California Water and Environmental Modeling Forum

2006
Annual Meeting
Abstracts

"Modeling for Integrated Regional Water Management"

February 28-March 2, 2006

Asilomar Conference Grounds
800 Asilomar Boulevard
Pacific Grove, California

California Water and Environmental Modeling Forum
2006 Annual Meeting Summary of Sessions

Tuesday, February 28, 2006

Time	Session	Moderator	Location
10:15 am-12:00 pm	1: Shared Vision Modeling	Rich Juricich	Fred Farr
	2: Delta Hydrodynamics and Modeling	KT Shum	Oak Shelter
12:00-1:00 pm	Lunch	---	Dining Hall
1:15-3:00 pm	3: Improving Quantitative Information for the CA Water Plan	Rich Juricich	Fred Farr
	4: 2005 DSM2 Developments and Applications	P. Nader-Tehrani	Oak Shelter
	5: Real-Time Data Acquisition and Forecasting	Marianne Guerin	Sanderling
3:00-4:00 pm	Registration	---	Social Hall
4:15-6:00 pm	6: CALFED Common Assumptions Modeling	Rob Leaf	Fred Farr
	7: Climate Change Modeling I	Francis Chung	Oak Shelter
	8: North State Integrated Regional Water Management	Dwight Russell	Sanderling
6:00-7:00 pm	Dinner	---	Dining Hall
7:00-10:00 pm	9: Reception I and Poster Session	Mike Deas	Fred Farr
7:45-8:30 pm	Hugo B. Fischer Award/Presentations by Recipients	Nigel Quinn	
8:30-9:30 pm	Keynote Speaker: "Santa Ana Watershed Integrated Regional Water Management," Joe Grindstaff		

Wednesday, March 1, 2006

Time	Session	Moderator	Location
7:30-8:15 am	Breakfast	---	Dining Hall
8:15-9:00 am	10: CWEMF Activities / Annual Business Meeting	KT Shum	Fred Farr
9:00-10:00 am	Review of CWEMF's Peer Review Process		
10:15 am-12:00 pm	11: Recent Advances in Model Integration I	Marianne Guerin	Fred Farr
	12: Climate Change Modeling II	Jamie Anderson	Oak Shelter
	13: Salton Sea Modeling	Armin Munevar	Sanderling
12:00-1:00 pm	Lunch	---	Dining Hall
1:00-2:00 pm	14: Water Community Program Updates	Fred Feyrer	Chapel
2:00-4:15 pm	15: IEP / CWEMF Joint Modeling Session	Steve Slater	Chapel
4:15-5:00 pm	Registration	---	Social Hall
4:15-6:00 pm	16: Temperature Modeling and Applications	Mike Deas	Chapel
	17: Recent Advances in Model Integration II	Tara Smith	Oak Shelter
	18: Southern CA Integrated Resources Planning	Chuching Wang	Sanderling
6:00-7:00 pm	Dinner	---	Dining Hall
6:30-7:00 pm	19: Career Achievement Award/Presentation by Recipient	KT Shum	Dining Hall
7:00-9:00 pm	20: Reception II and Featured Speaker: "Glen Canyon Adaptive Management Program," Ted Melis	IEP Rep	Chapel

Thursday, March 2, 2006

Time	Session	Moderator	Location
7:30-8:15 am	Breakfast	---	Dining Hall
8:15-10:00 am	21: CA Long-Term Modeling SAF – USCOE HEC-WAT	Rob Tull	Oak Shelter
	22: Water Quality Data Assessments	Lisa Holm	Sanderling
10:15 am-12:00 pm	23: 2005 CalSim-II Developments and Applications I	Sushil Arora	Oak Shelter
	24: Flood Control Modeling	John Headlee	Sanderling
12:00-1:00 pm	Lunch / Check-Out	---	Dining Hall
1:15-3:00 pm	25: 2005 CalSim-II Developments and Applications II	Randi Field	Oak Shelter
	26: 2005 IWFM/C2VSIM Enhancements and Applications	Tariq Kadir	Sanderling

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Tuesday, February 28, 2006

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

Session One: Shared Vision Modeling and Modeling for California Water Management

Collaborative approaches that integrate the technical and decision-making components of water resources management are becoming more common. This session will describe the Shared Vision Planning technique developed and applied over the last fifteen years by the Institute for Water Resources. The session is intended to introduce basic concepts of the collaborative planning approach, demonstrate some modeling tools, and suggest implications for California water planning.

Collaborative Modeling for Water Resources Planning - the Shared Vision Planning Approach, Hal Cardwell (USCOE Institute for Water Resources)

Shared Vision Planning (SVP) is a collaborative approach to formulating water management solutions that integrates three disparate practices: 1) traditional water resources planning; 2) structured public participation; and 3) collaborative computer modeling. Modeling under the SVP approach is tailored to the needs of the planning situation and focuses on collaboration and transparency of the tools produced. This talk will provide an overview of SVP, emphasizing how collaboratively developed models support meaningful collaboration in technical analysis and decision-making. Previous SVP studies and models will be mentioned along with similar approaches.

Application of Shared Vision Planning for Lake Ontario Water Regulation, Mark Lorie (USCOE Institute for Water Resources)

The International Joint Commission sponsored a five-year, $20 million study of water levels regulation in the Lake Ontario – St. Lawrence River Basin. The study involved dozens of stakeholders and experts, and millions of dollars of original research on environmental and economic impacts of water levels regulation. SVP was used to integrate these efforts by supporting collaborative plan formulation and evaluation and group decision-making. This presentation will summarize the Lake Ontario study, demonstrate the models used as part of the SVP process, and describe how the models supported collaborative decision-making. The presentation will highlight lessons learned and strategies for overcoming potential challenges.

Using HEC Tools to Support Shared Vision Planning, Beth Faber (USCOE Hydrologic Engineering Center) and Hal Cardwell (USCOE Institute for Water Resources)

Most applications of SVP involve the development of original, customized decision support tools using generic software packages such as STELLA. Yet in many cases a well-established hydrologic or hydraulic model, such as those developed by the Hydrologic Engineering Center, is either already in use and trusted, or is desired by managers for design or for day-to-day operation. Therefore, there is a need for strategies and software to integrate existing water resources-specific models such as HEC-ResSim, HEC-PRM, or others into a collaborative process like SVP. This talk will highlight past experience and future plans for integrating HEC models into an SVP process. Implications for integrating other types of sophisticated models (e.g. QUAL2E, ModSim) into collaborative modeling efforts will be discussed with reference to past and ongoing SVP efforts.

Applying Shared Vision Planning to Identify the Conceptual Design of Water Demands, Rich Juricich (CA DWR)

A significant barrier to reaching agreement about specific computational methods in water planning is an insufficiently developed shared understanding of how the California water management system works, and how it responds to changes. When there is a technical disagreement about a model or parts of a model, we rarely have a productive discussion that leads resolution. Discussions tend to be vague. DWR proposes to use a Shared Vision Planning approach to work with experts and stakeholders and develop a conceptual design of significant factors related to determining water demands in California. A demonstration of how this might be accomplished through the EXTEND software is presented.

Session Two: Delta Hydrodynamics and Modeling

Flow Monitoring in the Sacramento Deep Water Ship Channel, Shawn Mayr (CA DWR)

A method of predicting flow was developed for determining flow leakage into the ship via the boat locks at the upstream end of the Sacramento Deep Water Ship Channel. Established equations were successfully calibrated using five sets of Acoustic Doppler Current Profiler field measurements under varying hydraulic conditions.

Modeling the Big Gulp: What Might Happen if 50 Delta Levee Breaches Occurred Simultaneously, John DeGeorge (RMA)

As part of the initial phase of the CALFED sponsored Delta Levees Risk Assessment, RMA simulated a massive breach event where 50 individual levee breaches occurred on 21 Delta Islands. The modeling exercise included dynamic breaching and initial flooding of the islands through the repair and recovery period for a total simulation period of 2 ½ years. Immediately following the initial flooding and throughout the repair-recovery period, many decisions must be made regarding implementation of emergency barriers, reservoir releases, gate operation, in-Delta pumping, and exports. The system was operated based on experience modeling scenarios with flooding on a small number of islands, and, as it turned out, the operation was probably not optimal. The talk will consider shortcomings of the operational decisions made for the 50-breach simulation and consider options for improved decision making.

Simulations of Periodic Stratification and Dispersive Salt Transport in San Francisco Bay, Edward Gross (Environmental Consultant)

Three-dimensional simulations of circulation in San Francisco Bay were performed with a version of the three-dimensional TRIM3D model which incorporates an accurate scalar transport method and a generalized length scale turbulence closure model. Salinity was estimated during a period of extensive field data collection and the magnitude and duration of predicted stratification during a spring-neap cycle was analyzed. The relative strength of different transport mechanisms was estimated during spring tides and neap tides.

