

Russ T. Brown, Ph.D.
ICF International Technical Director- Hydrology and Water Quality

Education

Ph.D. Civil Engineering and Water Resources, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1978.

M.S. Ocean Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1974.

B.S. Civil and Environmental Engineering, University of California, Irvine, 1972.

Professional Memberships

California Water and Environmental Modeling Forum

Russ Brown's expertise includes delta hydrodynamics, water quality, aquatic habitat and transport evaluations, water resources operations and planning models, reservoir and river temperature and water quality modeling, chemical transport and fate modeling, watershed erosion and sediment transport processes, nonpoint source pollution controls, water quality sampling designs, water resource problem solving, and effluent discharge and mixing systems. He contributes to projects requiring delta, reservoir, river, watershed erosion, sediment transport, hydrologic, and pollutant fate modeling. Russ develops simulation models to integrate and interpret hydrologic, water quality, and ecological data for environmental assessments. He uses biological criteria to develop flow, temperature, dissolved oxygen, and nutrient models appropriate for predicting biological impacts under alternative project operations; plans water quality sampling, monitoring, and modeling efforts for projects; and evaluates existing water quality and hydrologic data for relationships useful for predicting project impacts.

Project Experience

Delta Hydrodynamics and Water Quality. Prepared hydrologic, hydrodynamic, and water quality impact assessment of the proposed Sacramento–San Joaquin River Delta (Delta) Wetlands In-Delta Storage Project for the State Water Resources Control Board (SWRCB) and the U.S. Army Corps of Engineers. Utilized the Resources Management Associates hydrodynamic Delta model to provide detailed summary of Delta flow and salinity conditions. Developed a spreadsheet model (DeltaSOS) to investigate the effects of alternative Delta water quality standards on Delta channel flows and exports with historic or simulated hydrologic conditions. Conducted experiments to determine the contribution of dissolved organic carbon (DOC) from Delta peat soil and vegetation. Evaluated data from the Department of Water Resources' municipal water quality investigations samples of Delta agricultural drainage and channel water and developed a monthly Delta agricultural drainage water quality model that links the water, salinity, and DOC concentrations. Evaluated the effects of proposed Mountain House wastewater effluent in south Delta channels. Reviewed and summarized historical water quality data from the Stockton Deepwater Ship Channel for the City of Stockton.

Prepared the water supply, Delta tidal hydraulics, and water quality existing conditions descriptions and impact assessments for the DWR South Delta Improvements Program that includes tidal gates for water

level control and fish migration protection. Utilized CALSIM and DSM2 model results to provide accurate evaluations of natural and modified tidal conditions in the Delta.

Water Temperature Modeling. Applied a daily two-dimensional reservoir flow and temperature model (BETTER) to the Lewiston Reservoir on the Trinity River and Lake McClure on the Merced River for evaluating effects of release temperatures on downstream river temperatures. Developed and applied an hourly river temperature model (STREAM) for fisheries evaluations on the Owens River, Putah Creek, Merced River, and Guadalupe River. Each application was calibrated with measured temperatures and used to demonstrate effects of various flow and reservoir management alternatives. The Putah Creek and Guadalupe River applications investigated the effects of riparian vegetation and low-flow pools on water temperatures. The JSATEMP model has been peer-reviewed by the Corps Waterways Experiment Station for application on the Guadalupe River downtown flood control project. The Guadalupe River model was extended to include Alviso Slough and tidal flow effects on temperature and salinity.

Developed and applied a reservoir temperature and water quality model for Olivenhain Reservoir to help San Diego County Water Authority design the selective withdrawal facilities. Thermal stratification as well as salinity gradients that may control mixing in the reservoir were evaluated. Used the CE-QUAL-R2 model to evaluate the stratified reservoir water quality (temperature and dissolved oxygen) of Lake Almanor for PG&E and of San Luis Reservoir for the Santa Clara Valley Water District.

