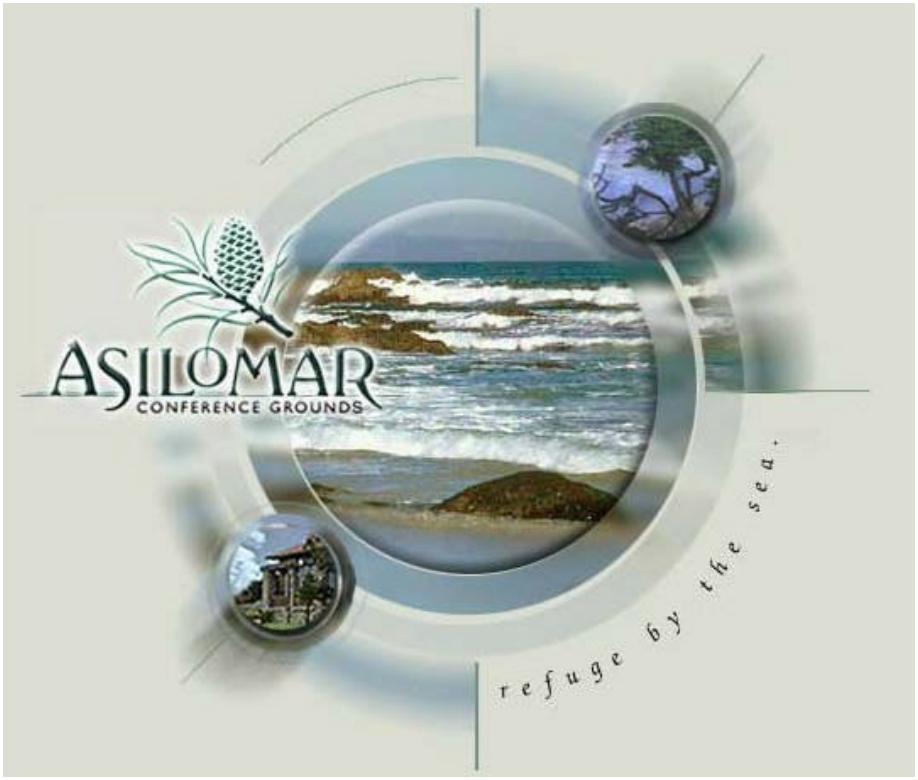
California Water and Environmental Modeling Forum

2005
Annual Meeting
Abstracts

"Water and Environmental Modeling to Support Decision Making"



March 1-3, 2005

Asilomar Conference Grounds
800 Asilomar Boulevard
Pacific Grove, California

California Water and Environmental Modeling Forum
2005 Annual Meeting Summary of Sessions

Tuesday, March 1, 2005

Time	Session	Moderator	Location
10:15 am-12:00 pm	1: San Joaquin Drainage and Recirculation via SANMAN	Nigel Quinn	Heather
	2: Water Rights and Availability Modeling I	Rich Satkowski	Curlew
12:00-1:00 pm	Lunch	---	Dining Hall
1:15-3:00 pm	3: Modeling of Water Transfers	Rob Tull	Heather
	4: 2004 DSM2 Developments and Applications	Parviz Nader	Curlew
3:00-4:00 pm	Registration	---	Social Hall
4:15-6:00 pm	5: Screening/Decision Support Tools	Armin Munevar	Heather
	6: Multi-Dimensional Model Applications	Ralph Cheng	Curlew
6:00-7:00 pm	Dinner	---	Dining Hall
7:00-10:00 pm	7: Reception I and Poster Session	Mike Deas	Heather
7:45-8:30 pm	Career Achievement Award / Presentation by Recipient	Rob Tull	
8:30-9:30 pm	Keynote: "TX Water Availability Modeling," Ralph Wurbs	Francis Chung	

Wednesday, March 2, 2005

Time	Session	Moderator	Location
7:30-8:15 am	Breakfast	---	Dining Hall
8:15-10:00 am	8: CWEMF Activities / Annual Business Meeting	Nigel Quinn	Heather
10:15 am-12:00 pm	9: Water Rights and Availability Modeling II	Rich Satkowski	Heather
	10: MIKE Model Applications	Jesper Kjelds	Curlew
	11: Integrated Surface Water and Ground Water Modeling	Tariq Kadir	Sanderling
12:00-1:00 pm	Lunch	---	Dining Hall
1:00-2:20 pm	12: Water Community Program Updates	Chuck Armour	Chapel
2:40-4:00 pm	13: IEP / CWEMF Joint Modeling Session	Rich Satkowski	Chapel
4:00-5:00 pm	Registration	---	Social Hall
4:15-6:00 pm	14: Advances in Biological Modeling for Fish	Zack Hymanson	Chapel
	15: 2004 CalSim-II Developments and Applications I	Lloyd Peterson	Heather
	16: Remote Sensing, LiDAR, and All That Jazz	Ralph Finch	Curlew
6:00-7:00 pm	Dinner	---	Dining Hall
7:00-10:00 pm	17: Reception II and Featured Speaker	---	Chapel
7:15-8:30 pm	Featured: "Chesapeake Bay Ecosystem," Edward Houde	Mike Chotkowski	

Thursday, March 3, 2005

Time	Session	Moderator	Location
7:30-8:15 am	Breakfast	---	Dining Hall
8:15-10:00 am	18: CA Long-Term Modeling Strategic Analysis	Jay Lund	Kiln
10:15 am-12:00 pm	19: CA Water Plan Update 2005 and Beyond	Rich Juricich	Kiln
	20: Flooding of Upper Jones Tract	Tara Smith	Acacia
12:00-1:00 pm	Lunch / Check-Out	---	Dining Hall
1:15-3:00 pm	21: 2004 CalSim-II Developments and Applications II	Sushil Arora	Kiln
	22: San Joaquin River Dissolved Oxygen TMDL Modeling	Russell Grimes	Acacia
3:15-5:00 pm	23: Restoration Modeling	Russ Brown	Kiln

2005
Annual Meeting
Abstracts

Tuesday, March 1, 2005

10:15 a.m.-12:00 p.m.

Session One: San Joaquin Drainage and Recirculation: A SANMAN Perspective

Application of SANMAN: A San Joaquin River Salinity Management Spreadsheet Model
Paul Hutton (MWDSC)

The purpose of the San Joaquin River Salinity Management Model (SANMAN) is to provide reconnaissance-level decision support in the development of a San Joaquin River Salinity Management Plan (part of the Delta Improvements Package) by (1) identifying coordinated management actions that meet the Vernalis salinity objective and (2) estimating water costs of actions. SANMAN is an Excel-based spreadsheet model that is designed to layer potential salinity management actions on top of a baseline CALSIM hydrology and operations. Actions being considered include: real-time coordination of tributary releases; drainage reduction; re-timing drainage releases; DMC re-circulation through the Newman Wasteway; strategic water purchases; and re-operation of New Melones reservoir.

SANMAN was used to explore the potential benefits of re-timing winter and early spring drainage releases from managed wetlands on the west side of the San Joaquin River basin. Preliminary studies suggest that redistributing March and early April drainage releases could be used, in conjunction with other management actions, to meet the Vernalis salinity objective more frequently with less burden on New Melones Reservoir.

2004 San Joaquin River Recirculation Experiment Sharon McHale (USBR)

The U.S. Bureau of Reclamation and the California Department of Water Resources collaborated with local agencies in conducting a limited, monitored pilot study to collect data and evaluate the effects of using the Tracy Pumping Plant and Delta Mendota Canal (DMC) to augment flows in the San Joaquin River for water quality purposes. The pilot study objective was to achieve water quality benefits while avoiding adverse impacts to fish habitat. Pilot study constraints included avoiding any impact to water contractors financially, and any reduction in water deliveries or export capacity. In August 2004, the pilot study was implemented releasing up to 300 cfs of water from the DMC into the Newman Wasteway for conveyance into the San Joaquin River and return flow into the Delta, where the water was recaptured at the Tracy Pumping Plant (hence, Recirculation). Preliminary analysis of results indicate that recirculated flow was effective in increasing flow and improving water quality on the San Joaquin River at Vernalis.

