David T. Williams, Ph.D., P.E., P.H., CPESC, CFM, F.ASCE, F. EWRI, D.WRE

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As of June 2023

Education

Ph.D., Civil Engineering, Colorado State University (December 16, 1995)
M.S., Civil Engineering, University of California, Davis (September 9, 1977)
B.S., Civil Engineering, University of California, Davis (June 13, 1972)

Registrations

Professional Engineer (Civil) license number and date:

Arizona 24349, 1990
Colorado 42353, 2008
Louisiana, 34075, 2009
New Mexico 12187, 1993
Washington 27190, 1990
California 57020, 1997
Hawaii 7796, 1993
Mississippi 8242, 1981
Texas 80003, 1994
Missouri 2012015265, 2011

Registered Professional Hydrologist (PH: 96-H-1146)
Certified Professional, Erosion and Sediment Control (CPESC: #703)
Certified Floodplain Manager (CFM; US-08-03224)

Work History

2011 – 2012: National Director, Water Resources Engineer, NV5, Centennial, CO

2009 – Present; President, David T. Williams and Associates, Engineers, LLC, Fort Collins, CO

2005 - 2008; National Technical Director for Water Resources, PBS&J, Fort Collins, CO

2002 - 2005; National Director for Hydrology and Hydraulics, HDR Engineering, San Diego, CA

1988 - 2002; President and co-founder of WEST Consultants, a premier water resources engineering firm

1979 - 1988; Research Hydraulic Engineer, Hydraulics Lab, Engineering and Research Development Center (formerly Waterways Experiment Station), Vicksburg, MS

1983 - 1984; Acting Chief, Hydrology and Hydraulics Section, Baltimore District Corps of Engineers

1977 - 1979; Civil Engineer, Hydrology Branch, Nashville District Corps of Engineers

1975 - 1977; Research Hydraulic Engineer, Planning Branch and Research Branch, Hydrologic Engineering Center (HEC), Davis, CA

1972 - 1975; Airborne Infantry Platoon Officer and Combat Engineering Unit Officer, 7th Special Forces Group, Fort Bragg, NC

Professional Affiliations

American Society of Civil Engineers (past chair of 4 technical committees)
American Academy of Water Resources Engineers (Board of Trustees, founding diplomate)
International Erosion Control Association (IECA – 2 time president)
American Society of Testing and Materials (ASTM)
American Institute of Hydrology (Past Chair, Board of Registration and Executive Committee Board member)

Honors and Awards

Fellow and Life Member, American Society of Civil Engineers
Founding Diplomate, American Academy of Water Resources Engineers
Fellow, Environmental Water Resources Institute
Owen Award for Meritorious Achievement, Floodplain Management Association (FMA)
Karl Mohr Distinguished Service Award for National Activities, FMA
Mentorship Award, FMA
Sustained Contributor Award, International Erosion Control Association
Small Business Person of the Year, Chamber of Commerce, Carlsbad, California, 1993
Sustained Superior Performance, USACE
Special Act Award, USACE
U.S. Army Commendation Medal

U.S. Army Commendation Medal with Oak Leaf Cluster

Summary

David T. Williams and Associates (DTW) is a certified MBE, SBE, DBE and Disabled Veteran owned business. Dr. David Williams, the president of DTW, has over 45 years of experience in the water resources industry and is known nationally and internationally for his contributions to the industry. He served as Principal-in-Charge for several FEMA flood insurance studies in San Diego and Orange counties. He has written the new HEC-6 User Manual for the U.S. Corps of Engineers Hydrologic Engineering Center, performed HEC-6 and local scour analysis of pipeline crossings in Arizona and New Mexico, headed the Keene Ranch groundwater modeling study and the Nile River sedimentation evaluations for the World Bank. He is well versed in the computer programs HEC-1, HEC-HMS, HEC-2, HEC-RAS, HEC-6, STORM, and WQRRS. Dr. Williams is also a nationally recognized expert in sedimentation engineering and in developing innovative solutions to difficult hydraulic and hydrologic design problems in rivers and estuaries.

Dr. Williams previously served as a two time President of the International Erosion Control Association. He has served as chair of the ASCE Task Committee on Analysis of Laboratory and Field Sediment Data Accuracy and Availability. He is also a past chair of the ASCE Sedimentation, Computational Hydraulics, Stream Restoration, and Probabilistic Committees. He served as a committee member of ASTM A05.12 (Wire specifications), where he helped develop the standards for both welded and twisted (woven) gabions. He also served on ASTM D18.25 (Erosion Control Products), where he helped develop a variety of standards related to erosion control. While chair of the Federal Interagency Technical Committee on Sedimentation when Dr. Williams was with the U.S. Army Corps of Engineers, he worked with hydraulic and sedimentation experts from the Federal Highway Administration, Bureau of Reclamation, U.S. Geological Survey, Bureau of Land Management, Forest Service, TVA, Bureau of Land Management and the Agricultural Research Service. His work with the Committee involved developing sediment sampling equipment and sediment data collection methods. He is the author of more than 100 technical papers and reports on hydraulics and sedimentation. Dr. Williams was formerly an Associate Editor of the ASCE Journal of Hydraulic Engineering, as well as a reviewer. He was selected the 1993 Small Business Person of the Year by the Carlsbad, California Chamber of Commerce, and served as chair of the Carlsbad Beach Erosion Committee.

His professional experience includes more than eighteen years as a hydraulic engineer with the U.S. Army Corps of Engineers at the Waterways Experiment Station (WES,, now ERDC) in Vicksburg, Mississippi, both the Nashville and Baltimore Districts, and the Hydrologic Engineering Center (HEC) in Davis, California. While at WES, Dr. Williams worked on research applications of sediment transport in rivers and reservoirs and the solution of unusual hydraulic and sediment related problems using computer models and other state-of-the-art techniques. He also worked on the development of the

cohesive and network versions of the HEC-6 sediment transport computer model and wrote the Reservoir Sedimentation Chapter in the U.S. Corps of Engineering Manual on Sedimentation Investigations. At the Nashville District, Dr. Williams performed erosion control and sedimentation studies for the Tennessee-Tombigbee Waterway Project and also conducted sedimentation and floodplain information studies of proposed flood control projects. He was acting Chief of the Hydrology and Hydraulics Section at the Baltimore District Corps of Engineers. During the mid 1970's, Dr. Williams worked at HEC, helping in the development of spatial data management techniques, evaluation of the economic benefits of flood control projects, and sedimentation in rivers and reservoirs.

Dr. Williams has been a frequent short course instructor for ASCE, Federal and State Agencies for computer training workshops on using HEC-2, HEC-RAS, HEC-HMS and HEC-6. In addition, he has taught short courses on channel bed scour for toe protection design, sediment transport, fluvial geomorphology, risk and uncertainty, bridge scour and streambank protection.

Selected Projects

Expert and Independent Technical Review Panels

Member of 18 Board of Senior Consultants/Safety Assurance Review/Independent Panel of Experts Panels – The Sacramento Area Flood Control Agency (SAFCA), the West Sacramento Area Flood Control Agency (WSAFCA), Ventura County Watershed Protection District, and the Three Rivers Levee Improvement Authority (TRLIA) are each upgrading their levee systems in the northern California to the 200 year protection level and the City of Dallas (Trinity River Watershed Protection) and the North Texas Council of Governments to the 100 year flood level. After the devastation brought on by Hurricane Katrina, the U.S. Army Corps of Engineers required that all new or upgraded flood control projects that received federal cost sharing funding are to have an Independent External Technical Review (IETR) comprised of national experts in the appropriate disciplines. In response to this edict, these agencies appointed Dr. Williams as a member of the Board of Senior Consultants (BOSC) or Safety Assurance Review (SAR) Panel for their projects to review and provide expert advice on the risk and uncertainty analysis, plan formulations, erosion control, sediment transport analyses, fluvial geomorphology, hydrology and hydraulic aspects of the project.

