Delta Smelt Turbidity Monitoring Project

Introduction:

The Delta Smelt Turbidity Monitoring Project is a response to recent court mandates for turbidity monitoring for delta smelt. The project initiates investigations to better understand factors that influence delta smelt survival and movement. This project will also benefit model calibrations and provide findings to help guide water operation management decisions. It is anticipated that this project will provide important information to develop a complex network of continuous water quality stations to increase knowledge about the habitat movement and migration of delta smelt.

Project Background:

In August 2007, Federal Judge Oliver Wanger ruled (case number 1:05-CV-01207-OWW-GSA) that the 2005 Long-Term State and Federal Water Projects' Pumping Operations Criteria Plan and Biological Opinion were unlawful and inadequate in regards to the protection of the threatened species delta smelt. Judge Wanger also concluded that the supplementary Delta Smelt Risk Assessment Matrix was in violation of the Administrative Procedure Act, 5 U.S.C. § 705 et seq.

Judge Wanger's court order established several measures that would trigger restrictions to both State Water Project and Central Valley Project operations in the Sacramento-San Joaquin Delta to reduce salvage and prevent the extinction of delta smelt.

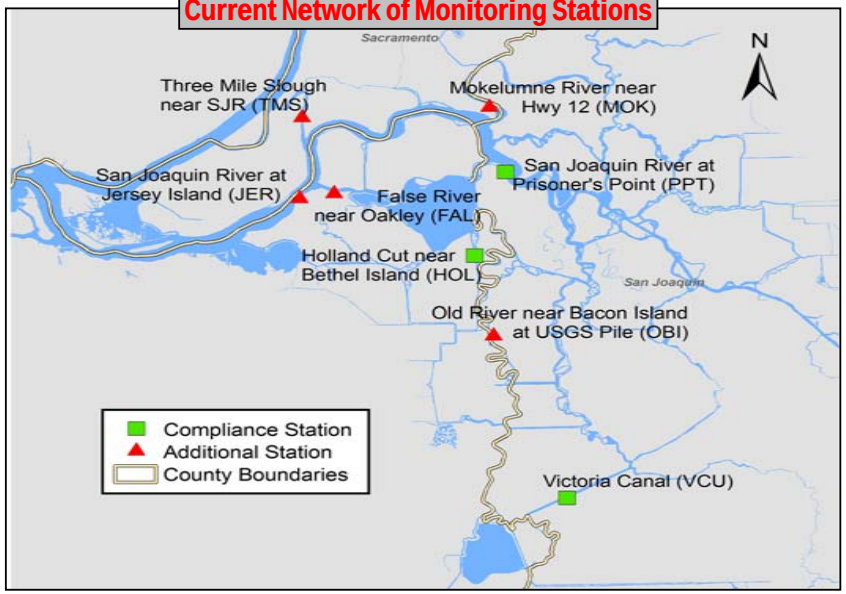
Based on recent delta smelt studies, scientists from the Delta Smelt Working Group (DSWG) discovered significant correlations between several water quality parameters and the presence of delta smelt in the Sacramento-San Joaquin Delta. Those specific water quality parameters included: water temperature, specific conductance, and turbidity (F. Feyrer, M.L. Nobriga, and T.R. Sommer, 2007). Most important to DSWG was the connection between increased turbidity levels during and prior to known delta smelt spawning migration into the interior of the Sacramento-San Joaquin Delta in the months of mid-December through March. Studies by Lenny Grimaldo, an environmental scientist in DWR and currently a member of DSWG, showed a significant increase in delta smelt salvage at the water export facilities during periods of high turbidity (levels of 12 nephelometric turbidity units (NTU) and higher).

Judge Wanger found this to be significant scientific evidence to implement a measure in his court order that addresses turbidity levels as a required control measure in pumping operations to insure the protection of delta smelt.