Real-Life and Real-Time Agricultural and Wetland Drainage Nigel Quinn (LBNL/USBR)

Real-time water quality management is the coordinated controlled management of west-side agricultural and wetland drainage with east-side reservoir releases to improve water quality conditions in the San Joaquin River. Two experimental programs will be described that help to demonstrate the feasibility of this alternative to strict load-based TMDL's. These experiments have taken place in the Grasslands Basin on both selenium affected agricultural land and in both private and public seasonal wetlands. Innovative technologies are being deployed to address institutional constraints on both systems.

Session Two: Water Rights and Availability Modeling I

Water Rights and Flow Distribution Modeling Using ModSim, Leslie Stillwater (USBR)

River system management models provide the cornerstone hydrologic analyses and investigations for water conservation, water management, flow augmentation, conjunctive use of surface water and groundwater, water availability, and many other planning and operations studies. The river systems management model, MODSIM, is unique in its ability to efficiently simulate the distribution of flows subject to Western Water Law (i.e., natural flow rights and Reclamation storage contracts), as well as other complex operating policies such as implicit and explicit exchanges of stored and natural flows, water transfers, rent pool agreements, and minimum streamflow requests. The network linear flows algorithm which drives the solution process in MODSIM streamlines the representation of water law and policy and allows the user to perform these tasks with considerably less effort and coding than other modeling tools. The MODSIM model of the Boise River, a tributary to the Snake, demonstrates the combined simulation of complex operations policy, natural flow rights, and storage contracts.

Evaluation of SWRCB's Water Availability Methods in California's North Coast Ungaged Streams Mike Mann (USBR)

Various streamflow statistics are used by the California State Water Resources Control Board (SWRCB) for use in their Water Availability Methods to allocate water rights. When streamflow data are lacking for a site, estimation techniques are used to generate the necessary streamflow statistics. Prior to this study, the SWRCB's procedures for generating streamflow statistics had not been evaluated for accuracy. Use of unevaluated flow-statistic estimation techniques can result in improper water-resources decision-making. The SWRCB uses both rain- and flow-based methods (modified rational equation and flow statistic transfer) to estimate several streamflow statistics. The SWRCB uses the U.S. Geological Survey's (USGS) regional peak-flow equations for estimating peak flow statistics. In this study the SWRCB estimated various streamflow statistics at 40 USGS gaging stations in the north coast region of California without reference to the gaging data. This evaluation used historical streamflow data from these stations to generate flow statistics that could be compared with SWRCB estimates for accuracy. While some SWRCB estimates compared favorably with USGS gaging station statistics, results were subject to varying degrees of error over the region. Few correlations were discovered between estimation errors and geographic locations or various basin characteristics.

1:15-3:00 p.m.

Session Three: Modeling of Water Transfers

Decision Tools for Water Transfers Brandon Goshi (MWDSC)

The Metropolitan Water District of Southern California has developed a diverse water resource portfolio that, in addition to State Water Project and Colorado River Aqueduct supplies, includes conservation, recycling, storage, and water transfers. The operation of this portfolio depends a great deal on current year climate and hydrology. In order to develop and execute operational plans on an annual basis, Metropolitan has developed a suite of analytical tools that provide probabilistic information on cost, resource use, and risk. A look at these tools and the information that they develop can provide insight into how decisions on structuring, entering, and executing water transfer contracts are made.

Water Transfers: Potential Approaches and Complexities Brian Van Lienden (CH2M Hill)

The evaluation of water transfers capability is an important part of the planning activities of several water management programs in California, particularly those with direct impacts to the Bay-Delta. The ability to estimate the parameters affecting water transfers timing and conveyance usage has direct impacts on the evaluation of new facilities and the allocation of benefits for such facilities. This presentation discusses possible approaches for incorporating water transfers into a comprehensive statewide analysis and how the Water Transfers Tool (WTT) could help to facilitate the analysis.

Integration of Groundwater Monitoring and Numerical Modeling in Assessing Potential Impacts of Water Transfer Programs Pete Lawson (CH2M Hill)

This presentation will focus on the methodology developed to assess potential impacts on surface water and groundwater resources associated with the implementation of the Sacramento Valley Water Management Program. The methodology involves the integration of a numerical groundwater model of the Sacramento Valley with a proposed extensive groundwater monitoring program associated with a number of conjunctive water management projects proposed as part of the Sacramento Valley Water Management Program. A brief description of the model will be provided, followed by a detailed discussion of the types of data that will be collected during monitoring activities, how that information will be analyzed and utilized to assess impacts, and how the model will then be refined to provide improved impact estimates for subsequent program operations. Emphasis will be placed on the importance of simultaneously applying knowledge of Sacramento Valley hydrogeologic properties and District operations, numerical modeling tools, and on-going data collection and interpretation, to assess potential impacts on surface water and groundwater resources.

Modeling Environmental Water Account Purchases Nancy Parker (USBR)

Analysis for the Long Term EWA EIS has disaggregated EWA purchase logic to represent individual purchase options. North of Delta transfers now balance purchase terms with conveyance capacity at Banks, carriage water requirements, use of storage facilities for backing up water, and priorities for other transfers. South-of-Delta purchases now include multiple sources and exchanges that respond to debt or San Luis storage thresholds. This presentation will outline the several types of purchase options now simulated with CalSim.

Session Four: 2004 DSM2 Developments and Applications

DSM2 California Aqueduct Extension Kyle Winslow (CH2MHill)

On behalf of the State Water Project Contractors, CH2M HILL is building a DSM2 application to allow hydrodynamic and water quality simulation of the California Aqueduct system and the Delta Mendota Canal. DWR's Municipal Water Quality Investigation (MWQI) program is interested in application of this model for forecasting of short-term and long-term water quality. The model may also be integrated with the existing Delta and San Joaquin River DSM2 applications. The model includes the California Aqueduct from the Banks Pumping Plant to Silverwood Lake on the east branch and Pyramid Lake on the west branch. San Luis Reservoir is also included, as is the South Bay Aqueduct through the Santa Clara Tank. The model is currently being calibrated for flow, stage, and EC for a three-year period beginning January 2001.

Generating Water Quality and Climate Data at DSM2 Boundaries for Temperature and Dissolved Oxygen Studies of the Delta Hari Rajbhandari (CA DWR)

The procedure used to develop boundary conditions for simulating dissolved oxygen (DO) and temperature with DSM2 under a typical planning scenario is presented. For DSM2 Delta water quality simulations, water quality data typically need to be provided for the major sources of inflow (the Sacramento River, San Joaquin River etc.), the downstream boundary at Martinez, and the agricultural return flows within the Delta. When simulating electrical conductivity (EC) in CASIM II-based planning studies, established flow-EC relationships at the Delta boundaries can be used to generate boundary EC, but no such relationships exist for the water quality parameters used in simulating DO. Thus, methods were developed to use available historical data to generate the data needed for modeling DO and temperature under hypothetical Delta hydrology.

PTM Animations Illustrating the Flexibility of South Delta Permanent Barrier Operations Bijaya Shrestha (CA DWR)

A series of particle tracking animations are prepared to illustrate the flexibility provided by the South Delta Permanent Barriers to improve water quality and circulation in the South Delta region, and to increase flow in the Stockton Ship-Channel.

Replacing Unformatted Data Storage in DSM2 Using HDF5 Tawnly Pranger (CA DWR)

The unformatted binary tidefile is being replaced with a structured HDF5 file. Improving flexibility and access to the data contained within.

Model Steering Eli Ateljevich (CA DWR)

Operating rules are a means of guiding the model in real time, using rules that are aware of the current model state. An example is "open a gate and curtail pumping when stage exceeds 1 foot in channel 5". A new feature in DSM2 (database version) allows users to express both simple and complex operating strategies. This talk describes the operating rule feature and shows output from a simple example based on Clifton Court pumping and gate operations.