Member, FEMA's Scientific Resolution Panel (SRP), Washington DC - The Federal Emergency Management Agency makes available an independent scientific body referred to as the Scientific Resolution Panel (SRP) that can be convened when deemed necessary by FEMA or upon a joint agreement between FEMA and a community. SRPs are independent panels of experts organized, administered, and managed by the National Institute of Building Sciences. They are established for the purpose of reviewing and resolving conflicting scientific and technical data submitted by a community challenging FEMA's proposed flood elevations as well as assesing compliance with local, state and

federal regulations. Dr. Williams is on a pre-qualified roster of national experts on FEMA regulations and procedures and was recently appointed to a Panel for a dispute in Texas and another in Oregon.

NCHRP 24 – 34, Risk Based Approach for Bridge Scour Prediction. For the U.S Department of Transportation, Transportation Research Board, Dr. Williams is on the technical advisory committee for this research. The project objective is to develop a risk-based methodology that can be used in calculating bridge pier, abutment, and contraction scour at waterway crossings so that scour estimates can be linked to a probability. The developed probabilistic procedures would be consistent with LRFD approaches used by structural and geotechnical engineers.

EPA Selection Panel, Washington D.C. – Dr. Williams has served on 3 EPA selection panels in the areas of climate change, ecological indicators and thresholds. The panel evaluated research proposals from universities and non-profit organizations and made recommendations to EPA on which proposals to approve. The panels were comprised of experts in the engineering and naturals sciences. Dr. Williams was the only private consultant on each panel, which was composed of academic and government personnel.

Scour and Sediment Transport Analysis

Levee Breach Analyses, California – A private client wanted to place a buried gas pipeline through the Sacramento–San Joaquin River Delta but was concerned with the possiblity of levee breaches that could erode out and destroy the pipeline. Under Dr. Williams' technical direction, historic levee breaches were examined, likely location of levee breaches along the proposed pipeline alignment were identified, and breaching parameters determined from the available data and other information sources. The hydraulic model, HEC-RAS, was used to determine potential erosive breach discharges using combinations of possible water surface elevations and levee breaching scenarios. These discharges were then used to determine potential erosion limits (vertical and lateral linits) on the landside of the levees. These erosion limits were presented to the client to determine the feasibility of placing the pipeline at these locations.

QA/QC, 50 Bridge Scour Analyses, Caltrans, California - Principal in Charge and Senior Project Manager. Responsible for quality control and assurance for over 50 bridge scour analyses that were required under CalTrans seismic retrofit program. The projects ranged state-wide but were concentrated mostly in desert environments in southern California. Dr. Williams also acted as project manager for complicated situations that involved innovative channel designs or scour protection requirements to minimize the impacts of the bridge retrofit on channel scour using HEC-RAS as the hydraulic model. Several of these projects involved fluvial geomorphic analyses.

Humboldt Bay Highway Seismic Retrofit Scour Evaluation Study - Caltrans planned to seismically retrofit the highway bridge crossing Humboldt Bay near Eureka in Northern California. The bridge is approximately 8,000 feet long, and crosses the bay in

three sections with two islands. The proposed retrofit would substantially increase the number of piles at each pier and the size of the pile caps. Dr. Williams studied the seismically retrofit using a 2-dimensional hydrodynamic model (using RMA-2) and a 2-dimentional sediment transport model (using SED2D) study was conducted to: (1) determine if the larger bridge foundation might alter circulation patterns in the northern part of the bay, (2) to evaluate the scour at the modified individual bridge piers, and (3) determine if sediment transport processes in the bay might change sufficiently to cause increased sedimentation in sensitive areas, such as a nearby marina. The study included a detailed survey within 2,000 feet of the bridge, development of a detailed finite-element grid in the vicinity of the bridge, model calibration, and model application. A 14-day tide, including neap and spring cycles, was used to analyze the bay's circulation and sediment transport response to normal conditions. A 100-year storm surge was used to evaluate pier scour at the modified bridge.

Evaluation and Re-Design of Palm Canyon Grade Control Structure, Riverside County Flood Control and Water Conservation District, CA – Dr. Williams was called upon to evaluate what caused the failure of the Palm Canyon grade control structure. This structure had a low flow notch in a riprap structure with a riprapped stilling basin. The work involved forensic engineering, examination of design and specification documents, and evaluation of construction techniques. He was then asked to redesign the grade control while salvaging as much material as possible and minimal rearrangement of the remaining existing structure.

Evaluation of Fluvial-12 Sedimentation Model on Pole Creek for Ventura County Watershed Protection District, California - The sediment transport model Fluvial-12 was used by Chang and Associates to model a sedimentation basin and exit conditions on Pole Creek in Ventura County. The model results were used to justify the location and dimensions of the sedimentation basin as well as the channel dimensions of its outlet to the Santa Clara River. The Ventura County Watershed Protection District required an outside expert, Dr. Williams, to evaluate the Fluvial-12 model results and make recommendations on improvements to the model, if needed.

Cherokee Wash Hydraulic/Sediment Analysis, Paradise Valley, Arizona - Hydrologic, hydraulic, and sedimentation studies were performed for the Maricopa County Flood Control District to evaluate options to alleviate flooding and sediment problems. Existing HEC-1 models were evaluated and modified to reflect current and with-project (flow diversions) hydrologic conditions. The existing HEC-2 model was reviewed and found unsuitable; therefore a new model was created to evaluate current hydraulic conditions including controls and flow break-out points. An HEC-6 model was prepared for sedimentation studies of the wash; a sediment sampling program was designed by WEST, and the gradation results were used in the model. Channel sediment continuity and geomorphic analyses were also performed, and the study results were used to render opinions on the need for grade control, sedimentation basins, and maintenance of the project.

Evaluation of Sediment Transport and Scour Analyses of the Agua Fria River, Arizona, for the Flood Control District of Maricopa County - Dr. Williams headed this project in which the PSB&J team was asked to assess the validity of sediment transport and scour analyses that had been conducted on the Agua Fria River as well as conduct an independent study. The analyses included development of an HEC-6T sediment transport model, analyses of levee heights and determination of toe scour depths to protect the levees. The resulting report was use by the Flood Control District of Maricopa County to require the project owners to reconsider their design and use the techniques that were presented in the report.

Pipeline Crossings over Desert Rivers and Washes, Arizona and New Mexico - Dr. Williams was Project Manager and Project Engineer for numerous Pipeline Crossings over Desert Rivers and Washes in Arizona and New Mexico for the El Paso Natural Gas Company. These efforts required the understanding of fluvial geomorphology, alluvial fan flooding, sediment transport and short duration/high peak discharge as related to desert hydrology.

Potrero Creek In-Channel Sedimentation Basin Alternative Study, California - Ventura County Flood Control District (VCFCD) proposed building one or more in-channel sedimentation basins to reduce the incoming sediment load from Potrero Creek from reaching the homes located in Westlake Lake in Westake Village, California. Dr. Williams evaluated the effectiveness of their various sedimentation basin plans. Dr. Williams formulated a plan to first estimate the average annual sediment yield from Potrero Creek and then model the system using HEC-6T, the sediment transport software package developed by the U.S. Army Corps of Engineers. Dr. Williams estimated average annual sediment yield using two different methods. The first method involved numerical integration of sediment yield-frequency curves for four contributing sub-watersheds provided by the VCFCD. The second method applied U.S. Geological Survey methodology based on a curve of long-term sediment yield in nearby mountain watersheds in Los Angeles and Ventura Counties to the VCFCD data. The sediment yield-frequency curve and U.S.G.S. methods provided two cases for input into sediment transport model.

Various Projects for the Flood Control of Maricopa County - Dr Williams was the Principal-in-charge of several sediment transport studies (Agua Fria, Salt, and Gila Rivers) for the Flood Control District of Maricopa County in Arizona. The purposes of these studies were to develop sediment models that could be used as predictive and management tools. The developed sediment transport models served to evaluate potential effects on channel stability of bank protection measures, floodplain encroachments and sand and gravel mining operations along the rivers.

Ventura County Flood Control District, Calleguas Creek Sediment Transport Study, Ventura, California - An HEC-6T sediment transport model was prepared for Calleguas Creek, Arroyo Las Posas, and Arroyo Simi in Ventura County to establish baseline conditions and to evaluate proposed channel improvements. The model extends

25 miles from State Highway 1 near the mouth at Mugu Lagoon to upstream of Hitch Boulevard in the vicinity of Moorpark. Inflowing sediment loads and sediment discharge to Mugu Lagoon were calibrated to records of historical sediment deposition in the lagoon, historical bed changes in the channel, and records of maintenance sediment removals. A long term hydrological simulation (50 years) was used in HEC-6T to evaluate proposed grade control structures, sediment basins, and other channel improvement options in Calleguas Creek and to determine their effectiveness in reducing sediment inflow to the lagoon.

