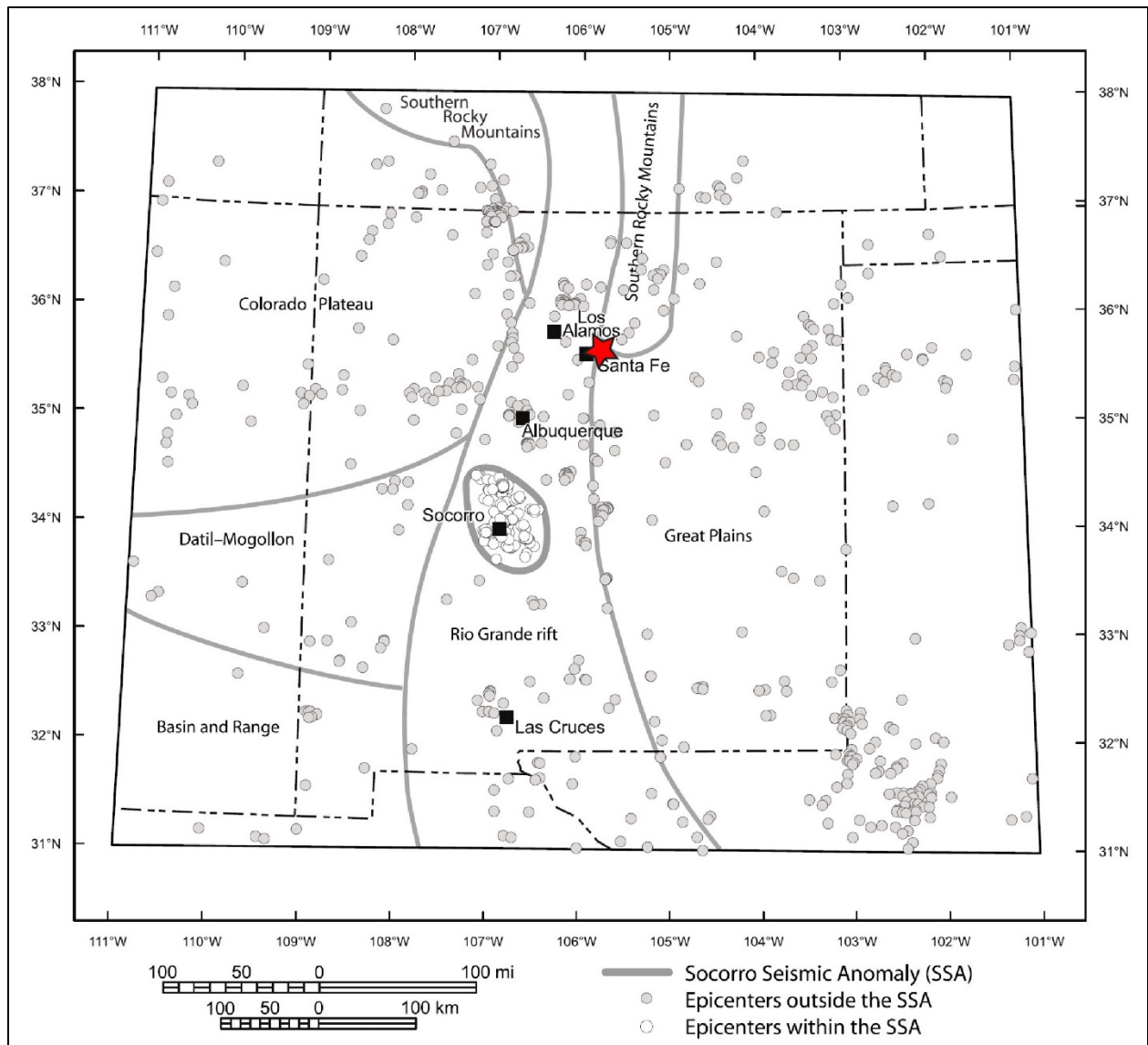
Two-Mile Pond sits in a narrow valley that hosts the Santa Fe River. Outcrops of the Pennsylvanian Madera Group occur to the north of the pond, as well as to the southwest as a small fault block exposed in the floor of the valley (Read et al., 2000; Figure 3). To the south are exposures of Proterozoic granite (Xbg) and to the north are exposures of granitic gneiss. Several faults are documented in the area, as well as north-northeast trending fold hinges (anticlines and synclines) (Read et al., 2000). The pond itself is set into both shallow alluvial deposits in the valley floor and the northern wall of the pond includes granitic gneiss overlain and/or faulted against limestone beds and reddish mudstone beds of the Madera Group. Two fold hingelines cross through the pond and northern wall. An interpreted fault plane has also been identified to the north of the pond (Read et al., 2000).



