

Preliminary Geologic Map of the Bottomless Lakes Quadrangle, Chaves County, New Mexico

By

Geoffrey Rawling

May, 2006

**New Mexico Bureau of Geology and Mineral Resources
*Open-file Digital Geologic Map OF-GM 126***

Scale 1:24,000

This work was supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program (STATEMAP) under USGS Cooperative Agreement 06HQPA0003 and the New Mexico Bureau of Geology and Mineral Resources.



**New Mexico Bureau of Geology and Mineral Resources
801 Leroy Place, Socorro, New Mexico, 87801-4796**

The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government or the State of New Mexico.

Preliminary Geologic Map of the Bottomless Lakes Quadrangle

OF-GM-126

Mapped and compiled by Geoffrey Rawling

EXPLANATION OF MAP UNITS

Anthropogenic Deposits

af - artificial fill for stock tanks and highway embankments.

Quaternary and Tertiary Surficial Deposits

QHa - Alluvium (Holocene to Historic) – Unlithified poorly to moderately sorted clay, silt, sand, and minor gravel in the active, incised channel of the Pecos River and larger tributary arroyos. Incised into Pecos river floodplain deposits and **Qvf**.
Thickness: 0 to 4 (?) meters.

QHps – Alluvial and eolian playa deposits (Holocene to Historic) - Stratified gypsiferous sand, silty clay, and clay underlying flat, largely vegetation-free expanses of the Pecos River floodplain. Thickness: 0 to 2 (?) meters.

QHbf - Eolian deposits within blowouts (Holocene to Historic?) - Deposits probably silty clay and clay. Thickness: < 2 m (?).

QHsf – Sinkhole fill deposits (Pleistocene to Historic) – Alluvial and colluvial

boulders, sand, silt and clay filling dry sinkholes and derived from the Seven Rivers formation. Thickness: Unknown, probably up to several tens of meters.

Qed – Dunes (Holocene) – Eolian sand in dune and local sand sheet bedforms. Deposits

are along the eastern margin of the quadrangle and appear to be localized by the low bluff formed by outcrops of Triassic Santa Rosa formation. Largely stabilized by vegetation other than in blowouts. Sand sheets appear to be common throughout the quadrangle east of the bluff composed of Seven Rivers formation, but these deposits could not be consistently delineated on aerial photographs. Thickness: < 1 to 5 (?) meters.

Qaf – Alluvial fan deposits (Pleistocene to Holocene) – Coalesced alluvial fans

composed of poorly sorted gypsiferous sand, silt, clay, and boulders (?) derived from Seven Rivers formation. Fans interfinger with and/or spread out onto **Qafs** and Pecos River floodplain deposits (**Qfpy** and **Qfpo**). Stabilized by vegetation and apparently not currently active, and locally incised by small drainages floored with **QHs**. Only mapped where geomorphic expression is clear on aerial photos. Thickness: 0 to 8 (?) meters.

Qafs – Alluvial plain and low-gradient fan deposits (Pleistocene to Holocene) –

Coalesced, very low gradient alluvial fan deposits grading laterally into alluvial plain

deposits. Unit probably interfingers with **Qflo**. Little or no development of channels. Composed of sand, silt, and clay and probably deposited by sheetwash processes. Surface anthropogenically disturbed in most areas. Thickness: 0 to 9 (?) meters.

Qvf - Valley fill (Pleistocene to Holocene) - Unlithified valley fill in arroyos and swales composed of poorly sorted clay, silt, and sand. Matrix material is light to dark brown, reflecting soil development processes. Probably deposited largely by alluvial processes with subordinate sheetwash and colluvial processes. Grades into minor alluvial and colluvial fans on toes of hillslopes. Heavily vegetated and often incised by active drainages too small to map, which are floored by **QH_a**. Thickness: 0 to 5 (?) meters.

Floodplain and Terrace Deposits of the Pecos River

Qfly - Younger floodplain deposits of the Pecos River (Holocene) - Alluvial deposits composed of interstratified fine to coarse sand and subordinate gravel. Active channel of the Pecos River (underlain by **QH_a**) is incised into this deposit and **Qfpo**. Upper surface is within 2 meters of present stream grade. This deposit, with unit **Qflo**, underlies the Lakewood terrace of Fiedler and Nye (1933), which comprises the present floodplain of the Pecos River. Vegetation cover is nonexistent to moderate and the surface is not anthropogenically disturbed. Mapped from aerial photographs. Thickness: 0 to 5 (?) meters.

