



Hydrology | Hydraulics | Geomorphology | Design | Field Services

Christopher Bowles, Ph.D., P.E. President, Eco-Engineer, **cbec**, inc. eco-engineering

Education

Ph.D., 1999 Hydraulics, specializing in 3-D numerical modeling of environmental flows related to run-of-the-river hydropower.

CIWEM, 1995 Water and Environmental Management Diploma, Nottingham Trent University, England.

B. Eng., 1995 Civil Engineering (First Class with Honors), Nottingham Trent University, England.

H.N.D., 1989 Engineering Surveying, Trent Polytechnic, Nottingham, England.

Professional Experience

2007 – Present – President

cbec, inc., eco-engineering, Sacramento, CA.
Providing environmental consulting services to the water resources industry.

1998–2007 - Hydrologist to Principal
Philip Williams & Associates (PWA), Ltd.,
Sacramento, CA

1995–1998 - Standard Instructor: Land Surveying,
I.T., and Fluid Mechanics
Nottingham Trent University, Nottingham,
England

1995 - Flood Defense Technician
National Rivers Authority, Scarrington Road,
Nottingham, England

1994 - Assistant Flood Defense Technician
National Rivers Authority, Scarrington Road,
Nottingham, England

1989–1993 - Site Engineer/Project Manager
G.F. Tomlinson & Sons Civil Engineering
Contractors, Derby, England

1987–1988 - Junior Land Surveyor
M.N. Oliver & Co. Land Surveyors, Cheshire,
England

Professional Registration and Institutions

- Professional Civil Engineer, 2010 CA No. 76898
- Chartered Civil Engineer (UK)
- Chartered Environmental Engineer (UK)
- Member of the Chartered Institution of Water & Environmental Management (CIWEM) (UK)
- International Association of Hydraulic Research (IAHR)
- Institution of Civil Engineering Surveyors (ICES)

Dr. Bowles is Civil Engineer specializing in hydraulics, hydrology, geomorphology, water resources, water quality and environmental restoration. He has more than twenty years of project management experience on a wide variety of large multi-disciplinary, multi-stakeholder projects such as floodplain restoration, sediment studies, watershed hydrology, water quality, river and wetland restoration in California, Nevada, Washington, Oregon, and Florida, and overseas, including projects in the UK and Central America. Fifteen of these years have been spent in practice in the US. His technical expertise spans the range of hydraulic and hydrologic modeling (HEC software and a wide variety of 1D, 2D and 3D hydraulic models), geomorphology, GIS and field data collection (topographic and bathymetric surveying, water quality monitoring, flow gauging and sediment transport measurements). Prior to specializing in environmental hydrology, Dr. Bowles worked initially as a land surveyor and latterly as a site construction supervisor.

Dr. Bowles founded **cbec**, inc., eco-engineering in 2007, specializing in engineering services as they relate to the water resources industry to provide ecologically sensitive and sustainable solutions in the fields of hydraulics, hydrology, geomorphology and restoration design. Since 1998 he has managed or directed numerous projects in northern California (Central Valley, the Bay Area and Coastal Regions) the Sierra Nevada (the Tahoe Basin) and southern California. Clients have included Federal, State, and local agencies and private client such as Sacramento Area Flood Control Agency (SAFCA), Yolo County, Solano County Water Agency, Solano Land Trust, CALFED, California Department of Fish and Game (CDFG), US Fish and Wildlife Service, the Sacramento Water Forum, Department of Water Resources, Three Rivers Levee Improvement Authority and the US Army Corps of Engineers. Other clients that Dr. Bowles has served include local private developers in the Central Valley, where his involvement has primarily involved advising clients on hydromodification impacts of new development (assessing the impacts of stormwater flows on the geomorphology of receiving waters).