4:15-6:00 p.m.

Session Five: Screening/Decision Support Tools

SANMAN: Decision Support for the Delta Improvement Package SJR Salinity Mgt Plan
Paul Hutton (MWDSC)

The purpose of the San Joaquin River Salinity Management Model (SANMAN) is to provide reconnaissance-level decision support in the development of a San Joaquin River Salinity Management Plan (part of the Delta Improvements Package) by (1) identifying coordinated management actions that meet the Vernalis salinity objective and (2) estimating water costs of actions. SANMAN is an Excel-based spreadsheet model that is designed to layer potential salinity management actions on top of a baseline CalSim hydrology and operations. Actions being considered include: real-time coordination of tributary releases; drainage reduction; re-timing drainage releases; DMC re-circulation through the Newman Wasteway; strategic water purchases; and re-operation of New Melones Reservoir.

Interactive Screening Model and the Exploration Process Armin Munevar (CH2M Hill)

An interactive screening model of the Central Valley water resources system has been developed to support exploration of a variety of potential water management alternatives. The Central Valley "Gaming" model seeks to incorporate the fundamental relationships between water project operations, hydrologic conditions, and the dynamic responses of the water resources system. The model, developed in VBA-Excel, allows users to evaluate various scenarios by making changes to system operations. The model includes a generalized approach to storage and flow accounts and permits tracking of water quality throughout the export area. This presentation will discuss the role of screening tools in water management and policy development, the current state of the Central Valley model, and some thoughts on a portfolio of modeling tools.

Testing Instream Flow Regimes with ECOSIM-W Derek Hilts (USFWS)

As a result of the passage of CVPIA, the U.S. Fish and Wildlife Service (USFWS) has the responsibility to dedicate and manage a portion of U.S. Bureau of Reclamation's Central Valley Project (CVP) yield. In order to explore different CVP operational scenarios, the USFWS began development of suite of simulation models, referred to as ECOSIM. Most of the work to date has been on the Visual Basic wrapper and the water module, ECOSIM-W. ECOSIM-W is a monthly simulation model of the macroscopic water projects in California's Central Valley. It's inputs and outputs are ASCII files. Though ECOSIM-W doesn't currently contain all the hydrology refinements that CalSim-II has, its representation of the CVP and SWP is sufficiently accurate and its speed is sufficiently fast to make it an effective screening tool for some what-if questions. This presentation will demonstrate the use of ECOSIM-W to answer what-if questions regarding alternate instream flow proposals.

Intelligent Screening Models and Connecting Models to Reality Jay Lund (U.C. Davis)

Two distinct ideas are presented which seem important for California's water system. First, we need a quality control program for our data and our models so that they very explicitly and transparently correspond to reality. We have a huge, complex system and our data management, documentation, and quality control needs to rise to the challenge in an engineered way. Otherwise, the controversies of our increasingly tight and controversial system will either keep us in court or keep modeling out of decision-making. Second, California's system is so large and complex that normal simulation models are insufficient to explore the

myriad of possibilities in the search for promising solutions. In essence, we need intelligent screening models to supplement human intuitive insights and political processes and give us some promising suggestions of how we can usefully combine the many management activities available. We have not been bad modelers, but our work needs to mature in these areas.

Session Six: Multi-Dimensional Model Applications

Flow, Salinity, Franks Tract, and the Delta: On-going Analysis of the Influence of Franks Tract on Delta Salinity, John DeGeorge, Richard Rachiele and Stacie Grinbergs (RMA)

The California Bay-Delta Authority is sponsoring the Flooded Islands Feasibility Study to evaluate the potential to create ecosystem, water quality, recreation, and other benefits at Franks Tract, Sherman Lake, and Big Break. As part of the study, the RMA-Bay-Delta model is being used to evaluate salinity impacts of a wide variety of alternative configurations with primary focus on controlling flow and salinity mixing near Franks Tract. Analysis of initial alternatives indicates that there is potential for significant improvement in salinity at the South Delta export locations.

Physical and Numerical Modeling of Bank Scour in the Sacramento River, Bassam Younis (U.C. Davis)

We have investigated an existing problem of bank erosion in close proximity to a bridge on the Sacramento River by using two very different techniques: physical modeling, which involved the construction of a distorted-scale model (130:1 in the horizontal, 70:1 in the vertical) and obtaining velocity measurements with a current meter, and mathematical modeling, based on the solution of the full Navier-Stokes equations in three dimensions. The presentation will report on our experiences with each technique, and on the outcome of an evaluation of the use of groins to prevent further erosion.

The Influence of Horizontal Momentum Diffusion on 3D Hydrodynamic Simulations in the Delta, Pete Smith (USGS)

Three-dimensional (3D) hydrodynamic model calculations in the Sacramento-San Joaquin River Delta are used to demonstrate the sensitivity of model results to the eddy viscosity coefficient that controls horizontal momentum diffusion. If too much viscosity, either physical or numerical, is present in the calculations, the solution velocities appear overly smoothed, and the tidal range in flows and water surface elevations can be significantly under simulated. The tidally averaged flows can be under simulated also. Using a calibrated 3D model of the San Joaquin River in the vicinity of Stockton, California, the influence of horizontal momentum diffusion on simulation results is quantified. It is shown that the effective eddy viscosity, which accounts for both physical and numerical viscosity, should not exceed a value of approximately 0.1 m^2/s for 3D calculations in typical-sized delta channels and for medium resolution (10- to 30-m) numerical grids. This is a smaller value than previously was assumed necessary for accurate simulations. The effective eddy viscosity coefficient for a calculation is due only in part to turbulence and in general also accounts for numerical viscosity and advective sub-grid scale motions. It is shown that the use of an upwind differencing scheme for advection of momentum in a 3D hydrodynamic code of the delta can introduce a numerical viscosity that is much too high, on the order of 1.0 to 5.0 m^2/s.

Preliminary Modeling Results of Tidal Circulation in Hood Canal, Washington,
Ralph T. Cheng (USGS)

Hood Canal is a 110-km long narrow fjord in the Puget Sound estuary with a relatively shallow (55 m) sill at the entrance and reaching depths greater than 175 m in some areas. Low dissolved oxygen levels in Hood Canal have been observed during the late summer. The cause for this trend has been hypothesized to result from a combination of eutrophication from increased nutrient inputs into Hood Canal and naturally occurring sluggish circulation in the fjord. Because of the size and complexity, an unstructured grid, a three-dimensional tidal circulation model known as UnTRIM has been implemented for Hood Canal (Casulli and Zanolli, 2004; Cheng and Casulli, 2002). The unstructured grid nature of the model allows boundary fitting and very detailed and arbitrary local grid refinements in areas of interest. A numerical model grid was developed for application that uses very fine grids in the region of the great bend (where the lowest dissolved oxygen concentrations are found), and to gradually increase the grid size to more coarse towards the mouth of the canal. Fifty vertical layers are used to resolve the vertical structure of salinity and velocity fields. Preliminary model results and some limited field ADCP measurements will be presented and discussed.

7:00-10:00 p.m.

Session Seven: Evening Program

Poster Session, Sponsored by Mike Deas of Watercourse Engineering, Inc.

Click here to see poster session abstracts.

Presentation of the Career Achievement Award

The California Water and Environmental Modeling Forum's Career Achievement Award is given annually to individuals for significant contributions over their career in developing, using or promoting computer modeling to analyze California's water-related problems.

Remarks by the Career Achievement Award Recipient

The recipient will discuss the modeling-related work associated with the award.

Texas Water Availability Modeling System: Institutional Dimensions of Modeling,
Ralph Wurbs (Texas A&M University, Department of Civil Engineering)

The general lessons learned in Texas regarding the process by which a water management community implements a shared modeling system to support integrated planning and regulatory activities will be presented.

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Wednesday, March 2, 2005

8:15-10:00 a.m.

