

February 2007 *The Engineerogram*¹

This Month's Outstanding Project and Outstanding Leaders

by Martin Farber, PE, President-elect Sacramento Section

Editor's note: This month, I am pleased to report on two outstanding projects in our area, the restoration of the salmon run in the San Joaquin River upstream of the Merced River, and work toward improving water quality in the San Joaquin River, as well as the Stockton Deep Water Ship Channel. An outstanding leader in our Section, ASCE Life Member Dr. G. Fred Lee, P.E., D.E.E. with his wife and research partner Dr. Anne Jones-Lee, have played an important role in the work toward improving water quality in the San Joaquin River, and have generously provided me with the information used in this brief summary of their paper, "Summary of Water Quality Issues in the San Joaquin River and Stockton Deep Water Ship Channel." The paper appears in its entirety on their website, at

<http://www.members.aol.com/annejlee/SJRIssuesEngineerogram.pdf> – Martin Farber, P.E., D.WRE

This Month's Outstanding Project: San Joaquin Salmon Restoration and Water Quality Improvement

Friant Dam (near Fresno) now diverts San Joaquin River water to agricultural uses, leaving about 100 miles of the river generally dry, and the remainder highly polluted, mostly from agricultural runoff. Court-ordered restoration of flows to the San Joaquin, as a result of litigation by environmental groups, will restore Chinook Salmon spawning areas on the dry reach. The flow restoration will be beneficial to farmers as well as fish. Water quality standards have been established for the San Joaquin, and these standards will be maintained by obligating farmers to reduce pollutant loading in Ag runoff. The dilution of polluted waters by the high-quality Sierra waters released from Friant Dam could significantly improve WQ in the San Joaquin near Patterson, and reduce the burden on the farmers for pollutant control. Even with the Friant Dam releases there will be need, however, for extensive pollutant control from agricultural sources to fully restore the beneficial uses of the San Joaquin.

