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# **Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh**

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## **Chapter 3: Analysis and Preparation of Observed Data for Input Files in Support of DSM2 Extended Validation (1975-1999)**

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# **3 Analysis and Preparation of Observed Data for Input Files in Support of DSM2 Extended Validation (1975-1999)**

## **3.1 Introduction**

This chapter summarizes the work done analyzing and preparing the observed 1975-1999 data for DSM2 input files that will be used in a forthcoming DSM2 Extended Validation Project.

## **3.2 Objectives**

The primary objectives of the analysis and preparation of the data for DSM2 input files are to:

- ❑ Check the observed data for errors,
- ❑ Organize an accurate data set conformable to the required format of DSM2, and
- ❑ Convert and link this data set to the DSM2 input files.

## **3.3 Description of Analysis and Preparation of Data**

### **3.3.1 Acquisition of Data**

The historical raw data of stage, flow, and electrical conductivity at 11 boundary-condition sites and 64 Delta-interior sites were downloaded from the Interagency Ecological Program (IEP) website (<http://iep.water.ca.gov/dss/>). Additionally, historical information on barrier installations and island floodings were obtained from various DWR bulletins (DWR Bulletin 132: Appendix E series; DWR Bulletin 69 series; and DWR Bulletin 160 series).

### **3.3.2 Analysis and Screening of Input Data for DSM2 Input Files**

To improve the accuracy and quality of the input data and also to conform to the requirements of the DSM2 input format, the downloaded raw data were screened for missing data and for inaccuracies. One of the vital requirements of the data provided to the DSM2 input files is that data must be continuous. During the screening process, the raw data were checked for missing values, errors, and questionable data. If unchecked, the inaccurate data will affect the accuracy of DSM2's simulation results. Missing values and errors in data can occur for various reasons, including:

- ❑ Mechanical or electrical breakdown of the data acquisition equipment.
- ❑ Data collection devices damaged by passing marine vehicles or debris.
- ❑ Abnormally high currents, flows, or sediment movement that are beyond the device's ability to measure or that could damage the device.
- ❑ Errors that occurred in the data due to the incorrect post processing of the collected data by the collecting agency.

Using the data analysis and visualizing tool, VISTA, the raw data were classified in five different ways: Unscreened, OK, Missing, Questionable, and Reject. The unscreened data flag indicates that the data have not been reviewed for errors. The OK data flag indicates that the data are correct. The missing data flag indicates missing data. The questionable data flag indicates that the data are suspicious but not obviously in error. Finally, the reject data flag indicates that the data are in error and should not be used as input or for comparison. Later in the preprocessing of the data, the flagged missing, reject, and questionable data will be filled in and/or replaced by data generated by a filling function.

### **3.3.3 Documentation of Delta Events and Activities**

During the data analysis, it was observed that some of the data were strongly affected by natural events and man-made remedial activities in the Delta. The comprehensive knowledge of the events and activities that occurred in the Delta is beneficial to understanding which data to flag as rejected or questionable. In order to gather information about the Delta events and activities the published bulletins and reports were sought and studied. The notable events, activities, and changes that occurred in the Delta were documented.

The information has helped to explain the predominant and/or probable causes behind the abruptly changing values and abnormally high or low values of data. Some examples of the documented events and activities are:

- ❑ Naturally occurring undesirable events, such as levee breaks, island floods, and droughts. e.g., On Aug 23, 1982, the west levee of McDonald Island broke at 3 a.m. The break widened to 600 feet and later deepened to 85 feet, flooding 5,800 acres.
- ❑ Irregular or temporary closures of channels and sloughs (to mitigate the water quality issues). e.g., On Sep 1, 1976, a temporary closure in Sutter Slough was built to increase the transfer of Sacramento River water to the central Delta via the Delta Cross Channel and to help reduce the flow-reversal in the San Joaquin River.
- ❑ Seasonal installation of temporary rock-barriers. e.g., The fall-installation of the Head of Old River Barrier depends primarily upon the water quality in the San Joaquin River near Stockton. In some years, the Old River Barrier was installed September through December. In other years, it was not installed and an alternative solution (such as curtailment of exports) was carried out.

- ❑ Trial measures to improve the Delta water quality.  
e.g., In September 1977, a Dutch Slough Barrier was installed (with siphons and flap gates) to mitigate salinity intrusion to the central and south Delta. It was removed three months later and not installed again.
- ❑ Occasional installations of barriers.  
e.g., In March 1977, an Indian Slough Barrier was installed to allow northward one-way flow of low salinity water. It was removed in March 1978.
- ❑ Irregular operations of SWP and CVP pumps.  
e.g., In June 1976, California Aqueduct deliveries were interrupted and State Water Project (SWP) pumping operation ceased. Also, in May 1981, the California Aqueduct failed and consequently SWP pumping was reduced and later increased dramatically to make up the loss in export.
- ❑ The State Water Resources Control Board's (SWRCB) relaxation on Delta water quality standards during critical water years.  
e.g., During the severe drought of 1977, SWRCB modified and/or temporarily suspended required water quality standards at various sites in the Delta and Suisun Marsh. It also imposed emergency regulations and export restrictions on the SWP and CVP.

### **3.4 In Progress and Future Work**

Presently, 15-minute stage data for DSM2's downstream boundary at Martinez has been prepared. The historical configuration of gates and barriers in the Delta has been collected. However, work still in progress includes:

- ❑ Formatting the gate and barrier information for use in DSM2.
- ❑ Completing documentation of events and activities that historically occurred in the Delta.

Future work includes:

- ❑ Filling and merging the screened and flagged stage, flow, and EC data for the DSM2 interior boundary conditions.
- ❑ Collecting and updating the most accurate information on Delta Island Consumptive Use.
- ❑ Running the historical simulations of DSM2 Model (1975 to 1999).
- ❑ Reviewing and analyzing the simulation results.
- ❑ Comparing the simulation results with the observed data.
- ❑ Documenting the DSM2 Extended Validation (1975 to 1999).