Dr. Bowles regularly gives training courses in hydraulics and hydrology and has prepared and delivered courses to the State Water Resources Control Board (and the Regional Boards) and CDFG. He has had lecturing experience in several fields including land surveying, IT, hydraulics and hydrology. He has also presented technical papers at numerous conferences and meetings and regularly gives technical presentations to Clients and Stakeholders in his project management and direction roles.

Dr. Bowles has had significant field reconnaissance and assessment experience including bathymetric surveying, flow and tide measurement, and velocity measurement using the latest technology in Acoustic Doppler Velocimetry and water quality monitoring. His knowledge of laboratory based hydraulic modeling is also extensive with a substantial part of his doctoral research based on this technology.

Dr. Bowles is focused on providing innovative, environmentally sensitive solutions to impacted watersheds from the Sierras to the Central Valley to achieve the protection, enhancement, and restoration of water dependent ecosystems. He has particular interests in multi-objective floodplain management and innovative urban development that is sensitive to, and sustainable for, our natural water resources systems.

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Environmentally sustainable solutions for the water resources industry

Selected Projects

Assessing the Use of Dry Wells as an Integrated Low Impact Development (LID) Tool for Reducing Stormwater Runoff while Protecting Groundwater Quality in Urban Watershed, Elk Grove, CA, 2012-present. The purpose of the City of Elk Grove Dry Well Project is to determine whether dry wells, in combination with other low impact development (LID), are a cost-effective way of infiltrate stormwater, alleviate localized flooding and recharge groundwater without negatively affecting the groundwater quality. The Project will design and construct dry wells and groundwater monitoring wells at three locations within the City: a residential neighborhood, a commercial / light industrial property, and a site adjacent to a major roadway. The Project will monitor event-based runoff and water quality of the runoff entering the dry well installation. The Project will also monitor the resultant groundwater quality in the receiving aquifers in the vicinity of the dry well installations. cbec's role is to incorporate swale LID features prior to dry well infiltration and to perform stormwater-quality monitoring and flow monitoring during both wet and dry season events for two years. The water quality data will then be analyzed to determine the efficacy of the use of dry wells as an LID feature in an urban setting.

Low Impact Development Guidebook. Placer County, CA. 2008-2010. cbec is a partner in a team, being led by Placer County, to develop a Low Impact Development (LID) guidebook for Placer County. The project is being funded by the Sierra Nevada Alliance and cbec are working with the Sierra Business Council and CKB Consulting in development of the guidebook. The purpose of the guidebook is to provide guidance on the use and implementation of LID techniques to protect and enhance the water quality of Placer County in the Yuba, Truckee and American River watersheds through the promotion of innovative, cost effective, stormwater management techniques in the higher elevations. Chris is the project director for development of a web-based document that promotes and encourages the application of appropriate LID principles and strategies for planning, selecting, designing, constructing and maintaining new and redevelopment.

Flood Control Projects

North Sacramento Streams and Sacramento River East Levee Environmental Consultation Services for Sacramento Area Flood Control Agency (SAFCA), November 2013, Sacramento, CA. cbec, as a subconsultant to AECOM, was recently selected to provide services to the Sacramento Area Flood Control Agency (SAFCA) for National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) compliance and permitting services related to improving levees on the Natomas East Main Drainage Canal (NEMDC), Arcade Creek, and on the Sacramento River East Levee from the American River to Freepoint. Chris Bowles's role is project director.

Central Valley Flood Protection Plan (CVFPP) Lower Sacramento Regional Flood Management Plan. 2012 to present. Chris Bowles is Project Manager to provide assistance for the Central Valley Flood Protection Plan (CVFPP) to develop the Lower Sacramento and Delta North Regional Flood Management Plan (RFMP), otherwise known as Flood Protect. Project requirements included local knowledge of environmental issues associated with the flood control system in the region, and relationships with project stakeholders to ultimately develop a RFMP that is technically sound and addresses stakeholders' needs. cbec's specific role has been to provide oversight and development of a Conservation Strategy for Flood Protect, including development of mitigation sites and prioritization. This work has required close collaboration with SAFCA.