Developed a daily water temperature model of the San Joaquin River from Friant Dam to the Merced River. Applied this daily flow and hourly water temperature model for evaluating restoration actions using chinook salmon and steelhead temperature criteria and habitat assessment calculations.

Water Quality Assessment. Prepared water quality assessment for SWRCB revisions to the City of Los Angeles diversions from Mono Lake tributary streams, including the effects on Crowley Lake nutrients and arsenic concentrations at the city's drinking water treatment plant. Developed a model for the assessment of the fate of nutrients and metals in the constructed wetlands at the Sacramento Regional Wastewater Treatment Plant. Developed models to assess the transport and fate of sediment and mercury in the Holston River, Virginia, that included daily rainfall-runoff, sediment transport, and mercury partitioning calculations.

Participated in special studies of the Stockton Deep Water Ship Channel (DWSC) to determine the sources and causes of low DO concentrations for the SJR DO TMDL stakeholder process. Assisted the City of Stockton in evaluating these data and conducted two CALFED-sponsored research evaluations of the tidal exchange near Turner Cut and the potential for aeration and oxygenation of the DWSC to improve DO concentrations during the summer and fall. Assisted in the design and operational testing of the DWR Aeration Demonstration Facility (i.e., U-tube oxygenation device with diffuser) to increase the dissolved oxygen concentrations in the DWSC.

Prepared a summary and review of historical daily suspended-sediment data collected in the 1930s and 1960s by the Tennessee Valley Authority. Prepared files for the USGS database and compared the daily patterns of sediment concentrations during storm flows from the 15 watersheds with at least 3-years of daily flow and sediment data.

Hydrological and Ecological Modeling. Prepared habitat water quality evaluation for U.S. Bureau of Reclamation's Central Valley Project Improvement Act programmatic environmental impact statement (EIS) that linked reservoir and Delta operations and associated temperature and salinity conditions that govern habitat water quality fish responses. Developed life-stage model of Mono Lake alkaline fly population (POPFLY) to evaluate the effects of larval substrate and salinity changes from various lake elevations. Developed Delta transport and entrainment model (DeltaMOVE) for assessment of impacts to larval and juvenile fish life-stages resulting from Delta flows and export pumping operations and applied this model to evaluate effects of Pacific Gas and Electric's Delta power plant and Delta Wetlands operations. Assisted in the selection of appropriate hydrologic, water quality, and ecological assessment tools for the CALFED Bay-Delta Program Programmatic EIS/environmental impact report (EIR). Developed a daily model of alternative PG&E operations of Lake Almanor and the North Fork Feather River hydroelectric facilities to support a water right application by Plumas County for increased fish flows.

Developed a daily model of Delta exports and San Luis Reservoir operations for use in interactive simulation (i.e., gaming) of export restrictions to protect endangered fish species for the CALFED environmental water account. The daily model combines historic salvage data with historic hydrology and Central Valley Project and State Water Project operations data to provide an integrated assessment tool. Project operators and fish resource managers change the initial export pattern to reduce entrainment during periods of high fish density, and then allow higher pumping during periods of reduced fish density. The daily model

accurately simulates many of the operational constraints and allows adaptive management actions to be evaluated.

Prepared an evaluation of the Salton Sea restoration alternatives for Salton Sea Authority. Simulated water and salt management alternatives using the USBR water and salt accounting model and compared these alternatives with possible on-shore solar salt ponds, similar to those used by salt industry in San Francisco Bay.

Prior Experience

Tennessee Technological University. Associate professor of civil engineering. Directed graduate student research projects and taught courses in hydrology and water quality modeling. Conducted water quality data collection, data analysis, and modeling. Authored numerous technical reports on reservoir water-quality modeling for the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Tennessee Valley Authority, and Oak Ridge National Laboratory.