Session Eight: CWEMF Activities / Annual Business Meeting

The CWEMF will (1) report on 2004 model user groups, peer reviews, technical workshops, and administration activities and (2) hold its Annual Business Meeting.

10:15 a.m.-12:00 p.m.

Session Nine: Water Rights and Availability Modeling II

Texas' Water Rights Analysis Program (WRAP) Modeling System,
Ralph Wurbs (Texas A&M University)

The Texas Water Availability Modeling (WAM) System was implemented during 1997-2003 pursuant to the 1997 Senate Bill 1, which was a milestone water management legislative package enacted by the Texas Legislature in 1997. The Texas WAM System consists of the generalized Water Rights Analysis Package (WRAP) simulation model, datasets for the 23 river basins of the state, and supporting databases and software. The WAM System is applied by water agencies and consulting firms in Texas in planning studies and in preparation and evaluation of water right permit applications.

Modeling Klamath River Basin Water Rights Using CalSim (WRIMS), Nancy Parker (USBR)

Ongoing DOI negotiations towards a settlement with the Klamath Tribes require representing water rights in the Klamath Basin, both upstream and downstream of Upper Klamath Lake. Reclamation has developed a CalSim (WRIMS) application for water use planning in the Klamath Basin. This model is being expanded to include water rights above Upper Klamath Lake.

Modeling of the Truckee River Operating Agreement Using RiverWare Mike Mann (USBR)

RiverWare is a generalized basin modeling tool used for scheduling, planning, and evaluating operations on rivers and reservoirs. It simulates water storage, water deliveries, water ownership and accounting, and hydropower generation in a framework designed for operational decision making. In the Truckee-Carson Basin, RiverWare has been selected for implementation of the Truckee River Operating Agreement (TROA). TROA is expected to be implemented as early as 2007, and represents the needs of numerous stakeholders and a variety of goals in the Truckee-Carson Basin. The complexity of TROA necessitates a flexible modeling system that has the ability to perform water accounting, forecasting, operational scheduling, and long-term planning. A RiverWare system for the Truckee-Carson Basin, under current operating conditions, is in the final stages of development. The system is currently

being used to compare RiverWare water accounting versus Federal Water Master record-keeping and to provide operational forecasts to interested stakeholders. The next step will be to implement TROA operations into the existing RiverWare system. The TROA models will be the primary water accounting, forecasting, and scheduling decision making tools once TROA is implemented.

Session Ten: MIKE Model Applications

Decision Support Tools for Assessing Impacts on Aquatic Species from Hydroelectric Pulseflows, Jesper Kjelds (Jones & Stokes)

Abstract not available.

Selenium Contamination in the Delta-Mendota Canal Parallel to the San Joaquin River, South of San Francisco Bay, David Wood (DHI, Inc.)

The Delta Mendota Canal runs from its connection with the San Joaquin River West of Stockton to the Delta Mendota Pool in the southern end near Fresno. DHI is participating in a study to help the US Bureau of Reclamation operate the structures along the canal to optimize the delivery of a reliable supply of clean water to customers. To meet the project objectives an integrated surface/groundwater and hydraulic model was developed and validated. The model will assist the operators of the canal to predict the effects of selenium contamination on water delivered to farms and wildlife refuges in central California.

Selenium is a naturally occurring trace element that is toxic to fish, amphibians, birds, and mammals. The main source of Selenium is from drainage water and groundwater. The water quality objective for selenium in the Delta Mendota canal is 2 ug/l. The developed model represents the groundwater interaction with the canal flow (groundwater interaction influences the transport and fate of Selenium) as well as the hydrodynamics of flow in the canal and through the structure facilities. DHI's MIKE SHE and MIKE 11 software was used for the project.

Early Warning Systems and Modeling of Tsunamis, David Wood (DHI, Inc.)

Many of the low-lying coastal areas surrounding the continents are prone to severe flooding due to natural hazards like cyclones, storm surges and tsunamis. In many places these areas coincide with high population densities, reflecting a high risk of human casualties, when a cyclone, storm surge or tsunami strikes a coast without warning or with short notice only not to mention the associated massive direct and indirect damage.

By virtue of regional weather forecasts, the lead-time for storm surges forecasting is up to several days. There is thus a realistic time horizon available for forecasting and warning dissemination. Cyclone surge forecasting systems have been established locally a number of places in the affected regions.

Tsunamis progress at very high speeds in the deep waters of the oceans, as it has become tragically evident from the recent Asian tsunami disaster on December 26, 2004. The tsunami measuring 9.0 on the Richter scale was triggered by an earthquake under the sea off the coast of Sumatra, Indonesia. The subsequent tsunami wave crashed into the coastal regions of the Indian Ocean including Sri Lanka, Indonesia, India, Thailand, the Maldives, Malaysia, Myanmar and Bangladesh with more than 250,000 casualties.

While the meteorological forces driving cyclone-induced surges can be predicted several days in advance, prediction of earthquakes with similar lead-time is yet not possible. Early warning systems for tsunamis are thus not based on real time modeling in the same way as storm surge forecasting systems are. Rather, they are based on hazard maps and contingency plans.

On basis of seismological information and sea-level monitoring information, tsunami waves and their propagation can be forecasted. This is done using hydrodynamic models of regional scale and potentially linked to a global model. As the strong threat is associated with local amplification of the wave in the nearshore area, it is imperative that these models include detailed information of the local nearshore bathymetry.

Session Eleven: Integrated Surface Water and Ground Water Modeling

Trends in Integrated Hydrologic Modeling Saquib Najmus (WRIME)

Integrated hydrologic modeling is a key element of the conjunctive use planning and management. Integrated modeling requires that all pertinent components of the hydrologic cycle be included in the model simulation and analysis. There are different levels of integration and internal/external linkages of different hydrologic components into a single model or a suite of linked and/or coupled models. The recent trends in this complex area of hydrologic modeling will be presented.

An Updated Hydrologic Model of California's Central Valley Using MODFLOW-2000 with the Farm Package, Randall Hanson (rthanson@usgs.gov) and Claudia Faunt, (ccfaunt@usgs.gov)

The USGS is revising and updating the CV-RASA model into a model that is capable of being more accurate and can be used to quantitatively address groundwater issues in the Central Valley. The ongoing USGS study has three tasks. The first task, "texture modeling," will address the objective of developing a better understanding of the internal architecture of the freshwater bearing deposits in the Central Valley. The second task, the "Farm Package", will address the objective of developing a systematic approach for estimating water budget components, which in this study will be based upon the consumptive use of water by plants and available surface water deliveries and supplementary ground-water pumpage. The third task, "Ground-water Modeling," will address the objective of developing a model capable of being accurate at a scale relevant to management decisions, including water availability issues.

A New Sub-Domain Water Budgeting Post-Processor for IGSM2 Can Dogrul (CA DWR)

A new post-processing tool for IGSM2 for listing detailed inflow and outflow components to user specified sub-domains has been developed. Theoretical framework and results of verification tests of the new tool will be presented.

MODGRASS: Updated Ground-Water Flow Model of the Central Part of the Western San Joaquin Valley, Charles Brush (cfbrush@usgs.gov)

A better understanding of the factors affecting the sources, quantity and quality of agricultural drainage flows is needed to facilitate management of selenium and other contaminants in wetland water-supply channels in the western San Joaquin Valley. The original USGS ground-water flow model of this area has been revised, updated and extended to incorporate a finer spatial discretization and an annually varying water budget for water years 1973-2000. Kriged sediment-texture maps were used to estimate the distribution of hydraulic conductivity. Results

from the modified model indicate that the largest stresses in the ground-water system are recharge and pumpage, and that the simulated vertical hydraulic gradient is extremely sensitive to the specified pumpage rates. Simulation results indicate that prior to 1993, significant withdrawals from storage occurred only during drought-affected years (1977-79 and 1990-92), indicating a reliance on imported surface water in most years. The balance between inflows and outflows after 1993 suggest that growers are increasingly relying on the pumping of ground-water to make up for short-term disruptions in imported water supplies. The modified model can be used to evaluate the water-quality impacts of agricultural water management alternatives on agricultural drainage flows.