Urrutia Pond and Bank Restoration Project. 2009-present. Chris Bowles is Project Director for preparing the SMARA reclamation and restoration plan for the Urrutia Pond and associated river bank in the Lower American River Parkway. cbec was instrumental in providing support for the development and successful grant application for \$5 million to DWR FESSRO to support design and implementation of the river bank restoration piece of the project. Bank restoration along the Lower American River adjacent to the Urrutia pond involves removal of disused concrete rubble on the riverbank, creation of an inset floodplain terrace, and establishment of riparian upland and shaded riverine aquatic habitat (SRA). The site will be used to provide environmental mitigation for local levee projects in the Sacramento area.

Central Valley Flood Protection Plan (CVFPP)- Identification and Prioritization of Potential Restoration Sites. Sacramento County, CA. 2010 to present. cbec is currently assisting DWR, to identify and prioritize potential restoration sites for the Central Valley Flood Protection Plan. The project involves sophisticated GIS techniques and HEC-Ecosystems Function Model (EFM).

Bay Delta Conservation Plan Effects Analysis. Yolo County, CA. 2010 – Present. cbec is currently assisting DWR to understand the effects of various inundation scenarios in the Yolo Bypass. The project involves 2D hydrodynamic modeling from Fremont Weir to Liberty Island using the MIKE 21FM platform.

Sacramento Area Flood Control Agency (SAFCA) Lifecycle Management of Vegetation on Levees White Paper, 2009. Dr. Bowles has recently completed the co-authoring of a white paper into the lifecycle management of vegetation on levees, a topic prominent in the scientific and political realms of flood risk management locally and nationally. This involved development of a conceptual decision support tool for life cycle management, working with nationally renowned academics.

Lower Sacramento River Regional Project: Geomorphic Assessment. SAFCA, 2003- 2004. Project manager for this project to assess the geomorphic impact of proposed changes to the regional flood management of the Sacramento River and its tributaries and bypasses. The project focused on the geomorphic overview and in developing sediment transport models of the potential scenarios.

Coyote Creek OM Analysis. Marin County. 2004–2008. Marin County Flood Control and Water Conservation District (FC&WCD). The project objective was to reassess the maintenance regime of the flood control channel and develop a design for a self-maintaining channel with ecological benefits. Project elements included review of existing information, hydrologic model development and calibration, hydraulic model (HEC-RAS) development, estimation of equilibrium channel dimensions, and development of conceptual alternatives to reduce channel maintenance requirements.

Ross Creek Flood Conveyance Assessment. 1999 to 2001. Marin County, CA. Dr. Bowles developed a flood conveyance assessment for Ross Creek through the Town of Ross, to assess the town's potential future flood risks.

Crest Marin Creek Diversion, 2005. For Marin County FC&WCD. The purpose of this project was to develop revised flood discharges to be used in the design of a diversion to minimize flooding to homes along Crest Marin Creek. Project elements included modifying the Coyote Creek hydrologic model (HEC-HMS) to develop design flows for the proposed diversion and assessing the impacts of the diversion on the flood channel (HEC-RAS).

Multi-Objective Projects

Feather River Corridor Management Plan. *Sutter and Yuba Counties, CA. 2011 to present.* Dr. Bowles is the project director for this investigation into multi-objective management planning for the Feather River from Yuba City to the Sacramento River. The project involves detailed 2-dimensional hydrodynamic and sediment transport modeling to assess a range of management alternatives.

Southport Early Implementation Project. *West Sacramento, CA. 2010 to present.* Dr. Bowles is the project director for this large levee setback project in West Sacramento being undertaken for WSAFCA. cbec's role in the project is for historic and geomorphic assessments, 2-dimensional hydrodynamic and sediment transport modeling to assess the potential impacts and benefits to geomorphology of the proposed setback alignments, and for input into the ecological mitigation design for the project.

