



Christopher R. Goodell, P.E., D. WRE

Director of Applied Research

Mr. Goodell is the Director of Applied Research for WEST Consultants, Inc and manages the Portland Oregon Office. He has over twenty years of experience in river mechanics, sediment transport, hydraulic design, and computational hydraulic modeling and is a registered Professional Engineer in the states of Oregon, Washington, and Alaska. Mr. Goodell possesses a strong educational background in hydraulics, refined at both the International Institute for Hydraulic Engineering (UNESCO-IHE) and at the Corps of Engineers Hydrologic Engineering Center (HEC). His work experience includes watershed hydrology, hydraulic design studies on multipurpose hydropower projects, river and stream restoration, bridge hydraulics studies, flood control projects, sediment/erosion projects, hydraulic computational model development, dam breach studies, and fish passage design. He is an expert in, and was involved with the development of HEC-RAS and is competent in other hydrologic, and sediment computer modeling programs including HEC-6, HEC-HMS, HEC-ResSim, SMS, FLO-2D, and CCHE2D.

Registration

Professional Civil Engineer
Oregon No. 52293
Alaska No. 12564
Washington No. 49637

Diplomate, Water Resources
Engineer, AAWRE No. 00104

Education

M.Eng. (Hydraulic Engineering)
International Institute for
Hydraulic Engineering (IHE),
Delft, The Netherlands

B.S. (Civil Engineering) Oregon
State University

Professional Organizations

ASCE
ASDSO
EWRG-Oregon, Past President
IAHR

Instructor

Steady and Unsteady HEC-RAS

Dam Breach Analysis using
HEC-RAS

Sediment Transport Analysis
with HEC-RAS

Two-Dimensional Modeling
using HEC-RAS

Blog

www.therassolution.com

Book

"Breaking the HEC-RAS Code"

@RASModel

At WEST Consultants, Mr. Goodell worked on a sediment impact analysis of the removal of Milltown Dam in Montana and the fate and transport of slag material in the Upper Columbia River. He also completed a two-dimensional hydrodynamic model and "No Rise" analysis of the lower Willamette River for restoration along Sauvie Island. Mr. Goodell has completed many hydrologic studies, including a rainfall-runoff relationship re-evaluation for the Tennessee Valley Authority and Probable Maximum Flood development for various dam breach projects nationwide. He is a contributing author to the HEC-RAS User's Manual and Hydraulic Reference Manual and is the author of the book "Breaking the HEC-RAS Code", a manual for externally controlling and automating HEC-RAS. Mr. Goodell has worked on the Flood Risk Assessment component of the Columbia River Treaty 2014 Review Program and has worked on dam breach models for the Corps of Engineers' Modeling, Mapping, and Consequences Center (MMCC). He was also involved with a "proof of concept" study of LIFESim for the Corps' Risk Management Center (RMC). Mr. Goodell has actively taught HEC-RAS courses since 2001. He currently teaches HEC-RAS courses through ASCE and he developed the "Dam Breach Analysis using HEC-RAS" and "Two-Dimensional Modeling using HEC-RAS" courses. Mr. Goodell is the author of the popular blog site "The RAS Solution".

Prior to joining WEST Consultants, Mr. Goodell spent over two years employed by the Corps Hydrologic Engineering Center (HEC) where he served on the HEC-RAS development team. While there, he actively worked in code development and computer programming while incorporating stable channel design and sediment transport capacity functionality into HEC-RAS; he also developed the graphical user interface for the Sediment Impact Assessment Model. Mr. Goodell was a technical guidance specialist at HEC and provided consultation and advice on the use of HEC-RAS to hydraulic engineers throughout the United States and around the world. He is widely considered an expert in dam and levee breach analyses using HEC-RAS. Mr. Goodell continues to write code and develop computer programs with WEST Consultants, including MCBreach, a Monte Carlo driven probabilistic software application for dam breach modeling using HEC-RAS.

Mr. Goodell also spent over 6 years of his career with the Hydraulic Design Section at the Portland District Corps of Engineers. He worked on the design and analysis of spillways and outlet works, canals, stilling basins, fish passage facilities and other appurtenant hydraulic structures where he gained considerable experience in the use of physical and computational models. While employed at the Corps, Mr. Goodell earned his Master's Degree at the International Institute for Hydraulic Engineering in Delft, The Netherlands (UNESCO-IHE).

