



San Joaquin River Dissolved Oxygen Control Program



CONTENT AND PURPOSE OF THIS FACT SHEET

This fact sheet provides an overview of the following:

- ✓ Impairment in Stockton Deep Water Ship Channel (DWSC)
- ✓ Dissolved Oxygen Control Program
- ✓ Regulatory Programs to address impairment
- ✓ Dissolved Oxygen Trends

OVERVIEW

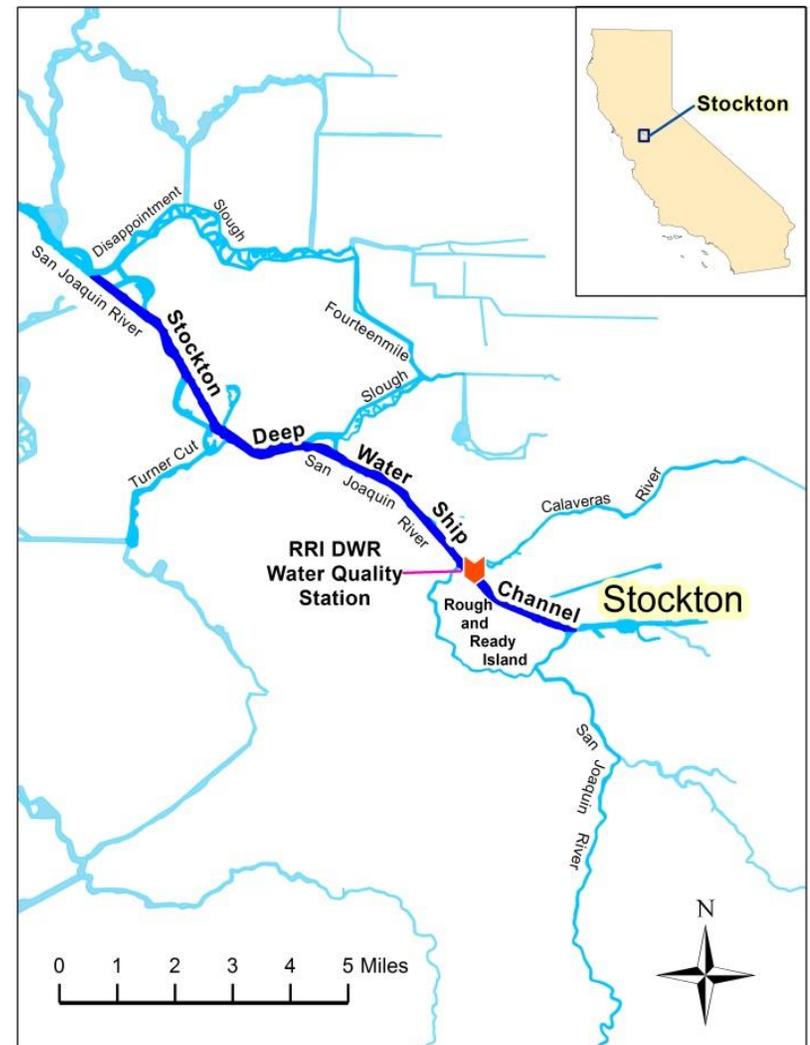
The San Joaquin River connects the global economy to the Port of Stockton through a 78-mile DWSC. The Stockton DWSC not only serves as a shipping corridor for cargo ships, but also as a migration corridor for anadromous fish. Chinook salmon and steelhead navigate through the altered channel to the tributaries of the San Joaquin River where their life cycle began. The fish require a minimum dissolved oxygen (DO) concentration level.

In 1994 the Stockton DWSC portion of the San Joaquin River from Stockton to Disappointment Slough was placed on the Clean Water Act Section 303(d) list of impaired water bodies due to low DO concentrations. The low DO levels resulted in non-attainment of water quality objectives and fish kills. These conditions also likely impeded fish migration.

In 2002, the City of the Stockton wastewater control facility was ordered to reduce the loads of oxygen-demanding substances in its effluent, particularly ammonia.

In 2005, the Central Valley Water Board adopted a Control Program for Factors Contributing to the Dissolved Oxygen Impairment in the DWSC. The Control Program includes, as part of its implementation requirements, a Total Maximum Daily Load (TMDL) to address the point and nonpoint source discharge of pollutants that contribute to the DO impairment. The Control Program aims to bring the impaired reach of the Stockton DWSC into compliance with DO objectives and improve water quality conditions for fish.

The Stockton Deep Water Ship Channel



DISSOLVED OXYGEN CONTROL PROGRAM

The three main contributing factors to the DO impairment in the Stockton DWSC were identified in the Control Program as the following:

- Loads of oxygen demanding substances from upstream sources that react by numerous chemical, biological, and physical mechanisms to remove dissolved oxygen from the water column in the Stockton DWSC
- Altered geometry of the Stockton DWSC that impacts various mechanisms that add or remove dissolved oxygen from the water column, such that net oxygen demand exerted is increased
- Low net flow through the DWSC impacts various mechanisms that add or remove dissolved oxygen from the water column, such that net oxygen demand exerted in the DWSC is increased

The TMDL did not specify the relative responsibility among the three contributing factors. Each of the three contributing factors is considered to be one hundred percent responsible for addressing the excess net oxygen demand and the margin of safety.