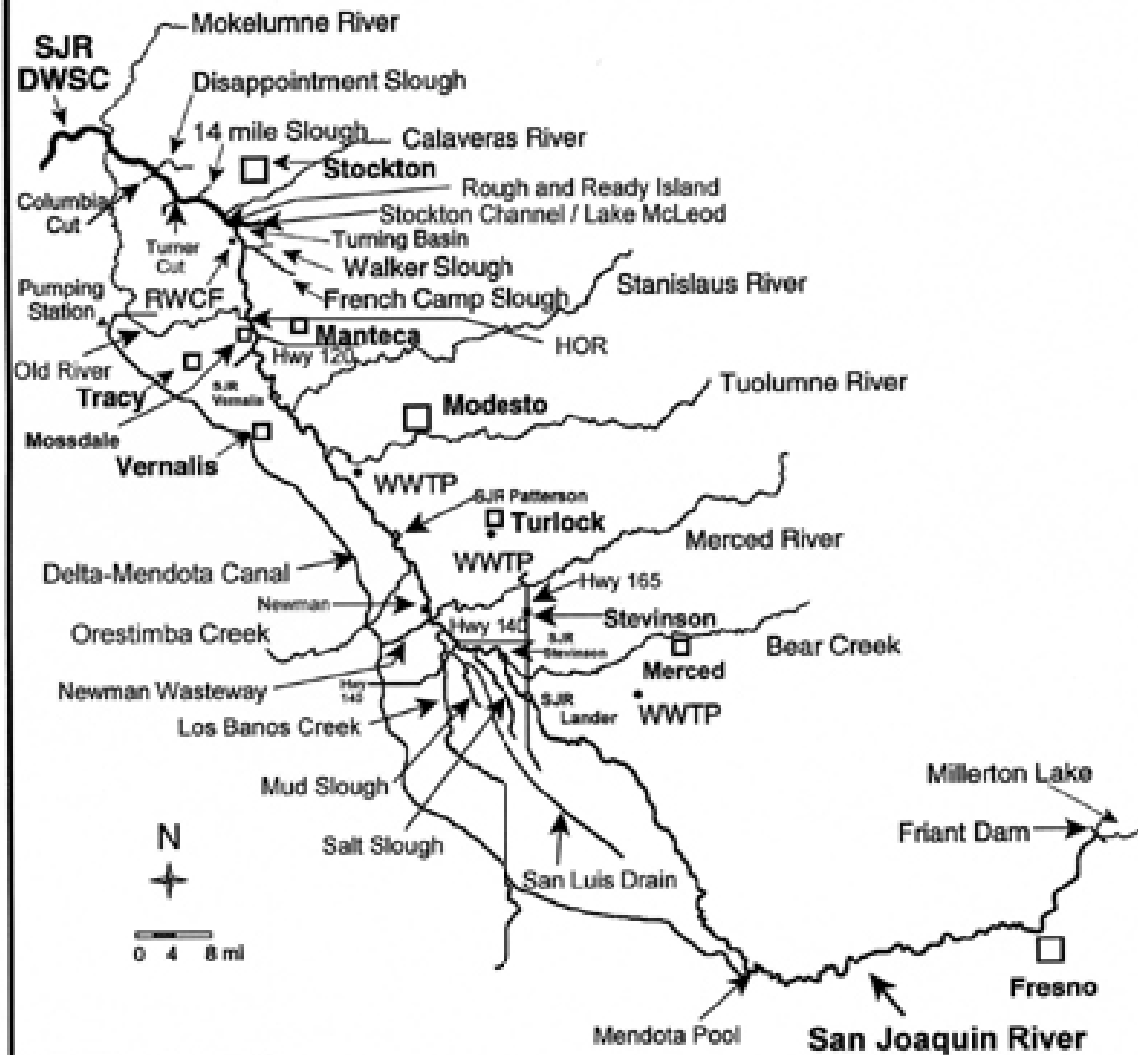
Further downstream, the Delta faces the same WQ problems as the lower San Joaquin. The Stockton Deep Water Ship Channel (DWSC) has concentrations of dissolved oxygen that fall below the water quality standard, particularly during periods of low flow. A low-DO condition can block or delay the salmon migration, and impair their reproduction. The challenge, then, was to discover the causes of DO depletion, and to find the remedy. Through CALFED and other sources of support, about a dozen investigators over a several-year period conducted studies on the low-DO problem in the DWSC. Drs. Lee and Jones-Lee reported on the two primary causes of DO depletion. One cause of low DO is ammonia, the result of wastewater discharge from the City of Stockton. Another cause of DO depletion is the decomposition of algae. The algae's high growth rate is supported by nutrients in Ag runoff. The algae's high death rate is the result of the depth of the DWSC, which is much greater than the depth of the river. The DWSC's generous cross-section is beneficial to navigation, but it slows the current so that the algae settle to lower depths, where they are deprived of sunlight, and die.

To further compound the problem, large withdrawals of water that occur upstream from the DWSC greatly reduce the flow through the Ship Channel. The result is that there is less water available to carry the pollutant load through the critical reach of the DWSC. The low flow also increases the residence time of oxygen-demanding materials in the DWSC.

Stakeholders have agreed on a three-pronged approach to the low DO problem. First, the City of Stockton will convert the ammonia in its wastewater to nitrate. Second, the channel will be aerated. Third, the potential for reducing pollutant loading at the source is being evaluated.