Feather River Levee Setback Project, 2005 – December 2007. For the Three Rivers Levee Improvement Authority. Project director for this levee setback project on the Feather River, responsible for the geomorphic assessment of the proposed levee setback and the physical process elements of the environmental enhancement of the setback area.

Bear River Levee Setback Project, Bear River, CA, 2005 – 2007. Dr. Bowles is the Project Director for this levee setback project on the Bear River, responsible for the geomorphic assessment of the proposed levee setback and the physical process elements of the environmental enhancement of the setback area.

Hydrodynamic Modeling Projects

Selby Slag Site Environmental Impact Report (EIR). *2012-present.* Chris Bowles is Project Manager to assist with the development of an EIR associated with improvements and remedial works intended to improve capping of hazardous substances at the Selby site, once the site of heavy industrial activities. Phase 1 of the project includes development of an existing conditions 3-dimensional hydrodynamic model, to be used by AECOM for design purposes, and by cbec for impact assessments for the EIR. The purpose of this initial phase is to prepare the modeling tool for design and impact assessments expected once the alternatives for the project have been developed later in 2013 or early 2014 (tentative dates).

Suisun Valley Floodplain Modeling, Fairfield, California, 2009-2010. Dr. Bowles is the project director for this project which includes bathymetric and topographic surveying, flow, stage and sediment transport measurements (using ADCP technologies) and 1D and 2D hydrodynamic modeling.

Temperature Monitoring and Modeling, Lower American River, Sacramento, CA. January 2008 to present. Dr. Bowles is directing a project with the Water Forum to monitor temperature at 14 locations and stage at 4 locations along the Lower American River from Nimbus Dam to the confluence with the Sacramento River. Also, cbec, inc., have collaborated with HEC in Davis to construct a 1-dimensional, hydrodynamic HEC-RAS temperature model of the Lower American River. This model has an hourly time step. cbec are in the process of calibrating and validating this model using stage and temperature data collected from August 2008 to the present day.

Santa Ynez Temperature Modeling, Santa Barbara, CA. 2010 to

present. Dr. Bowles is overseeing an effort to develop a two-dimensional flow model to model the Santa Ynez river hydraulics. The model was calibrated using the measured field data. The existing conditions and additional scenarios were modeled to assess the habitat of the upstream reach of the Santa Ynez river.

Santa Clara River Parkway. *Ventura County, CA. 2010 - 2011.* cbec has developed a 2D hydrodynamic model for approximately 40 miles of the Santa Clara River from the Los Angeles County Line to the Ocean. The model was validated against the January 2005 flood event and was used to assess the flood attenuation benefits of multiple levee setback scenarios incrementally and in aggregate for Q25 and Q100 under existing and future climatic conditions.

San Joaquin 1D Hydraulic Model Development. *2010 – 2011.* cbec conducted a baseline hydraulic survey (ADCP, RTK GPS) which quantified a stage and discharge relationship for a range of flows for over 60 miles of the San Joaquin River. This data was used to develop a fully calibrated 1D hydraulic model (HEC GeoRAS) for 60 miles of the San Joaquin River to establish relationships between flow and floodplain habitat within the modeled reach.

Rose Creek Watershed Assessment. *San Diego, CA 2009 – 2010.* cbec is working to develop a suite of hydrologic, hydraulic and sediment transport models appropriate for assisting in the development and assessment of potential restoration and rehabilitation projects for Rose Creek and San Clemente Creeks. This suite of models will be combined into a Decision Support Tool (DST) to assist project stakeholders in selection of appropriate future actions in the watershed. This project involves a wide-ranging field data collection component including the installation of water level gauges, extensive topographic surveys, and sediment characterization. These data are used in the calibration of the hydraulic and sediment transport models. cbec developed a watershed scale hydraulic and sediment model that was used as a decision support tool for future restoration efforts in the Rose Creek Watershed. This project involved an extensive hydrographic and geomorphic assessment.