Wolf River Reconnaissance Study, Tennessee - Included a hydraulic and sedimentation analysis for approximately 75 miles of the Wolf River in western Tennessee. An HEC-2 model for the lower reaches was extended with new survey data into the upper watershed. A HEC-6 model was then developed to evaluate the effect of grade stabilization weirs, environmental enhancement weirs with permanent pools, and reductions in inflowing sediment loads from 9 tributaries in the upper watershed. HEC-1 was used to compute unit hydrographs for calibration to stream gage data. The sediment-weighted histogram generator program was used to construct the HEC-6 input hydrology. The results of a 25-year future simulation were evaluated in terms of vertical bed elevation changes over time and volumetric changes in sediment deposited and scoured on a reach by reach basis.

<u>Stream Restoration, Fluvial Geomorphology and Streambank Protection</u>

Left Hand Creek and St. Vrain Creek Diversion Stream Restoration projects, Boulder County, CO – The floods of September 2013 caused severe damage to streams along the Colorado front range, endangering critical infrastructure. As technical advisor to these projects, David assisted in the conceptual design of the stream restoration efforts, oversaw the computations, and provided QA/QC of the plans and specification.

Lower Cogan Creek Restoration, City of Santa Rosa, CA – Dr. Williams was the technical advisor for this stream restoration project in an urban setting. The restoration effort required innovative design because of the special conditions posed by such items as right of way limitations, bridges, existing "hard" structures and other conditions often encountered in an urban environment.

Sevenmile Creek Restoration, SW Oregon – This project involved the restoration of Sevenmile Creek which included features to enhance the migration of various species of fish. Maximum use of historic creek features were implemented using natural channel design concepts. As the QA/QC of the project, Dr. Williams helped oversee the development of the concepts into plans and specification, which he was the engineer of record

Cuddy Creek Restoration Study, Kern County, CA – This study for Kern Co. involved the sediment transport conditions for Cuddy Creek, which has been ravaged by materials mining. The study included evaluation of pre-existing conditions, existing

conditions, and proposed conditions. These conditions were then used to determine any mitigation measure that would minimize the continuing adverse impacts of the historic mining as well as the proposed condition.

Sellar Gulch Restoration Study, Castle Rock, CO. – As technical advisor, Dr. Williams provided guidance in the fluvial geomorphology analysis for the restoration of Sellars Gulch. This included andextensive field reconnaisance of the project area and the use of geomorphic principles to determine the best slope and channel dimensions that would be self sustaining.

Santa Clara River Emergency Streambank Protection for Ventura County Watershed Protection District, California - As the lead technical advisor, Dr. Williams and his team identified potential alternatives to the streambank erosion problem along the Santa Clara Creek which included a No-Action plan, as well as non-structural and structural solutions. The consensus alternative was the use of river training structures such as spur dikes along with minor bank protection. This alternative involved design considerations using geomorphic and natural channel design procedures, determining the dimensions of the low flow channel, scour analyses for preventing undermining of the spur dikes, and the orientation, spacing and dimensions of the spur dikes.

Santa Paula Creek Emergency Streambank Protection for Ventura County Watershed Protection District, California - As the lead technical advisor, Dr. Williams and his team identified potential alternatives to the streambank erosion problem along the Santa Paula Creek which included a No-Action plan, as well as non-structural and structural solutions. The consensus preferred alternative was the use of river training structures such as Bendway Weirs and Spur Dikes. This alternative involved design considerations using geomorphic and natural channel design procedures, determining the dimensions of the low flow channel, scour analyses for preventing undermining of the spur dikes, and the orientation, spacing and dimensions of the spur dikes.

Cumulative Effects Study of Sedimentation Impact, Upper Mississippi River - Dr. Williams helped quantified the cumulative man-made and natural effects on sedimentation, stream morphology and ecology along the Upper Mississippi River (UMR) and IWW and predicted future conditions for the year 2050. The study area involves 5 states, 3 Army Corps of Engineer's Districts, and about 1,200 river miles. The geology and glacial history of the study area was analyzed to define the influences and controls on channel morphology. Hydrologic records were examined to identify changes in discharge and stage along the UMR. Available research was reviewed to define potential impacts of global climate change on basin hydrology. The history and extent of human influences on the fluvial system were characterized. Historic plan form and channel geometry data were analyzed to quantify changes in channel morphology. The sources and sinks of sediment along the UMR were quantified and a sediment budget developed to estimate backwater sedimentation rates in navigation pools. Historic changes in nine geomorphic categories were characterized throughout the study area. Predictions of geomorphic conditions along the UMR and IWW in the year 2050 were

developed based on trends identified from historic geomorphic data and results of the sediment budget. Ecological conditions in the year 2050 were predicted based on ecological guilds and the trends established for aquatic habitat.

Restoration/Environmental Enhancement Plans, Tres Rios and Rio Salado Projects, Los Angeles Corps of Engineers, Phoenix, Arizona - Principal in charge and Senior Project Manager: Two channel restoration and environmental enhancement plans were developed in Phoenix for the Tres Rios and Rio Salado projects for the Los Angeles Corps of Engineers. Tres Rios involved HEC-6 modeling, and Rio Salado had both HEC-RAS and HEC-6 models developed for the Salt River through Phoenix, AZ. The work involved the use of fluvial geomorphology principles and took into consideration the effects of san/gravel mining activities. The project also required coordination with biologists and botanists to establish a well-balanced environmentally sound project and still meet the flood control requirements.

Flood Control and FEMA Mapping

FEMA Studies of 27 Streams in the Unincorporated Areas of San Diego County, California – Dr. Williams was the principal-in-charge for this project for FEMA. He also took on some of the studies are the project manager. The studies involved over 50 miles of streams using FEMA standards for surveying, hydraulic modeling and floodplain and floodway delineations which and resulted in new and updated FIRM maps.

Approximate Floodplain Study for Orange County, California - Dr. Williams and his team prepared an approximate floodplain study for the Orange County Flood Control District to delineate 100-year floodplains for the East Garden Grove - Wintersburg Channel (C05), the Ocean View Channel (C06), and seven tributaries to the C05 channel. This project was undertaken by the District to facilitate lifting of the Santa Ana River floodplain (zone A99) after the completion of the Santa Ana River flood protection project by the U.S. Army Corps of Engineers (Corps). The Corps project has controlled breakout flows from the Santa Ana River (SAR), but the flooding from other sources underlying the SAR floodplain, needed to be delineated before the A99 zone was lifted by FEMA. The study area is located in the Cities of Huntington Beach, Fountain Valley, Westminster, Santa Ana, Garden Grove, Anaheim, and Orange, in Orange County, California. The C05 and C06 channel system consists of a complex network of leveed channels, storm drains, and detention basins that convey stormwater runoff from highly urbanized low-lying interior areas to the Pacific Ocean. About 16 miles of flood control channels were analyzed using an approximate hydraulic analysis with the Corps HEC-RAS program. The C05 channel laterals were analyzed using various computer programs including the Corps HEC-RAS program and the HEC-2 program with the split-flow option, and the Los Angeles County Flood Control Districts WSPG program. To obtain a model for an approximate level of analysis, all levees, bridges, and culverts, were removed from the cross-sections. Engineering judgment was used to interpret the model results based on output that appeared reasonable in accordance with field observations. Field observations were used to verify flow directions, track flow paths, and evaluate the effect of floodplain features such as elevated highway embankments. Approximate

studies in urban environments can be especially challenging because of the need to make appropriate assumptions in order to simplify complex hydrologic and hydraulic phenomena. A Zone A approximate 100-year floodplain was delineated. The results of the study satisfied FEMA requirements and were subsequently published for the benefit of the community. Dr. Williams was the Project Manager and Principal in Charge.

