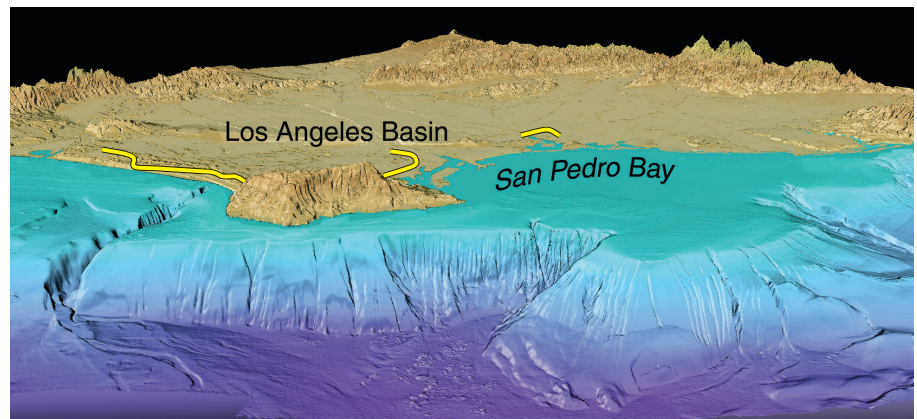


SUPPORTING SOUND MANAGEMENT OF OUR COASTS AND SEAS

Saltwater Intrusion in Los Angeles Area Coastal Aquifers—the Marine Connection

One-third of the water supply for coastal areas of Greater Los Angeles comes from local ground-water sources. Saltwater has penetrated a part of the supply, and a significant part of the remaining supply is at risk. U.S. Geological Survey (USGS) scientists, working in cooperation with local water agencies, are studying the connection between coastal aquifers and the offshore geology to better understand the processes and pathways of saltwater intrusion.



This computer-generated perspective view of the Greater Los Angeles region highlights the locations of “barriers” (shown in yellow) to saltwater intrusion into coastal aquifers. These barriers consist of freshwater injection wells. Because some saltwater continues to infiltrate into Los Angeles Basin aquifers, U.S. Geological Survey scientists are investigating the geology both onshore and offshore to better understand the pathways of saltwater intrusion. This image combines high-resolution offshore bathymetric data and onshore digital-elevation data. (Image produced by J.V. Gardner and P. Dartnell, U.S. Geological Survey.)

Saltwater from the Pacific Ocean is seeping into some Los Angeles Basin coastal aquifers and replacing freshwater. Without treatment, this ground water does not conform to drinking-water or agricultural standards.

This problem is significant because much of the water used by the nearly 10 million residents of Los Angeles County comes from ground-water sources. Although not all coastal aquifers in the region are at risk, the existing resources are vital and must be protected to maintain adequate supplies of potable water.

In the 1950’s, construction began on the first of three “barriers” in an attempt to halt saltwater intrusion. Each barrier consists of a series of injection wells that essentially form a subsurface wall of freshwater designed to keep saltwater from penetrating further into aquifers. The barriers are only partly effective; saltwater continues to infiltrate in some areas.

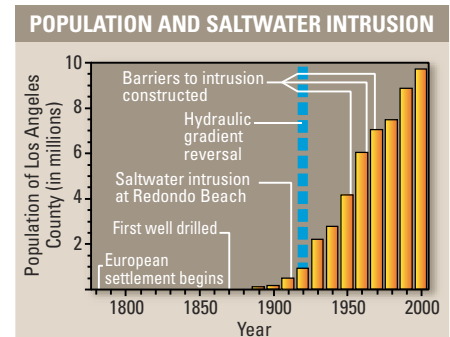
New studies show that the ground-water geohydrology of the coastal aquifers

is more complex than previously imagined. U.S. Geological Survey (USGS) scientists, working in cooperation with the Water Replenishment District of Southern California and the Los Angeles County Department of Public Works, are expanding efforts to understand the geologic processes and fluid pathways that control saltwater intrusion.

Potential pathways for saltwater intrusion include hydraulic connection to aquifer beds exposed at the sea floor, flow along buried ancient stream channels, and flow through crushed rock in fault zones. The USGS and its cooperators are focusing their efforts on (1) conducting geologic and hydrologic studies on land and (2) surveying and mapping the sea floor near the coast.

To investigate the marine connection to saltwater intrusion in coastal areas of Greater Los Angeles, scientists are using a variety of techniques to study the geology offshore. An acoustic technique, known as reflection seismology, produces vertical profiles that provide information on the layering of strata in the subsurface and also

on the geometry of geologic structures and buried erosional features, such as ancient stream channels. Another system uses laterally directed acoustic pulses to create detailed three-dimensional images of the sea floor. In addition to providing accurate



Saltwater intrusion in coastal aquifers of Los Angeles County is a result of increasing use of ground-water resources accompanying population growth. This diagram shows the growth of Los Angeles County’s population and significant events in the history of ground-water usage. In the 1920’s, the overall flow of coastal ground water reversed, leading to saltwater intrusion in some coastal aquifers.