

# Jean Marie Boyer, Ph.D., P.E.

Principal, Senior Water Resources Engineer / Water Quality Modeler



## Professional Summary

Dr. Boyer is an engineer and project manager with over 25 years' experience in surface water-quality modeling and analysis; lake and reservoir planning and management, watershed studies, and design, development and application of decision support systems. She has provided expert witness testimony (deposition and trial) in a number of cases involving surface water quality and groundwater contamination. Her experience includes analysis of a variety of properties and constituents including water clarity, temperature, nutrients, dissolved oxygen, toxic substances, sediment, salinity, and pathogenic microorganisms in lakes, reservoirs, and streams.

## Professional Qualifications

Professional Engineer (PE), CO # 30510, NM # 15712, OK # 21235

## Education

Ph.D., Civil (Environmental) Engineering, University of Colorado, 1993

M.S., Chemical Engineering, University of Colorado, 1988

B.S., Chemical Engineering, University of Wisconsin-Madison, 1981

## Memberships

Member, North American Lake Management Society

North American Lake Management Society: Region 8 Director (2003-2005)

Member, American Society of Limnology and Oceanography

Member, Water Environment Federation

Member, Water Pollution Control Federation Research Committee (1989 - 1992)

Colorado Lake and Reservoir Management Association (CLRMA):

- Chair, Membership Committee (1996 - 1999)
- Director at Large (1997 - 1999)
- President - Elect, President, Past President, (2000-2002)

Member, Colorado Non-Point Source Council (2002-2007)

## Summary of Core Skills

Water-Quality Modeling and Analysis; Watershed Management; Management of Lakes, Reservoirs, and Streams for Water-Quality Purposes; Source Water Assessment and Protection (SWAP); Eutrophication Studies; Watershed-based Trading, TMDLs, NPDES Permitting; Design,

Development and Application of Decision Support Systems; Water Resources Planning and Management.

### Employment History

- 2010 - Present Principal, Hydros Consulting Inc.
- 1994 - 2010 Senior Project Engineer, AMEC Earth & Environmental, Inc. (formerly Hydrosphere Resource Consultants) Water-quality modeling. Water-quality analyses. Computer modeling of water resources systems. Water resources planning and management.  
Member of the Hydrosphere Board of Directors (1997 to 2003) and Hydrosphere Vice-President (2001 to 2007).
- 1991 - 1994 Hydraulic Engineer/Project Manager, U.S. Bureau of Reclamation. Led research and managed development and implementation of integrated river-basin management models.
- 1989 - 1991 Research Engineer, CADSWES (Center for Advanced Decision Support for Water & Environmental Systems), University of Colorado. Designed and developed decision support systems for water and environmental systems. Focused on river-basin management, reservoir operation, and water-quality modeling.
- 1986 - 1988 Teaching Assistant, University of Colorado. Instructed Chemistry and Introduction to Engineering Computations.
- 1988 Independent Water-Quality Consultant.
- 1985 - 1986 Project Manager, Foth & Van Dyke and Associates, Inc. Project manager and consultant to the papermaking industry.
- 1981 - 1984 Process Engineer / Project Manager, Procter & Gamble Paper Products Company.
- 1981 Technical Services Engineer, Eastman Kodak Co. Provided technical services to papermaking and film making divisions.
- 1979 - 1980 Technical Services Engineer, Procter & Gamble Paper Products Company. Responsible for technical coordination and support to manufacturing division.

### Representative Projects

**Three Lakes Water-Quality Technical Support and Modeling, CO** The Three Lakes System (Grand Lake, Shadow Mountain Reservoir, and Granby Reservoir) is an important part of the Colorado-Big Thompson Project. Dr. Boyer has led technical analyses on behalf of the Three Lakes Technical Committee for over a decade. Work has included:

- Development and Use of an EXCEL-based Integrated Dynamic Water-Quality Model for all Three Water Bodies;
- Development and Use of a CE-QUAL-W2-based Integrated Dynamic Water-Quality Model for all Three Water Bodies (to be used for NEPA evaluations);
- Performing Model Runs to Aid in Operational Planning;

- Use of the CE-QUAL-W2-based model as part of the Adaptive Management Process to improve Grand Lake Clarity;
- General Technical Support for the Adaptive Management Process;
- Model Sensitivity Analyses;
- Technical Support for Development of a Clarity Standard for Grand Lake; and
- General Technical Support to the Stakeholder Group.