Lower Yuba River Rehabilitation Concepts Design and Analysis. *Marysville, CA. 2009-present.* For South Yuba River Citizens League. Project director for a study developing rehabilitation concepts/projects for a ~4 mile reach of the Yuba River, with a focus on increasing/improving rearing habitat available to salmonids. Activities include field reconnaissance and data collection, water level monitoring, topographic surveys, vegetation surveys, water table depth modeling and concept design development. A second phase of the project includes the development, design and implementation of a pilot riparian planting project, which is currently underway.

Honolulu Bar Side Channel Fisheries Enhancement Project, Stanislaus River, California, 2008 to present. Dr. Bowles is project director for this geomorphic assessment, 2-dimensional modeling and design project to enhance steelhead juvenile rearing habitat at a gravel bar on the Stanislaus River.

Tidal Projects

Northern Liberty Island Fisheries Enhancement Project Assessment. *2011. Wildlands, Inc.* Dr. Bowles was the project director for overseeing the application and refinement of a 2D hydrodynamic model using MIKE 21FM. The MIKE 21FM model developed by cbec encompasses a complex network of tidal channels (both natural and manmade) within the Yolo Bypass-

Liberty Island-Cache Slough Complex. The main goal of the Northern Liberty Island Fisheries Enhancement Project was to assess the feasibility, sustainability, and regional benefits of implementing various proposed enhancements (e.g., levee breaches, ditch plugs, pilot channels, etc.) within Stair Steps 1 and 2 in northern Liberty Island under tidal and flood regimes. These proposed enhancements are intended to create and enhance delta smelt and salmonid habitat in the project area.

NAVFAC Bangor P990 Mitigation Survey and Modeling –Director of the project, which included field data collection and model development for tidal estuary and riverine restoration projects in the Puget Sound, Washington. The project entailed collection of surface sediment samples representative of fluvial and deltaic morphological units and statistical tidal analyses for modeled water level calibration in the Puget Sound and Hood Canal, and 2D hydrodynamic (Delft3D modeling software, Deltares) simulations of tidal currents and riverine-floodplain interaction at the Big Beef Estuary and Big Quilcene River. The model was also calibrated and validated the 2D model of the Hood Canal inlet system based on measured water levels, tidal constituents and measured velocity.

Selby Slag Site Environmental Impact Report (EIR). 2012-present. Chris Bowles is Project Manager to assist with the development of an EIR associated with improvements and remedial works intended to improve capping of hazardous substances at the Selby site, once the site of heavy industrial activities. Phase 1 of the project includes development of an existing conditions 3-dimensional hydrodynamic model, to be used by AECOM for design purposes, and by cbec for impact assessments for the EIR. The purpose of this initial phase is to prepare the modeling tool for design and impact assessments expected once the alternatives for the project have been developed later in 2013 or early 2014 (tentative dates).

Shine Tidelands State Park Tidal Lagoon Restoration Feasibility, Puget Sound, WA. Present. Project manager for developing a two-dimensional hydrodynamic model of tidal and nearshore processes at the Shine Tidelands State Park proposed restoration site by using Delft3D modeling system of Delft Hydraulics. The Shine Tidelands model is being developed to simulate two-dimensional flow, tides and waves and their interactions.

Yolo Ranch Tidal Wetland Restoration Project. Solano County, CA. 2008 – to present. Dr. Bowles is the project director for the largest restoration project in the Yolo Basin of California, for the State and Federal Water Contractors Agency. The project is being completed in partial fulfillment of the contractors' requirement to provide mitigation restoration for the endangered Delta Smelt.

North Delta Hydrodynamic and Water Quality Modeling and Monitoring. Yolo County, CA. 2008–present. Project director for the development and calibration of a MIKE 21FM hydrodynamic model for the Yolo Bypass–Liberty Island–Cache Slough complex.