St. Tammany Flood Control Analysis, U.S. Army Corps of Engineers, New Orleans District, New Orleans, Louisiana - Dr. Williams and his engineers developed a conceptual flood management plan for St. Tammany Parish in southeast Louisiana. Flood management in St. Tammany Parish was a unique challenge, with 100 square miles drained by a complex network of natural bayous and man-made canals. Hydrologic and hydraulic models were needed to evaluate existing conditions and compare flood management alternatives. The results of the hydrologic models provided the input for hydraulic modeling to the New Orleans District Corps of Engineers with useful answers about their proposed flood management plan, allowing the District and the citizens of St. Tammany Parish to make informed decisions about their watershed.

Dam Breach Analyses for San Diego County Water Authority (SDCWA) – As principal in charge, Dr. Williams also acted as the technical advisor for this series of contracts to analyse numerous dam breach projects for SDCWA. This contact involved using the NWS DAMBreak model for FERC re-authorization of existing hydroelectric dams as well as for scenarios of raising dams to obtain additional storage and power. The results, which included numerous breach scenarios, output hydrographs and resulting inundation areas for FEMA flood mapping, were used to create new or revise Emergency Action Plans.

Hydraulics and Hydrology

Reservoir Sedimentation Analysis for FERC relicensing, Alcoa Power Generating Inc. – Dr. Williams was in charge of this reservoir sedimentation study for the High Rock Dam in North Carolina. The client needed this information for the application for relicensing of the dam. The sediment transport model was used to evaluate the effects of the dam on sedimentation that had a potential to adversely affect adjacent infrastructure.

Examination of Hydraulic Rollers at Run of the River Dams, Illinios Dept. of Natural Resources, Springfield, IL – As technical advisor to this project, Dr. Williams provided technical guidance in developing solutions to the hydraulic roller problem at the downstream portion of the weir at Geneva Dam. The temporary solution was the placement of rock riprap at this location and its design based upon high turbulence conditions.

Eastern Arkansas Water Supply Study - Study included extensive model application and model calibration to analyze the effect of in-basin water transfers on surface water flow magnitude, frequency, and duration in the La Grue Bayou stream network using Corps of Engineers' programs HEC-1, HEC-2, HEC-DSS, and HEC-FFA. A unique

feature to this study was the application of the Memphis District's program HUXRAIN to develop long term (50 years) synthetic discharge hydrographs using calibrated antecedent precipitation index coefficients, a long term rainfall data base, and computed unit hydrographs for the sub-basins. Another component of this work was an interior hydrology study for the city of Clarendon, Arkansas. Several scenarios were analyzed using HEC-IFH for continuous simulation with 50 years of data.

IDIQ for Los Angeles District Corps of Engineers - During this IDIQ contract for hydrology and hydraulics with the Los Angeles District, Dr. Williams and his team completed multiple work orders. A spillway inundation study was conducted for Carbon Canyon simulating dam break using HEC-RAS. A two-dimensional link node model was applied to Mission Creek in Santa Barbara to evaluate flooding due to overspilling of the channels to lower elevations and connector streams. In the Santa Margarita river watershed study, HEC-1, HEC-2 and HEC-6 were used to evaluate flooding extents and sedimentation problems in the river. Two channel restoration and environmental enhancement plans were developed in Phoenix area for the Tres Rios and Rio Salado projects. Tres Rios involved HEC-6 modeling and Rio Salado had both HEC-RAS and HEC-6 models developed for the Salt River. A major flood map revision study and levee analysis report was conducted for the Los Angeles River and Compton Creek, resulting in hundreds of thousands people taken out of the 100 year regulatory floodplain. During this study, numerous HEC-2 models were modified to reflect levee system changes made by the Los Angeles District. Overbank models were also modified to analyze split flow conditions.

Lindo Lake Park Water Quality Study, Lakeside, California - Dr. Williams conducted detailed study of water quality conditions, to evaluate lake rehabilitation alternatives, and to develop a restoration plan to improve water quality conditions and to support a wide array of beneficial uses, including active recreation for Lindo Lake Park. Lindo Lake Park Water Quality Study. The Lindo Lake Park Water Quality Study was comprised of five major tasks: 1) public meetings; 2) report on inventory, bibliography and proposed methodology; 3) Quality Assurance Project Plan according to EPA guidelines; 4) Water quality study and associated technical report; and 5) Implementation plan.

Minnesota and Red River CWMS Watershed Modeling, U.S. Army Corps of Engineers, St. Paul District - To establish a flood forecasting system and reduce future flood damage in the Red River of the North basin (4,010 square miles) and Minnesota River basin (1,770 square miles), Dr. Williams, along with his staff and the U.S. Army Corps of Engineers, St. Paul District (the Corps), developed a Corps Water Management System (CWMS) model to assist in real time operation of the reservoirs to regulate reservoir outflows. Dr. Williams' team developed snow process, hydrologic, water control, and hydraulic models that will be incorporated by the Corps into CWMS as model components. The modeling work included development, calibration, and verification of the Distributed Snow Process Model (DSPM), HEC-HMS, HEC-ResSim, and HEC-RAS models.

Wellhead Protection Plan for the Los Angeles Corps of Engineers, Planning Division, San Luis, Arizona - The components included the delineation of wellhead protection areas, the compilation of a contaminant source inventory, the development of management tools to protect the groundwater and the formulation of a contingency plan for both short and long term losses of one or more wells.

Two-Dimensional Study of the Missouri River, Chamois Reach, USACE, Kansas City District IDC - Dr. Williams was Principal in Charge for a 2-D study of the Missouri River called the Chamois reach between RM 116.5 and RM 113.5. The model used was RMA2, which is a part of the WMS system. It was used to identify low and medium flow habitat areas and the depths and velocities associated with those areas. The results were used to determine opportunities for habitat enhancements.

West Tennessee Tributaries Project Limited Evaluation Study, Tennessee - A reconnaissance level analysis was conducted to evaluate the proposed restoration of old river meanders that were cut off from the Middle Fork Forked Deer River by historical channelization projects. This study included an extensive combination of hydrological, hydraulic, and sediment transport simulations, using historical rainfall and runoff records, current field data, and calibration to 1960 and 1979 channel geometry survey data. In addition to Corps of Engineers' programs HEC-1, HEC-2, HEC-DSS, HEC-FFA, and HUXRAIN for surface water flow modeling and standard computer program HEC-6 for sediment transport analysis, the newer HEC-6T, "Sedimentation in Stream Networks", developed by William A. (Tony) Thomas, was used to evaluate the sediment transport of flow converging and diverging at the junctions of the main channel and the old meanders. A sediment-weighted histogram generator modified by WEST Consultants was used to generate the hydrology input for the HEC-6 programs. Designs for rock riprap diversion weirs and bridge protection, and an in-line sediment trap were developed in this study.

White River Unsteady Flow Model, Arkansas - An unsteady flow model using the computer program UNET was developed for 70 miles of the White River in eastern Arkansas. Model parameters were calibrated to historical stage and flow records before executing two 47 year simulations. Simulations were run for existing conditions and conditions after installation of an inlet canal and pumping station for an irrigation scheme. Results were provided to the District to help them evaluate effects of the irrigation project on the river. A second part of this project involved evaluation of the irrigation canals for sediment transport and scour/deposition. The computer program SAM was used to help determine stable channel parameters and the amount of scour/deposition that could be expected with the District's design geometry and slope.

Miscellaneous

Lead Instructor and Course Notes Author – Dr. Williams developed short course notes for and taught HEC-RAS, HEC-HMS, HEC-6, Bridge Scour, Fluvial Geomorphology, Stream Restoration, Sediment Transport and Streambank Protection short courses for such entities as the Floodplain Management Association of California

and Nevada, Association of State Floodplain Managers, American Society of Civil Engineers, Federal Highway Administration, Flood Control District of Maricopa County, Riverside County Flood Control and Water Conservation District, Ventura County Watershed Protection District, the International Erosion Control Agency and numerous other state and federal agencies. The courses were very technically oriented and geared to immediate implementation of the subjects taught. Certain subjects were enhanced according to the location of the course - local problems and situations. The courses ran from 2 to 3 days.