**Cherry Creek Reservoir Water-Quality Model, CO** Dr. Boyer was the project manager for a CE-QUAL-W2 model developed for the Cherry Creek Basin Water-Quality Authority. Key issues include evaluating the performance of an existing destratification system and understanding algal dynamics (including cyanobacteria) for meeting the chlorophyll *a* standard.

**Chatfield Reservoir Water-Quality Model, CO** Dr. Boyer is the project manager for a CE-QUAL-W2 model application for the Reallocation of Chatfield Reservoir. Key issues focus on the sediment-water interactions at soon-to-be areas of inundation.

**McLellan Reservoir and South Platte Reservoir Water Quality, CO** Dr. Boyer is providing technical services to better understand and manage problematic algae blooms and the impacts in reduced filter run times at a drinking water facility.

**Northern Integrated Supply Project (NISP) EIS / 401 Certification, CO** Dr. Boyer is the project manager for water-quality and temperature modeling services to the lead EIS contractor for Northern Water's NISP FEIS and to Northern Water for 401 Certification application development. This work includes a water-quality model and temperature model of the Cache la Poudre River, as well as CE-QUAL-W2 models for two of the reservoirs (Glade Reservoir and Cactus Hill Reservoir) proposed under the NISP alternatives. The use of these models is focused on potential project impacts in the Poudre River, as well as in the two proposed reservoirs, which would be used for drinking water, irrigation, and river flow augmentation. Mitigation activities are also being evaluated.

**Ziegler Reservoir, CO** Providing technical support to a contractor working on water treatment issues for the Town of Snowmass, CO. Water treatability issues arise due to source water in Ziegler Reservoir and include taste and odor problems, as well as filter runtime issues.

**Water-Quality Standards – Technical Support, CO** Provided technical guidance and testimony before the Colorado Water Quality Control Commission in support of the establishment of a Direct Use Water Supply Classification and chlorophyll *a* standard for Pueblo Reservoir, CO. The work was conducted on behalf of the Pueblo Board of Water Works.

**Water-Quality Standards – Technical Support, CO** Provided technical guidance and testimony before the Colorado Water Quality Control Commission in support of the establishment of a chlorophyll *a* standard for Standley Lake, CO. The work was conducted on behalf of the City of Westminster.

**Horsetooth Reservoir Water-Quality Model, CO** Project Manager and modeler for the development of a hydrodynamic water-quality model for Horsetooth Reservoir, near Fort

Collins, Colorado. Concerns include low metalimnetic dissolved oxygen concentrations, total organic carbon, manganese, and taste and odor events.

**Windy Gap Firming Project EIS, CO** Provided water-quality services to the lead EIS contractor for Northern Water's Windy Gap Firming Project EIS. This work (2003-2011) involved dynamic water-quality modeling and estimating water-quality conditions under possible future alternatives for the Upper Colorado River, Grand Lake, Shadow Mountain Reservoir, Granby Reservoir, Horsetooth Reservoir, Carter Lake and Ralph Price Reservoir. In addition, water-quality conditions for four proposed reservoirs were predicted. Nutrients, algal production, water clarity, and temperature were of primary concern.

**Operational and Water Clarity Assessment – Grand Lake, CO** Developed a report summarizing water operations and the effect on water quality and clarity in Grand Lake and Shadow Mountain Reservoir in recent years.

**Expert Witness Services – 401 Certification Appeal, CO** Provided expert witness services during the appeal of the 401 Certification for the Southern Delivery Project to the Colorado Water Quality Control Commission. The work involved standards assessments and application of antidegradation rules.

**Moffat Collection System Project EIS, CO** Providing water-quality services to the lead EIS contractor for Denver Water's Moffat Collection System Project EIS. The work involves modeling and prediction of water quality in the Fraser River and in the Three Lakes System (predominantly Grand Lake) for various alternatives being considered. Nutrient, algal growth, and water clarity are of primary concern.

**Bear Creek Watershed Study, CO** Conducted a watershed assessment for Denver Water focused on identifying and evaluating management alternatives to improve raw water quality. Constituents of concern included nutrients, total organic carbon, microorganisms, and emerging contaminants. Numerous options were evaluated and compared based on cost and anticipated water-quality impacts.