Lindsey Slough Tidal Wetland Restoration Project, Delta, CA, 2005 – December 2007. Project manager for this restoration feasibility study which includes hydrodynamic modeling, geomorphic assessment and conceptual design of a freshwater tidal wetland.

Barker Slough Water Quality Monitoring and Modeling, the Delta, CA, 2005 – present. Project manager and director for Solano County Water Agency's investigation into the water quality factors affecting the Barker Slough Pumping Plant. The project has involved developing and implementing a water quality field monitoring program and complex 2-dimensional water quality modeling.

Solano County Water Agency North Delta Water Quality Modeling, the North Delta, California, 2009. Dr. Bowles is the project director for this large and technical complex 2-dimensional water quality modeling in the North Delta (the Cache Slough-Liberty Island complex). cbec is utilizing MIKE 21 for this purpose

Napa-Sonoma Marsh Restoration Project, San Pablo Bay, CA. 1998-2004. Dr. Bowles was the project manager for the feasibility assessment of restoration of over 10,000 acres of salt pond to tidal marsh in northern San Francisco Bay. The project involved detailed 1D, 2D, and 3D modeling of the salt pond system, slough, Napa River and the Bay. The project has lead to a successful design and implementation project at the marsh complex.

Hamilton Airfield Wetland Restoration Project. Marin County, CA. 2000 – 2003. Dr. Bowles was the lead modeler using 2-dimensional hydrodynamic modeling to support design of this tidal wetland restoration project.

Triangle Rock Environmental Assessment, Sacramento County DWR, CA. cbec performed an environmental assessment for the proposed detention basin in the Laguna Creek Watershed to investigate the potential environmental and hydrologic impacts of a proposed regional detention basin.

Hydromodification Projects

Sacramento County Hydromodification Management, Sacramento, California, 2009. cbec was selected to assist the Sacramento Stormwater Quality Partnership (SSQP) with the preparation of the HMP as part of their NPDES MS4 Stormwater Permit Renewal process. Dr. Bowles is the project manager to the SSQP for this project, which will be completed in 2011.

Sacramento County Hydromodification Management Planning Pilot Study, Sacramento, California. Dr. Bowles is managed a project with the County's Department of Water Resources to investigate new and innovative tools to assess the impacts of hydromodification and propose potential mitigation strategies. Hydromodification refers to the impacts of urbanization on the frequently occurring flow events (typically between the 2- and 10-year events) that primarily affect the geomorphology of receiving waters.

Cordova Hills Geomorphic and Hydromodification Assessment. Sacramento, CA. cbec is assisting Mackay & Somps Civil Engineers with the stormwater drainage master planning for the Cordova Hills Specific Plan. Hydromodification mitigation was theoretically undertaken using LID and flow duration control approaches to match pre and post-project hydrology. cbec assisted with concept designs for multi-purpose flow duration control-water quality-storm detention basins. These technical studies are being completed in anticipation of imminent stormwater requirements of the Regional Water Quality Control Board (RWQCB), including a Hydromodification Management Plan (HMP) to assess and mitigate for the effects of urbanization on the frequently occurring flow events passing to receiving waters.

State Water Resources Control Board Training Academy Hydromodification Workshop, 2009. Dr. Bowles has organized two, two-day training workshops into HMP in Northern and Southern California for SWRCB, RWQCB, and other state, county and city staff.

Squaw Creek Restoration Project, Squaw Valley, CA. 2005 to present. Dr. Bowles has assisted Placer County and the Friends of Squaw Creek with development of concepts for restoration of

Squaw Creek since 2005. Currently, Dr. Bowles is assisting the Friends of Squaw Creek, through grants provided by Sierra Nevada Conservancy and the TRWC, to further develop these concepts into implementable solutions.

Sun Creek Hydromodification Planning. *Sacramento, CA.* cbec is currently undertaking hydromodification planning for the Sun Creek Stormwater Master Plan in the Laguna Creek watershed. Hydromodification mitigation was theoretically undertaken using LID and flow duration control approaches to match pre- and post-project hydrology. cbec assisted with concept designs for multi-purpose flow duration control-water quality-storm detention basins. Of particular concern, the designs are addressing the infiltration and evapotranspiration of summer irrigation runoff flows.

