
[Editor's Note: The following report is an electronic reproduction of the 15th annual progress report to the State Water Resources Control Board. The format of this chapter is different than the original report. Furthermore, the Table of Contents has been expanded to include listings of the sub-headings, figures, and tables. The page numbers listed in this table of contents still reflect the page numbers from the original document.]

FOREWORD

This is the fifteenth annual progress report on the development of methodologies to predict flow and salinity in the Sacramento-San Joaquin Delta and Suisun Marsh as required by Order 9 of the State Water Resources Control Board Water Right Decision 1485. With D1485 still in effect, the DWR Delta Modeling Section will continue to comply with Order 9 by filing this report. This document also serves the purpose of reporting activities under the Bay-Delta Evaluation Program, DWR Work Order 1463. This year, the report was compiled under the direction of Francis Chung, program manager of the Bay-Delta Evaluation Program. Presented below is a brief overview of the subjects addressed in this report. Contributing authors are noted in parenthesis.

Ongoing Model Development: DWR Delta Simulation Model. DWR's Delta Simulation Model, or DWRDSM, is the Department's main production tool for a variety of engineering analyses in the Delta. This year, development efforts were focused on the extension of model boundaries and on modifications to DWRDSM's flow submodel. These efforts will allow for a wider range of model applications while increasing numerical accuracy. The downstream tidal boundary was extended from Martinez to the Pacific Ocean at Golden Gate. The upstream Sacramento River boundary was extended from the American River confluence to Shasta Dam. (Mohammad Rayej and Parviz Nader-Tehrani)

New Model Development: DSM2. With the goal of creating a public domain model for the Delta, work on developing a new model herein referred to as Delta Simulation Model 2 or DSM2 has continued. The new model, herein referred to as DSM2, incorporates enhanced versions of the Four-Point flow submodel, the Branch Lagrangian Transport (BLTM) quality submodel, and other submodels and peripherals developed for DWRDSM. The target date for completing this task is June 1995. (Parviz Nader-Tehrani, Hari Rajbhandari, and Shawn Mayr)

Particle Tracking Model for the Delta. Fish and wildlife issues are critical to management of the Delta. Preliminary work on the Particle Tracking Model, a tool primarily designed to evaluate the transport of fish eggs and larvae, was reported in last year's progress report. Advances in model development, testing and verification were made this year and are reported. Significant developments include (1) a modification to quasi three-dimensionality that allows for particle tracking across channel width and depth, and (2) new subroutines that account for biological phenomenon such as the entrapment zone, egg and larvae mortality, and variable settling rates. (Tara Smith)

Delta Island Consumptive Use (DICU) Analysis. Recognizing the importance of agricultural activities on Delta hydrodynamics and water quality, a joint feasibility study to determine inflows and outflows from Delta islands is being conducted by DWR Division of Local Assistance and the U.S. Geological Survey. This study will focus on developing a water balance for Twitchell Island. The DICU model is currently being used by the study team in prioritizing data needs through the use of sensitivity analyses. One such sensitivity analysis is presented here. It is anticipated that the DICU model will be used to extrapolate knowledge gained from the Twitchell Island study to other islands in the Delta. (Nirmala Mahadevan)

Disinfection By-Product Formation Modeling. Work continued on developing, calibrating and validating a model of trihalomethane (THM) formation potential in Delta waters. Recent work, particularly in the areas of THM predictive equation calibration and DWRDSM performance testing, has focused on the anticipated joint use of DWRDSM and EPA's Water Treatment Plant (WTP) simulation program to look at cost-effective drinking water management alternatives. A formulation that can be used as a basis for predicting relative speciation of several disinfection by-products, including THMs, haloacetic acids, and haloacetonitriles, was also developed and is presented. (Paul Hutton)

Delta Graphical User Interface (DGUI). DGUI is used extensively to plot and manipulate observed and computed data pertaining to the Delta. This chapter reports new developments and additions to the DGUI. (Ralph Finch)

Data Assembly: Time Series Data. Efforts continued to further expand the data stored in-house. As of June 1994, the Section has assembled 12.2 million data points on flow, stage, velocity, gate position, water quality, etc. This represents an increase of about 50 percent from one year ago. It is anticipated that several other major sources of data will be assembled during the next year; these sources are discussed. (Ralph Finch)

Model Input System. A new input system is being developed to make DSM2 easy to use and to promote the execution of reliable model studies. Project status and future directions in the model input system are discussed in this chapter. (Ralph Finch)

Refinement of Carriage Water Routine. Several attempts were made to improve the performance of the existing routine, Minimum Delta Outflow (MDO), that is used to estimate the amount of carriage water. No conclusive findings are yet available. (Paul Hutton)

Two Part Per Thousand Isohaline Equation Analysis. EPA has proposed standards for the Delta estuary based on a flow-salinity relationship developed by Kimmerer and Monismith. Implementation of the proposed standard could have significant impacts on SWP operations. Therefore, a thorough review of the flow-salinity relationship was undertaken and is summarized in this chapter. (Chris Enright)

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