Tennessee Valley Authority Engineering Laboratory. Research engineer. Conducted engineering studies of water temperature effects from thermal power plant discharges and hydropower dam releases. Analyzed data obtained from hourly water temperature monitoring systems. Participated in multi disciplinary water resource studies, assisted in planning field data collection activities, and developed and applied reservoir water quality models to evaluate environmental concerns.

U.S. Army Corps of Engineers Waterways Experiment Station. Graduate fellow. Studied the range of reservoir water quality model predictions resulting from uncertain river loadings. Investigated data requirements for reservoir inflows and coefficient estimates. Participated in team development and testing of reservoir water quality models.

Selected Publications

Brown, R.T., A. Huber. 2004. The Effects of Riparian Shade on Stream Water Temperature. In *Proceedings of 2004 Riparian Ecosystems and Buffers: Multi-Scale Structure, Function, and Management*. American Water Resources Association Specialty Conference, Olympic Valley, California

Brown, R.T., A. Huber, J. Zhou, K. Steele. 2000. Planning Water Quality Operations for San Diego County Water Authority Emergency Storage Project Reservoirs. In *Proceedings of 2000 Joint Conference on Water Resources Engineering and Water Resources Planning and Management*. ASCE Reston VA.

- Brown, R.T., T. Cannon, D. Fullerton, B. Herbold. 2000. California (CALFED) Daily Environmental Water Management Modeling for Fish Protection and Water Supply Evaluation. In *Proceedings of 2000 Joint Conference on Water Resources Engineering and Water Resources Planning and Management*. ASCE Reston VA.
- Brown, R.T. 1998. Water Quality Impacts from Agricultural Drainage of Peat Soils in the Sacramento-San Joaquin Delta. Pages 1165-1170 in S.R. Abt, J. Young-Pezeshk, C.C. Watson (eds). *Proceedings of the 1998 International Water Resources Engineering Conference*, ASCE. Reston VA.
- Brown, R.T., A. Huber. 1998. Hourly Water Temperature Modeling of the Guadalupe River, California. Pages 684-689 in S.R. Abt, J. Young-Pezeshk, C.C. Watson (eds). *Proceedings of the 1998 International Water Resources Engineering Conference*, ASCE. Reston VA.
- Brown, R. T., J. J. Field, M. J. Zanolli, R. W. Crites. 1994. Modeling pollutant fate and transport in constructed wetlands. M. Edwards (ed.). *Proceedings of the 1994 National Conference on Environmental Engineering*, ASCE. New York, NY.
- Brown, R. T., D. Brewer, D. Owen, Z. Chowdhury. 1994. Trihalomethanes in chlorinated Sacramento-San Joaquin Delta drinking water simulated with the EPA WTP-THM model. M. Edwards (ed.). *Proceedings of the 1994 National Conference on Environmental Engineering*, ASCE. New York, NY.
- Brown, R. T., P. Wisheropp, D. Smith, R. Rachiele. 1993. Modeled hydraulic and salt transport patterns in the Sacramento-San Joaquin Delta. H.W. Shen, S. T. Su, and F. Wen (eds.) *Proceedings of 1993 National Conference on Hydraulic Engineering*.
- Brown, R. T. 1992. Hydrologic constraints for water management in Owens Valley and Mono Basin. C. A. Hall, Jr., V. Doyle-Jones, B. Widowski (eds.) *The History of Water: Eastern Sierra Nevada, Owens Valley, White-Inyo Mountains, White Mountain Research Station Symposium*. Volume 4. Los Angeles, CA.
- Brown, R. T., H. Crouch, T. Higgs. 1991. Application of 2-D water quality model (BETTER) to manage effects of low flow and wastewater effluents in Cheatham Lake, Tennessee R. M. Shane (ed.) *Proceedings of the 1991 National Hydraulic Engineering Conference*.
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ASCE. New York, NY.

