Late Quaternary gypsic and clastic landforms and facies of the northern Tularosa Basin, New Mexico, respond to climate change

D. W. Love1, B. D. Allen1 and R. G. Myers2

1NM Bureau of Geology and Mineral Resources, NM Tech, Socorro, NM, 87801, dave@gis.nmt.edu
2U.S. Army, IMSW-WSM-PW-E-ES, White Sands Missile Range, NM, 88002

Two hydrologic systems determine landforms and sedimentary facies preserved in the northern Tularosa Basin: 1) the surface water runoff and clastic sediment delivery system of Malpais drainage, Salt Creek, and Three Rivers and their tributaries, and 2) the sulfate-laden groundwater system that dissolves Permian evaporites and reprecipitates evaporite minerals in extensive springs, marshes, and lakes. The relative dominance of Quaternary springs, wetland habitats, rivers, and lakes in the northern basin has undergone extensive spatial and temporal changes as indicated by both clastic and precipitated sedimentary deposits and landforms. Clastic landforms and deposits are alluvial aprons with two or more inset levels of channel, fan, and eolian sandloess-sheet development. Alluvial channels continue southward to the lowest part of the Tularosa Basin, disrupted by eolian blowouts and dunes.

The present-day Mound Springs south of the Oscura Mountains are crater-topped conical hills of gypsum deposited by calcium-sulfate-dominated brackish springs. These cratered mounds reach up to 5.5 m high and 50 to 250 m across. Dozens of extinct cratered mounds occupy the western flank of an earlier and much larger accumulation of discharge-related gypsum, covering an area of at least 16 km². Similar extensive fossil discharge deposits are present to the northeast and southwest of the Mound Springs area. These older deposits are pitted with aligned sinkholes more than 8 and perhaps as much as 13 m deep.

During a late-Pleistocene wet episode along Salt Creek farther south, a huge, gypsum-precipitating wetland area covered at least 50 km² and formed fossiliferous deposits up to 3 m thick. The water table has dropped 10 m since then. The last glacial maximum expansions of Lake Otero (to 1207m elevation) represent times when fluvial and lacustrine systems and wetland habitats in contributing watersheds to the north were integrated and produced an extensive siliciclastic fluvio-deltaic complex along the lake's northern margin.

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Tularosa Basin, climate change, clastic landforms, springs, gypsum, hydrology

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