Uncertainty Analyses Using Simplified Methods for the Flood Control District of Maricopa Co., AZ – The study developed simplified methods to evaluate the uncertainty for flood control projects using cutting edge techniques that are not usually seen in flood control projects. This involved automated execution of hydrologic and hydraulic models with varying inputs to develop probability density functions for use in Monte Carlo simulations. The probability distributions of hydrologic and hydraulic inputs were developed based upon experience and technical literature. The results were the determination of the uncertainty in the outputs so that decisions could be made such as the height of freeboard, operation schemes for reservoir operation, etc. Dr. Williams was the chief technical advisor for this effort.

Development of State Standards for Floodplain Modeling, Arizona Department of Water Resources - Dr. Williams worked with the Arizona Department of Water Resources State Standards Work Group (SSWG) to develop a State Standard for floodplain modeling. The Standard provides guidance on mathematical modeling of hydraulic processes in watercourses and floodplains. Topics of interest included split flows, floodway encroachments, ineffective flow areas, breakout/overflow zones, alluvial fans, levee analysis, confluences, channel roughness characteristics and other topics. The study included evaluation of several 1-Dimensional hydraulic models. Four of the models were applied to four case studies and evaluated. The final product was the development of State Standard for Floodplain Modeling. This document provided guidelines and criteria for floodplain modeling and procedures for the preparation of submittals for floodplain hydraulic modeling as well as for the review and approval of models by local agencies.

Forensic Engineering, Consulting or Testifying Expert and Support

<u>Forensic Engineering or Consulting Expert</u>

Streambank erosion issues endangering buildings, Kirkland, WA, for private party
Flooding of private property, Loma Linda, CA, for private client
Flooding of property by US Army Corps of Engineers, Missouri, for private party
Stream restoration design and construction defects, North Carolina, for private party
Analysis of Milltown Dam Removal and Potential Deposition at Thompson Falls Reservoir, Montana, for Pennsylvania Power and Light

FERC relicensing, North Carolina, for Alcoa Power Generating Corporation
Scour Evaluation of Grading Plan Changes for Cyrus Wash, for Kern County, CA
Baker River FERC relicensing, WA, for Puget Sound Energy
Blackfoot and Clark Fork River Restoration Plan, Montana for unnamed client
Agua Fria River Streambank Scour Analyses, Phoenix, AZ, for Flood Control District of Maricopa Co., AZ
Erosion and Drainage, Newport Beach, California, for private client
Subdivision Flooding Problems and Floodplain Mapping Procedures, Dayton, Ohio, for private client
Flooding Problems, Unnamed creek, Los Angeles, California, for private client
Subdivision Flooding Problems, Waialae Iki V, Oahu, Hawaii, for private client
Alpine Mobile Home Park Flooding, Alpine, California, for private client
River Effects of Sand Mining Operations, San Luis Rey River, California, for private client
San Diego Creek Revetment Failure, Irvine, California, for private client
San Luis Obispo Creek Flooding, San Luis Obispo, California, for private client
Kern River Ordinary Highwater Litigation, Bakersfield, California, for private client
Property flooding and river erosion, Riverside County, CA, for private client
Government taking of property, Reno, NV, for private client
Erosion and flooding, Osage Beach, Missouri, for private client
Erosion of river, Greenwood, Indiana, for private client
Flooding problem, Fremont, CA, for private client
Permitting issues, Kansas City, MO, for private client
Property Flooding, Lancaster, CA, for Los Angeles County Flood Control District, CA
Property Flooding, Henderson, NV, for private client
Hydraulic modeling evaluation, New Orleans, LA, for the New Orleans Corps of Engineers
Property Flooding, Picayune, MS, for private client
Determination of definition of Riverport versus Seaport, Houston, TX, for private client
Reservoir operation, for City of Smyrna, TN, for City of Smyrna
Streambank erosion, Kearny, NE, for private client
Sand and Gravel minining issues, Pinal County, AZ, for private client
Flooding and Bank erosion, Riverside County, for Riverside County Flood Control and Water Conservation District, CA
Erosion of access road at Dam, Tuolumne County, CA, for private client
Dredging amount dispute, St. Louis, MO, for private client
Flood damages to homes, City of Long Beach, CA, for County of Los Angeles
Flood damages to homes, City of Woodlands, TX, for private client
Flood damage to home, Denver, CO, for private client
Death due to flooding, Riverside CO, for private client

Testifying (Arbitration, Trial and/or Deposition) Expert

Flooding death, San Diego county, CA, for private client
Flooding death, for Metropolitan St. Louis Sewer District, for St. Louis Sewer District
Gabion technical claims dispute, Terra Aqua Gabions, for Terra Aqua Gabions
Subdivision Flooding, for City of Reno, NV, for City of Reno
Murrieta Creek Flooding, Riverside County, California, for Riverside Co. Flood Control District
Flooding Potential and Analysis of Coconut Grove, Kailua, Oahu, Hawaii, for private client
Flood Problems at Carlton Oaks Country Club, Santee, California, for private client
Pecos Road Pipeline Scour, Phoenix, Arizona, for El Paso Natural Gas Company
Personnel determination for Engineer Competency, Sacramento, CA, for private client
Flooding and Erosion problem, Houston, TX, for private client
Former employee claimed unlawful termination, Orange County, CA, for private client
Corruption by public employees, Albuquerque, NM, for private client
Sand Mining permit dispute, Maricopa County, AZ, for private client

Misc. Floodplain Hydraulics and Flood Protection

Reconnaissance Study Report and Project Management Plan for the Tijuana River Watershed Study – USACE, Los Angeles District
Spillway, Outlet, and Stilling Basin Design for Reelfoot Lake Sedimentation Basin – USACE, Memphis District
FEMA Studies of River System near Huntington Beach, Orange County, California
River System Studies near Huntington Beach for Orange County for Submittal to FEMA, Orange County, California
FEMA Studies of 27 Streams in the Unincorporated Areas of San Diego County, California
Hydraulic Analysis and Levee Elevation Design of West Williamson, West Virginia, Flood Control Project, for USACE, Huntington District
Flood Information Study of Pineville, Kentucky, for USACE, Nashville District
Murrieta Creek Flood Control and Environmental Restoration Project – USACE, Los Angeles District
Hydraulic Design of Supercritical and Subcritical Flood Control Channels for the Rio Puerto Nuevo Flood Control Project, San Juan, Puerto Rico, for USACE, Jacksonville District
Flood Control Channel Design, Buena Vista Creek, Vista, California, City of Vista, CA
Forest Falls Community Flood Warning System – USACE, Los Angeles District

Misc. Sedimentation and Scour Evaluations

Harrow Debris Basin Overtopping Analysis, Los Angeles County, California
Bridge Scour Analyses, Various locations, California Department of Transportation
Ashtabula River Hazardous Waste Project, Ohio
Tia Juana River Valley Surface and Groundwater Water Budget Analysis, San Diego, CA
Sedimentation Investigations of Boeuf River and Tributaries, Louisiana
Sedimentation Analysis of a Cutoff for the Barbourville, Kentucky, Flood Control Project
Analysis of the Effects of Strip Mining on Project Life of Martin's Fork Reservoir, Kentucky
Sedimentation Surveys and Analyses of J. Percy Priest Reservoir, Tennessee
Sedimentation Surveys and Analyses of Laurel River Reservoir, Tennessee
Sedimentation Surveys and Analyses of Martin's Fork Reservoir, Kentucky
Sedimentation Study of the St. Lucie River and Estuary, Florida
Sedimentation Analysis and Debris Basin Design for the Rio Puerto Nuevo Flood Control Project, San Juan, Puerto Rico
Determination of Sediment Yields after the Mt. St. Helens Eruption, Washington
Modeling the Sedimentation Effects of the Removal of the Washington Water Power Dam, Lewiston, Idaho
Sedimentation and Dredging Maintenance Requirement Study for the Rochester, Minnesota, Flood Control Project
Sedimentation Study of Tuttle Creek Reservoir, Kansas
Sediment Yield and Debris Basin Evaluation of Goleta, California, Flood Control Project
Sedimentation and Sediment Yield Study of the Harding Ditch, East St. Louis, Missouri, Flood Control Project
Analysis of Sediment Exclusion and Ejection System of the Igdir Irrigation Project, Turkey, for the World Bank
Reservoir Sedimentation Study of Shoccoe Dam, Jackson, Mississippi
Evaluation and Assessment of Sedimentation in the White Nile River and Irrigation Schemes, Sudan, for the World Bank
Zink Dam Sedimentation Study, Arkansas River, Tulsa, OK
Erosion and Sedimentation Analysis of South Coast Materials Mine Reclamation Plan, Buena Vista Creek, Carlsbad, California
Incipient Motion Analysis of Spawning Gravel, Cedar River, Renton, Washington

