

Late Holocene Lacustrine Chronology and Archaeology of Ancient Lake Cahuilla, California

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Freshwater lakes existed intermittently in the Salton Trough of southern California during the late Holocene. The lakes formed north of the subaerial Colorado River Delta whenever the Colorado River flowed west into the trough instead of south to the Gulf of California. Water filled the trough to a maximum altitude of 12 m. Stratigraphy, radiocarbon dates, and supplementary evidence document four lacustral intervals of Lake Cahuilla between A.D. 700 and 1580. Archaeological sites are associated with the 12-m shoreline and their occupation correlates with these lacustral intervals.

INTRODUCTION

A prominent lacustrine shoreline occurs at an altitude of 12 m in the Salton Trough of southern California (Fig. 1). William Blake first reported this lacustrine shoreline in 1854, and in 1907 he designated the extinct body of water it represents as "Lake Cahuilla." Although important for understanding the late Holocene geology and archaeology of the Colorado Desert, the lacustrine chronology of Lake Cahuilla has never been rigorously investigated. This paper presents the late Holocene chronology of Lake Cahuilla and relates this chronology to the regional archaeology.

PHYSIOGRAPHIC SETTING

The Salton Trough is the landward extension of the depression flooded by the Gulf of California (Fig. 2). The trough extends 225 km northwestward from the head of the Gulf of California, and ranges in width from a few kilometers at its northwest end to 110 km at the United States-Mexico border. More than 5400 km² of the trough lie below sea level. The Salton Trough is surrounded by mountains on all sides except the south where the barrier formed by the subaerial Colorado River Delta separates the Salton Trough from the Gulf of California.

The depositional basin contains fine-

grained Colorado River sediments peripherally surrounded by locally derived coarse-grained alluvium and colluvium (Merriam and Bandy, 1965). Major faults, including the San Andreas, traverse the trough.

The trough lies within the Colorado Desert and has a climate characterized by low annual precipitation (average 6.4 cm/yr), high summer temperatures (up to 51°C), and mild winters (Hely *et al.*, 1966). All streams in the Salton Trough are ephemeral.

The Colorado River, which now flows south to the Gulf of California, has influenced the geologic history of the Salton Trough. It originates in the Rocky Mountains of Colorado, Utah, and Wyoming and drains an area of more than 629,270 km². The average annual discharge of the river gauged at Yuma, Arizona, from 1903-1930 was 2×10^4 hm³/yr (Hely, 1969). After 1930 the discharge decreased due to upstream damming and water withdrawals. Thomas *et al.* (1960) extrapolated the average annual discharge of the Colorado River for the last 650 yr from tree-ring and climatic records. Their discharge estimate agrees closely with the 1903-1930 average.

HYDROLOGY OF LAKE CAHUILLA

Lake Cahuilla formed several times in response to the western diversion of the Col-