

Dissolved Oxygen Levels in the Stockton Ship Channel

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Dissolved oxygen concentrations in the Stockton Ship Channel are closely monitored during the late summer and early fall of each year because levels can drop below 5.0 mg/L, especially in the eastern portion of the channel. The dissolved oxygen decrease in this area is apparently due to low San Joaquin River inflows, warm water temperatures, high biochemical oxygen demand (BOD), reduced tidal circulation, and intermittent reverse flow conditions in the San Joaquin River past Stockton. Low dissolved oxygen levels can cause physiological stress to fish and block upstream migration of salmon.

Monitoring of dissolved oxygen levels in the Stockton Ship Channel was conducted by vessel nine times between August 10 and December 7, 1999. (See the article in this issue on historical fall dissolved oxygen levels for information about methods.)

Dissolved oxygen levels in the Stockton Ship Channel followed a unique pattern in late fall 1999. Usually dissolved oxygen levels in the eastern portion of the channel recover from the relatively low late summer and early fall (August through October) levels of 3.0 to 5.0 mg/L to levels greater than 5.0 mg/L by late fall (November) due to cooler water temperatures and improved San Joaquin River inflows to the eastern channel. In some years, late fall levels in the eastern channel improve sufficiently to approach the 7.0 to 9.0 mg/L typically measured in the western channel. In 1999, however, low dissolved oxygen levels persisted in the central and eastern channel from November through December in spite of cooler water temperatures and improved inflows.

During the late fall, field staff observed activities that could have increased the BOD and subsequently contributed to the persistence of low late fall dissolved oxygen levels in the central and eastern channel. The crew observed dredging and re-suspension of sediments in the area from Light 28 (immediately west of Fourteen Mile Slough) to Light 34 (adjacent to Fourteen Mile Slough) on November 23 and near the middle of Rough and Ready Island on December 7. In addition, they observed that the aerators operated by the US Army Corps of Engineers near the eastern end of Rough and Ready Island were not operating during the same period as the dredging activity. These and other factors could have contributed to the anomalous 1999 fall dissolved oxygen values.

As in previous years, dissolved oxygen levels in the western channel from Prisoner's Point to Disappointment Slough were relatively high and stable throughout the study period, ranging from 7.7 to 10.0 mg/L from August 10 to December 7. The robustness of dissolved oxygen levels in this portion of the channel is apparently due to the greater tidal mixing and the absence of conditions creating BOD. In the central portion of the channel from Columbia Cut to Fourteen Mile Slough, dissolved oxygen levels dropped from the consistently high levels in the western channel to levels approaching or below 5.0 mg/L throughout the monitoring period. In the eastern channel from Buckley Cove to the eastern end of Rough and Ready Island, the dissolved oxygen results were more variable, but in general, approached or fell below 5.0 mg/L throughout much of the monitoring period.