Results from the Hydrodynamic Element of the 1994 Entrapment Zone Study in Suisun Bay

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ABSTRACT

The term entrapment zone has been used to describe a zone of elevated concentrations of pa plankton, and juvenile fish observed in low-salinity areas of north (San Francisco) bay and the western Sacramento-San Joaquin Delta. California. The hypothesized mechanism for entrapment was a combination of particle aggregation, sinking and a residual current null zone. The null zone is a time-mean, near-bed flow convergence where riverine flow ends and gravitational circulation begins that was presumed to occur near a salinity of 2 psu. Current-meter measurements made prior to 1990 provide evidence of gravitational circulation and a null zone during autumn in the north ba of San Francisco Bay, including Suisun Bay and the western delta. Data collected after 1990, however, show an absence of gravitational circulation from most of Suisun Bay during spring, and the presence of multiple gravitational circulation cells between hathymetric constrictions elsewhere in the bay. Because null zones appear to be hathymetrically controlled, they often occur in are removed from the low salinity zone (near X2, the position of a bottom salinity of 2 psu). The presence or absence of gravitational cirCLIlation can be predicted with appropriate physical scaling, w explains the most recent and historical current-meter observations throughout the Bav/Delta system. In areas where gravitational circulation is weak or nonexistent, some other physical or b mechanism(s) must be causing Oie observed concentration of particles and organisms in th low-salinity zone. Four physical mechanisms are disCLIssed in this chapter: density- current puls that occur near slack tide, ebb/flood shear stress asvmmetries, vertical migration of organisms during the tidal cvcle, and an Upstream mass flux known as Stokes' drift. Stokes' drift was eliminated from further consideration because variations in sea level are small relative to the me depth and because of the weak correlation between sea level and the tidal Currents in Suisun Bay.

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