As a result, Judge Wanger included in his measures, the requirement to monitor turbidity levels by December 25, 2007 at three compliance stations:

1. Holland Cut near Bethel Island (HOL)
2. Victoria Canal near Byron (VCU)
3. San Joaquin River at Prisoner's Point (PPT)

Current Network of Monitoring Stations



Continuous Water Quality and Telemetry Equipment:

CR1000 Datalogger

Raven AirLink Cellular Modem

CDEC California Data Exchange Center

Real-Time Event / Hourly Data

YSI 6136 Optical Turbidity Sensor

Mechanical self-cleaning wiper for long-term deployment.

Range:	Accuracy:
0 – 1,000 NTU	± 0.3 NTU

Central District collects water temperature, specific conductance, and turbidity data continuously at 15-minute intervals, by deploying Yellow Spring Instrument (YSI) 6600EDS mutiparameter sondes, at all stations.

Stations are telemetered to CDEC using a YSI 6091 communication cable that is connected to CR1000 Campbell Scientific Data logger and an Airlink CDMA modem.

Quality Assurance and Quality Control:

YSI Sonde Calibrations

Hydstra.lnk

WDL Water Data Library

Discrete Monitoring

Field data is collected discretely at all stations during every station visit for the purpose of data comparison.

HACH

2100P Portable Turbidimeter

Central District has developed a complex and thorough methodology of quality assurance and quality control steps to ensure that the data for this project will be consistently accurate.

2007-2008 Significant Findings:

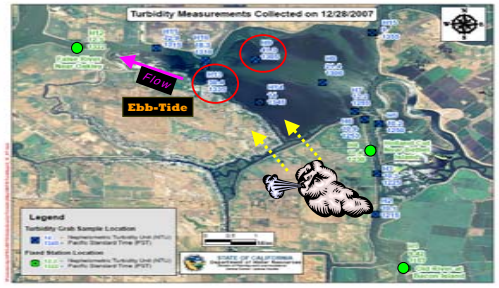
Wind/Storm Event December 24 – 25, 2007:

The San Joaquin Valley experienced a high wind event that caused significant increase in turbidity levels at only the Holland Cut near Bethel Island (HOL) compliance station. Based on Judge Wanger's court order, SWP and CVP operators were forced to respond by shutting down pumping for 10 days.

Why the high turbidity at only Holland Cut?

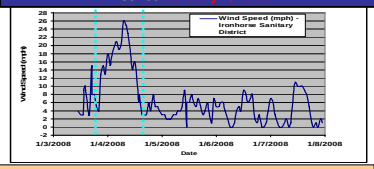
Central District and USGS staff responded by analyzing available data and discussing possible causes of this significant increase in turbidity.

Could Frank's Tract be the localized source of turbidity?



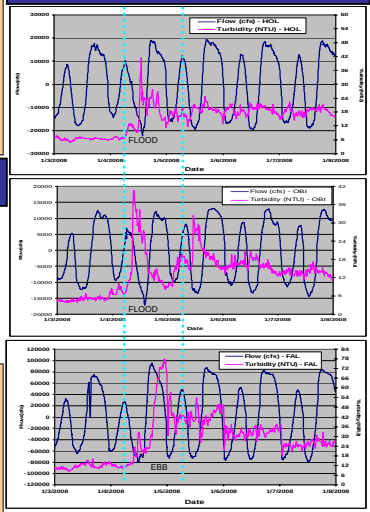
Central District staff responded by conducting an onsite turbidity investigation of Frank's Tract on December 28, 2007. Discrete samples were taken and two new turbidity probes were installed (at Old River near Bacon Island (OBI) and False River near Oakley (FAL) stations), in an effort to better understand the movement of turbidity in and out of Frank's Tract.

Wind Speed Data collected at Ironhorse Sanitary District January 4, 2008



Another high-wind event occurred on January 4, 2008. Based on DWR's continuous turbidity data, the use of wind speed and direction data from Ironhorse Sanitary District, and the lack of turbid water entering the Delta from the Sacramento River, it seems highly probable that Frank's Tract was the source of increased turbidity levels at all three of our monitoring locations. This turbidity monitoring and associated analysis should provide State and Federal water managers the ability to better predict the timing of delta smelt movement into the interior of the Delta, and therefore reduce water exports in an effort to direct delta smelt north towards the Sacramento River.

Turbidity and Flow Data collected on January 4, 2008



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