COMPLEX SEDIMENT PRESERVATION AND REMOVAL IN THE NORTHERN AND CENTRAL TULAROSA BASIN, NEW MEXICO, DUE TO DEFLATION, BASE LEVEL CHANGES, DOWNWIND ACCUMULATIONS, AND RECYCLING

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On the floor of the Tularosa Basin, deflation has repeatedly controlled local base levels and related eolian, playa, and alluvial geomorphic features, with eolian sediment being an important contributor to aggradation on eastern basin margins. Modern surface water transports fine sediment and dissolved salts to the lowest parts of the basin in deflated, non-integrated playas such as modern Lake Lucero (base elevation 1,183 m, 44 m below the drainage divide to the south). Shallow ground water controls depths of deflation which in turn determine local base levels. Deflation basins scoured and partially filled episodically, so alluvial terraces are preserved at several intermediate levels between the maximum level of basin fill and present streams. At one of these levels (locally ~17 m below the level of maximum fill; 2-11 m above Salt Creek) an inactive gypsum-marsh deposit covers >50 km². Radiocarbon ages of 10,900 to 10,300 yr bracket as much as 1.5 m of gypsum-marsh deposition. At least two intermediate levels of terrace-alluvium lie between the marsh and the level of maximum basin fill. Three levels of Holocene alluvium are inset below the marsh, reflecting short-term aggradation between deflation episodes and erosion by Salt Creek. During Holocene time, between the San Andres Mountain front and Alkali Flat, alluvial-fan drainages that had been graded to the edge of Pleistocene Lake Otero cut downward and planed laterally following 20 m of base-level fall during lake-bed deflation.

Deflated sediment was transported primarily to the northeast. Lunette dunes formed immediately downwind of many blowout areas; White Sands dune field accumulated beyond Lake Lucero and Alkali Flat. Farther downwind, clay- to sand-size gypsum episodically formed broad sheets. An unknown (presumably large) component of clay-to-fine sand, including gypsum, is (and was) carried eastward to the alluvial fans and slopes of the Sacramento Mountains. Holocene runoff has reworked components of that sediment back onto the alluvial fans. Most late Quaternary sediment preservation is on the eastern and western alluvial fans, in the proximal hanging walls of active normal faults, but episodic deflation precludes long-term sediment preservation in the basin center.

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