1:00-2:20 p.m.

Session Twelve: Water Community Program Updates

Interagency Ecological Program Update, Chuck Armor (IEP/CA DFG)

The IEP will summarize its 2004 activities.

CA Water and Environmental Modeling Forum Update, Nigel Quinn (CWEMF)

The CWEMF will summarize its 2004 activities.

CA Bay-Delta Authority Update, Zach Hymanson (CBDA)

The CBDA will summarize its 2004 activities.

CA Bay-Delta Authority Independent Science Board Update, John Melack (CBDA)

The CBDA ISB will summarize its 2004 activities.

Long-Term Fish Monitoring Review, Paul Cadrett (USFWS)

Abstract not available.

Evaluating New Methods for Marking Delta Smelt,
Zak Sutphin (USBR) and Jerry Morinaka (CA DFG)

Abstract not available.

2:40-4:00 p.m.

Session Thirteen: IEP / CWEMF Joint Modeling Session

California Long-Term Modeling Strategic Analysis Framework Jay Lund (U.C. Davis)

The California Water and Environmental Modeling Forum (CWEMF) has embarked on an effort to develop a strategic analysis framework to guide the long-term development of analytical tools and data for California's water management problems over the next ten years. The CWEMF committee charged with this effort has solicited input from (1) a plenary session at the CWEMF 2004 Annual Meeting, (2) various California water community members who answered a CWEMF questionnaire and (3) two half-day technical workshops conducted in the summer of

2004. The CWEMF Long-Term Modeling Committee has developed a draft report and submitted major portions of the report to CALFED in the form of an initial proposal for funding.

The proposed framework activity would be broad-based, involving agencies and expertise from all levels. However, the effort would be technically focused, and designed to support a specified set of policy, planning, and management applications. The intent is to provide all agencies and analysts with a common integrated quantitative understanding of California's water supply system. While a complete quantitative understanding of all aspects of California's water system is unavailable, this work would begin this long-term process. Policy and technical committees representing major technical and policy expertise for California's water management will ensure that the detailed framework and products become standard for water management analysis. Relevant documents and background materials are on the CWEMF's web site at www.cwemf.org.

This plenary session will review the report findings and ideas for how to move forward. Most important will be the open discussion on how (and if) to proceed further.

2004 Hydrodynamic Field Experiment in the Stockton Deep Water Ship Channel, Jim Hench (Stanford University)

Abstract not available.

Hydrodynamic Modeling of the Stockton Deep Water Channel, Pete Smith (USGS)

Abstract not available.

Analysis of Flows Following the Jones Tract Levee Failure, Cathy Ruhl (USGS)

Abstract not available.

4:15-6:00 p.m.

Session Fourteen: Advances in Biological Modeling for Fish

Stage-Based Matrix Models for Delta Smelt: Simple Models with Complex Implications for Management, Bill Bennett (U.C. Davis)

Abstract not available.

Building Models to Explore Variability in Sacramento Splittail Populations: Fueling Biology via Floodplain Topography, Steve Culberson (CA DWR)

For species such as Sacramento splittail, *Pogonichthys macrolepidotus*, there is considerable uncertainty in predicting relative population benefits of different management strategies including California Bay-Delta Authority restoration actions. Simulation modeling of population trends and ecosystem dynamics resulting from alternative landscape/hydrodynamic configurations provides a promising approach to address this issue. In this phase of our study we are combining hydrodynamic models of Estuary sub-regions with habitat suitability estimates to influence a regional Sacramento splittail population model. Focus for this presentation will be on illustrating procedures used to incorporate elevation data into our models. Modeling scenarios can be examined to evaluate population effects of likely regional, near-stream, seasonal floodplain inundation events. These scenario-based characterizations are

subsequently used as input to population dynamics simulation sectors. Example population simulations indicate that population effects of hydrologic variability are significant, and the availability of seasonal floodplain spawning areas strongly effect yearly changes in splittail reproduction.

Winter Chinook Modeling: Insights into What is Driving Population Trends,
Steve Cramer (SP Cramer & Assoc.)

A life-cycle model, referred to as the Integrated Modeling Framework (IMF), was developed for Sacramento winter-run Chinook salmon by a team of fish consultants commissioned by the California Urban Water Agencies and State Water Contractors. Model development proceeded through a collaborative process of regular briefings with representatives of fish agencies, CALFED, and peer review by the IEP Winter-run Project Work Team. The life-cycle model was parameterized with rates and functions that are substantiated by field sampling to the full extent possible, and was intended for use to predict fish benefits achieved by changes to water management, harvest regulation, hatchery augmentation, and stream habitat alteration. Use of the model is the topic of this CWEMF talk. The initial model version produced a good fit of predicted to observed run sizes, and accounted for 74% of variation in run sizes during 1972-2003. Factors accounting for most of the population decline during the 1970's were impaired passage at RBDD, and density-dependent survival from fry-to-smolt in years of high spawner abundance (35,000 to 114,000 spawners). Egg mortality due to high temperatures was also a key factor for the 1975-1977 broods. Population increases that started in the late 1990s were driven by correction of passage and temperature problems, combined with a reduction of harvest rates from about 35% to 21%. Model development will continue in 2005 with a focus on adding weekly time steps in specific river reaches.

Cost-Effectiveness of Actions to Protect or Recover Chinook Salmon, Rick Sitts (MWDSC)

Winter run Chinook salmon levels remain well below the recovery goal. In response, a number of regulatory and restoration actions have been implemented. CALFED agencies anticipate dozens more actions to recover listed salmonids, costing perhaps hundreds of millions; taking decades; and requiring financing agreements between Federal and state governments, water users and the public. However, tools to compare the likely effectiveness of potential actions in achieving the goal have received little attention. The goal should be achieved sooner by directing investments to implement the most cost-effective actions first.

Here, we will demonstrate for a variety of past and potential future actions, the use of an initial, collaboratively-developed winter run life cycle model to estimate gains in annual returns (i.e. the benefits) and a cost model to estimate their respective annualized costs. From these, the effectiveness of each action can be estimated and they can then be ranked by preliminary estimates of the "bang (fish gain) for the buck." Actions considered in this preliminary evaluation include fish screens, the Environmental Water Account, habitat restoration, the Shasta temperature control device, and potential changes in ocean harvest. Ultimately, actions could be packaged to include the most cost-effective actions expected to achieve the goal.

Session Fifteen: 2004 CalSim-II Developments and Applications I

CalSim-II Peer Review of 2003 and the CalSim-III Development Plan Tariq Kadir (CA DWR)

In November 2003, the CALFED Science Program commissioned an external review panel to provide an independent analysis of the strengths and weaknesses of CalSim-II. In April 2004 DWR and BOR held a public workshop in response, and to outline plans for the enhancement of

CalSim-II. A summary of both events and an overview of the CalSim-III 2-year development plan will be presented

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CalSim-III: Key Features and Current Status, Tariq Kadir (CA DWR)

Two key elements in the development of the CalSim-III model are an enhanced representation of the Sacramento and San Joaquin Valley water resources system, and proposed modifications for developing the hydrological input. An overview of both will be presented.

San Joaquin River Water Quality Module Ver1.00 for CalSim-II, Levi Brekke (USBR)

Working with a team of San Joaquin hydrologists and water quality experts, Reclamation has developed a salinity routing module for CalSim--II that relates Vernalis salinity to upstream sources below Lander Avenue. The module improves upon CalSim-II's previous salinity computation because it allows Vernalis salinity to be linked to source contributions above Maze; the previous version did not. Using the Module, CalSim--II can be used for source-specific planning studies on improving lower basin salinity management.