The Control Program included measures to reduce the impacts of the three main contributing factors. Among these measures, the Central Valley Water Board would do the following:

- consider alternate measures (such as aeration), rather than direct control, if they adequately address the impact on the DO impairment and do not degrade water quality in any way
- review allocations and implementation provisions based on information gathered during studies required by the Control Program
- require compliance with allocations of oxygen-demanding substances and their precursors and development of alternate measures to address non-load related factors by December 2011

Prohibition

The discharge of oxygen demanding substances or their precursors into waters tributary to the DWSC portion of the San Joaquin River have been

prohibited since December 2011 when net daily flow in the DWSC near Stockton is less than 3,000 cubic feet per second (cfs), unless DO objectives are being met. These prohibitions do not apply if the discharge is regulated by a waiver of waste discharge requirements, or individual or general waste discharge requirements (WDRs) or NPDES permits, which implement the Control Program or which include a finding that the discharge will have no reasonable potential to cause or contribute to the dissolved oxygen impairment in the DWSC.



Chinook salmon

Aeration

The Department of Water Resources constructed an aeration facility in the Stockton DWSC and conducted a multi-year study to show its effectiveness at increasing DO concentrations in the DWSC. The Port of Stockton, which now owns the aeration facility, is partnering with the State Water Contractors, the San Joaquin River Tributaries Authority, the San Luis & Delta-Mendota Water Authority and the San Joaquin Valley Drainage Authority to provide funding for the operation and maintenance of the facility. The aeration facility is being used by these participants to help meet the DO objectives in the Stockton DWSC and improve low DO conditions in the channel.



REGULATORY PROGRAMS TO ADDRESS THE DO IMPAIRMENT

Prior to and since adoption of the DO Control Program, the Central Valley Water Board's regulatory programs have included requirements to reduce oxygen demanding substances upstream or within the DWSC. The City of Stockton has added nitrification facilities to significantly reduce ammonia from its wastewater discharge to comply with its NPDES permit. This action has likely had the most significant positive impact on the dissolved oxygen conditions in the DWSC.

City of Stockton and County of San Joaquin storm water discharges are regulated by a Municipal Separate Storm Sewer System (MS4) Permit. The Permit requires the development and implementation of a DO monitoring and assessment work plan to address the DO impairment for the urban sloughs tributary to the Stockton DWSC.

The Port of Stockton's MS4 Permit requires implementation of a Low Dissolved Oxygen Plan for the Stockton DWSC, which includes BMP implementation, monitoring, and BMP effectiveness evaluation. The Port of Stockton is also regulated by WDRs for their berth dredging within the Stockton DWSC, which requires aeration to mitigate for the long-term effects of increased channel geometry.

The NPDES Permit for Storm Water Discharges from Small MS4s requires permittees in the San Joaquin River basin to comply with the DO TMDL.

Irrigated agricultural sources in the San Joaquin River basin are regulated by WDRs. The WDRs require preparation and implementation of farm evaluations, nitrogen management plans, and sediment and erosion control plans from owners or operators. Surface water quality management plans are also required under certain conditions such as when exceedances of water quality objectives are linked to agricultural discharges. In addition to the preparation and implementation of the mentioned plans, agricultural sources are required to submit Nitrogen Management Plan Summary Reports for the previous crop year. WDRs also require implementation of a monitoring and reporting program.



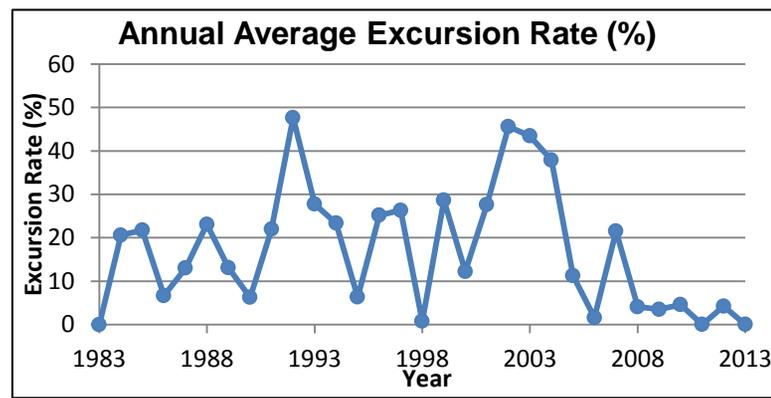
Central Valley Steelhead

DISSOLVED OXYGEN TRENDS

Episodes of low DO in the San Joaquin River near Stockton during the late summer months have been documented as early as 1935, occurring concurrently with fish kills and algal blooms. Typical DO concentrations in the Stockton DWSC during the late summer have ranged from 3 to 4 mg/l.