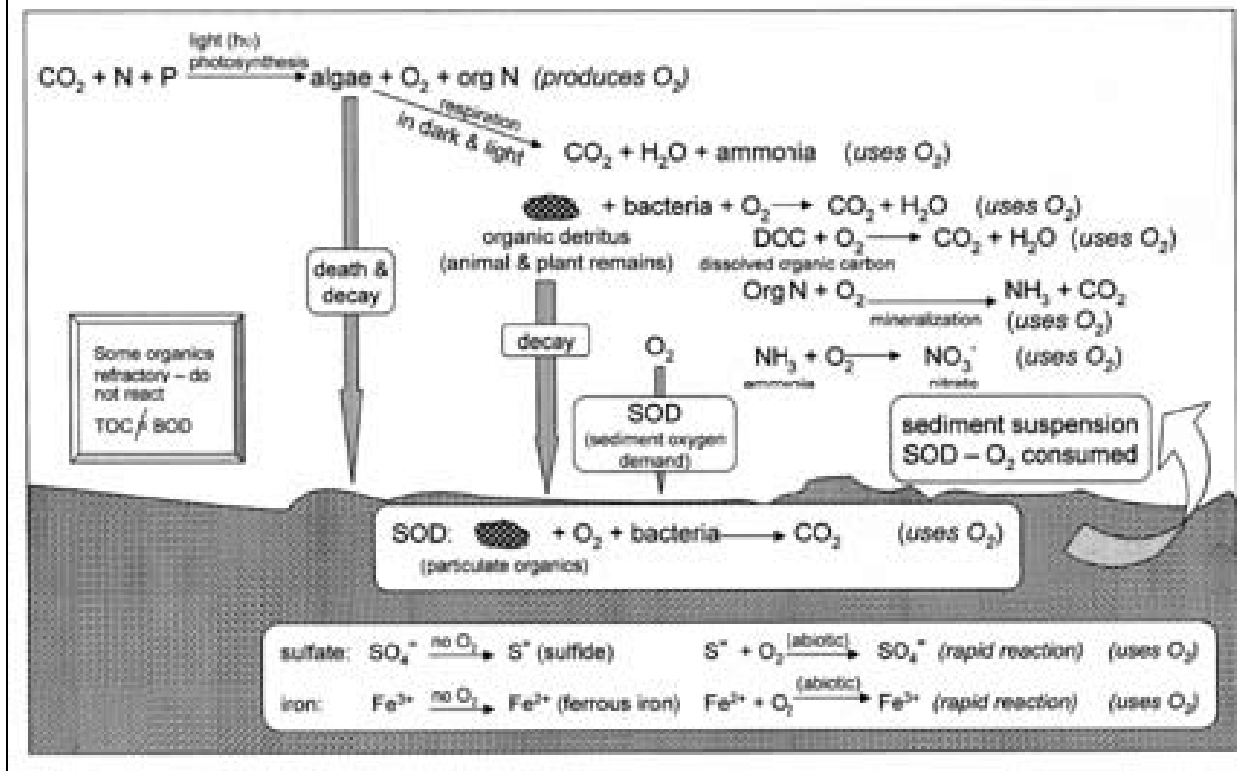
¹ The Sacramento Section of the American Society of Civil Engineers Newsletter

San Joaquin River Deep Water Ship Channel Watershed



(Jones-Lee, 2005)

Conceptual Model of DO Depletion Reactions in the SJR DWSC



This month's Outstanding Leaders: Drs. G. Fred Lee and Anne Jones-Lee

Drs. Lee and Jones-Lee have been full-time consultants through their firm G. Fred Lee & Associates since 1989 when they moved to El Macero (near Sacramento). This firm specializes in evaluating and managing the impacts of chemicals on water quality, advanced level water supply water quality, water and waste water treatment, water pollution control, and solid and hazardous waste investigation and management. Drs. Lee and Jones-Lee have established a website, www.gfredlee.com, where they make available over 600 papers and reports developed from their research and consulting activities.

Dr. G. Fred Lee received his PhD degree in environmental engineering from Harvard University in 1960. For 30 years he taught university graduate-level environmental engineering courses and conducted research on water quality and solid waste management issues at several US universities, including the University of Wisconsin, Madison; University of Texas at Dallas; Colorado State University; and the New Jersey Institute of Technology (NJIT) where he held the position of Distinguished Professor. During that period he conducted over \$5 million in research and published over 500 papers and reports on his work. Dr. Anne Jones-Lee received her PhD degree in Environmental Sciences from the University of Texas at Dallas in 1978. For 11 years she held university graduate-level teaching and research positions at several universities including holding a tenured position in Civil and Environmental Engineering at NJIT.

Drs. Lee and Jones-Lee first began work on San Joaquin River and Delta water quality issues in 1989.