Some Modeling Issues of the Delta, KT Shum (EBMUD)

This presentation will review a number of approximations used in one-dimensional hydrodynamic and transport models of the Delta. Recent field data and numerical experiments are analyzed to examine the effects of an imposed inflow used as upper boundary condition, a gate-type formulation in simulating Delta Cross Channel flow, a uniform stage and salinity assumption on open water surface areas, and other issues.

1:15-3:00 p.m.

Session Three: Improving Quantitative Information for the California Water Plan

Overview: Improving Quantitative Information for the California Water Plan, Rich Juricich (CA DWR)

This presentation describes 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 became 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.

Water Portfolio Refinement and Coordination with WEAP and CALSIM Studies, Todd Hillaire (CA DWR, No. District)

An on-going issue in water planning is the need for better, more detailed data to characterize current use, supplies, and operational conditions in local, regional, and statewide water analysis. The Water Portfolios as presented in the California Water Plan Update 2005 were a starting point for data management, analysis, and presentation. In a continuing effort, the California Department of Water Resources is developing methodologies and conducting pilot studies to improve annual estimates of water supplies and uses for different hydrologic conditions. These methodologies focus on improving the representation of current system operations and conditions and understanding the relationships between supplies, water uses, operations, and hydrologic conditions and their underlying factors to assess future conditions. This presentation will highlight these developments and how they relate to improving the CALSIM model and the application of the WEAP model to the Sacramento Valley.

Rethinking Water Policy Opportunities in Southern California - a Project Update, David Groves (RAND/Evolving Logic) and Robert Wilkinson (UC Santa Barbara)

This presentation reports on progress in developing and implementing a scenario tool to evaluate scenarios of water demand and supply in Southern California. The scenario tool, developed in the Analytica modeling environment, reproduces the supply and demand forecasts presented in the region's 2005 Urban Water Management Plans as reference scenarios. The user may then generate alternative scenarios based on (1) different assumptions about factors affecting future demand and supply and (2) alternative levels of efficiency attainment and local resource development. The initial development of this tool was part of a collaborative effort with the California Department of Water Resources for the California Water Plan Update 2005. To date, the project has focused on increased levels of urban water use efficiency (informed by the recently-released Comprehensive Review study) and more aggressive development of conjunctive groundwater management and municipal water reuse facilities.

Disaggregation of Water Management Detail in a Model of the Sacramento Valley, Brian Joyce and David Purkey (NHI)

An application of the WEAP model to the Sacramento Valley, which included complete integration of hydrologic and water management elements of the system, was applied with two different levels of aggregation of water management activity in the Stone Corral HUC (Glenn and Colusa counties). The more disaggregated version split a single computational unit into 11 sub-units. The logic behind this disaggregation and the implications of the disaggregation on water deliveries and groundwater pumping was investigated and found to be significant. NHI is currently working collaboratively with the California Department of Water Resources to evaluate the use of WEAP to study climate change for the next California Water Plan.

Session Four: 2005 DSM2 Developments and Applications

Modeling of South Delta Gates, Kyle Winslow (CH2M Hill)

The proposed operation of permanent barriers in the South Delta, specifically in Old River, Middle River, and Grant Line Canal, has undergone several iterations. The “Plan C” barrier operations discussed in the SDIP DEIS/EIR document were designed to address both flow and water level concerns in the South Delta. CH2M HILL investigated further refinements to the permanent barriers operation with the express goal of further reducing the projected number of low flow and low water level events in the South Delta. This presentation discussed the results of the analysis.

Adaptive Management of Flow through Three Mile Slough to Improve Delta Water Quality (DSM2 Modeling Experiments), Bijaya Shrestha and Parviz Nader-Tehrani (CA DWR)

One of the major reasons Delta water quality degrades is ocean salt intrusion. This degradation is particularly pronounced during the dry periods when net delta outflow is low. Our talk presents DSM2 modeling experiments illustrating how one can use the adaptive management of flow through Three Mile Slough to reduce the ocean salt intrusion, in effect improving the Delta water quality. We also present some particle tracking runs to demonstrate that the adaptive management of flow through Three Mile Slough has a minimal impact on fisheries.

Sensitivity of the DSM2 Temperature Model to Time Step Size, Hari Rajbhandari (CA DWR)

Computational time steps are an important consideration when conducting temperature simulations. Increasing the time step reduces the amount of time needed to run the simulation, but it also reduces the ability to accurately represent phenomena with diurnal variation. The goal of this analysis is to determine the range of time steps in DSM2-QUAL that could be used for different types of temperature studies without compromising computational stability and hence the accuracy of the results. For example, shorter time steps are usually necessary for the purposes of model calibration and validation whereas larger time steps are useful for screening runs or simulating a long multi-year simulation period.

Validation of DSM2 Volumetric Fingerprints Using Grab Sample Mineral Data, Paul Hutton (MWDSC)

Volumetric fingerprinting is a modeling technique that is useful for understanding the relative importance of source water constituent loading on water quality throughout the Delta. To date, no method has been proposed for validating a modeled fingerprint. The purpose of this talk is to propose a method for indirectly validating DSM2 volumetric fingerprinting using grab sample mineral data such as chloride and sulfate. Preliminary findings and recommendations for future work are presented.

Session Five: Real-Time Data Acquisition and Forecasting

Innovations and Lessons Learned: Real-Time Water Quality Monitoring and Management in Seasonal Wetlands, Nigel Quinn (LLNL / USBR)

Flow and water quality monitoring in ephemeral agricultural drains and seasonal wetland channels can be exceptionally challenging, even for experienced hydrologists. In the past decade we have come to appreciate the value of continuously recorded data and through the use of telemetry - having this data provided in real-time. In this talk I will discuss some examples of these challenges we have faced over the past decade trying to obtain the best possible data - useful for environmental decision support. I will review the state of the art in commercially available sensor technologies and how we are going about deploying sensor networks in ongoing projects.

The DWR Real-Time Data and Forecasting (RTDF) Program, Ted Swift (CA DWR)

The Department of Water Resources together with the State Water Contractors has developed the Real Time Data and Forecasting Program. This Program consists of three parts: 1) field monitoring, 2) modeling and forecasting and 3) data dissemination. RTDF data and information are organized by watersheds and by water quality constituents in a user-friendly format designed to meet the needs of a diverse audience including municipal water quality managers, scientists, and other stakeholders. We will describe these elements and give some examples of how the data products may be used by members of the audience.

RTDF: Real-Time Forecasting of Water Quality with DSM2, Kevin Sun (CA DWR)

Water quality forecasts using DSM2 are based on both HYDRO model results and boundary EC values at several locations in the Delta. Some of those boundary EC values are preset in the DSM2 setup and seldom need to be changed for most forecast studies. Some of them need to be estimated or updated before a specific model run. The closer they are to the actual levels or the better they are estimated the better the forecast would be. This part of presentation will talk about what are those EC boundary conditions, how to update them if needed and how much they will affect the modeling results.

Forecasting Delta Salinity from Outflow, Lucinda Shih (CCWD)

Salinity in the Delta is correlated with net Delta outflow, as demonstrated by the G-Model (Denton and Sullivan, 1993). Contra Costa Water District (CCWD) uses the G-Model to predict near-term salinity at its drinking water intakes. Additional factors influencing Delta salinity not included in the G-Model are precipitation, drainage from local agricultural fields, and upstream reservoir operations. The forecasted salinity is then fed into the CCWD operations model to predict CCWD reservoir filling and releases and, ultimately, delivered water quality.

4:15-6:00 p.m.

Session Six: CALFED Common Assumptions Modeling

Overview and Status of Common Assumptions, Robert Leaf (CH2M Hill)
Future Direction of Common Assumptions, Robert Leaf (CH2M Hill)

The Common Assumptions effort is a concerted effort by the Authority, Reclamation, and the Department to coordinate and implement an evaluation framework to support the common needs of the CALFED Surface Storage investigations. In order to complete the environmental documentation and permitting process each CALFED Surface Storage project team must: 1) Represent CEQA (existing) and NEPA (future) no-action conditions, 2) Characterize likely impacts of the proposed projects and alternatives, and 3) Assess cumulative pacts of the proposed projects with other expected projects. The CALFED ROD framework calls for other Water Management Actions in addition to surface storage, including: 1) Ag and Urban Water Use Efficiency/Conservation, 2) Water Transfers, 3) Conjunctive Use and 4) Other Local Supply options such as Desalination and Recycling. The Common Assumptions process/framework includes: 1) Strategic planning for, and policy and management coordination of, the surface storage investigations and other related CALFED programs, 2) Establishment of common assumptions for Existing, Future No-Action, and Supplemental Future No-Action Condition baselines and Cumulative Condition analyses, including the Characterization and Quantification of other water management actions, and 3) Establishment of a common analytical framework and associated tools and methodologies for integrated hydrologic and economic analysis, including implementation of baselines and cumulative analyses, development and implementation of common reporting metrics for assessing the impacts and benefits of projects, and definition and implementation of modeling protocols and quality control measures. There are three phases in the Common Assumptions workplan. Phase 2, the Plan Formulation phase close to completion. Phase 3, the Feasibility Study phase is underway. This presentation will provide a review and update regarding both phase 2 and 3 of the Common Assumptions effort.

