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THE ROLE OF ANTECEDENT RIVERS IN SHAPING THE SOUTHERN CALIFORNIA COAST

There are several prominent antecedent river channels on the southern California coast: the Bolsa Chica, Santa Ana, Upper Newport Bay, Aliso, and San Juan.

The geologic record suggests that, in southern California during Pleistocene time, rainfall probably reached close to 80 inches per year transforming ephemeral streams into powerful perennial rivers that eroded the five antecedent river channels

A relatively narrow belt of elevated terrane created by uplift along the Newport-Inglewood fault zone lies inland from the coast. Deformed in this fault zone are Pleistocene marine and fluvial strata. It is this higher ground, including the San Joaquin Hills that was cut through by the five antecedent rivers to form five water gaps.

The high ground along the fault zone ranges from 40 to several hundred feet higher than the inland floodplains across which these rivers came. The rivers were powerful enough to maintain their channels and avoid being diverted by the rising terrane.

The variation in widths and depths of the channels is related to differences in the erosion resistance of the uplifted bedrock through which the rivers had to cut their channels and to the size of their drainage basins.

As the glaciers waned around the close of the Pleistocene, sea level rose invading all the channels, in some cases up to two miles inland, creating estuaries.

The interplay of uplifting terrane along the Newport-Inglewood fault zone, glacial epoch rainfall, and the accompanying low stand of the sea produced the five water gaps and associated estuaries that are today significant geomorphic features on the southern California coast. The geologic evolution of these water gaps and estuaries may serve models in the study of the origin of similar ones at the Malibu, and Ventura Rivers to the north and the San Mateo and San Onofre Rivers to the south.