**Zebra/Quagga Mussel Veliger Transport Model, CO** Project Manager for the development of a veliger transport model to determine the risk of mussel infestation of a downstream reservoir by an upstream reservoir via transport down the connecting stream. The risk of infestation of Cheesman Reservoir from Tarryall Reservoir was investigated for Denver Water.

**Fountain Creek Antidegradation Designation, CO** Conducted a study to assess conditions on Fountain Creek for purposes of antidegradation designation. The study included investigating if the stream is effluent dominated. Services included testimony before the Colorado Water Quality Control Commission.

**Zebra Mussel Impacts and Prevention, CO** Project Manager and lead investigator in providing assistance to a drinking water utility concerned about potential zebra or quagga mussel infestations in their water supply reservoir. Potential impacts in the areas of water treatment, recreation, and lake ecology were provided along with a review of other's prevention activities and levels of success.

**Dillon Reservoir Spill Model, CO** Project Manager for the development of a two-dimensional, hydrodynamic model of Dillon Reservoir to simulate how potential spills move through the reservoir. Concentrations of contaminants at the drinking water intake are predicted based on spill location, contaminant, volume and duration of the spill, and time of year. The results are incorporated into a decision support tool that is used by the operators to influence reservoir management.

**Lake DeSmet Water-Quality Monitoring and Assessment, WY** Project Manager to establish baseline water-quality conditions and to assess the general water quality of Lake DeSmet, a large reservoir in Wyoming. Baseline conditions are important for the evaluation of future anticipated activities which include development, coal-bed methane production, and the use of the reservoir for a drinking water supply. The work included the development of a water-quality sampling and analysis plan, field work, and data analysis. The results were reported as part of the Buffalo / Sheridan Area Water Supply / Lake DeSmet Level I Study.

**Standley Lake Watershed Model, CO** Project Manager for the development of a flow and water-quality model for the Clear Creek watershed (400 mi<sup>2</sup>). This watershed is the source of water for a 43,000 AF drinking water reservoir which has experienced taste and odor complaints due to algal growth. The WARMF model is being used to characterize flow and nutrient concentrations on a daily basis throughout the basin.

**Cherry Creek Reservoir, Destratification / Oxygenation Feasibility Study, CO** Provided water-quality technical services for a study investigating the feasibility of vertically mixing or providing for hypolimnetic oxygenation for a eutrophic reservoir. The goal of the project was to reduce algal growth. Much of the work focused on quantifying internal loading of nutrients from the sediments, before and after project implementation.

**Mariano Exchange Ditch System Assessment, CO** Project Manager for an assessment of a reservoir / exchange ditch system that is contributing sediment and nutrients to the Big Thompson River. The project involved monitoring, data analysis, and recommendations for best management practices.

**Impacts of Recreation of Reservoir Water Quality, CO** Investigated the impacts of recreation on Standley Lake, a reservoir used for drinking water purposes and is the sole supply of drinking water for the City of Westminster, Colorado.

**Arkansas River Basin Water-Quality, CO** Provided water-quality environmental assessment services to the City of Aurora. The work involved stream and reservoir modeling and focuses on salinity and selenium.

**Lake Mead Water-Quality Model Review, NV** Member of an expert panel to review a three-dimensional hydrodynamic and water-quality model of the Boulder Basin of Lake Mead. The models used for this effort were ELCOM and CAEDYM.

**Lake Okeechobee Northern Tributaries TMDL, FL** In support of litigation, provided expert witness services regarding a draft phosphorus TMDL. The work involved deposition and trial testimony.

**Barr Lake / Milton Reservoir Watershed Study, CO** Project Manager for the first and second phases of a Clean Lakes Watershed Study. The phase one work involved the development of a comprehensive and defensible database and assessment of different modeling approaches for two hyper-eutrophic plains reservoirs. The second phase involved a detailed water-quality assessment for each reservoir. This work helps to lay the foundation for upcoming TMDL's and nutrient criteria setting.

**Water-Quality Impacts from Coal Bed Methane Produced Water, WY** Provided comments on a draft EIS for a coal bed methane project in Wyoming. The analysis included investigating the potential impacts of produced water on the North Platte River and Seminole Reservoir.

**Gore Creek Algae Study, CO** Conducted a study to determine the cause of increased algal growth in a high-altitude stream. The project involved the development of a sampling plan, sampling activities, data analysis, and modeling.

**Upper Big Thompson Water Quality, CO** Project Manager for the review, assessment, and presentation of water-quality conditions in the Upper Big Thompson Watershed.