Presentation will focus on the Module development methodology and its effects on CalSim--II results. Module development caps a larger effort to refine CalSim--II's San Joaquin representation. That effort has included (1) Implementation of Eastside land-use based water demands, (2) calibration of Eastside tributary operations, (3) redevelopment of basin accretions/depletions, and (4) disaggregating of Westside return flows into Module source categories. CalSim--II's new San Joaquin representation was developed to reflect present-day basin conditions (i.e. approximately since 1999). This philosophy for hydrology refinement and Module source assumptions produces simulation results at Maze that depart significantly from CalSim--II results using the old San Joaquin representation. Several examples will be highlighted. San Joaquin River Water Quality Module ver1.00 is a first-stage product. Ongoing data collection efforts will require periodic review of Module source assumptions. The Module's framework and calibration procedure has been designed to assimilate new source information.

Common Assumptions: Technical Coordination Team and Plan Formulation Common Model, Robert Leaf (CH2M Hill)

The Department of Water Resources (DWR), the Bureau of Reclamation (Reclamation) and the California Bay Delta Authority (Authority) are conducting Investigations of water management actions included in the 2000 CALFED ROD. Each investigation differs in purposes, partners and interests, policy and technical challenges; but all share some common requirements. The Common Assumptions effort was established by DWR, Reclamation and the Authority to coordinate policy, management and technical efforts associated with the surface storage investigations: 1) the Shasta Lake Water Resources Investigation (SLWRI), 2) the North-of-the-Delta Offstream Storage investigation (NODOS), 3) the In-Delta Storage investigation (IDS), 4) the Enlarged Los Vaqueros investigation (ELV), and 5) the Upper San Joaquin River Basin Storage Investigation (USJRBSI).

This presentation summarizes the past efforts and present strategy of the Common Assumptions process to define, develop, and apply Common Model Packages through: 1) common model codes, 2) common baselines, 3) common analysis protocols, and 4) common reporting metrics. Specifically, the “Plan Formulation” Common Model Package includes the CalSim--II, DSM2, LCPSIM, WTT and other models. The package includes Existing Condition and Future No Action Condition baseline models. The package includes assumptions and the code implementation to simulate the effects of non-surface-storage actions included in the CALFED ROD: 1) Water Transfers, 2) Demand Management, 3) Local Projects, 4) Conjunctive

Use. The Common Assumptions technical team is drawing together technical advances from a variety of projects and model development activities in an effort to maintain a state of the art, defensible set of tools to support the current and future needs of the storage investigations. This is accomplished through: 1) coordination with, 2) support of, and 3) integration with other model development and application efforts of DWR, Reclamation and other agencies. This presentation summarizes these technical advances, including: 1) development of the Water Transfers Tool (WTT), 2) refinement, and restructuring of the CalSim--II model, 3) development of model integration framework and tools, 4) CALFED-action characterization and quantification efforts, 4) integration of hydrology improvements, 5) integration of modules for integrated surface storage investigations.

Session Sixteen: Remote Sensing, LiDAR, and All That Jazz

Use of High Resolution Imagery and Pattern Recognition Software for Moist Soil Plant Mapping in San Joaquin Valley Wetlands Josephine Burns (LBNL)

Seasonal wetlands in the San Joaquin Basin provide essential habitat and food supply for migrating and local bird populations. Any decision support system which might aid seasonal wetland management will require an accurate tool for estimating the areal extent and diversity of plant species. The current study was designed to test the feasibility of using high resolution, multispectral satellite imagery to classify moist soil plants and uplands vegetation in the San Luis National Wildlife Refuge (SLNWR) and the North Grassland Water District (NGWD). QuickBird satellite imagery was collected on three dates in 2004: April 26, May 14, and June 19. Landcover as it appeared on the imagery was classified using a maximum likelihood classifier for the three images. Classification was able to distinguish between a number of notable wetlands and uplands species, and was able to precisely delineate the present boundaries of wetland basins. For seasonal wetlands, multispectral imagery could be used as a cost-effective tool to establish a baseline habitat map which may be used as a reference in assessing potential impacts of salinity management.

Automated Crop Mapping for Water Needs Assessment from LANDSAT Imagery
Michal Koller (USBR)

The development of water resources planning models often requires information concerning the spatial distribution of agricultural crops over some historic time period. The spatial distribution of crops at the field scale is not usually available. However, such information is necessary for the development and calibration of spatially refined models such as ground water and irrigation management simulation models. The goal of this project is to better estimate the spatial distribution of previous cropping patterns by performing historical crop classifications of the agricultural fields in San Joaquin County, California for the period from 1972 to 2000. A set of two LANDSAT images were available annually. Very limited crop survey data (with associated GIS agricultural field border databases) completed for 1988 and 1996 by the California Department of Water Resources was utilized for developing spectral signatures for different crop groups. For testing purposes, a random subset of approximately 8% of the fields, stratified by crop type, was used to develop spectral signatures for a supervised classification applied to the whole dataset. Results from separate spring and summer classifications were merged to create annual crop summaries for each year. Classification accuracies are reported and indicate acceptable results for years with available control data. Applying spectral signatures developed from a control year to image data from other years, results in lower classification accuracies. However, when combined with other non-spatial crop data available from County Agriculture Commissioners Offices, these classifications may still provide useful estimates of the historic spatial distribution of crops.

Delta Bathymetry Mapping with Four Beam ADCPs: Tools, Techniques and Tradeoffs
Aaron Blake (USGS)

During the 2003/2004 winter field season the USGS Bay/Delta Hydrodynamics Group developed BathMapper, a software tool to facilitate rapid, detailed, and intelligent bathymetry mapping with off the shelf ADCP technology. Although originally developed for special studies reconnaissance, BathMapper shows promise for rapidly developing bathymetry grids for hydraulic models. The BathMapper software controls an RDI ADCP, which is capable of making accurate depth measurements along four independent beams several times a second. Because sampling on a regularly spaced grid would be inefficient with this type of technology, the BathMapper software has been optimized to allow the operator to capture key bathymetric features on an irregular survey grid. Utilizing multithreading capabilities built into modern processors, this package performs software timed data acquisition and real-time visualization and navigation. Real time processing and display of ping data and navigation history allows the operator to maintain survey consistency and provides real-time feedback on bathymetric features. The BathMapper package integrates an automated DEM generation module that allows the user to create a regularly spaced bathymetry model from survey data within several minutes of ending data acquisition. This bathymetry model is used to select regions of special interest, based on bathymetric gradient, data spacing, and user input. These interest regions are marked on the navigation screen so they can be filled in during a second acquisition pass. In order to maximize the functionality of this software, protocols for a three stage mapping process have been developed to increase mapping speed and data quality. Finally, modules have been integrated to allow users to create input for major models from survey data, with the goal of same day boat to model turnaround time.

LiDAR Coverage of Delta, Marsh, and Bypass, Gary Darling (CA DWR)

Abstract not available.

Other Bathymetry Data, Storage, and Visualization, Ralph Finch (CA DWR)

Other significant bathymetry data collections exist today and are described briefly. Plans for storage, dissemination, visualization and analysis of all data are explained, and will use BDAT and other systems.

7:00-10:00 p.m.

Session Seventeen: Evening Program

Ecosystem-Based Approaches to Fisheries Management in Chesapeake Bay,
Edward D. Houde (University of Maryland Center for Environmental Science)

In 2000, the NOAA's Chesapeake Bay Office established a Technical Advisory Panel to develop a Chesapeake Bay Fisheries Ecosystem Plan (FEP) that recognizes the importance of key habitats and species interactions. The FEP, which was completed in February 2004, is an umbrella document that sets forth guidelines that must be followed by all future fishery management plans in Chesapeake Bay. Ecosystem-based plans reflect a growing recognition among scientists that a complex web of interacting factors affects the dynamics of every fisheries species. Five plans are currently in the works. They are designed to help managers simultaneously provide maximum sustainable yields for blue crabs, oysters, striped bass, shad and related species, and menhaden.