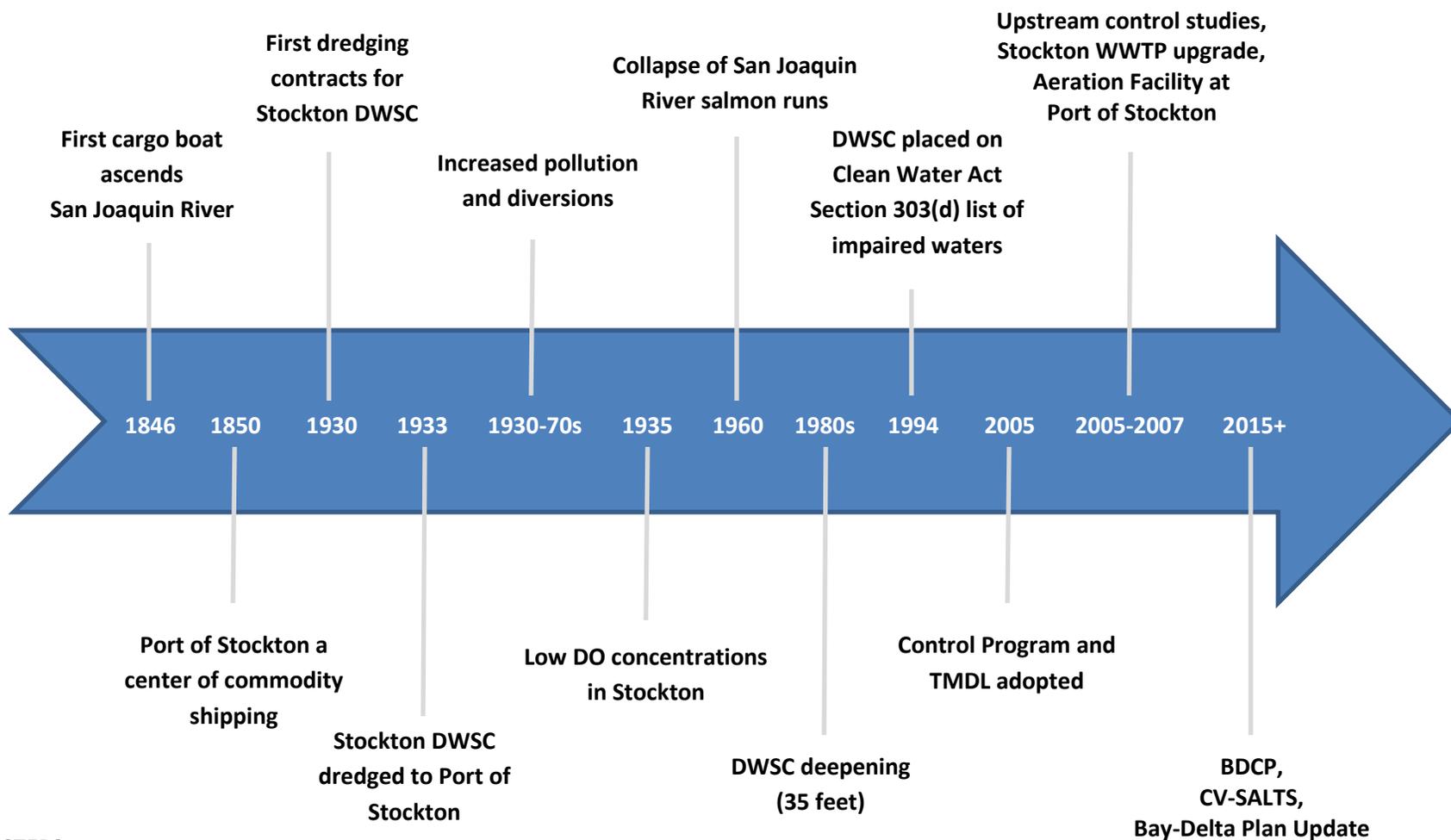
Since continuous DO data collection began at Rough and Ready Island in 1983, the annual percentage of data points below the DO water quality objective (excursion rate) was as high as 48 percent in 1992 (see figure below). The annual excursion rate was as high as 46 percent as recently as 2002.

Subsequent to the upgrade of the City of Stockton RWCF in 2007, annual excursion rates have dropped considerably. Between 2008 and 2013 the average annual excursion rate was less than 3 percent. Since 2013, when the aeration facility was first operated to meet water quality objectives in the Stockton DWSC, there has been a less than one percent excursion rate.



DISSOLVED OXYGEN OBJECTIVES

DO concentrations shall not be reduced below 6.0 mg/l in the San Joaquin River (between Turner Cut and Stockton, 1 September through 30 November) and 5.0 mg/l in all other Delta waters.



NEXT STEPS

Central Valley Water Board staff is evaluating the DO Control Program and will be bringing a resolution with recommended next steps for Board consideration in February 2015. For additional information, please contact Rajmir Rai at (916) 464-4716 or Rajmir.Rai@Waterboards.ca.gov.