**Three Lakes Clean Lakes Study, CO** Project Manager and Lead Water-Quality Modeler for a Clean Lakes Study for the Three Lakes System. This system (Grand Lake, Granby Reservoir, and Shadow Mountain Reservoir) is located just west of Rocky Mountain National Park. The project focused on the impact of nutrients and related parameters that indicate trophic status and involved the development of dynamic, integrated water-quality models for the three lakes and the contributing watersheds.

**Standley Lake Strategic Planning, CO** Providing assistance to three municipalities, who use Standley Lake as a drinking water source, in developing a long-term reservoir management plan.

**Gunnison River Temperature Model and Analysis, CO** Lead Scientist and Project Manager for data analysis, assessment, and modeling to determine potential impacts of operational modifications to three reservoirs on the Gunnison River and river temperature 40 miles downstream. The three reservoirs involved are part of the Aspinall Unit (Blue Mesa, Morrow Point, and Crystal Reservoirs) and were modeled using CE-QUAL-W2. The Gunnison River downstream of the reservoirs was modeled using QUAL2K. The effort is part of the Upper Colorado Recovery Program and is focused on improving conditions for the Colorado pikeminnow.

**Village at Wolf Creek, CO** Conducted review and provided comments on development plans for a new waste water treatment facility and the anticipated impacts to the receiving stream.

**Pecos River Salinity, NM** Conducted water-quality analyses on the Pecos River to support the preparation of the Long-Term Miscellaneous Proposal and Contract EIS for the Carlsbad Project on behalf of the New Mexico Interstate Stream Commission.

**Colorado Source Water Assessment and Protection (SWAP) - Contaminant Inventory.** Project Manager for the GIS portion of Colorado's SWAP Contaminant Inventory effort. This project

involved defining the locations of potential source of contamination (PSOCs) and creating maps displaying PSOCs in source water assessment areas.

**Aurora Reservoir Water-Quality Model, CO** Project Manager and Lead Modeler for the development of a eutrophication model (CE-QUAL-W2) for a drinking-water supply reservoir located on the Front Range of Colorado. The project includes the development of a watershed model to estimate nutrient loadings to the reservoir and model runs to predict future conditions with watershed development.

**Standley Lake Water-Quality Model, CO** Developed a dynamic, mechanistic nutrient/food chain model for a reservoir in Colorado experiencing long periods of hypolimnetic anoxia. The EXCEL-based model offered an intermediate level of analysis –between a simplistic empirical approach and a more complicated hydrodynamic modeling effort. Also applied CE-QUAL-W2 to the reservoir to predict the impacts of modifying the outlet works elevation.

**USBR Water Conservation Guidebook** Responsible for writing the section of the guidelines concerned with the impact of water conservation practices on return flow water quality and the water quality of the receiving water body.

**Santa Clarita Valley Chloride Source Study, CA** Provided expert review of a study to determine sources and amounts of chloride loading to a wastewater treatment facility.

**Drinking Water Supply Water-Quality Analysis, NM** Provided expert review of a report and lab analyses conducted to evaluate the water quality of a school's drinking water supply.

**Oregon Effluent Trading Resource Guide, OR** Project Manager for the development of a resource guide for effluent trading in the State of Oregon. The resource guide was developed to aid stakeholders and watershed councils throughout the state in determining how effluent trading could help meet water-quality restoration plans and TMDL goals.

**Clear Creek Orphan Sites Study - Phases I, II, and III, CO** Project Manager in a feasibility study of a market-based system for the adoption of “orphan” non-point pollution sources for credit, consistent with the intent of the Clean Water Act. Examined technical, institutional and public acceptance issues associated with adoption and uses of credits and approaches to developing a credit banking system within the Clear Creek Basin.

**City of Boulder NPDES Permitting, CO** Provided technical support for NPDES permitting for the City of Boulder’s wastewater treatment plant on located Boulder Creek. Activities included water-quality analyses, stream water-quality modeling, and sampling design.

**Eagle Mine Superfund Site, CO** Technical review of documents produced through the CERCLA Remedial Investigation/Feasibility Study Process. Analyzed, evaluated, and monitored remedial activities with regard to generation of acid mine drainage and the impact on water quality.

**USCOE Waterways Experiment Station** Developed a dynamic water-quality model to assess the impact of contaminated sediments on surface water. The model predicts the concentration of toxics in the water column and sediments of a lake as a function of time.