Characterization and Quantification of CALFED Water Management Actions, Brian VanLienden, (CH2M Hill)

The process and results of the characterization and quantification of the water management options identified in the CALFED ROD in order to generate model inputs for use in the Existing, Future No-Action, and Supplemental Future No-Action Conditions. The characterization and quantification process is used to determine the projects and programs that are expected to be in place for each condition using the criteria described and to develop estimated quantities for each water management option. The following water management options are addressed: 1) Ag and Urban Water Use Efficiency/Conservation, 2) Water Transfers, 3) Conjunctive Use and 4) Other Local Supply options such as Desalination and Recycling.

LCPSIM Update for Plan Formulation, Ray Hoagland (CA DWR)

Recent improvements to the DWR Least-Cost Planning Simulation Model, including those resulting from work to integrate the model more closely with CALSIM II and work with a multi-agency Surface Storage Program Common Assumptions workgroup tasked with reviewing the model. Also, next steps.

Session Seven: Climate Change Modeling I

Climate Change Impacts on the State Water Project and Central Valley Project, Dan Easton (CA DWR)

With a warming planet, changes in precipitation patterns are expected. California, dependent on winter snowfall for much of its summer water supply, could be vulnerable to such changes. As such, the California Department of Water Resources wants to consider climate change effects in State Water Project (SWP) and Central Valley Project (CVP) planning studies. In this presentation, some trial CalSim-II climate change studies will be presented. CalSim-II is the benchmark water supply planning model for the SWP and CVP. Four climate scenarios – results of two carbon loading scenarios input into two different global climate models (GCM) – were analyzed. Potential impacts to SWP and CVP water supply will be addressed.

Climate Change Impacts on the Sacramento-San Joaquin Delta, Jamie Anderson (CA DWR)

This talk focuses on potential impacts of climate change on Delta water quality. Reservoir operations and Delta exports for four climate change scenarios were determined using the operations model CalSim-II (see previous abstract). Effects of those modified systems operations on Delta water quality were examined using the Delta Simulation Model 2 (DSM2). Compliance with water quality standards and chloride mass loadings at municipal and industrial intakes are presented. Preliminary results for water quality impacts of a one-foot rise in sea level without any additional operations changes will be discussed.

Flood/Water Supply Forecasting with Climate Change, Michael Anderson (CA DWR)

Observational evidence and climate simulation models indicate that global climate change will cause changes to flood and water supply related hydrology in California. In order to better understand the risks associated with global climate change on California's water resources, it is important to be able to quantify any impacts related to flood frequency statistics and snow pack dynamics. Observed trends over the past 100 years are presented as point of reference to discuss potential future changes over the next century. The implications to forecasting of both the observed trends and expected future changes will then be explored. An improved understanding of the potential future changes and their implications will allow adaptive strategies to be developed and employed.

Climate Change Impacts on Water for Agriculture in California: A Case Study in the Sacramento Valley, Brian Joyce and David Purkey (NHI) and Sebastian Vicuña (UC Berkeley)

Climate change has the potential to change patterns of snow accumulation and snow melt in California, in accordance with which water management infrastructure is operated. Understanding how this infrastructure can be managed in the face of climate change in order to meet the array of vital water management objectives for the system is a critical question. An application of the Water Evaluation and Planning (WEAP) system for the Sacramento River Basin was used to evaluate the impact of four future climate scenarios, and to investigate whether water management adaptation could reduce potential impacts. The four climate scenarios were derived by downscaling the output from two GCMs (Parallel Climate Model and Geophysical Fluid Dynamics Laboratory) run under two emission scenarios (A2 and B1) to a 1/8 degree grid over California. The Sacramento Valley WEAP application sampled these climate fields to provide input to a model of the Sacramento River Basin. The model was applied under two formulations, one where cropping and irrigation management patterns remained fixed over the course of a 100 year simulation and one where cropping and irrigation management patterns evolved over the course of the 21st century along with the climate. Model runs suggest irrigation management adaptation has implications for reservoir storage and the provision of water to the M&I and environment sectors.

Session Eight: North State Integrated Regional Water Management — Or — Are Your Model Input and Results Defensible?

Do You Know What You Are Doing? — Or — Calculating Land Use and Water Balances, Tito Cervantes and Patrick Parsons (CA DWR, No. District)

As water experts become more involved with Integrated Regional Water Planning (IRWM), they are required to use land and water use data. Some of these land and water use datasets are complete and some have questionable accuracy. Good IRWM planning involves the task of producing a viable dataset that accurately documents land and water use using detailed land use surveys. These datasets are extremely valuable for evaluating hydrology and water supply. The datasets also can be used to determine: 1) how project and non-project water is used and re-used and between basins: and 2) the calculation of agricultural, environmental, and urban demands within the study area for a given water year and a given water source. An accurate and accessible statewide collection of these datasets forms the foundation of true integrated regional water management.

Are DWR and DFG Working Together? — Or — Diversion Control to Assist Fishery Recovery Efforts within the Scott and Shasta River Watersheds, John P. Clements and Joe Scott (CA DWR, No. District)

A majority of the water rights to divert surface water from the Scott and Shasta Rivers and their tributaries have been defined by Siskiyou County Superior Court and SWRCB water right determinations. DWR watermasters are currently responsible for enforcing the terms and conditions of several but not all existing water right determinations for the two watersheds. Most of the water right determinations under watermaster service do not provide for any instream flows for the protection of fish and wildlife habitat and allow the water users to dewater the stream below the furthest downstream diversion. During the last 10 years many anadromous fish species that have historically existed within the watersheds have been declared threatened or endangered by State and Federal Agencies. This presentation outlines the coordinated efforts of various local, State and Federal entities to provide detailed stream flow monitoring and water diversion control to assist in the fishery recovery efforts.

What Can You Do With Experience? — Or — Obtaining a 2-Dimensional Hydraulic Modeling Solution Using 1-Dimensional Modeling Techniques, Patricia Huckabay (CA DWR, No. District)

Most detailed hydraulic analysis for FEMA's floodplain mapping studies generally use step-backwater computer models such as HEC-RAS to determine the flood elevations for riverine areas. HEC-RAS performs one-dimensional water surface profile calculations for steady gradually varied flow through natural and manmade channels. Although two-dimensional hydraulic models are available, one-dimensional computer models can still be applied on certain two-dimensional flow situations commonly created by undersized culverts. This presentation offers solution using HEC-RAS for a study where high flows from two independent, but adjacent creeks are impaired by undersized highway culverts.

7:00-10:00 p.m.

Session Nine: Evening Program

7:00-10:00 p.m. Reception I and Poster Session

Please see poster abstracts at the end of this document.

7:45-8:30 p.m. Presentation of the Hugo B. Fischer Award

The CWEMF Hugo B. Fischer Award, which is made in honor of Dr. Hugo B. Fischer's pioneering work on water quality modeling for the Bay-Delta system, recognizes pioneering contribution(s) to the use of modeling for understanding or solving California water problems. More specifically, the award, which was conceived and endowed by Lyle Hoag, retired Executive Director of California Urban Water Agencies and a co-founder of the CWEMF, is given annually for (1) innovative development, refinement, or application of a computer model or (2) significant furtherance of the effective use of models in open forums for planning or regulatory functions that benefit California water stakeholders and decision makers.

Remarks by the Hugo B. Fischer Award Recipients

Dr. Carl Chen Dr. Paul Hutton

8:30-9:30 p.m. CWEMF Keynote Speaker: Joe Grindstaff (California Bay-Delta Authority Director / Former General Manager, Santa Ana Watershed Project Authority)

Santa Ana Watershed Regional Water Management

The Santa Ana Watershed Project Authority (SAWPA) is a regional water agency having responsibility for over 2,650 square miles that includes parts of San Bernardino, Riverside, Los Angeles, and Orange counties. The watershed is home to more than 5 million people. The regional water management efforts to drought-proof the Santa Ana Watershed will be discussed.

