

Sediment supply and wetlands in San Francisco Bay

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The bottom of San Francisco Bay and the San Francisco Bay watershed are vast reservoirs of sediment. Hydrodynamic and meteorologic processes can transport watershed sediment to the Bay, lift bottom sediment up into the water column, and transport some of this suspended sediment to bordering wetlands and potential wetlands where it can deposit. An adequate supply of sediment is required to create new wetlands.

Data collected by the U.S. Geological Survey at suspended-sediment concentration monitoring stations in the Bay reveal the sources of suspended sediment in the Bay waters. Most of the suspended sediment is brought into suspension from the bed by stronger tidal currents during spring tides or by wind-wave resuspension in shallow water, primarily during spring and summer when seasonal winds are greatest. Suspended sediment from the Sacramento and San Joaquin Rivers deposits on the bed where it is available for resuspension by spring tides and wind waves.

Whereas the primary source of suspended sediment is recycled bed sediment, the primary source of new sediment in San Francisco Bay is river sediment that originates in the Central Valley watershed. The Central Valley provided about 86 percent of the sediment inflow to the Bay from 1909-1966. Data collected by the U.S. Geological Survey from 1960-1995 indicate that the supply of sediment from the Sacramento River to San Francisco Bay has been decreasing, possibly due to increased reservoir capacity in the watershed. Data for the other primary source of sediment to the Delta, the San Joaquin River, does not demonstrate a decreasing trend, but rather a constant input for the 1960-1995 period. The sediment load of the San Joaquin River is approximately an order of magnitude less than that for the Sacramento River.

Bathymetric surveys of San Pablo Bay indicate that the reduction in riverine sediment supply is reflected by a decrease in sediment volume (increasing water depth) during the latter half of the 20th century. In addition, the surface area of mudflats in San Pablo Bay is decreasing. Mudflats are shallow water areas adjacent to wetlands that are probably an important source of sediment to wetlands.

The decreasing supply of sediment to San Francisco Bay diminishes the supply of sediment to bordering wetlands and potential wetlands. As the Bay deepens and the size of mudflats decreases, the quantity of sediment resuspended by wind waves decreases and there is less suspended sediment available for transport by tidal currents to wetlands. The decrease in sediment supply reduces the likelihood that natural sedimentation rates can create new wetlands as sea level rises.