**Phoenix TCE Groundwater Contamination, AZ** In support of litigation, project manager and lead expert for 1) the development of a comprehensive groundwater database and 2) the development of recharge estimates to support groundwater modeling efforts. The purpose of the modeling was to reconstruct historical groundwater conditions over a 40-year period using MODFLOW and MT3D. The database contained more than 30,000 well records in a 500 square-mile area. Recharge rate estimates were made for numerous types of land uses and land use conditions (since 1953) were reconstructed from aerial photographs and other sources. Provided expert testimony (deposition and trial) for three separate cases.

**Metropolitan Water Supply Investigation, CO** As part of a State of Colorado-sponsored cooperative investigation involving over 40 Denver area water providers, evaluated options for direct and indirect effluent reuse for agricultural, non-potable urban irrigation, and industrial purposes as a means of increasing the regional municipal water supply. Reviewed and commented on published irrigation water-quality requirements and thresholds for a variety of agricultural crops. Also investigated the feasibility of implementing interruptible supply contracts (dry year options).

**Santa Ana Watershed Project Authority, CA** Designed and developed a decision support system, built around EPA's stream water-quality model, QUAL2E-UNCAS for use on the Santa Ana River.

**Shasta Reservoir Temperature Model, CA** Developed a one-dimensional, object-oriented, reservoir temperature model for Shasta Reservoir. This model was coupled with a stream model to predict temperatures at a point downstream on the Sacramento River where specific temperature objectives were to be met to protect endangered salmon.

**Boulder Creek Watershed Management, CO** Developed a concept paper describing a watershed approach to water management on Boulder Creek. The document describes a process of municipal planning to address a broad range of current and future issues surrounding the Boulder Creek Watershed.

**Great Lakes Nutrient Model** Developed an integrated object-oriented model to simulate phosphorus concentrations in the Great Lakes system. Model includes water-sediment interactions.

**Flaming Gorge Reservoir Water Quality** Used TVA's two-dimensional reservoir model, BETTER, to simulate water-quality interactions in Flaming Gorge Reservoir in Wyoming and Utah. Developed data display tools to aid in analysis and interpretation of results.

**Oklahoma Source Water Assessment and Protection (SWAP)** QA/QC Manager for the GIS portion of Oklahoma's SWAP effort.

**Groundwater Contamination, CA** Provided litigation support in a case involving TCE contamination in Burbank CA.

**Jasper Reservoir Flood Inundation, CO** Provided oversight for a dam break analysis for a reservoir in the Boulder Creek watershed.



**Vail Mountain, CO** Performed a dam break analysis for a reservoir located on steep, mountainous terrain. Used BREACH and DAMBRK models, developed by the National Weather Service.

### Publications / Presentations

- Boyer, J.M., C. Hawley, T. Adams, and K. Bierlein. 2017. Analyzing Lake Data – Finding Patterns and How to Avoid Being Led Down the Wrong Road. Presented at the North American Lake Management Society 37th International Symposium. Denver, CO. November 7-9, 2017.
- Boyer, J.M., S. Chapra, and C. Hawley. 2012. “Simulating Water Clarity Using a Lake Eutrophication Model.” Presented at the North American Lake Management Society 32<sup>nd</sup> International Symposium. Madison, WI. November 7-9, 2012.
- Hawley, C., Boyer, J.M. and E. Vincent. 2012. “Development of Water-Quality Index for Evaluation of Modeling Scenario Results.” Presented at the North American Lake Management Society 32<sup>nd</sup> International Symposium. Madison, WI. November 7-9, 2012.
- Boyer, J.M. and M. Fabisiak. 2010. “Development of a Chlorophyll *a* Standard to Protect Drinking Water Supplies.” Presented at the North American Lake Management Society 30<sup>th</sup> International Symposium. Oklahoma City, OK. November 3-5, 2010.
- Boyer, J.M. M. Van Nostrand, and R.B. Hanna. 2009. “The Use of a Hydrodynamic Model for Reservoir Management During a Contaminant Spill.” Presented at the North American Lake Management Society 29<sup>th</sup> International Symposium. Hartford, CT. October 28-30, 2009.
- Boyer, J.M. N. Sperandeo, and R.B. Hanna. “A Transport Model to Determine the Risk and Timing of Zebra/Quagga Mussel Infestation.” Presented at the North American Lake Management Society 29<sup>th</sup> International Symposium. Hartford, CT. October 28-30, 2009.
- Happe, M, M Fabisiak, and J.M. Boyer. 2008. “Zebra and Quagga Mussels – How One City is Protecting Its Water Supply.” Presented at the North American Lake Management Society 28<sup>th</sup> International Symposium. Lake Louise, Alberta, Canada. November 12-14, 2008.
- McGregor, R., A. Horne, and J.M. Boyer. 2006. “Managing Chlorophyll *a* Levels in Cherry Creek Reservoir with Aggressive In-lake Mixing”. Presented at the North American Lake Management Society 26<sup>th</sup> International Symposium. Indianapolis, IN. November 6-10, 2006.
- Boyer, J.M. 2005. “Converting Two Hyper-Eutrophic Reservoirs from Irrigation to Drinking Water Use: Defining the Approach.” Presented at the North American Lake Management Society 25<sup>th</sup> International Symposium, Madison, Wisconsin. November 9-11, 2005.
- Boyer, J.M. 2005. “Algae Growth in Streams with Wastewater Treatment Plant Discharge.” Presented at the Eleventh Annual Vail Professional Wastewater Operators Seminar,