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Wednesday, March 1, 2006

8:15-10:00 a.m.

Session Ten: CWEMF Activities / Annual Business Meeting / Peer Review Process Review

The CWEMF will (1) report on 2005 model user groups, peer reviews, technical workshops, and administration activities and (2) hold its Annual Business Meeting.

As part of its mission, the CWEMF orchestrates and manages impartial peer reviews of models. In 2005, the CWEMF, in collaboration with the CALFED Bay-Delta Science Program, conducted a peer review of the new San Joaquin River valley representations in the reservoir operations model, CalSim-II. In previous years, the CWEMF sponsored peer reviews on (1) one-dimensional hydrodynamic and transport models and (2) the integrated groundwater and surface water model, IGSM2. In November 2005, the CWEMF prepared a draft peer review process document, which outlines the steps in the process. The CWEMF will review the peer review process and solicit suggestions for improvement.

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

Session Eleven: Recent Advances in Model Integration I

MIKE SHE – A Generalized Integrated Hydrological Modeling System, Jesper Kjelds (NHI)

MIKE SHE is an integrated hydrologic modeling system that describes the entire land phase of the hydrologic cycle (see www.dhisoftware.com/mikeshe). In the most advanced mode MIKE SHE is a fully distributed, physically based model that solves governing equations for 2D-overland flow, 1D-channel flow (including a wide range of hydraulic structures), 1D-unsaturated zone flow and 3D-groundwater flow. During the past decade MIKE SHE has gradually moved from being a complex research oriented simulation tool towards a true engineering tool. Today MIKE SHE offers sophisticated GUI facilities, GIS integration and a suite of physically based and simplified conceptual simulation modules that may be combined as needed. This approach flexibility makes MIKE SHE a generic and flexible modeling system that can be tailored to simulate almost any hydrologic/hydraulic regime and to almost any modeling scale. Physically based, continuous simulation of surface water and groundwater of complex and controlled hydraulic systems is a relatively new area of application for MIKE SHE. It is clear that a modeling tool such as MIKE SHE appears as an exponent of the most sophisticated integrated modeling approach currently available. The presentation will provide a summary of key-experiences and conclusions from a series of California relevant MIKE SHE applications.

Conceptual Design of CalSim Model Suite (CMS), Hongbing Yin (CA DWR)

DWR Modeling Support Branch proposed the concept of CalSim Model Suite (CMS) for possible uses in the State Water Plan Update process and the state climate change studies. The CMS potentially integrates CalSim-II with various economic models (CVPM, LCPSIM), water quality models (DSM2, ANN), and hydrologic models (SIMETAW, CU, Accretion/ Depletion, CVGSM, NWS RFC Rainfall-Runoff, etc.), which are developed by experts in the respective fields, into a single windows GUI. The CMS is an open system featured "plug-n-play". All models in CMS retain their original capabilities and features and they are "glued" together in series by their corresponding data conversion and transferring modules to be developed. A pilot study integrating CalSim-II, CU, Accretion/Depletion, and CVPM models is under way.

Recent and Ongoing Enhancements to Reclamation's HydroGeoSphere Model, George Matanga (USBR)

Recent advances in numerical algorithms and improved understanding of flow/transport processes have resulted in development of a robust and accurate model known as HydroGeoSphere. This is a comprehensive and fully-integrated physically-based and distributed model that accounts for 3D variably-saturated subsurface and 2D surface (overland/stream flow). In FY 2005, sub-timing and sub-gridding techniques were incorporated into the model to improve its computational efficiency and thereby broaden its utility. The on-going testing of the sub-timing and sub-gridding techniques against field data and conditions will provide a benchmark of the computational efficiency of the model, provide a real-world test case for knowledge and technology transfer to other users, and allow for appropriate and effective planning of possible future model enhancements. Further recent and on-going enhancements of HydroGeoSphere include: planning for linkage of HydroGeoSphere and CalSim models; incorporation of temperature (heat transport) in both surface and subsurface modules; incorporation of parallel processing into the model and application of subbasins in accounting for flow and transport processes in large watersheds. Reclamation is developing a GUI based on C# language and .NET Framework; and applying the model to evaluate effectiveness of the drainage water-reuse system at Red Rock Ranch.

Session Twelve: Climate Change Modeling II

Anticipating Future Climate Change Impacts on California Mountain Hydrology, Ed Maurer (Santa Clara University)

Across the western U.S. significant changes have been detected in both climate and the hydrologic response of watersheds, and the consensus of projections into the future indicate a continuation and intensification of these impacts. While the inevitability of a changing future climate is compelling, resource managers planning for the future are faced with the difficulty of large and often unquantified uncertainties in the degree of future change and the impacts experienced. These differences are due to many factors, including uncertain levels of greenhouse gases (GHGs) in the atmosphere, differing responses of global climate models (GCMs) to the concentrations of these gases, unknown local manifestations of large scale changes simulated by the GCMs, and hydrologic modeling uncertainty. In hydrologic studies of climate change impacts, temperature and precipitation play key roles in driving the future amount and variability of water in a river basin. While projections of these vary considerably between GCMs and GHG concentrations, some changes can be anticipated with relatively high degree of certainty. Recent research results will be discussed to illustrate a method that assesses regional hydrologic impacts for selected California watersheds, examines the levels of uncertainties from different sources, and is an example of an initial step toward providing a probabilistic context for water planners and managers needing to make decisions in the face of these uncertainties.

Extreme Drought and Water Supply Management in California, Jay Lund (UC Davis)

The geological record contains extreme droughts beyond those seen in historical hydrologic records. For California, the geological record contains several extreme droughts the last few thousand years. Two of these droughts are 120-200 years long, with mean annual streamflows between 40% and 60% of the historical mean. This study synthesized a 72-year historical record for a drought of this character, having a mean flow of 40% of the historical record. This hydrologic time series was used as input to the CALVIN economic-engineering optimization model of California's water supply system. The model allows exploration of how California's water management system might respond to such an extreme drought and provides preliminary estimates of economic costs and effects of such a drought on water operations and demands. The overall results show the importance of management flexibility and adaptation in response to extreme stresses on water systems. Results also illustrate the physical ability of extensive, diversified, and highly intertied water systems having heterogeneous economic water demands to economically respond to such extreme stresses. The study provides a different approach to climate change studies, focusing on observed past changes in climate from the geologic record rather than downscaled general circulation model results to provide hydrologic scenarios.

Climate-Change Probabilities, Impact Probabilities, and the Impact-Model Bottleneck, Mike Dettinger (USGS-Scripps)

Projections of climate change in response to increasing greenhouse-gas concentrations are uncertain and likely to remain so for the foreseeable future. As more projections become available to analysts, we are increasingly able to characterize the probabilities of obtaining various levels of climate change in current projections. However, the probabilities of most interest in impact assessments are the probabilities of various levels of climate-change impact, and these probabilities often are difficult to estimate even if the climate-change probabilities are well known. The difficulty arises because, frequently, impact models and assessments are computationally demanding or time consuming of hands-on, human expert analyses, so that severe limits on the numbers of climate-change scenarios for which impacts can be assessed. Several "derived distributions" approach to estimating the probabilities of various impacts from known climate-change probabilities and just a few impact-model simulations will be proposed and illustrated. The prospects for optimally selecting a few climate-change scenarios (from a large available ensemble of climate-change possibilities) that will allow the best estimates of impact probabilities to be made will be discussed and demonstrated for a simple case.

Assessing the Risks of Shifting Climate on Water and Power Operations, Levi Brekke (USBR)

How do we assess the risks of shifting climate on State and Federal water/power operations? Many research groups are projecting future climate changes using different climate models and atmospheric composition assumptions. In response, Reclamation and DWR are teaming on a two-year project to survey an ensemble of climate projections, analyze ensemble impacts, and merge the uncertainty of both into a risk assessment for water and power operations. The risk assessment will frame mitigation analyses on potential strategies for water supply development given future shifts in climate variability. The case study region is the combined CVP/SWP service area. Work-products are expected be (a) risk and mitigation information for Reclamation and DWR, and (b) an assessment methodology that would be transferable Reclamation-wide using area-/region-specific planning models. The presentation will highlight planned contributors, initial progress, and work plan elements to be completed by 9/30/2007.