Misc. Stable Channel and Sediment Transport Analysis

San Luis Rey Levee Design and Sediment Transport Analysis
Sediment and Stable Channel Analysis of Pipeline Crossings for El Paso Natural Gas Company, Northern New Mexico and Arizona
Channel Stability Study of the Salt/Gila River Project, Arizona

Sediment and Channel Stability Study of the Gallup, New Mexico, Flood Control Project
Keene Ranch Stable Channel Assessment, Bakersfield, California
Stability Assessment of Sewer Pipeline, Tia Juana River, San Diego, California
Channel Stability Analysis, East Memphis, Arkansas

Misc. Water Quality and Groundwater

Caltrans NPDES Permit Project, Los Angeles County, CA
Keene Ranch Groundwater Quality and Quantity Modeling, Bakersfield, California
Turbidity Plume Analysis of Open Ocean Disposal for the Tampa Bay Deepening Project, Florida
Predictions of the Effects of Structural Alternatives on Turbidity in the St. Lucie Canal at Port Mayaca, Florida
Determination of Light Extinction Coefficients for Lakes and Reservoirs for use in Water Quality Mathematical Models
Analysis of the Behavior of Fine Sediments in Reservoirs for Environmental and Water Quality Operation Systems (EWQOS) Program
PCB Transport Study for the Hudson River, New York

Other

Analysis of Proposed Hydraulic Dredging for Construction of Gallipolis Lock and Dam, West Virginia
Design of Sedimentation Basins and Erosion Control Measures, Tennessee- Tombigbee Waterway Project
Dredged Material Disposal Site Analysis in an Ocean Environment for the Tampa Bay Deepening Project, Florida
Assisted in the Development of the Cohesive and Network Versions of the Computer Program, "HEC-6, Scour and Deposition in Rivers and Reservoirs"
Evaluation of Structural Alternatives of a Sediment Retention Dam on the Toutle River for Hyper-concentration Sediment Conditions from Eruption of Mt. St. Helens, Washington
Debris Analysis of a Proposed Tunnel Cutoff for the Harlan, Kentucky, Flood Control Project
Preparation of the new HEC-6 Manual (Scour and Deposition in Rivers and Reservoirs) for the Hydrologic Engineering Center, Davis, California
Erosion Control Plan, Rancho Verde Development, Escondido, California
Development of Forest Sedimentation Management Plan, Tongass National Forest, Alaska, U.S. Forest Service
Development of Water Resources/Geomorphology Small Stream Classification System, State of Washington, Department of Natural Resources
Development of Computer Based Design Program for Gabion Lined Channels
Development of Computer Based Design Program for Riprap Channels
Development of Channel Design using Geosynthetics Computer Program

Professional Society Activities

American Society for Testing and Materials (ASTM), Member - D18.25, Committee on Erosion and Sediment Control Technology, 2001 - present
American Society for Testing and Materials, Member – A05.12, Committee on Wire products, 1990 - present
American Society for Testing and Materials, Member - D19 Committee on Water, 1983 – present
American Society of Civil Engineers (ASCE), Past Chair, Sedimentation Committee, 1992 - 1996
American Society of Civil Engineers (ASCE), Past Chair, Computational Hydraulics Committee, 1999 - present
American Society of Civil Engineers (ASCE), Member, Committee on Management Practice for Control of Erosion and Sediment (MPCES), 2005 – 2008
American Society of Civil Engineers (ASCE), Past Chair, Committee on River Restoration, 2006 - present
American Society of Civil Engineers (ASCE), Past Chair, Committee on Probabilistic Approaches (now called Risk, Uncertainty and Probabilistic Approaches), 2009 – 2013
American Society of Civil Engineers (ASCE), member, Task Committee on Dam/Levee Breaching, 2009 - present
American Society of Civil Engineers (ASCE), Past Chair - Task Committee; Analysis of Laboratory /Field Sediment Data Accuracy and Availability, 1987-1991
International Erosion Control Association, Board of Directors, 1990
International Erosion Control Association, President, 1994-1995
International Erosion Control Association, Vice President-1995
International Erosion Control Association, Member, 1998
International Erosion Control Association, President, 1998-1999
American Institute of Hydrology, Chair of Board of Registration, Executive Board Member, 2007 to present

Instructional Experience

Hydrology 101; For those that skipped it in college, Forester University and ASCE webinars
Hydraulics 101; For those that skipped it in college, Forester University and ASCE webinars
Expert Witness, Forester University and ASCE webinars
Fluvial Geomorphology, Forester University webinars
Stream Restoration, Forester University webinars
Risk and Uncertainty for Water Resources Projects, ASCE webinars
Ethics for Engineers and Academics; 2010 EWRI/ASCE Conference, Providence, RI
Fluvial Geomorphology & Alluvial Fans, Floodplain Management Association, May 2010

Streambank Stabilization and Erosion Control Design, Floodplain Management Association, July 2009
So You Have Been Asked To Be An Expert Witness? Now What?; 2010 EWRI/ASCE Conference, Providence, RI
P.E. Review Course, Hydrology and Hydraulics; University of California, San Diego
Use of Fluvial Geomorphology Principles in the Design of Natural Channels, for ASFPM
HEC-RAS, Basic and Advanced, taught for various organizations and ASCE at various locations
HEC-HMS, taught for various organizations and agencies at various locations
HEC-2, Basic and Advanced (Unsteady), taught for ASCE at various locations
Fluvial Geomorphology, for various organizations
Stream Restoration, for numerous agencies
Streambank Protection, for numerous agencies
Bridge Scour Analysis, taught for ASCE at various locations
Open Channel Hydraulics, San Diego State University, San Diego, California
Water Surface Profile Computation Using HEC-2, Advanced, HEC, Davis, California
Engineering Problem Analysis, San Diego State University, San Diego, California
FESWMS-2DH, WEST Consultants, San Diego, California
Sedimentation in Forested Watersheds, Alaska and Montana
Civil Engineering Planning, University of California, Davis, California
Sediment Transport Course, HEC, Davis, California
Spatial Data Management, HEC, Davis, California
Water Quality in Rivers and Reservoirs, HEC, Davis, California
Sedimentation in Rivers and Reservoirs, HEC-6, HEC, Davis, California
Sedimentation Analysis, Waterways Experiment Station (WES), Mississippi
Sediment Transport in Reservoirs and Inland Waterways, WES, Mississippi
Numerical Modeling for Engineers, WES, Vicksburg, Mississippi
Hydraulic Design of Flood Control Channels, WES, Mississippi
Water Surface Profile Computations on the Microcomputer, Fort Collins, Colorado
HEC-6, Sediment Transport Modeling, various locations
Stable Channel Design, Memphis State University, Memphis, Tennessee
Bank and Channel Protection in Rivers, (IECA), Vancouver, BC, Canada
Short Course on Sediment Problems in Rivers, Oregon State University
Calculus I-IV, Hinds Junior College (HJC), Vicksburg, Mississippi
Differential Equations, HJC, Vicksburg, Mississippi

Publications

Selected Professional Papers

Arvind Phukan, Ananta Nath, David T. Williams, and Bruce Sharky, "Challenges and Sustainable Design Solutions for Mitigation of Flooding and River Bank Erosion on the Majuli Island," *Proceedings*, World Environmental and Water Resources Congress 2022, Environmental & Water Resources Institute, ASCE, June 5-8, 2022, Atlanta, GA

Williams, David T., "Structural Sustainable Solutions to Solve the Erosion Problems of Majuli Island in the Brahmaputra River," Proceedings, World Environmental and Water Resources Congress 2022, Environmental & Water Resources Institute, ASCE, June 5-8, 2022, Atlanta, GA

Ray E. Martin, Ray E., Sills, George, Williams, David T., "Use of Fat Clays in Design of Levees," Association of State Dam Safety Officials, Dam Safety 2018, Sept. 8 – 13, 2018