- Brown, R. T., R. C. Young. 1991. Measurements to calibrate suspended sediment model for adsorbed contaminant transport study of North Fork Holston River, Virginia. R. M. Shane (ed.). *Proceedings of 1991 National Hydraulic Engineering Conference*. ASCE. New York, NY.
- Brown, R. T. and J. L. Young. 1989. Hydrologic interpretation of ambient water quality data from the Tennessee River Basin. S. Ragone (ed.). *Regional Characterization of Water Quality*. (Publication Number 182.) International Association of Hydrological Sciences Press. Wallingford, UK.
- Brown, R. T., K. D. Choate. 1989. Daily suspended sediment model for water resources management. S. S. Ywang (ed.). *Sediment Transport Modeling: Proceedings of International Symposium*. ASCE. New York, NY.
- Brown, R. T. and K. Choate. 1988. Daily water budget model for water resources management. M. Strech (ed.). *Critical Water Issues and Computer Applications: Proceedings of the 15th Annual Water Resources Planning and Management Division Conference*. American Society of Civil Engineers. New York, NY.
- Brown, R. T., M. H. Mobley, and C. F. Nubbe. 1988. Surface water pumps: Model-prototype calibration. P. H. Burgi (ed.). *Model-Prototype Correlation of Hydraulic Structures: Proceedings of the International Symposium*. American Society of Civil Engineers. New York, NY.
- Carey, W. P., R. T. Brown, and C. G. Chatham. 1988. History of suspended-sediment data collection and inventory of available data for the Tennessee and Cumberland River basins. (Open-File Report 88-497.) U.S. Geological Survey. Nashville, TN.
- Brown, R. T. 1987. Analysis of storm event suspended sediment data from Tennessee. Pages 859-865 in R. M. Ragan (ed.), *Proceedings of the 1987 National Conference on Hydraulic Engineering*. American Society of Civil Engineers. New York, NY.
- Brown, R. T. and C. Nubbe. 1987. Modeled effects of hydraulic mixing devices on reservoir water quality. R. M. Ragan (ed.). *Proceedings of the 1987 National Conference on Hydraulic Engineering*. American Society of Civil Engineers. New York, NY.
- Brown, R. T. and D. L. Dycus. 1986. Characterizing the influence of natural variables during environmental impact analysis. B. G. Isom (ed.). *Rationale for Sampling and Interpretation of Ecological Data in the*
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Assessment of Freshwater Ecosystems. (ASTM STP 894.) American Society of Testing Materials. Philadelphia, PA.

Wilson, T. M., V. D. Adams, R. T. Brown, J. A. Gordon, and H. H. Mills. 1986. Design of a statewide monitoring network for groundwater quality. (Tennessee WRRC Technical Report No. 113.) University of Tennessee, Knoxville, TN.

Brown, R. T. 1985. Flow and mixing calculations for a two-dimensional reservoir water quality model. W. R. Waldrop (ed.), *Hydraulics and Hydrology in the Small Computer Age: Proceedings of the Hydraulics Specialty Conference.* American Society of Civil Engineers. New York, NY.

Brown, R. T. 1984. Relationships between suspended solids, turbidity, light attenuation and algal productivity. *In Lake and Reservoir Management Proceedings of the Third Annual Conference of The North American Lake Management Society.* (EPA 440/5-84-100.) U.S. Environmental Protection Agency. Washington, DC.

Hauser, G. E., L. M. Beard, R. T. Brown, and M. K. McKinnon. 1983. Modeling the downstream improvements in dissolved oxygen from aeration of Cherokee and Douglas releases. (TVA Report No. WR28-1-590-103.) Tennessee Valley Authority. Norris, TN.

Brown, R. T. 1981. Reservoir temperature modeling uncertainties. H. Stefan (ed.). *Proceedings of the Symposium on Surface Water Impoundments.* American Society of Civil Engineers. New York, NY.

Brown, R. T. 1980. Modeling hourly water temperature dynamics. G. Ashton (ed.). *Proceedings of the Specialty Conference on Computer and Physical Modeling in Hydraulic Engineering.* American Society of Civil Engineers. New York, NY.