Qflo - Older floodplain deposits of the Pecos River (Pleistocene to Holocene(?)) -

Poorly to moderately sorted alluvial deposits composed of interstratified fine to coarse sand and subordinate gravel. Incised channel of the Pecos River (underlain by **QH_a**) is incised into this deposit and **Qfly**. Upper surface is within 2 meters of upper surface of **Qfly**. This deposit, with unit **Qfly**, underlies the Lakewood terrace of Fiedler and Nye (1933), which comprises the present floodplain of the Pecos River. Vegetation cover is extensive and surface is locally anthropogenically disturbed. Mapped from aerial photographs. Thickness: 0 to 5 (?) meters.

Qopt – Orchard Park Terrace deposits (Lower (?) to middle (?) Pleistocene) -

Unlithified gravel, sand, silt and clay (?) underlying low terrace (Orchard Park terrace of Fiedler and Nye (1933)) on west side of the Pecos River and isolated small deposits at the mouth of Comanche Draw on the east side of the river. Gravels in outcrops east of the river are rounded cobbles composed of limestone and varicolored chert, with minor igneous rocks. Western terrace riser is a distinct low bluff about 3 meters high. Surface is anthropogenically disturbed by farming. Shallow water wells on this terrace and in sections immediately west of the quadrangle penetrate “shallow alluvium” and unlithified “sand, gravel, and conglomerate”. Thickness: 0 to 10 (?) meters.

Mesozoic Sedimentary Rocks

T_{sr} - Santa Rosa Formation (upper Triassic) – Unit not observed in the field due to difficulty of land access; mapped with aerial photos and projections of the top of the

Yates formation from well logs. The outcrop pattern is defined by a series of low hills (< 50 feet high) along the eastern margin of the quadrangle, and is in general agreement with Kelley (1971). Exposures appear to be poor, with abundant alluvial and eolian cover. Kelley (1971) described exposures approximately 20 miles to the north as composed of grayish to reddish brown thick-bedded sandstones and subordinate red, brown, and variegated mudstone. Lucas and Anderson (1993) described exposures at Mesa Diablo, seven miles to the north, as grayish-red and pale reddish-brown micaceous sandstones, siltstones and mudstones with subordinate yellowish- and greenish-gray conglomerates.

Paleozoic Sedimentary Rocks

Pag - Artesia Group, Yates Formation (upper Permian) – Unit not observed in the field due to difficulty of land access and poor exposure. Unit forms a broad bench across the central portion of the quadrangle. Mapping was performed with aerial photos and projections from well logs. Surface expression (soil texture and vegetation patterns) on aerial photographs allows differentiation from both the underlying Seven Rivers Formation and overlying Santa Rosa formation, although unit is largely obscured by sand sheets and small, stabilized dunes. Described by Kelley (1971) as gypsum, dolomite, and fine-grained, thin-bedded sandstone.

Pas – Artesia Group, Seven Rivers Formation (upper Permian) – White to pale gray gypsum, brick red, pale red, to orange very fine sandstone, siltstone, and mudstone, and minor limestone. Gypsum comprises up to 90% of the unit in the area of

Bottomless Lakes State Park. Towards the north edge of the quadrangle, gypsum content decreases to ~ 75%, with concomitant increase in clastic interbeds. Bedding is irregular and highly variable along eastern Pecos River bluffs due to sinkhole formation, associated dissolution and collapse, and rotated slump and landslide blocks. Gypsum beds are thick- to very thick-bedded, and massive to thin-bedded to laminated internally. Red outcrop color is due to surface wash from the thin clastic interbeds. These clastic layers often have veins of gypsum. Top of the bluff is often capped by or covered with rubble of medium gray thin- to medium-bedded, crinkly laminated limestone.

Paqg – Artesia group, Queen and Grayburg Formations, undivided (upper Permian) – cross section only

Psa – San Andres Formation (middle to upper Permian) – cross section only

Pya – Yeso Formation and Abo formation, undivided (lower to middle Permian) – cross section only

References

- Fiedler, A. G. and Nye, S. S., 1933, Geology and ground-water resources of the Roswell artesian basin New Mexico: U. S. Geological Survey Water Supply Paper 639, 369 p.
- Kelley, V. C., 1971, Geology of the Pecos Country, Southeastern New Mexico: Memoir, New Mexico Bureau of Mines and Mineral Resources Memoir 24, 75 p.
- Lucas, S. G. and Anderson, O. A., 1993, Triassic stratigraphy in southeastern New Mexico and southwestern Texas, *in* Love, D. W., Hawley, J. W., Kues, B. S., Adams, J. W., Austin, G. S., and Barker, J. M., eds., Carlsbad Region, New Mexico and Texas: New Mexico Geological Society Guidebook 44, p. 231-235.