Wu, Weiming, Williams, David T., et.al, "Earthen Embankment Breaching," *J. Hydraul. Eng.*, 137(12), 1549–1564, 2011

Williams, David T,. and Stedinger, Jey R., "Practical Applications of Risk & Uncertainty Theory in Water Resources: Shortcuts Taken and Their Possible Effects," Proceedings, World Environmental & Water Resources Congress 2011, Environmental & Water Resources Institute, ASCE, Palm Springs, CA, May 22 - 26, 2011

Yescas, Alex, Norman, Kirk, Williams, David T., "Bank Stabilization by Redirective Structures on the Santa Clara River, Ventura Co., CA," Proceedings, World Environmental & Water Resources Congress 2011, Environmental & Water Resources Institute, ASCE, Palm Springs, CA, May 22 - 26, 2011

Williams, David T., Harder, Leslie, Jr., Sills, George, and Martin, Ray, "The Value Added to Flood Control Projects By Use of External Review Panels," Proceedings, World Environmental & Water Resources Congress 2010, Environmental & Water Resources Institute, ASCE, Providence, RI, May 16 - 20, 2010

Depue, Michael, Williams, David T., and Esterson, Kris, "Planning for Climate Change in the Technical Analysis of Floodplain Mapping and Flood Control Projects," Association of State Floodplain Managers Conference, Orlando, FL, June 2009

Su, Yu-Chun, Wobig, Loren, Winters, Brad, He, Xin, and Williams, David T., "The Geneva Dam, IL Hydraulic Roller Problem: Design of a Temporary Steep Riprap Ramp," *Proceedings*, World Environmental and Water Resources Congress 2009, Kansas City, MO

Williams, David T., and Countryman, Joseph, "Uncertainty Analysis: You Need to Know What You Don't Know," Proceedings, World Environmental and Water Resources Congress 2009, Kansas City, MO

McEvoy, Donald M., and Williams, David T., "Proposed Procedures in Utilizing Risk and Uncertainty Principles in Floodplain Management and Mapping," Proceedings, Association of State Floodplain Managers Conference, Reno, 2008.

Philips, Bruce M., and Williams, David T., "Design Considerations for Confining and Guiding Levees on Alluvial Fans," Proceedings, World Environmental and Water Resources Congress 2008, Honolulu, Hawaii, May 12–16, 2008.

Kreymborg, Leo, R., and Williams, David T., "The PBS&J Scour Spreadsheet: A Tool for Stream Restoration, Utility Crossings and Streambank Protection Projects," Proceedings, World Environmental and Water Resources Congress 2008, Honolulu, Hawaii, May 12–16, 2008.

Williams, David T., "Tips on Using the Dambreak Option in HEC-RAS," Proceedings, Arid Regions and CASFM Conference, Breckenridge, CO, 2007.

Williams, David T., and Houghland, Sarah, "Alluvial Fan Management and Analysis: Methods used in the State of Colorado," Proceedings, Arid Regions and CASFM Conference, Breckenridge, CO, 2007.

Williams, David T., "So You Have Been Asked to Be an Expert Witness? Now What?" Floodplain Managers Association Annual Conference, San Diego, CA, Sept., 2008

Thomas, Iwan M., and Williams, David T., "Common Modeling Mistakes Using HEC-RAS," Proceedings, World Environmental and Water Resources Congress 2007: Restoring our Natural Habitat, Tampa, Florida, May 15–19, 2007.

Kreymborg, Leo R., Williams, David T and Thomas, Iwan M., "Rapid Floodplain Delineation," Proceedings, World Environmental and Water Resources Congress 2007: Restoring our Natural Habitat, Tampa, Florida, May 15–19, 2007.

Williams, David T., "Finessing 1-D Hydraulic Models into 2-D Performance," Proceedings, World Environmental and Water Resources Congress 2007: Restoring Our Natural Habitat, Tampa, Florida, May 15–19, 2007.

Williams, David T., Marcy, Jennifer K., and DePue, Michael, "FEMA Levee Analysis Requirements for Floodplain Mapping," Proceedings, Association of State Floodplain Managers Conference, Norfolk, VA, 2007.

Desai, Harshal, Baird, Matt, and Williams, David T., "2-D Floodplain Hydraulic Modeling using 1-D Hydraulic Models," Proceedings, Association of State Floodplain Managers Conference, Norfolk, VA, 2007.

Williams, David T., and Kreymborg, Leo R., “Are You Double Counting, Over Conservative, or Misapplying Safety Factors for Stream Scour Analyses?” Floodplain Management Association Annual Conference, Coronado, CA, September 5-8, 2006

Williams, David T., and Doeing, Brian J., "Variation in Depth of Toe Scour Computations For Stream Restoration Bank Protection Design," Proceedings, International Erosion Control Annual Conference and Exposition, Las Vegas, NV, February 24-28, 2003.

Williams, David T., Gusman, A. Jake., and Teal, Martin J., "Proposed Methodology for Floodway Determination Using Unsteady Flow in HEC-RAS," Proceedings, ASFPM Conference, Biloxi, MS, June 23-28, 2003.

Williams, David T., Hu, Henry H., and Stefanovic, Dragoslav, "Sediment Flushing From a Flood Control Channel Outlet Into the Pacific Ocean", Proceedings, EWRI 2002 Conference on Water Resources Planning and Management, Symposium on Managing the Extremes: Floods and Droughts, First Symposium on Environmental and Water Resources Systems Analysis, Roanoke, Virginia, May 19-22, 2002.

Williams, David T., and Doeing, Brian J., "Predicting Bed Scour for Toe Protection Design in Bank Stabilization Projects," Short Course notes, International Erosion Control Association 33rd Annual Conference and Expo, Orlando, Florida, February 25, 2002.

Williams, David T., Hu, Henry H., Doeing, Brian J., and Phillips, Craig, “Headcut Analysis Due to Overbank Sand and Gravel Mining.” Proceedings, Floodplain Management Association 21st Semi-Annual Conference, Lake Tahoe, NV, September 23-26, 2001.

Stefanovic, Dragoslav, Williams, David T., “Two-Dimensional-Vertical Numerical Modeling of Stratified Environments”, Proceedings, World Water and Environmental Resources Congress Conference, Orlando, Florida, May 20-24, 2001.

Williams, David T., Teal, Martin J., and Bradley, Jeffrey B., “Use of GIS and Regional Relationships to Determine Subbasin Sediment Yields for Input to a Sediment Transport Model”, Invited paper, Proceedings, ASAE International Symposium, Honolulu, Hawaii, January 3-5, 2001

Williams, David T., and Teal, Martin J., "Between A Rock And A Soft Place: Which Riprap Method Should I Use for My Project?" Proceedings, ASCE and EWRI 2000 Joint Conference On Water Resources Engineering and Water Resources Planning & Management, Minneapolis, MN, July 30-Aug 2, 2000.

Teal, Martin J., Schulte, Marc A., Williams, David T. and Remus, John I., "Sediment Modeling of Big Bend Reservoir, South Dakota", Proceedings, ASCE and EWRI 2000 Joint Conference On Water Resources Engineering and Water Resources Planning & Management, Minneapolis, MN, July 30-Aug 2, 2000.

Schulte, Marc A., Forman, Selena M., Williams, David T., Mashburn, Glenn, and Vermeeren, Rene, "A Stable Channel Design Approach for the Rio Salado, Salt River, Arizona", Proceedings, ASCE and EWRI 2000 Joint Conference On Water Resources Engineering and Water Resources Planning & Management, Minneapolis, MN, July 30-Aug 2, 2000.

Forman, Selena M., Williams, David T., and Remus, John I., "Development of Methodology to Reduce Suspended Sediment Sample Collection on the Missouri River at Sioux City, Iowa", Proceedings, ASCE and EWRI 2000 Joint Conference On Water Resources Engineering and Water Resources Planning & Management, Minneapolis, MN, July 30-Aug 2, 2000.