Session Thirteen: Salton Sea Modeling

Salton Sea Ecosystem Restoration Program, Doug Osugi (CA DWR)

Under the direction of the State Secretary for Resources, the Department of Water Resources and the Department of Fish and Game are preparing an Ecosystem Restoration Study (ERS) and Programmatic Environmental Impact Report (PEIR) for the Salton Sea. The ERS and PEIR were authorized by the State legislature in 2003 and are to be submitted to the legislature by the end of 2006. The purpose of the study is to evaluate alternatives that would include strategies for salinity control, habitat creation and restoration, and different shoreline elevations and surface area configurations. The major technical challenges confronting scientists and engineers under future conditions of declining inflows and increasing salinity at the Sea include hydrogen sulphide releases from a eutrophic deep marine sea component, selenium exposure to human health and wildlife, air quality problems from emissive soils, and designing habitat systems to meet a variety of species requirements. Eight alternatives have been developed for restoring the Salton Sea ecosystem in addition to a No-Action CEQA alternative and a No-Action Variability alternative.

Closed-Basin Hydrologic Modeling with Uncertainty, Armin Munevar (CH2M Hill)

Various restoration alternatives have been proposed for the Salton Sea to control salinity and support habitat. Declining inflows to this closed-basin Sea contribute to increasing salinity and declining water surface elevations. Restoration alternatives have focused on salinity and elevation control and require allocation of water and salt to various project components such as saline habitat, air quality mitigation, partial marine water bodies, and brine sinks. A hydrologic model (SALSA) has been developed to support allocation of water amongst various uses and has been applied to support analysis of alternatives. Due to the long planning horizon for this project (75 years) and considerable uncertainties related to inflows, climate effects, and other factors, a stochastic analysis is being conducted to account for an uncertain future. The results from the hydrologic modeling are used to support subsequent modeling of Sea water quality, exposed playa dust emissions, and human health and eco-system risks.

3-D Temperature and Circulation Modeling for the Salton Sea, Geoff Schladow (UC Davis)

The Salton Sea has been modeled using both a one-dimensional model (DLM) and a three-dimensional model (Si3D), in order to explore the Sea's response to future changes in its size and shape. Results from the 1-D model suggest that reducing the Sea's size will increase the strength of the vertical density stratification, due to the reduction in energy due to wind shear. The 3-D model, which allows for application of a spatially distributed, time-varying wind field, supports this conclusion, but suggests that the effect may be complicated because of vorticity in the regional wind field. The results for both models will be presented, and the effect of uncertainty due to the sparseness of the measured wind forcing will be discussed. The differences in basin scale circulation patterns for the current Sea and a potentially smaller future Sea will be presented.

Stratification-Water Quality Relationships in a Terminal Lake, Kyle Winslow (CH2M Hill)

The Salton Sea is a shallow, hyper-eutrophic lake. Prevailing winds are primarily responsible for circulation and mixing in the lake. Agricultural runoff and optimal growing conditions have led to water quality concerns in the sea. Proposed restoration alternatives will allow for a functional sea smaller than the current sea. The design of proposed restoration alternatives will take into account the resulting water quality of the future sea. The physical shape of the future sea and determination of operational plans can benefit from water quality modeling.

1:00-2:00 p.m.

Session Fourteen: Water Community Program Updates

Welcome and IEP Update, Chuck Armor (CA DFG)

The IEP will summarize its 2005 activities.

CA Water and Environmental Modeling Forum Update, KT Shum (CWEMF Convener/ EBMUD)

The CWEMF will summarize its 2005 activities.

CALFED Science Program Update, Lauren Hastings (CBDA)

The CALFED Science Program will summarize its 2005 activities.

2:40-4:15 p.m.

Session Fifteen: IEP / CWEMF Joint Modeling Session

Three-Dimensional Simulations of Flow in the Vicinity of the Delta Cross Channel, Bassam Younis (UC Davis)

Abstract not available.

Progress on Incorporating Climate Change into Management of California's Water Resources, Francis Chung (CA DWR)

The California Department of Water Resources and the U.S. Bureau of Reclamation have formed a joint Climate Change Work Team to provide qualitative and quantitative information to managers on potential effects and risks of climate change to California's water resources. The mission of the team is to coordinate with other state and federal agencies on the incorporation of climate change science into California's water resources planning and management. The work team has recently completed its first report titled "Progress on Incorporating Climate Change into Management of California's Water Resources." The report provides preliminary analysis on potential impacts of climate change on State Water Project and Central Valley project operations, Delta water quality, flood management, and evapotranspiration. This talk will provide an overview of the team's work plan. Highlights from our recent report will be presented, and future directions to examine probabilities associated with climate change will be emphasized.

San Joaquin River Valley CalSim-II Peer Review, Jay Lund (UC Davis)

The CALFED Science Program and the CWEMF, in collaboration with the U.S. Bureau of Reclamation (USBR), California Department of Water Resources (DWR), California Regional Water Quality Control Board, Central Valley Region (RWQCB-CVR), and the U.S. Environmental Protection Agency (Water Quality Program), cosponsored a technical review of the recent improvements in the simulation of the San Joaquin River Valley in the CalSim II model. The review focused on recent model developments in (1) Eastside hydrology and operations, (2) Eastside water demands and (3) San Joaquin River drainage flow and salinity, and in particular the salinity estimate at Vernalis. The Review Panel consisted of Prof. Jay Lund (University of California at Davis) who served as Chair of the Panel, Les Grober (RWQCB-CVR), Prof. Daene McKinney (University of Texas at Austin), David Ford (David Ford Consulting), and Prof. Tom Harmon (University of California at Merced). The results of the review will be summarized.

Predation Losses of Steelhead in Clifton Court Forebay: Results of 2005/2006 Pilot Studies, Chuck Hanson (Hanson Environmental)

Abstract not available.

South Delta Fish Studies: Do Our Fishes Have Behavioral Problems?, Lenny Grimaldo, (CA DWR)

Abstract not available.

Spatial and Temporal Variation in Life History Traits of Age-0 Splittail in Tributaries of San Francisco Bay, Fred Feyrer (CA DWR)

Splittail exhibits a unique life history strategy among North American cyprinids by making annual spawning migrations from brackish estuarine habitats to inundated freshwater river margins and floodplains. Because existing data suggest that factors associated with upstream spawning and rearing are important for production, we examined life history traits of splittail in river channel, backwater, and floodplain habitats across their distribution in attempt to elucidate factors affecting recruitment of age-0 fish. Through the application of studies on distribution, growth rates, diets, stable isotopes, and otolith microchemistry, we found evidence to suggest that habitat availability may possibly limit the production of age-0 splittail. This finding would conform to that predicted by life history and population regulation theory for a periodic-type species in that protecting spawning and nursery habitat should be a priority for mangers.

4:15-6:00 p.m.

Session Sixteen: Temperature Modeling and Applications

Multi-Objective Optimization of Folsom Reservoir Operation, Randi Field (USBR)

Contemporary reservoir systems often require operators to meet a variety of objectives under uncertain meteorological conditions. Such multi-purpose reservoir requirements and uncertain conditions frequently complicate annual water management decisions. In addition, many reservoir objectives have non-linear relationships and are difficult to implement using traditional optimization techniques. A practical application of multi-objective optimization is developed for Folsom Reservoir near Sacramento, California where flood control, water delivery, hydropower and downstream temperature control are desired. One objective, fishery habitat, is maintained in the summer by regulating river temperatures downstream of Folsom reservoir, potentially at a cost to hydropower generation. In this application, optimal seasonal reservoir release decisions are found using a multi-objective evolutionary algorithm and a one-dimensional reservoir temperature model. A Monte Carlo simulation is also used to analyze uncertain meteorological inputs. Seasonal reservoir release results are examined to evaluate tradeoffs between objectives.

Temperature Modeling for Two Reservoirs in Series on the Mokelumne River, Rachel Simons (EBMUD)

Recent efforts have improved the accuracy of temperature prediction in the two main reservoirs on the Mokelumne River and increased the range of management alternatives that can be analyzed. The East Bay Municipal Utility District's Pardee and Camanche Reservoirs operate in series on the Mokelumne River in Northern California. The Lower Mokelumne River directly below the reservoirs contains habitat for Chinook salmon and steelhead trout, the health of which is influenced by water temperature. The temperature modeling presented provides a quantitative tool to evaluate how changes in reservoirs operations could affect downstream water temperature. The reservoir temperature models were calibrated to within 1 ºC of the historical data for dam release and vertical profiles. This talk will present some of these results and discuss a few of the reservoir management issues this modeling tool will be used to address.