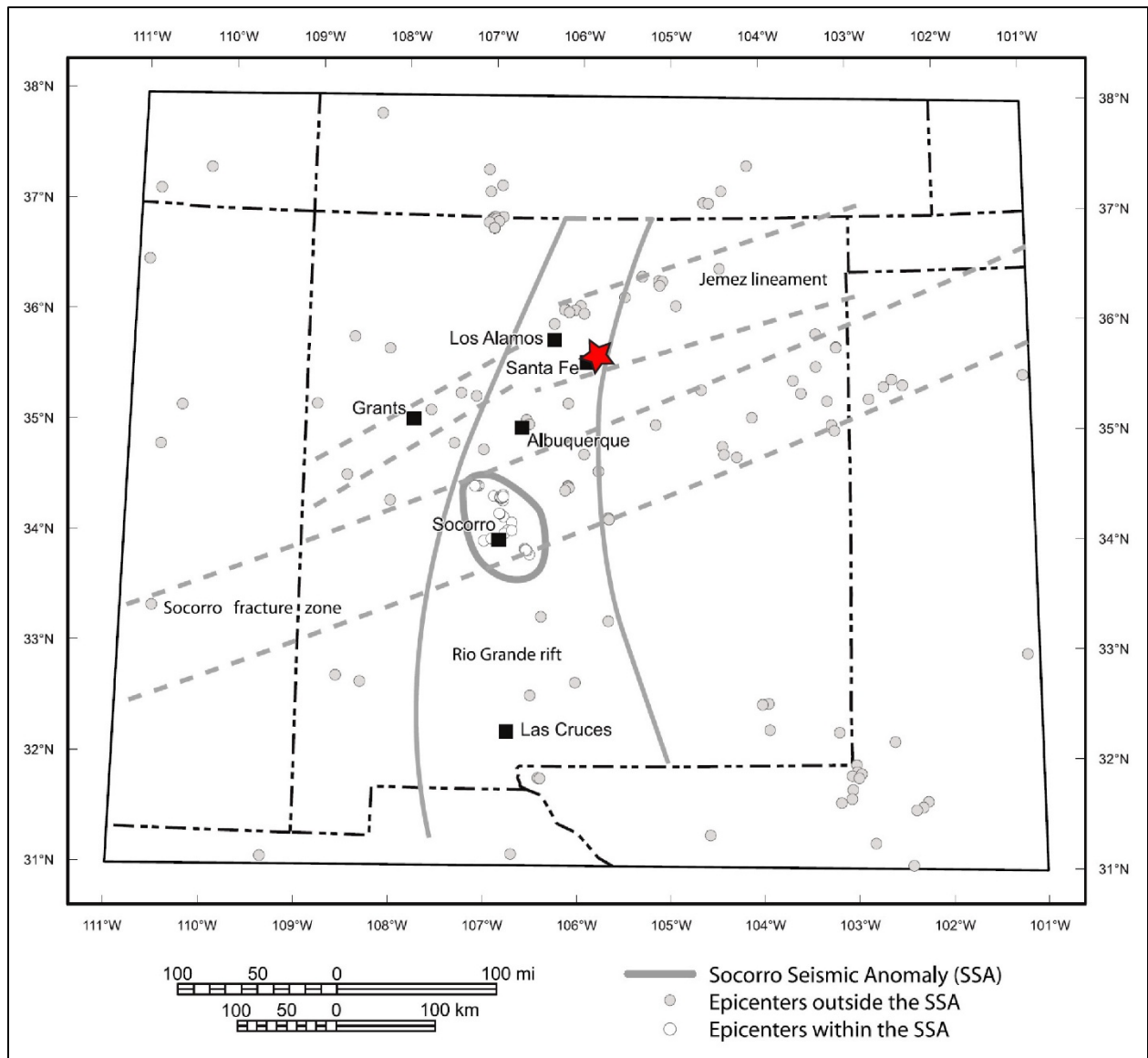
**Figure 3. Geology in the vicinity of Two-Mile Pond (from Read et al., 2000). Pale green coloration around the pond is the underlying topographic map expression for a body of water.**