Other Projects

M&T Chico Ranch / Llano Seco Rancho Fish Screen Facility Long-Term Project – Evaluation of Rock Removal on the Sacramento River (RM 194-187), *Chico, CA* Present. Dr. Bowles is project director who oversaw a hydraulic and geomorphic assessment that is intended to evaluate the potential impacts to long-term hydraulic and sediment transport processes associated with rock / revetment removal project on the upper Sacramento River. This effort involved a geomorphic assessment as well as the development of a 2-dimensional sediment transport model.

Channel Management Assessment and Planning for the Vale of Pickering – Phase 1, *North Yorkshire, UK.* January 2008 to present. Dr. Bowles is undertaking a multi-objective channel management investigation in the River Derwent Catchment of the UK. This is a scoping study with the objective produce a planning document to balance the needs of agricultural land drainage, flood risk reduction, and biodiversity enhancement.

Grady Ranch EIS/R. *Skywalker Properties, Marin County, CA.* 2010 to present. This project involves peer review of stream restoration designs associated with a planned development at Grady Ranch for Marin County Flood Control and Water Conservation District.

Triangle Rock Gravel Mine. *Sacramento County, CA.* 2009 to present. cbec has conducted various studies for Triangle Rock Products, including studies associated with their Waste Discharge Requirements (WDR), modeling and design services.

Stream Sewer Creek Crossing Assessment for Sacramento County, *Sacramento County, California.* cbec is currently undertaking the geomorphic assessment of 41 creeks and streams within Sacramento County for Sacramento Area Sanitation District (SASD). Dr. Bowles is overseeing the fieldwork and analysis component of this project to assess the bank and bed stability in the reaches where existing sewer crossings exist. cbec is using rapid geomorphic assessment techniques in conjunction with hydrodynamic and sediment transport analysis to provide recommendations on suggested biotechnical bank stabilization methods.

City of Elk Grove Expert Advisory Committee, *Elk Grove, California,* 2009. Dr. Bowles has been selected to serve on the City of Elk Grove EAC to provide expert geomorphology and modeling experience into the renewal of the City's stormwater master plan.

Corte Madera Creek Maintenance Project. 1999 to 2001. *Marin County, CA.* Dr. Bowles developed a 1-dimensional (HEC-RAS) model for Corte Madera Creek to assess the impacts of sediment deposition in the concrete lined section of the tidal channel, and it develop potential management strategies.

Whidbey Island Naval Air Station Stormwater Analysis and Mitigation Project, *Puget Sound, Washington.* August 2007 to present. Project director for this US Navy Project for stormwater modeling and wetland mitigation planning.

Putah Creek Flow Restoration Project, *Putah Creek, CA,* 2003 – December 2007. Project manager for this project to assess the impact of riparian vegetation on Putah Creek Diversion Dam for Solano County Water Agency. The project involves geomorphic assessments and hydraulic modeling.

Clifton Drain/Cordova Creek Naturalization, 2006 – December 2007. *For the Sacramento Water Forum.* Project director for this project to develop a conceptual enhancement plan for naturalization of Clifton Drain to a restored Cordova Creek.

Selected Conference Presentations:

Major conference presentations since 2009 (additional information for prior years available upon request):

Hydrodynamic Modeling of the Puget Sound and Hood Canal for Impact Assessment and Ecological Mitigation Design – EWRI, Portland, June 2014

Large Scale Hydrodynamic Modeling for Multi-Objective Floodplain Management – California Water and Environmental Modeling Forum Annual Conference, Folsom, February 2014.

Computational Modeling for Eco-Engineering: Making the Connections Between Engineering and Ecology – American Geophysical Union, Invited Speaker, San Francisco, December 2013.