Modeling of Water Temperature and Total Dissolved Gas in the Snake River below the Hells Canyon Dam, Idaho, Jesper Kjelds (DHI)

Management and operation of hydropower dams in order to comply with state standards of temperature and total dissolved gas and at the same time ensure sufficient power production and reservoir storage is by no means a trivial task. Supporting tools combining mathematical river modeling technique and data monitoring are, however, becoming more and more standard in order to obtain a good understanding of the cause relation between reservoir release and downstream impacts. Based on DHI's MIKE river network modeling system such a tool has been developed for the Snake River downstream of the Hells Canyon Dam. Of particular concern is water temperature and total dissolved gasses in relation to salmon and steelhead habitats. With special focus on the forcing functions in terms flow release, spills and exchange with the surroundings the modeling approach and main results are presented. (Contributor: Mads N. Madsen)

Basin Scale Flow and Temperature Modeling in the Klamath River, Oregon and California, Mike Deas (Watercourse Engineering)

A numerical modeling framework was implemented using sub-daily hydrodynamic and temperature models to represent and assess basin-scale flow and thermal conditions in the Klamath Basin from Upper Klamath Lake (River Mile (RM) 254) to the Klamath River estuary (RM 5). The framework consists of river and reservoir models and is configured to assess existing conditions, alternative operations, modified boundary conditions, as well as configurations with selected reservoirs removed. Three aspects of modeling will be briefly discussed: (1) the value of a conceptual model: river and reservoir dynamics, (2) imple-mentation and calibration at the basin scale: river and reservoir models and(3) model application.

Session Seventeen: Recent Advances in Model Integration II

Population Modeling for Delta Smelt, Wim Kimmerer (SFSU)

A new project approved for funding by the CALFED Science Program will develop a suite of modeling tools for investigating population dynamics of the threatened delta smelt. The project is a cooperative effort among four academic institutions to develop three classes of models. Matrix models (Bennett, U.C. Davis) will be used for rapid assessment of the landscape of potential responses of the smelt population to changes, and their likelihood of extinction. Particle tracking models (Monismith, Fong, and Hench, Stanford) will be used to investigate how

the smelt population may respond to flow conditions in the Delta. An individual-based model (Rose, LSU, and Kimmerer) will be developed to build the population response from the summed interactions of the individual fish and investigate the response of the population from a variety of environmental conditions. The models will be linked implicitly and informally; that is, there will be no attempt to link computer programs, but results of each modeling effort will be used to modify inputs to the others. Inputs from agency scientists and stakeholders will be sought at several stages, including an initial workshop in fall of 2006.

Decision Solution Model for the U.S. Fish and Wildlife Service's Water Acquisition Program, Dick Jewell (USFWS) and Allan Highstreet (CH2M Hill) **Warning! This link is 8.4 MB**

The Central Valley Project Improvement Act (CVPIA) mandates that the acquisition of water to further the goal of at least doubling the historical populations of anadromous fish in California's Central Valley. As a result, the Water Acquisition Program (WAP) has to acquire water to augment instream flows on 18 rivers and creeks, benefiting 10 anadromous fish species. The Fish and Wildlife (FWS) retained CH2M HILL to help develop the tools and strategies needed to identify and evaluate, and optimize acquisition alternatives. Using decision science to integrate biology, hydrology, economics, and social values into a collaborative, stakeholder-defined decision framework, the Decisions Solutions Model (DSM) was developed. Criterium DecisionPlus, a decision support software package, is used in the DSM to rank acquisition alternatives based on the stakeholder-determined weighting structure and scores for each alternative. The software uses the Simple Multi-attribute Rating Technique (SMART). The output provides an overall numeric score and a graphical representation of how the alternatives rank against each other.

Procedures for Conjunctive Management Analyses in the Upper Snake River Basin, Leslie Stillwater (USBR)

Applications and procedures developed that conceptually link surface water operation simulation (MODSIM) and groundwater movement simulation (MODFLOW) are used to segregate the influence of historical surface water and groundwater irrigation practice from a period of record water supply data set for the Snake River basin upstream of King Hill in Idaho. Response functions derived are used to adjust the historical "unregulated" streamflow to represent a more "naturalized" streamflow condition. These response functions can be used to compute the influence on future streamflow from various alternative irrigation development and practice.

Session Eighteen: Southern California Integrated Resources Planning

City of Los Angeles Water and Wastewater IRP, Adel Hagekhalil (LA Dept. of Public Works)

The Integrated Resources Plan (IRP) is a visionary process for stakeholder-based integrated water resources planning for the entire City. The IRP incorporates the values of Los Angeles communities into infrastructure planning and integrates planning for the three interdependent water systems: wastewater, recycled water and stormwater. By realizing the relationships among these interdependent water resources and planning on a watershed basis, the community and the environment can get the highest benefit for the least overall cost with the least impact to our communities. Over 100 community leaders have joined the City in planning the future of wastewater, recycled water and urban runoff management in Los Angeles. After an intensive 3-year process that was built on the stakeholder preferences, 21 initial alternatives were narrowed down to 4 alternatives. These alternatives will meet the wastewater infrastructure needs of the population of 2020, which is expected to increase by 20% over today. The alternatives will also maximize the beneficial reuse of recycled water and urban runoff, optimize the use of our existing facilities and water resources, reduce pollution, and minimize our dependency on imported water.

MWD's IRP Update and Water Quality IRP, Lynda Smith and Chuching Wang (MWDSC)

Metropolitan Water District of Southern California (MWD) staff have developed integrated modeling approaches over the years to evaluate water supply alternatives and water quality improvement alternatives. These modeling approaches have been used to evaluate integrated water resources strategies that include both imported water supplies and local water resource development, and to evaluate integrated alternatives for water quality improvement that consider both potential CALFED/Delta water quality actions and local water quality actions. The presentation will include review of MWD's 2004 Integrated Water Resources Plan Update, and the water quality conditions that affect potential reliability of water supply options. MWD's ongoing Water Quality IRP studies will then be discussed, including the analytical approach used in these studies and the methods used to compare benefits of different integrated strategies for water quality improvement. This analysis will provide information to support decision-making regarding water quality investments for the region.

Innovative Water Conservation, Tim Blair (MWDSC)

Abstract not available.

6:30-7:00 p.m.

Session Nineteen: Career Achievement Award and Remarks by Recipient

Presentation of the Career Achievement Award

The CWEMF 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. More specifically, the CWEMF Career Achievement Award recognizes sustained and significant contributions that (1) increase the usefulness of models in water management analyses in California, (2) promote sound quantitative analyses in water management decisions and (3) raise public awareness and improving public acceptance of the role of modeling.

Remarks by the Career Achievement Award Recipient

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

7:00-9:00 p.m.

Session Twenty: Reception and Featured Speaker

Featured Speaker - Ted Melis (Acting Chief of the USGS Grand Canyon Research and Monitoring Center): Glen Canyon Adaptive Management Program

Section 1802 of the Grand Canyon Protection Act directed the Secretary to establish and implement long-term monitoring programs and activities to ensure the Glen Canyon Dam is operated "... in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use." The Glen Canyon Adaptive Management Program will be described.

2006
Annual Meeting
Abstracts

Thursday, March 2, 2006

8:15-10:00 a.m.

Session Twenty-One: California's Long-Term Modeling Strategic Analysis Framework – USCOE's Watershed Analysis Tool (HEC-WAT)

Overview of the CWEMF's Strategic Analysis Framework Process, Rob Tull (CH2M Hill)

This session builds on the concepts outlined in the CWEMF report "Strategic Analysis Framework for Managing Water in California" released in September of 2005. The underlying theme is that the development of databases and models, etc. to meet our future analytical needs (ten years or so in the future) requires a strategic analysis framework (SAF) to guide the development of new tools to address future water management issues. The development and application of the Corps Watershed Analysis Tool provides a good example of the type of broad model application and integration capability that is needed as the basis for the development and refinement of tools to address future water management challenges in California.

Model Integration and Coordination with the Watershed Analysis Tool (HEC-WAT), William J. Charley (USCOE Hydrologic Engineering Center)

The U.S. Army Corps of Engineers conducts watershed and water resources management studies. In many cases, hydrologic, hydraulic, economic, environmental, and social impact analyses are performed independently and the reporting and visualization of modeling results is not coordinated. For a project study, model integration, coordination, data and file sharing, reporting of modeling results, and status reporting are often a problem for the modeling and project management teams. To address this issue, the Corps' Hydrologic Engineering Center (HEC) is developing the Watershed Analysis Tool (HEC-WAT or the WAT). The WAT is an interface designed to streamline and integrate the planning process using software commonly applied by multi-disciplinary teams. HEC-WAT will help perform comprehensive watershed scale studies by creating procedures and capabilities that allow integrated modeling using risk analysis. The tool would improve coordination and communication across Project Delivery Teams (PDT) thus encouraging a team approach. HEC WAT will streamline the analytical process, while producing more consistent results, and shared displays.