2005
Annual Meeting
Abstracts

Thursday, March 3, 2005

8:15-10:00 a.m.

Session Eighteen: California Long-Term Modeling Strategic Analysis Framework

See abstract for Session Thirteen. Click here for presentation slides.

10:15 a.m.-12:00 p.m.

Session Nineteen: California Water Plan Update 2005 and Beyond

California Land and Water Use Database and Web Portal Scott Matyac (CA DWR)

California Land & Water Use is both a database and web portal containing information on the water used in various human activities. It covers urban, agricultural, and managed wetlands water use, known collectively as cultural water use. These data are critical to water resources planning studies, evaluation of water management options, and for estimating future water use in California. The data base and web portal represent one of the first products of DWR's collaboration with Advisory Committee members and other stakeholders to develop a statewide analytical approach that is better integrated with local and regional efforts.

Water Portfolios: Coordinating the California Water Plan Update with CalSim
Todd Hillaire (CA DWR)

During the development of the California Water Plan Update 2005, it has become clear that past presentations of data have not clearly described and communicated water conditions in relation to the total hydrologic picture. A critical issue facing water planning is the need for better, more detailed data for use in regional and statewide water analysis. Water Plan staff have worked with the Advisory Committee members to develop improved data methodologies. The results have produced Water Portfolios that track the movement and use of water including water storage, diversion, sectors of use and outflow. The short-term plan is to create a series of annual water portfolios which will provide input for analytical tool analysis of scenarios. The long-term view is to coordinate data development and analysis areas with other water planning and modeling efforts including CalSim.

Quantified Scenarios of 2030 CA Water Demand David Groves (Pardee RAND)

Future demand for water in California is highly uncertain, yet it is a major factor in long-term water resources planning, as water planners develop investment plans and management policies based in part on expectations of future water demand. Uncertainty about demographic

and economic trends, agricultural land use, and water use efficiency, however, make it difficult to predict how much water will be used throughout the state in the future.

This talk will report on a collaborative effort between David Groves of the Pardee RAND Graduate School and Scott Matyac and Tom Hawkins of DWR to quantify and evaluate scenarios of 2030 water demand in California. The authors created a simple model that generates plausible scenarios of urban, agricultural, and environmental water demand under current management practices based upon unique sets of uncertain model parameter values. The authors quantify a large ensemble of plausible scenarios, including the three narrative scenarios of California water demand described in the upcoming California Water Plan Update 2005. These scenarios are then expanded to include additional policy-induced conservation and more aggressive water pricing schemes to illustrate part of the water demand challenge facing California water managers. On-going work includes coupling these scenarios to characterizations of developed and new water supplies in order to identify management policies that are robust to the major uncertain factors affecting water supply and demand.

Beyond California Water Plan Update 2005, Rich Juricich (CA DWR)

This presentation will describe the current efforts underway by the California Department of Water Resources to improve the analytical framework for future Updates of the California Water Plan. During the development of Update 2005 it has become clear that analytical tool and data development has not kept pace with the growing public awareness of the complexity and interaction between water-related issues. The use of scenarios to describe several different plausible futures has emerged as a vital piece of this future work. In addition, a critical issue facing California is the need for better tools and data to produce useful information about and explore relationships between supply reliability, environmental objectives, water quality, economic performance, social equity objectives, and hydrologic uncertainties. Staff is working with technical experts and the Water Plan Advisory Committee to develop both a short-term analytical approach for the next Water Plan Update and a long-term vision.

Session Twenty: Flooding of Upper Jones Tract

Water Quality Assessment of the Jones Tracts Flood

Robert J. DuVall, Richard S. Breuer and Dan Otis (CA DWR)

On June 3rd 2004, an Upper Jones Tract levee breached and in less than two days a 12,000 acre island in the Sacramento-San Joaquin Delta was flooded to an average depth of about 15 feet. Immediate water quality concerns focused on salinity intrusion from the San Francisco Bay. Long-term concerns focused on the eventual pump-off of the island and potential water quality impacts on the nearby drinking water intakes from this island discharge, mostly due to organic carbon leached from the peat soils, but also perhaps pesticides and other constituents. The breach was closed on June 30th and the pump-off started in mid July. The initial pump-out rate was about 800 cubic feet per second (cfs) but as the pump-out progressed, the head differential between the island and the receiving channel increased and by early November this rate was less than 300 cfs. The summer-fall schedule of the pump-out resulted in discharge from the island during a period when the dilution capacity of the Delta was at its lowest due to low Delta outflow and low river inflow. The Municipal Water Quality Investigations Program studied this flooding event and pump-off in order to evaluate potential water quality impacts on Delta water users and the Delta ecosystem. This presentation will provide an overview of the flooding event and the water quality study as well as discuss some preliminary findings.

RMA Flow and Salinity Modeling of the Jones Tract Breach, Filling, and Repair

John DeGeorge (RMA)

On June 3rd, 2004 a levee breach occurred on Upper Jones tract that lead to the filling both Upper and Lower Jones tract, an area over 12,000 acres. The levee breach had immediate and dramatic impacts not only on the flow in the channels near the breach, but throughout the central Delta. Initial filling of Upper and Lower Jones tract consumed approximately 140,000 ac-ft of fresh water, consequently drawing higher salinity water from Suisun Bay towards the central Delta.

The Department of Water Resources called upon RMA to simulate the dynamic impact of the levee breach and subsequent repair period using the RMA Bay Delta Model. RMA had recently developed methodology for simulation of dynamic breach and repair of Delta islands as part of the on-going CALFED Levee Risk Assessment Project. The dynamics of the Upper Jones Tract levee breach modeling included the rapid expansion of the breach over a few hours, initial overland flow and filling of Upper Jones Tract, flow through the railroad trestle subsequent flooding of Lower Jones Tract.

Model simulations were performed within a few days of the breach event with operations estimates though the end of July, comparing without breach, with breach, and with breach and repair cases. Analysis of model results focused on initial salinity intrusion, changes in tidal flows, and the evolution of Delta salinity during and after the repair period.

The Impact of Jones Tract on Urban Drinking Water Supplies: As Simulated by DSM2

Michael Mierzwa (CA DWR)

In response to questions concerning the water quality impacts associated with the flooding of Upper and Lower Jones Tract on June 3rd, 2004, the California Department of Water Resource's Division of Operations and Maintenance (O&M) and Bay-Delta Office used DSM2 to forecast both hydrodynamic and water quality impacts at various Delta water quality locations throughout 2004. These studies and field data collected by DWR's Office of Water Quality Municipal Water Quality Investigations (MWQI) Program were incorporated into the 2004 DSM2 historical update. The algorithm used to simulate increases in organic carbon concentrations due to a flooding peat soil based islands for DWR's Integrated Storage Investigation's In-Delta Storage studies were applied to the flooded Jones Tract. This presentation focuses on the connection between the hydrodynamics associated with Jones Tract and the EC and DOC response at the State Water Project's Clifton Court Forebay as simulated by DSM2. The model results were validated by field data.

1:15-3:00 p.m.

Session Twenty-One: 2004 CalSim-II Developments and Applications II

CalSim-II Model Sensitivity Analysis Study

Hongbing Yin, Shengjun Wu and Messele Ejeta (CA DWR)

The CalSim--II Sensitivity Study was conducted in response to the issues raised in the review of the 2002 “State Water Project Delivery Reliability Report” and the recommendations in the peer review report sponsored by the CALFED Science Program in December 2003. The September 2002 version of CalSim--I Benchmark Study (D1641 step only) at 2001 Level-of-Development is used as the base model in the study. A total of 21 model input parameters are selected for the

sensitivity analysis and 24 model output variables for the results evaluation. Two performance measures: Sensitivity Index and Elasticity Index, are defined and used to quantify the model responses. The preliminary results of the study will be presented.

