

KEVIN FLORA

Current Mission

My current mission is to share practical knowledge in bridge scour, river hydraulics, hydraulic modeling, and field-based river assessment with engineers and organizations working in resource-limited settings. Through mentoring, training, technical review, and selected site visits, I seek to help local engineers build confidence and capacity to evaluate river crossings, recognize scour and flood-related risks, and make sound infrastructure decisions using the data and tools available to them.

Professional Certification

Professional Engineer in Civil Engineering - State of California # 49059
Diplomate, Water Resource Engineer - AAWRE

Professional Work Experience

Hydraulic Consultant, H₂Flo Consulting

1997 to Present

- Developed bridge hydraulic and scour software used by State Transportation Departments
- International consultant responsible for field data collection of bathymetric and riverine velocity data, numerical modeling and scour countermeasure design of the Second Vivekananda Bridge in Kolkata, India.

Membership on Research and Task Force Panels

Served on multiple NCHRP bridge scour and hydraulics panels, including Bridge Scour Risk Management, Scour at Contracted Bridge Openings, Debris Effects on Pier Scour, Joint Probabilities at Confluences, and Combining Scour Components. Also served on the FHWA/AASHTO Wave Task Force and AASHTO Technical Committee on Hydrology and Hydraulics.

Adjunct Professor, California State University, Sacramento

2008 to 2019

- Open Channel Hydraulics (CE 139)
- Hydraulics Lab Course (CE 135)

Senior Bridge Engineer, Caltrans, Structures Hydraulics

1998 to 2025

- Managed the scour program for evaluating over 4500 state-owned bridges in California
- Developed analytical guidelines and field procedures for scour prediction, hydrologic and hydraulic modeling and interpretation of research
- Developed 2D Hydraulic Models for complex flows and scour scenarios
- Managed development of Scour Plans of Action for State-owned structures
- Designed bridge scour countermeasures

Transportation Engineer, Caltrans, Structures Hydraulics

1995 to 1998

Supported early development of Caltrans' bridge scour evaluation program through hydraulic/scour software development, flood-damage investigations, and bridge hydraulic modeling.

Education

- **Bachelor of Science Degree in Civil Engineering: December 1988**
California Polytechnic State University, San Luis Obispo
- **Master of Science Degree in Civil Engineering: June 2003**
Masters Project: River Meander Migration Prediction
University of California, Davis
- **Doctorate Degree in Civil Engineering: May 2021**
Thesis: Experimental and Numerical Study for Improved High-fidelity Numerical Modeling of Complex Features in Natural Rivers
Stony Brook University, New York

Select Relevant Publications

- Flora, K., & Khosronejad, A. (2021). On the impact of bed-bathymetry resolution and bank vegetation on the flood flow field of the American River, California: Insights gained using data-driven large-eddy simulation. *Journal of Irrigation and Drainage Engineering*, 147(9):04021036. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0001593](https://doi.org/10.1061/(ASCE)IR.1943-4774.0001593)
- Flora, K., Santoni, C., & Khosronejad, A. (2021). Effect of bank vegetation on the hydrodynamics of the American River under flood conditions: a numerical study. *Journal of Hydraulic Engineering*, 147(9):05021006. [https://doi.org/10.1061/\(ASCE\)HY.1943-7900.0001912](https://doi.org/10.1061/(ASCE)HY.1943-7900.0001912)
- Flora, K. & Khosronejad, A. (2022). Uncertainty Quantification of Large-Eddy Simulation Results of Riverine Flows: A Field and Numerical Study. *Environmental Fluid Mechanics*, 22(5), 1135-1159. <https://doi.org/10.1007/s10652-022-09882-1>.
- Flora, K., & Khosronejad, A. (2023). Uncertainty quantification of bank vegetation impacts on the flood flow field in the American River, California, using large-eddy simulations. *Earth Surface Processes and Landforms*, 2023, 1-13. <https://doi.org/10.1002/esp.5745>.
- Khosronejad, A., Flora, K., Zhang, Z., & Kang, S. (2020). Large-eddy simulation of flash flood propagation and sediment transport in a dry-bed desert stream. *International Journal of Sediment Research*, 35(6), 576–586. <https://doi.org/10.1016/j.ijsrc.2020.02.002>
- Kerenyi, K & Flora, K. (2019). A hybrid approach to forensic study of bridge scour. *Forensic Engineering*, 172(1), 27-38. <https://doi.org/10.1680/jfoen.19.0000>.

Conference Presentations

- Flora, K. & Khosronejad, A. (2023) “Uncertainty quantification of bank vegetation impacts on the flood flow field in the American River, California: Insights gained via large-eddy simulations.”, Gravel Bed Rivers 9 Conference, Jan. 10-15, Villarrica, Chile.
- Flora, K. (2018) “Using Computational Fluid Dynamics (CFD) as a Tool to Gain Insights Into Challenging Scour Situations.” National Hydraulic Engineering Conference, Columbus, OH.
- Flora, K. (2014) “The Benefits of Using an Acoustic Doppler Current Profiler for Hydraulic Modeling.” National Hydraulic Engineering Conference, Iowa City, IA.