HEC-Watershed Analysis Tool: Development of a Common Watershed Schematic and Plug-in Application Architecture, John DeGeorge (RMA)

The U.S. Army Corps of Engineers Hydrologic Engineering Center is leading the effort to construct a new tool for integrated watershed modeling in a planning context. The Watershed Analysis Tool (HEC-WAT) will provide a framework for managing alternatives analysis involving multiple computational models. A central component of the WAT is the common watershed schematic which provides a geo-referenced data layer identifying important physical features that must be represented in each individual computational model. Another important characteristic of the WAT is its use of a "plug-in" application architecture, which permits integration of new computational models without requiring changes to the WAT application code. This talk will address the design strategy and some of the implementation details of the WAT's common watershed schematic and plug-in architecture.

Open Discussion, All

The session participants will discussion the next steps in the CWEMF's Strategic Analysis Framework process, including those specified in the SAF report's "Proposed Road Map" section.

Session Twenty-Two: Water Quality Data Assessments

Organic Carbon Sources in the Central Valley: What We Know and What We Don't Know, Elaine Archibald (Archibald & Wallberg Consultants)

The Sacramento River and San Joaquin River watersheds and the Sacramento-San Joaquin Delta provide drinking water for over two thirds of the people in California. The Sierra tributaries to the Sacramento and San Joaquin rivers are high quality sources of drinking water. As the water flows out of the foothills and into the valley, pollutants from a variety of urban, industrial, agricultural and natural sources affect the quality of the water. Narrative water quality objectives for the Sacramento and San Joaquin rivers are specified in the Water Quality Control Plan for the Sacramento and San Joaquin rivers (Basin Plan) to protect human health. However, numeric water quality objectives are not in place for a number of pollutants that may adversely affect drinking water supplies such as organic carbon, nutrients, and specific pathogens. The Central Valley Drinking Water Policy Development Project is leading a technical and administrative process to establish either numeric or modified narrative objectives for drinking water constituents as elements of an overall drinking water policy for the Central Valley. New or modified objectives must be adopted by the Regional Board in a Basin Plan amendment, in compliance with the California Water Code, which requires consideration of various factors, including the means by which the objectives can be attained, economic impacts of obtaining the objectives. One product of this project is a preliminary conceptual model of the sources, behavior, fate, transport and effect of organic carbon in the Delta and its tributaries. This presentation will discuss the development of this conceptual model.

The National Water Quality Assessment (NAWQA) Program of the U.S. Geological Survey: Changes in Direction and Focus for the Second Decade of Investigations, Joe Domagalski (USGS)

The National Water Quality Assessment (NAWQA) Program of the U.S. Geological Survey began in 1990 with the task of describing the status of and trends in the water quality of the United States. Cycle 1 of NAWQA, a ten-year effort, produced numerous reports for individual basins, as well as summary reports for each of approximately 50 basins that summarized the major water quality issues affecting surface and ground water as well as the status of aquatic ecology. In addition, synthesis papers were produced that compared water quality for

pesticides, nutrients, and volatile organic chemicals, in both surface and ground water, and aquatic ecology on a national scale. Water quality data could be compared to National and State standards to determine the effectiveness of the Clean Water Act and Safe Drinking Water Act for protecting aquatic resources. Cycle 2 of NAWQA began in 2001 with a new direction for the program. Many of the stream locations sampled in Cycle 1 were discontinued, but a new focus of the Status and Trends portion of NAWQA focuses on regional synthesis of data. A major new focus is directed research studies, referred to as topical studies, which are designed to better understand the causes of specific water quality problems and to help guide management efforts at local to national scales. Five so-called topical studies are in progress. These are Agricultural Chemicals Transport (ACT), Nutrient Enrichment of Streams, Transport of Anthropogenic and Natural Contaminants to Water Supply Wells (TANC), Mercury Bioaccumulation, and the Effects of Urbanization on Stream Ecosystems (EUSE). Individual study units are chosen for participation on a topical study on the basis of how well the national protocol of the topical study can be implemented, and the importance of the particular contaminants or topic to the watershed. Two such studies are in progress within the San Joaquin Valley: the ACT and TANC studies. The Sacramento River Basin was selected to participate in the EUSE study, and the Sacramento metropolitan region will be the site location. Activities for the EUSE study will begin later this year. An example of the implementation of the ACT study in the San Joaquin Valley will be presented in detail.

Use of Statewide Probabilistic Surveys to Evaluate Stream Condition, Emilie Reyes (SWRCB)

Although a vast amount of good science has been applied to improving water quality in California over the last 30 years, we still can not answer some basic questions about the condition of California water bodies (e.g., “what proportion of CA streams are in least disturbed and most disturbed conditions”; “is stream condition improving?”; “what are the relative risks of different stressors to biotic assemblages”). Statewide surveys based on a probabilistic survey design (in which each sampling location represents a known length of stream with known statistical confidence) permit the inference of stream conditions for large geographic regions with a relatively small investment in sampling. Thus, they offer a statistically defensible mechanism for addressing key statewide condition questions.

The EPA’s Western Environmental Monitoring and Assessment Program (EMAP) surveyed approximately 200 sites throughout California between 2000 and 2004 using a probabilistic survey design. Target sites were sampled for benthic macroinvertebrates (BMIs), fish, algae and a suite of riparian condition measures, and instream physical and chemical characteristics. BMIs were identified to species level and a newly developed predictive model (River Invertebrate Prediction and Classification System, RIVPACS) was used to score sites for biotic condition based on the BMI assemblages. Data from probabilistic survey designs can also be used to estimate the extent of stream length associated with various stressors and can be used to calculate relative risk assessments for these stressors. The probabilistic survey approach provides an objective view of stream quality throughout California that cannot be obtained by non-statistical methods, and helps provide a logical foundation for water quality monitoring.

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

Session Twenty-Three: 2005 CalSim-II Developments and Applications I

Enhancements to CalSim Representation of the Colusa Basin and Sacramento River from Red Bluff to Wilkins Slough, Walter Bourez (MBK Engineers)

CalSim has historically contained a vary course representation of the Colusa Basin, minimal representation of Stony Creek, a depiction of the Sacramento River that is inadequate to evaluate NODOS operations at a level of detail required for analysis. The intent of this work effort is to improve the depiction of the Sacramento Basin that influences, or is influenced by, potential NODOS operations. Improvements mainly focus on the Colusa Basin, Key Sacramento River flows, and Stony Creek. The work effort included the following tasks: (1) revise model schematic, (2) incorporate revised schematic into CalSim, (3) revise depiction of agricultural demands, (4) validate demands and diversions using recent historical data, (5) revise accretions in Colusa Basin, (6) revise representation of refuge operation, (7) validate model simulation and (8) documentation.

Automated Weight Generation Procedure for CalSim-II, Ines Ferreira (UC Davis)

Like most newer water supply simulation models, CalSim-II employs optimization methods to allocate water and operations according to fixed operational priorities for each time-step. For extensive complex networks with return flows, loops arising from pumping, and proportional delivery reductions for equal-priority deliveries, the assignment of unit weights can be a matter of some art and controversy. A generalized method is developed and implemented for automate assignment of units weights to guarantee priority-preserving behavior for network flow and linear programming-based simulation models. The method is developed for and applied to the CalSim-II model of California's State and Federal water supply projects.

Updated Artificial Neural Network Development for CalSim-II, Shengjun Wu (CA DWR)

ANN is used in CalSim-II for simulating salinities at the various control locations in the Sacramento-San Joaquin Delta. It is trained to mimic the function of DSM2. It needs to be updated when an unseen input change occurs in the system or when DSM2 changes. During 2005 ANN was updated twice; first for OCAP base study assumptions and then Common Assumptions base study assumptions. More validation analyses were performed for the proposed 2005 ANN. Some of the findings on validation of the proposed 2005 ANN on historical EC at Rock Slough (1991-2002) will be presented; as well as status of ongoing 2006 ANN development will also be discussed.

DETAW: A SIMETAW-Based Model to Estimate Consumptive Water Demands in the Sacramento – San Joaquin Delta, Tariq Kadir (CA DWR), Richard Snyder (UC Davis) and Morteza Orang (CA DWR)

The Delta ETAW (DETAW) model was developed using DPLA's SIMETAW model. DETAW calculates daily unit consumptive water demands for each DICU model subregion (as used in Delta Simulation Model DSM2) for the period 1922-2003. Volumetric consumptive water demands are also computed using current level GIS-based land use data. The water demands are aggregated for Delta Lowlands and Delta Uplands for use in the CalSim model.