- sponsored by the Rocky Mountain Water Environment Association, Inc., October 28, 2005.
- Boyer, J.M. and A. Cutler. 2004. "Modeling a System of Reservoirs to Determine How Reservoir Operations Impact Downstream River Temperatures." Presented at the North American Lake Management Society 24<sup>th</sup> International Symposium, Victoria, British Columbia. November 3-5, 2004.
- Boyer, J.M. 2004. "Colorado Lakes and Reservoirs." Presented at the Rocky Mountain Water Quality Analysis Association 2004 Convention. September 24, 2004.
- Boyer, J.M. 2004. "Colorado Lakes and Reservoirs -- An Overview." Presented at the NALMS / CLRMA Rocky Mountain Regional Lake and Reservoir Management Conference. May 14, 2004.
- Boyer, J.M. and A. Cutler. 2004. "The Gunnison River / Aspinall Unit Temperature Study -- A Look at How Reservoir Operations Impact Downstream Temperatures." Presented at the NALMS / CLRMA Rocky Mountain Regional Lake and Reservoir Management Conference. May 13, 2004.
- Boyer, J.M. 2004. "Water Quality of the Upper Big Thompson Watershed." Presented at the Big Thompson Watershed Forum 2004 Annual Meeting. Loveland, Colorado. February 19, 2004.
- Hydrosphere Resource Consultants. 2003. "Three Lakes Clean Lakes Watershed Assessment, Final Report." Submitted to the Three Lakes Technical Advisory Committee. December 5, 2003.
- Boyer, J.M. 2003. "The Three Lakes Clean Lakes Study." Presented at the Big Thompson Watershed Forum 2003 Annual Meeting. Loveland, Colorado. February 20, 2003.
- DiNatale, K., T. Settle, J.M. Boyer and C. Brady. 2001. "Water-Quality Monitoring Results for Colorado Front Range Drinking Water Reservoirs." Presented at the North American Lake Management Society 21<sup>st</sup> International Symposium, Madison, Wisconsin. November 7-9, 2001.
- Boyer, J.M. 2001. "Water-Quality of the Three Lakes System -- Grand Lake, Shadow Mountain Reservoir, and Granby Reservoir." Presented at the Colorado Lake and Reservoir Association Annual Fall Conference, Westminster, CO. October 3, 2001.
- Boyer, J.M., S.C. Chapra, and C. Brady. 2000. "Dynamic Eutrophication Modeling of Aurora Reservoir Using CE-QUAL-W2." Presented at the North American Lake Management Society 20<sup>th</sup> International Symposium, Miami, Florida. November 8-10, 2000.
- Boyer, J.M., S.C. Chapra, K. DiNatale, T.J. Settle. 2000. "An EXCEL-Based, Mechanistic Water-Quality Model for Standley Lake, Colorado." Presented at the North American Lake Management Society 20<sup>th</sup> International Symposium, Miami Florida. November 8-10, 2000.
- Boyer, J.M., L.T. Rozaklis, R. M. Weaver, and A. R. Oliveira. 2000. "A Watershed-Based Trading Program for Cleaning up Orphan Sites -- Testing the Concepts." Proceedings, ASCE Watershed Management 2000, June 21-24, 2000. Fort Collins, CO.