A New and Innovative Methodology for Determining the Integrity of Levee Slope and Toe Protection - Floodplain Management Association Conference, Anaheim, September 2013.

Hydromodification Workshop – Stream Susceptibility Tools – CASQA, Squaw Valley, September 2013.

The Challenges of Eco-Engineering: Making the Connections Between Engineering and Ecology – California Water and Environmental Modeling Forum, Folsom, April 2013.

Enhancing Salmonid Habitat on the Lower American River - California Water and Environmental Modeling Forum, Folsom, April 2013.

Reconciling Flood Risk and Improved Ecosystems: Ecohydraulics and Application to Flood Risk Reduction in the Central Valley - California Water and Environmental Modeling Forum, Folsom, April 2013.

Experiences of the Delta – Presentation to the Delta Independent Science Board, Sacramento, January 2013.

2D Hydrodynamic Modeling in the Yolo Bypass to Support Habitat Evaluation – Bay Delta Science Conference, Sacramento, October 2012.

Application of Innovative Rapid 2D Hydrodynamic Modeling for Planning Purposes in the Sacramento Valley – Floodplain Management Association Conference, Sacramento, September 2012.

Hydromodification Regulation and Rehabilitation Approaches – San Diego Region Hydromodification Workshop, August 2012.

Salmonid Habitat Enhancement Efforts on the Lower American River, SERCAL Conference, Davis, May 2012.

Habitat Modeling in the Yolo Bypass – Salmonid Restoration Federation Annual Conference, Davis, April 2012.

Enhancing Instream and Floodplain Habitat at Honolulu Bar, Stanislaus River – SERCAL Journal, Ecesis, March 2012.

Process River Restoration: Scotland vs USA – River Restoration North West, Oregon, February 2012.

Identification and Prioritization of Multi-Use Floodplains in the Central Valley – Floodplain Management Association Conference, San Diego, September 2011.

Experience with Enhancing Salmonid Habitat on a Highly Modified River in California – Floodplain Management Association Conference, San Diego, September 2011.

Spawning Gravel Augmentation in the Lower American River – The Salmonid Restoration Federation Annual Conference, San Luis Obispo, California, March 2011.

Multi-Objective Sustainable River Management: Balancing Flood Control, Bio-Physical Restoration and Socio-Economic Factors in a Scottish River – Co-Author for a poster presentation at the American Geophysical Union Annual Conference, San Francisco, California, December 2010.

Oh No! Here Comes Hydromodification! – Floodplain Management Association Annual Conference, Henderson, Nevada, November 2010.

An Innovative Approach for Ultra Rapid 2D Floodplain Modeling – Floodplain Management Association Annual Conference, Henderson, Nevada, November 2010.

Stream Susceptibility Assessment System (SASSy) – CASQA Annual Conference, Palm Springs, California, November 2010.

Integrating LID and Urban Runoff Management – LID: Current Trends and Case Studies, ABCW, Lumis, California, October 2010.

Assessing the Potential Restoration Impacts to Local Water Users in the Cache Slough Complex: A Modeling Approach – Bay Delta Science Conference, Sacramento, California, October 2010.

Stream Susceptibility Mapping – GIS and Field Applications – CASQA Annual Conference, Costa Mesa, California, October 2009.

Predicting the Linkages between Geomorphic Evolution and Ecological Outcomes in a Developing Watershed – Co-Author for a poster presentation at the American Geophysical Union Annual Conference, San Francisco, California, December 2009.

Life Cycle Management of Levee Vegetation – Floodplain Management Association Annual Conference, San Jose, California, September 2009.

Protect, Restore or Manage for the New Condition – Degraded River Systems and Development – Society for Ecological Restoration

California (SERCAL) Annual Conference, Folsom, California, May 2009.

A Stream Susceptibility Identification Tool for use in Hydrdomodification Planning – IECA Conference, Reno, Nevada, February 2009.