## **Earthquake Data**

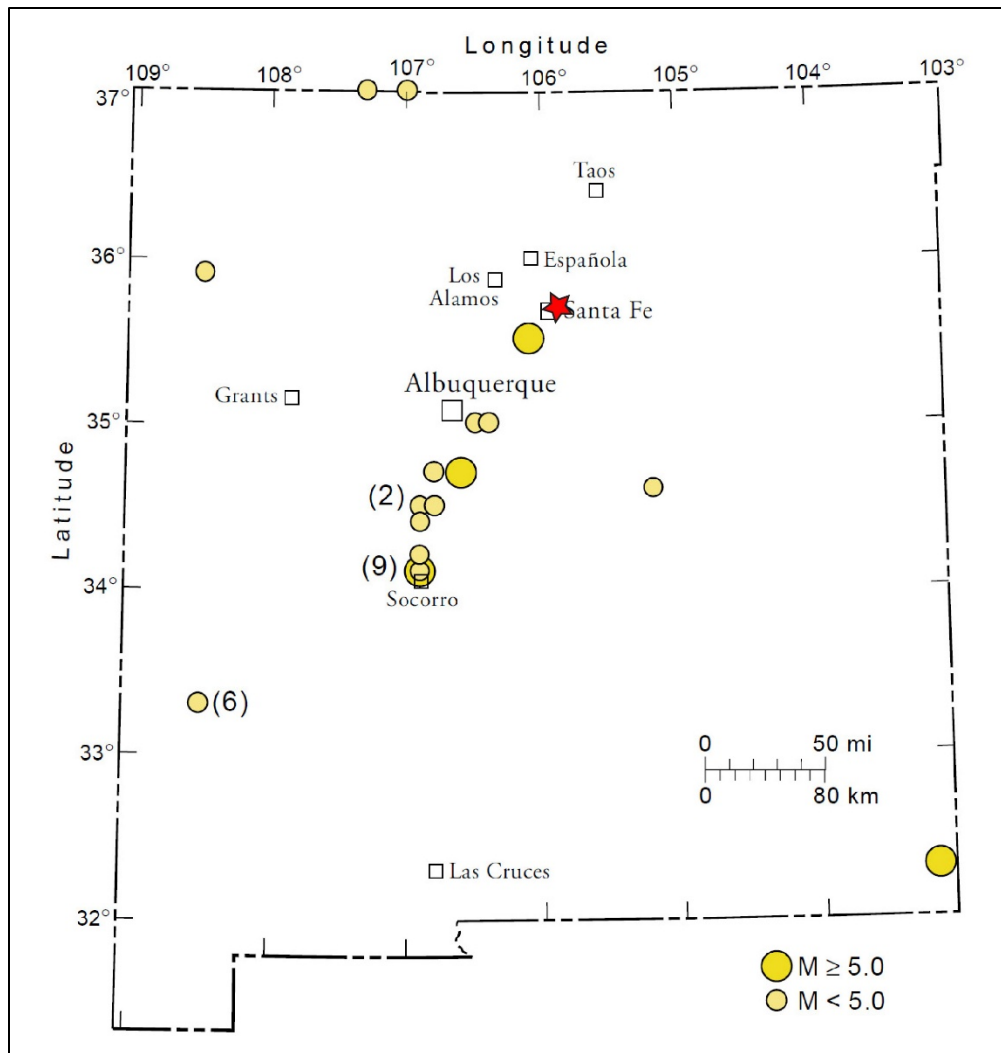
Sanford et al. (2002) published a systematic review of earthquakes in New Mexico from 1869 through 1998 (Figures 4-6). While there is a great deal of low-level seismicity in many areas of the state, especially along the Rio Grande Rift and in the Socorro Seismic Anomaly (Northrop and Sanford, 1972), there are few events documented for the area immediately surrounding Santa Fe (Sanford et al., 2002; Figures 4-5). Three events are documented to the northeast of Santa Fe in the southern Sangre de Cristo Mountains in the 1962-1998 period, all of magnitude 2.0 and no events greater than magnitude 3.0 have been documented in this area. A magnitude 5.5 occurred near Cerrillos in 1918 and this is the greatest magnitude earthquake documented in the greater Santa Fe area (Figure 6). Modeling of seismic hazards for New Mexico suggest that the much of the state has low potential for seismic hazard, with moderate potential along the Rio Grande rift and especially within and adjacent to the Socorro Seismic Anomaly (Lin, 1999).



**Figure 4. Seismic events of moment magnitude 2.0 or greater from 1962 to 1998 (Sanford et al., 2002). Red star denotes position of Two-Mile Pond.**



**Figure 5. Seismic events of moment magnitude 3.0 or greater from 1962 to 1998 (Sanford et al., 2002). Red star denotes position of Two-Mile Pond.**



**Figure 6. Strongest earthquakes from 1869 to 1998 (moment magnitude 4.5 or greater) (Sanford et al., 2002). Red star denotes position of Two-Mile Pond.**

### Site Visit and Conclusions

On May 23<sup>rd</sup>, 2025, K. Zeigler and field assistants I. Lyons and E. McGrath accompanied Mr. Richard Ellenberg on a site assessment of Two-Mile Pond. In examining the outcrop of rock that borders the north side of the Two-Mile Pond area, we observed the fault that is documented by Read et al. (2000), which was marked by sharply northwest-tilted beds of Madera Group limestone adjacent to a distinctive reddish-black fault breccia that is very well cemented (Figures 7, 8). To the southeast of the fault breccia zone, which is up to six feet (two meters) wide are outcrops of dark red granitic gneiss. Colluvial debris covers much of the slope along this side of

the pond, but the trace of the fault can be estimated based on the orientation of the fault breccia and adjacent tilted limestone beds. The trace of the fault lies along the north side of the pond and does not appear to directly intersect the existing berm. In addition, the fault breccia observed in two places along the walking trail developed on the northern side of the pond appears to be very well cemented and would probably not act as a conduit for water to move along if the fault plane does intersect the berm. We note also that there have been no documented seismic events at or in the immediate vicinity of Two-Mile Pond, suggesting that these faults have not been subject to motion since at least the late 1800s and are unlikely to experience motion in the foreseeable future.



**Figure 7. View to the north of the outcrop along the north side of the pond. Fault is situated nearly parallel to the metal retaining wall (arrow points to retaining wall).**



**Figure 8. View to the west of fault breccia along fault plane. Tan rocks to the right side are Madera Group strata.**

## References

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