Water Resource Integrated Modeling System (WRIMS)
Clay Booher, Ryan Wilbur and Tom Pruitt (CA DWR)

The WRIMS software is the second generation CalSim modeling system. This update to the development of WRIMS 2.0 includes replacing all text-based data input with a relational database management system for improved data integrity, modularity and scaling. A new table-based GUI has been developed to view and edit the database contents. A tool has been developed to transfer an existing text-based input files into the database for use with the new software. Additional improvements have been made to the solution procedure in streamlining the multi-step solution procedure, iterative cycle solutions, and pre- and post- MIP state variable evaluations. Extensive testing of the WRIMS 2.0 software is being conducted.

Enhanced ANN Model for CalSim-II Applications Shengjun Wu (CA DWR)

Improving the flow –salinity relationship in CalSim-II modeling is an ongoing effort. At present the Artificial Neural Network (ANN) that is used to predict flow –salinity relationship in the Delta uses Sacramento flow, San Joaquin flow, Delta Exports and Cross channel operations. Preliminary studies show that including boundary tide improves these predictions. Several improvements were also made in the linearization scheme that is currently used in CalSim-II implementation of ANN.

CalSim-II Allocations Module for State Water Project Simulation Ryan Wilbur (CA DWR)

A new model was developed to mimic the allocation procedure used by the State Water Project operations staff and to include it in the CalSim--II simulation model. This model optimizes the project's deliveries over a one-year window on a monthly time step. Extensive cooperation with SWP operations staff allowed very close representation of physical system, regulatory constraints and operations criteria in this new model. Several criteria were reviewed using the combined CalSim--II and CAM models. Various combinations of forecasted system inflows and target reservoir rule-curves were analyzed. DWR staff used these modeling results to modify the SWP operating procedures for the 2005 allocation year.

CalSim-II Hydrological Data Extension of Recent Historical Period
Messele Z. Ejeta (CA DWR)

The Bay-Delta Office of the California Department of Water Resources has been making efforts to extend hydrological data through water year 2003 for CalSim-II study purposes. This extension will allow CalSim-II to simulate 82 years of historical hydrological variability, including the recent historical period when SWP project demands have reached their maximum entitlements. Preliminary analysis for the Sacramento Valley will be presented.

Session Twenty-Two: Modeling and Science Support for the San Joaquin River Dissolved Oxygen TMDL

Oxygen Transfer Model Development and Applications to Designing an Aeration Facility, Steve Seville (Jones & Stokes) and April Gu (HDR Engineering)

One of the solutions identified to contribute to alleviating episodes of low dissolved oxygen concentrations in the San Joaquin River Deep Water Ship Channel (DWSC) is the introduction of oxygen directly to the water column. In order to develop a recommended aeration strategy, many techniques for aeration were explored, and three separate technologies were more thoroughly studied. The aeration devices that were evaluated include U-tube, Speece Cone and Soaker Hose aeration. A mass-transfer mechanistic model was developed that allows simulation and evaluation of oxygen transfer efficiency and capacity for these devices. The model also has capability to simulate oxygen transfer performance with different oxygen sources such as air versus pure oxygen. Nitrogen stripping and special gas trapping phenomena for Speece Cone were incorporated in the model as well. The model was calibrated with full-scale field-testing data to verify the validity of the algorithm and determine parameters used in the model. This oxygen transfer model was then utilized to compare various alternatives and configurations for field deployment. As an implementing agency for the CALFED program, the California Department of Water Resources (DWR) is designing an aeration facility, based in part on the results of the oxygen transfer model, to test the measurable effects of transferring 10,000 lbs/day of dissolved oxygen to the DWSC. The current model will continue to be improved as new data is collected from the DWR test facility.

Testing the Performance of the Port of Stockton (USACE) Aeration Device, Megan Robinson (Jones & Stokes) and Gary Litton (University of Pacific)

The Port of Stockton (Port) recently accepted the operational responsibility of two jet aerators located on the San Joaquin River near the intersection of the Deep Water Ship Channel (DWSC) and the San Joaquin River. To initiate the Port's use of the aerators, extensive field measurements of velocities and dissolved oxygen concentrations in upwelling and flow-away currents were made to determine the performance of the aerator jet facility. A dye study was also performed to evaluate the lateral and longitudinal spreading of aerated water and the increased DO concentrations from the aerators downstream in the DWSC and upstream in the San Joaquin River. In general, the results suggest that the existing aeration facility is capable of supplying oxygen to a relatively long DWSC reach.

San Joaquin River Water Quality Modeling: Upstream through the Deep Water Ship Channel, Andrew J. Thuman (HydroQual, Inc.)

The water quality modeling of the San Joaquin River being completed by HydroQual and Jones & Stokes is focused on the DO problem in the DWSC and investigating the role that upstream water quality has in the overall process. Hydrodynamic and water quality modeling is being completed in the DWSC from Vernalis to Jersey Island (tidal) and also in the upstream part of the river from near Stevinson to Vernalis (free-flowing). The water quality models will analyze the fate and transport of the various nutrients (nitrogen and phosphorus species), BOD, algae, temperature, conductivity and DO.

Evidence for Modeling Nitrification in the San Joaquin River as a Two-Step Process, Gary Litton (University of Pacific)

Severe dissolved oxygen deficits were observed in the San Joaquin River at Stockton during the winters of 2003 and 2004. Batch biochemical oxygen demand and nitrification kinetic studies were performed to identify the cause and elucidate the mechanisms associated with the low dissolved oxygen episodes. Ammonia was the dominant oxygen depleting substance in the water column downstream of the City of Stockton wastewater treatment facility effluent outfall. Kinetic studies indicated that the initial populations of ammonia-oxidizing or nitrite-oxidizing bacteria were important to mathematically describe the conversion of ammonia to nitrite and nitrite to nitrate. A two-step nitrification model of the three nitrogen species and two bacteria populations successfully simulated experimental observations.

3:15-5:00 p.m.

Session Twenty-Three: Restoration Modeling

Battle Creek Restoration Modeling of Flow, Temperature and Fish Abundance, Russ Brown (Jones & Stokes)

Abstract not available.

Salton Sea Restoration Plan: Modeling Issues, Doug Osugi (CA DWR)

The Department of Water Resources and the Department of Fish and Game are preparing a Salton Sea ecosystem restoration study and accompanying programmatic environmental impact report on behalf of the Secretary for Resources, in compliance with legislation enacted in 2003. Analytical tools will be needed to evaluate the Sea's response to expected changes in configuration, inflows, and water quality over a range of alternatives. A preferred alternative will be will be submitted to the Legislature by the end of 2006.

Solutions for Restoring Yosemite's Hetch-Hetchy Valley
Spreck Rosekrans (Environmental Defense)

In 2004, Environmental Defense evaluated the feasibility of draining and restoring Yosemite's Hetch Hetchy Valley, principally by analyzing how to replace the high quality water supplies and hydropower that Hetch Hetchy Reservoir makes possible. The study, *"Paradise Regained: Solutions for Restoring Yosemite's Hetch Hetchy Valley*," provides solutions for continuing to deliver Tuolumne River water to the San Francisco Bay Area without storing it in Yosemite's Hetch Hetchy Valley. Using information and methodology provided by the San Francisco Public Utilities Commission (SFPUC) and the State of California, Environmental Defense created a water-planning model to show how the system could meet present and projected needs for San Francisco and its suburban customers. The water model, Tuolumne River Equivalent Water Supply Simulation (TREWSSIM), shows that existing storage in Eleanor, Cherry and Don Pedro reservoirs could provide San Francisco with full supplies in 4 out of 5 years. In the driest one out of five years, approximately 18 percent of additional supplies would be needed in order to meet water delivery objectives while maintaining sufficient reserves. A new pipe or "intertie" connecting other Tuolumne River Reservoirs to the City's water delivery pipes would be required. The alternatives respect the senior water rights and delivery requirements of the Turlock and Modesto Irrigation Districts. Generation at San Francisco's three hydropower facilities in the Tuolumne Watershed would be reduced by 20-40 percent. The report is available at www.environmentaldefense.org/hetchhetchy.