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

The Bay-Delta Office of the California Department of Water Resources has recently completed the extension of hydrological data through water year 2003 for CalSim-II study purposes. The data allows CalSim-II to simulate 82 years of historical hydrological variability, including the recent historical period when SWP project demands have reached their maximum entitlements. The extended data is being used for Common Assumptions studies. Comparison of the trends in the various hydrological data of the extended period against the previous 73-year historical period will be presented.

Session Twenty-Four: Flood Control Modeling

Real-Time Flood Control Modeling With CWMS, the Corps Water Management System, William Charley (USCOE)

The Corps Water Management System (CWMS) is a decision support system for real time water control operations. The system retrieves stores and displays data from field sensors. Observed precipitation and flows are used with future precipitation estimates to model and evaluate potential operation plans for reservoirs and other control structures, and view and compare hydraulic and economic impacts for various "what if?" scenarios.

Where, When and How High Modeling by DWR's Division of Flood Management, Michael Anderson (CA DWR) **Warning! This link is 6.5 MB**

The California Department of Water Resources Division of Flood Management (DWR-DFM) forecasts river stages throughout the state of and forecasts tides in the Sacramento-San Joaquin Delta. During flood events DWR-DFM works with the National Weather Service River Forecast Center (NWS RFC) Sacramento Office to provide river stage forecasts with guidance out to 5 days. This information is posted on the California Data Exchange Center (CDEC) web site and on the NWS RFC web site. In addition, high and low tides at 4 locations in the Delta are forecast with corrections for pressure, winds, and flows. During flood events, this information is updated every 6 hours. This presentation discusses the forecast process, models, and products used by DWR-DFM during a flood event. In addition to the forecasting work, DWR-DFM is in the process of updating Bulletin 195, which provides intensity duration frequency design curves for locations throughout the state of California. Work to date on this product will be shown and plans for future work will be discussed.

Salinity Impacts Resulting from Multiple, Seismically- Induced Levee Failures, Sergio Guillen (CA DWR)

This presentation covers the preliminary modeling work on seismic risk to Sacramento-San Joaquin Delta levees and the resulting water quality consequences to the State Water Project and Central Valley Project assets due to multiple levee breaks. Early results have shown the vulnerability of the Delta to Catastrophic levee failure and its damaging effects on the State's economy.

1:15-3:00 p.m.

Session Twenty-Five: 2005 CalSim-II Developments and Applications II

The CalSim Roadmap, Lloyd Peterson (USBR)

CalSim development covers the software and application of the software. The software is known as the Water Resources Integrated Modeling System software (WRIMS). CalSim-II is the currently used, jointly developed application used to simulate the operation of the Central Valley Project (CVP) and State Water Project (SWP). A CalSim-III application is now under joint development. The CalSim Roadmap, or development plan, addresses both the software and the application. CalSim roadmap will improve development efficiency through the exchange of ideas, information, skills and technique, and through the identification of areas of collaboration and technical endeavors of mutual interest of the model. The following three questions were raised regarding roadmap development: (1) where have we been, (2) where are we now, and (3) where do we want to be in 3 years?

Previous joint coordination efforts between Reclamation and DWR prior to August 2004 indicate "where we have been." The range of tasks covered in this stage include land use hydrology development for the San Joaquin Valley, extended geographic modeling scope, real-time operation, hydropower, groundwater, data/data management system, software, and administrative involvement (peer review, training and education), etc. With regard to "where are we now" and "where do we want to be in three years" relies not only on the aspect of collaboration and mutual interest of both agencies, but also depends on the functions of the joint agreement. Roadmap development tasks include but not limit to: (1) Sacramento Valley hydrologic/operational restructuring and modified hydrology development process (CalSim-III), (2) data inventory and documentation (data/data management), (3) water demand, (4) documentation system & protocol (system documentation), (5) Groundwater representation and response functions, (6) Reclamation Response to CWEMF Peer Review on CalSim-II SJR Improvement and (7) CalSim-II application using a software (WRIMS 2.0). The California Department of Water Resources and Reclamation are collaborating in CalSim development as outlined in the Roadmap.

Sensitivity and Uncertainty Analysis of the CalSim-II San Joaquin River Representation, Levi Brekke and Nancy Parker (USBR)

A two-stage error analysis is being conducted on an updated San Joaquin River (SJR) representation in CALSIM II. The updates involve representation of Eastside San Joaquin water demands, hydrology, tributary operations, and salt-mass routing in the SJR. The first-stage is a sensitivity analysis to provide information for strategizing model improvements, and for framing the second-stage. The work involves a batch of simulations to evaluate output response to adjustment of parameters or input data, one adjustment per simulation. The results indicate relative reaction of output data to changes in various inputs, and also a set of "most influential inputs" to evaluate in the second analysis stage. The second stage is an uncertainty analysis to provide information to CALSIM II users on how to interpret SJR model output given the uncertainties of updated SJR model inputs. The work involves a Monte Carlo batch of simulations, with each simulation involving a unique randomly perturbed realization of the "most influential inputs" set. The analysis requires a large number of simulations, automated data handling, use of the SJR Standalone Model currently embedded in CALSIM II, and use of the software's multistudy runner. Planned methods will be discussed.

A Daily Time-Step Planning and Operations Model of the American River Watershed, Brian Van Lienden (CH2M Hill)

On behalf of the U.S. Bureau of Reclamation, CH2M Hill is developing a daily CALSIM model of the American River system upstream and downstream of Folsom Dam. The model uses daily inflows to simulate the upstream water projects in sufficient detail to help understand how daily flows enter Folsom as well as simulating Folsom Lake and Lower American River system operations. The project includes the development of a new historical daily hydrology that has been computed using historical data from the USGS and from each water agency managing a project in the basin. Once developed, this model will provide a flexible foundation for subsequent development of potential future modeling applications such as assessing current and future CVP operations of the American River system, climate change scenarios, assistance with weekly operations forecasts and with lower American River temperature forecasts, and hydropower analyses.

Water Resources Integrated Modeling System (WRIMS) Status, Ryan Wilbur (CA DWR)

The Water Resources Integrated Modeling System software version 2.0 development was presented at last year's meeting. A status update of the modeling is presented.

Session Twenty-Six: 2005 IWFM and C2VSIM (formerly IGSM2 and CVGSM2) Enhancements and Applications

Updates on IWFM Enhancements, C2VSIM Calibration, and Their Use in CalSim-III, Tariq Kadir (CA DWR)

A brief summary on the enhancements to the Integrated Water Flow Model IWFM (formerly IGSM2), calibration status of the California Central Valley Simulation Model C2VSIM (formerly CVGSM2), and their planned use in the development of CalSim-III and other applications.

A GIS-Based GUI for IWFM, Tom Heinzer and Diane Williams (USBR)

DWR has retained the Michael Thomas Group, Inc. to develop a Graphical User Interface (GUI) to run IWFM (formerly IGSM2) applications. The GUI uses ESRI's ArcGIS v9.1 and is currently tailored for C2VSIM (formerly known as CVGSM2). Key features of the GUI using the C2VSIM application will be demonstrated.

Update on C2VSIM Calibration Effort, Dan Wendell, Steve Shultz, Peter Lawson (CH2M Hill)

DWR has retained CH2M Hill to assist in revising and recalibrating DWR's C2VSIM model of the Central Valley, which is an application of DWR's Integrated Water Flow Model (IWFM). The calibrated model will be used to develop the hydrology and emulated ground water models in CalSim-III. The model can also be used to assess hydrologic and economic issues of water management programs such as CALFED's North-of-Delta-Offstream Storage (NODOS) investigation program, Sacramento Valley Water Management Program, and potentially provide boundary conditions for localized ground water models.

Integration of Groundwater Unit Response Functions into CalSim-II, David Purkey, Brian Joyce and Chuck Young (NHI)

The Natural Heritage Institute has modified the representation of Sacramento Valley groundwater in the CalSim-II planning model. The approach implemented in this work employs a unit response function methodology that links CalSim-II to a physically based model of the Central Valley groundwater system (CVGSM), in a manner similar to the linkage of CalSim-II to the physically based hydraulic model of the Delta (DSM2) through the use of the ANN. This direct linkage between models also permits for a representation in CalSim-II of groundwater impacts that are commensurate with the spatial discretization of the distributed groundwater flow model. CalSim-II can then begin to represent site-specific impacts on the groundwater system in a manner that will enable the model to consider the cumulative impacts of local water management projects employing recharge basins and extraction wells, such as Phase 8 and the Sacramento Valley groundwater management programs, on groundwater elevations or stream flows at specific locations along the river.