Chintala, Ramesh S., Williams, David T., Allen, Peter M., "Channel Response and Sediment Yields in Brookeen Creek, Central Texas", Proceedings of the International Erosion Control Association (IECA) Conference, Palm Springs, California, 2000

Doeing, Brian J. and Williams, David T., "Development, Calibration, Confirmation, Project Production Runs and Sensitivity Analyses of One Dimensional Sediment Transport Models", Proceedings, ASCE and EWRI 2000 Joint Conference On Water Resources Engineering and Water Resources Planning & Management, Minneapolis, MN, July 30-Aug 2, 2000.

Williams, David T., Smith, David S., and Schulte, Marc A., "What Caused the Palm Canyon Drop Structure Problem? Solving a Mystery and Finding Solutions in Palm Springs, California", Proceedings, Association of State Floodplain Managers, Arizona Floodplain Management Association (AFMA), Arid Regions Floodplain Management 8th Biennial Conference, Las Vegas, NV, January 20-22, 1999.

Teal, Martin J., Powell, Nancy; Gomez, Erika; and Williams, David T., “A Conceptual Flood Control Plan for a Complex Channel System Using UNET”, Proceedings, ASCE Water Resources Engineering Conference, Memphis, Tennessee, August 2-7, 1998.

Mohammed, Ejaz; Williams, David T.; Crossett-Avila, Catherine; and McBride, Dennis, “HEC-RAS Hydraulic and Scour Analysis of Ten Mile River Bridge Under the Caltrans Seismic Retrofit Program”, Proceedings, ASCE Water Resources Engineering Conference, Memphis, Tennessee, August 2-7, 1998.

Williams, David T., Teal, Martin J., and Kumar, Sree, "Overtopping Prevention of the Harrow Debris Basin in Los Angeles County", Proceedings, ASCE Water Resources Engineering Conference, Memphis, Tennessee, August 2-7, 1998.

Williams, David T., and Teal, Martin J., "Design Consideration and Recommendations for Seven Commonly Used Riprap Design Methods", Management of Landscapes Disturbed by Channel Incision, edited by Sam S. Y. Yang, Eddy J. Langendoen, and F. Douglas Shields, Jr., The University of Mississippi, May 19-23, 1997.

Williams, David T., "Commonly Used Computer Programs For Management of Stormwater," Invited Paper, Soil and Water Management for Urban Development Conference, Sydney, New South Wales, Australia, September 9 - 13, 1996.

Teal, Martin J., and Williams, David T., "Selection of Sediment Transport Relations: Part I, Review of Sediment Transport Comparisons," Proceedings, ASCE North American Water and Environmental Congress, Anaheim, California, June 22-28, 1996.

Smith, David S., and Williams, David T., "Selection of Sediment Transport Relations: Part II, Ranges of Dimensional Numbers," Proceedings, ASCE North American Water and Environmental Congress, Anaheim, California, June 22-28, 1996.

Williams, David T., and Julien, Pierre Y., "Selection of Sediment Transport Relations: Part III, Numerical Ranking of Sediment Transport Relations," Proceedings, ASCE North American Water and Environmental Congress, Anaheim, California, June 22-28, 1996.

Williams, David T., "Industry Standards for Erosion Control Products - Future Tools for Civil Engineers," Proceedings, ASCE North American Water and Environmental Congress, Anaheim, California, June 22-28, 1996.

Doeing, Brian J., and Williams, David T., "Site Selection for Pipeline Waterway Crossings," Proceedings, ASCE Pipeline Crossings, 1996, Burlington, Vermont, June 16-19, 1996.

Williams, David T., Austin, Deron N., and Thiesen, Marc S., "Erosion Protection of Using Permanent Geosynthetic Reinforcement Mattings," Proceedings, Sixth Federal Interagency Sedimentation Conference, Las Vegas, Nevada, March 10-14, 1996.

Williams, David T., "Selection and Predictability of Sand Transport Relations Based upon a Numerical Index," Ph.D. dissertation, Colorado State University, Fort Collins, CO, 1995.

Williams, David T., "River Restoration: Reverse Engineering of the Environment," invited paper for Third Annual Conference on the Management for Urban Development, Sydney, Australia, September 12-15, 1995.

Williams, David T., "The International Erosion Control Association's Committee on Erosion Control Standards," invited paper for Third Annual Conference on the Management for Urban Development, Sydney, Australia, September 12-15, 1995.

Williams, David T. and Austin, Deron N., "PC-Based Design of Channel Protection Using Permanent Geosynthetic Reinforcement Mattings," Proceedings, ASCE First International Conference on Water Resources, San Antonio, Texas, August 14-18, 1995.

Bradley, Jeffrey B., and Williams, David T., "Limitations and Applicability of Sediment Transport Modeling in Gravel Bed Streams," Proceedings, ASCE First International Conference on Water Resources, San Antonio, Texas, August 14-18, 1995.

Williams, David T. and Passarelli, Peter, "Equivalencing Rock Riprap and Gabions for Stream Channel Protection," Proceedings, ASCE First International Conference on Water Resources, San Antonio, Texas, August 14-18, 1995.

Teal, Martin J. and Williams, David T., and Grant, Gordon E., "A New Version of XSPRO: A Stream Hydraulic Analysis Computer Program," Proceedings, ASCE First International Conference on Water Resources, San Antonio, Texas, August 14-18, 1995.

Teal, Martin J. and Williams, David T., "Computer Aided Design of Riprap Revetments," Proceedings, ASCE First International Conference on Water Resources, San Antonio, Texas, August 14-18, 1995.

Williams, David T. and Cozakos, David, "Use of HEC-2 and HEC-6 to Determine Levee Heights and Revetment Toe Scour Depths," Proceedings, ASCE Hydraulic Engineering Conference, Buffalo, New York, 1994.

Williams, David T. and Osendorf, Gary R., "Computer Aided Design and Cost Estimation of Gabion Lined Channel," Proceedings, ASCE National Conference on Hydraulic Engineering, July 1993.

Bradley, Jeffrey B. and Williams, David T., "Sediment Budgets in Gravel-Bed Streams," Proceedings, ASCE National Conference on Hydraulic Engineering, July 1993.

Williams, David T., Carreon, Jr., Samuel, Hamilton, Douglas J., and Bradley, Jeffrey B., "Erosion Potential and Scour Depth Assessment of Pipeline Crossings," Proceedings, Arid West Flood Conference, Association of State Floodplain Managers, Las Vegas, Nevada, December 2-4, 1992.

Williams, David T., "Sedimentation Problems and Solutions; Roseires Dam and Reservoir, Sudan," Proceedings, ASCE National Conference on Hydraulic Engineering, Nashville, Tennessee, July 1991.

Bradley, Jeffrey B., Williams, David T. and Barclay, Michael, "Incipient Motion Criteria Defining 'Safe' Zones for Salmon Spawning Habitat," Proceedings, ASCE National Conference on Hydraulic Engineering, Nashville, Tennessee, July 1991.

Stoker, Bruce and Williams, David T., "Dam Removal Methods for Lake Mills and Lake Aldwell Dams, Elwha River, Washington," Proceedings, ASCE National Conference on Hydraulic Engineering, Nashville, Tennessee, July 1991.

Williams, David T., and Bradley, Jeffrey B., "Use of 2-D Hydrodynamic and 1-D Sediment Models to Estimate Dredging Requirements," presented at the Western Dredging Association (WEDA) Annual Conference, Las Vegas, Nevada, May 1991.

Williams, D.T., and P.Y. Julien, "Examination of Stage-Discharge Relationships of Compound/Composite channels, in Channel Flow Resistance: Centennial of Manning's Formula," Edited by B.C. Yen, Water Resources Publications, 1992, pp. 341-355.

Williams, David T., "Ocean Disposal of Dredged Material: Plume Analysis," Proceedings, Fifth Federal Interagency Sedimentation Conference, Las Vegas, Nevada, March 1991.

Thompson, James C., Williams, David T. and Bradley, Jeffrey B., "Integration of 2-D Hydrodynamic and 1-D Sediment Transport Models," Proceedings, Fifth Federal Interagency Sedimentation Conference, Las Vegas, Nevada, March 1991.

MacArthur, Robert C., Williams, David T., and Thomas, W.A., "Status and New Capabilities of Computer Program HEC-6: Scour and Deposition in Rivers and Reservoirs," Proceedings, ASCE National Hydraulics Conference, San Diego, Calif., August 1990.

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