

Effects of human alterations on the hydrodynamics and sediment transport in the Sacramento-San Joaquin Delta, California

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Abstract The Sacramento-San Joaquin Delta, California, (Delta) has been significantly altered since the mid-nineteenth century. Many existing channels have been widened or deepened and new channels have been created for navigation and water conveyance. Tidal marshes have been drained and leveed to form islands that have subsided, some of which have permanently flooded. To understand how these alterations have affected hydrodynamics and sediment transport in the Delta, we analysed measurements from 27 sites, along with other spatial data, and previous literature. Results show that: (a) the permanent flooding of islands results in an increase in the shear velocity of channels downstream, (b) artificial widening and deepening of channels generally results in a decrease in shear velocity except when the channel is also located downstream of a flooded island, (c) 1.5 Mt/year of sediment was deposited in the Delta (1997–2010), and of this deposited sediment, 0.31 Mt/year (21%) was removed through dredging.

Key words delta, tidal channel, sediment transport, dredging, tidal prism, sediment budget, shear velocity