- Boyer, J.M., R.M. Weaver, C.W. Howe, L.T. Rozaklis, A.S. Maest. 1998. "Evaluating Un-Like Watershed-based Pollutant Load Trades - the Target Zone Approach." Proceedings of the Water Environment Federation's 1998 Watershed Management Specialty Conference Water Management: Moving from Theory to Implementation, Denver, CO, May 3-6, 1998.
- Weaver, R.M., L.T. Rozaklis, A.S. Maest, J.M. Boyer, and C.W. Howe. 1997. "A Conceptual Taxonomy for 'Un-like' Watershed-Based Trades to Achieve Water Quality Objectives." Presented at Water Resources Education, Training, and Practice: Opportunities for the Next Century, American Water Resources Association Symposium, July 1997.
- Boyer, J.M., Chapra, S.C., Ruiz, C.E., and Dortch, M.S. 1994. "RECOVERY: A Mathematical Model to Predict the Temporal Response of Surface Water to Contaminated Sediments," Technical Report W-94-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A288 705. 1994.
- Boyer, J.M. 1994. "Addressing Central Valley Project Policy Issues Using a General Purpose Model," Proceedings of the 21st Annual Conference, ASCE Water Resources Planning and Management Division, Denver, CO, May 23-26, 1994.
- Johnson, R.C. and J.M. Boyer. 1994. "Global Models in Engineering Education: An Update," European J. Engin. Education, 19(1):83-92.
- Boyer, J.M. 1993. "An Object-Oriented Approach to Integrated Water-Quality Modeling," Ph.D. Dissertation, Department of Civil, Environmental, and Architectural Engineering, University of Colorado.
- Boyer, J.M. 1993. "An Object-Oriented Approach to General Purpose River Basin Management," Proceedings of the Federal Inter-Agency Workshop on Hydrologic Modeling Demands for the 90's, U.S. Geological Survey Water Resources Investigations Report 93-4018, Compiled by J.S. Burton, Fort Collins, CO, June 6-9, 1993.
- Chapra, S.C., J.M. Boyer, and R.L. Runkel. 1993. "Advanced Decision Support Systems for Environmental Simulation Modeling," Proceedings of the 20th Anniversary Conference, ASCE Water Resources Planning and Management Division, K. Hon (Ed.), Seattle, WA, May 1-5, 1993.
- Chapra, S.C. and J.M. Boyer. 1992. "Fate of Environmental Pollutants," Water Environment Research, 64(4):581-593.
- Johnson, R.C., J.A. Johnson, and J.M. Boyer. 1991. "Some Overlooked Topics in Third-World Studies," International Third World Studies Journal and Review, 2(2):321-326.
- Boyer, J.M. and S.C. Chapra. 1991. "Fate of Environmental Pollutants," Research Journal WPCF, 63(4):607-619.
- Boyer, J.M. 1991. "An Object-Oriented Approach to Water Quality Simulation of Reservoir Networks," Presented at the North American Lake Management Society's 11th Annual International Symposium, Denver, CO, November 11-16, 1991.
- Chapra, S.C. and J.M. Boyer. 1990. "Fate of Pollutants," Research Journal WPCF, 62(4):569-577.

Boyer, J.M. and S.C. Chapra. 1989. "RECOVERY: A Mathematical Model to Predict Temporal Response of Surface Water to Contaminated Sediments," CADSWES Working Paper No. 2.

Boyer, J.M. and R.C. Johnson. 1989. "Global Model in Engineering Education," Proceedings 1989 Conference on Simulation in Engineering Education, S. Cynar (Ed), pp. 74-78.

Chapra, S.C. and J.M. Boyer. 1989. "Fate of Pollutants," Research Journal WPCF, 61(6):992-998.

Boyer, J.M. 1988. "Design and Simulation of Strippers for the Removal of Volatile Organics from Contaminated Groundwater," Master's Thesis, Department of Chemical Engineering, University of Colorado.

#### Published Software

Boyer, J.M. "QUEST: QUAL2E-UNCAS Evaluation of the Santa Ana River Basin", Center for Advanced Decision Support for Water and Environmental Systems (CADSWES), University of Colorado at Boulder, 1989.

Boyer, J.M., and S.C. Chapra, "RECOVERY: A Mathematical Model to Predict Temporal Response of Surface Water to Contaminated Sediments", Waterways Experiment Station, U.S. Army Corps of Engineers