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INSTRUCTING EXPERIENCE

- Water Surface Profiles using HEC-RAS
- Advanced HEC-RAS
- Unsteady Flow with HEC-RAS
- Dam Breach Analysis using HEC-RAS
- Sediment Transport Analysis using HEC-RAS
- Two-Dimensional Analysis using HEC-RAS

TRAINING

- Reservoir Analysis using ResSim, Davis, CA
- CWMS Modeling for Real Time Water Management, Davis, CA
- Arctic Engineering, Seattle, WA
- Dam Failure Analysis, Association of State Dam Safety Officials, Portland, OR.
- HEC-6T, Sedimentation in Stream Networks, Sacramento, CA.
- Hivel 2D, U. S. Army Corps of Engineers Waterways Experiment Station
- Unsteady Flow with HEC-RAS, U. S. Army Corps of Engineers Hydrologic Engineering Center
- Advanced HEC-RAS, U. S. Army Corps of Engineers Hydrologic Engineering Center
- Sobek, Delft Hydraulics
- Visual Basic Programming, Sacramento CA
- Fish Passageways and Diversion Structures, Richmond, WA

SELECT PROJECT EXPERIENCE

Hydrologic Studies:

- Accelerated CWMS Deployment for Willamette River Basin
- Litigation Support for Flood Evaluation of Fishhawk Lake
- Columbia River Treaty Modified Inflows for the Lower Columbia River
- Rainfall-Runoff Relationship Investigation for Large Storm Events – Tennessee Valley Authority

Hydraulic Studies:

- Alder Creek Sauvie Island 2-D Hydraulic Analysis and No-Rise Certification
- Columbia River Treaty HEC-RAS Modeling and Review
- Kentuck Slough 2D model Restoration Project
- Truckee Meadows Flood Control Project HEC-RAS and FLO-2D Modeling
- North Sacramento Stream Survey and HEC-RAS Hydraulic Modeling
- Modification of the Sacramento River Flood Control Project HEC-RAS Model
- Napa River Bypass and Oxbow Hydraulic Design
- Cameron Run Watershed Study

Inundation Mapping, Flood Forecasting, and Flood Impact Studies:

- Application of LifeSim to Estimate Loss of Life from Levee Failure
- Accelerated CWMS Deployment for Willamette River Basin
- Berry Creek Dam Breach Inundation for Emergency Action Plan
- Walton and Three Creeks Dam Breach Inundation for Hazard Classification
- Willow Creek Dam Breach Inundation Analysis for Emergency Action Plan

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- Goodell, Christopher R., "The Effects of the Great Missoula Floods", Proceedings, 2014 World Environmental & Water Resources Congress, Portland OR, June 2014.
- Goodell, Christopher R., "The Dalles Dam – An ASCE National Historic Civil Engineering Landmark", EWRI Currents Newsletter, Volume 17, Number 2, Spring 2014.
- Goodell, Christopher R., "Moving Towards Risk-Based Dam Breach Modeling", Proceedings, Dam Safety 2013 Conference, Providence, Rhode Island, September, 2013.
- Goodell, C.R., "A Probabilistic Approach to Dam Breach Modeling", Proceedings, FloodRisk 2012 Conference, Rotterdam, The Netherlands, November, 2012.
- Goodell, Christopher R.; Froehlich, David C., "Comparison of Reservoir Routing Methods Used to Calculate Dam Breach Outflows", Presentation, World Environmental & Water Resources Congress (EWRI) 2012, Albuquerque, New Mexico, May 2012.
- Goodell, Christopher R.; Froehlich, David C., "Comparison of Dam Breach Flood Uncertainty Calculations", Presentation, United States Society on Dams 2012, New Orleans, Louisiana, April 2012.
- Froehlich, David C.; Goodell, Christopher R., "Breach of Duty (Not): Evaluating the Uncertainty of Dam-Breach Flood Predictions", Proceedings, United States Society on Dams 2012, New Orleans, Louisiana, April 2012.
- Bahner, Chris D.; Needham, Jason; Goodell, Christopher R., "Life Loss Estimates to Support Levee Safety Risk Assessment Using LifeSim", Proceedings, United States Society on Dams 2012, New Orleans, Louisiana, April 2012.
- Asbury, R. and Goodell, C., "Dam Breach Modeling using HEC-RAS and GIS", Obras y Proyectos, Edition No. 5, Universidad Catolica de la Santisima Concepcion, Concepcion, Chile, Fall 2009.
- Goodell, Christopher R.; Wahlin, Brian, "Dynamic and Level Pool Reservoir Drawdown-A Practical Comparison for Dam Breach Modeling", Proceedings, 33rd IAHR Congress, Vancouver, British Columbia, Aug 2009.
- Goodell, Christopher R.; Brunner, Gary W., "A Dam Breach Model of Epic Proportions-Simulating the Glacial Lake Missoula Floods", Proceedings, World Water Congress 2008, Honolulu, Hawaii, May 2008.
- Wahlin, Brian; Strand, Robert; Goodell, Christopher; Clemmens, Albert; Denny, Nathan, "SCADA Operator Training Tool Applied to the Central Arizona Irrigation and Drainage District", Proceedings, World Water Congress 2008, Honolulu, Hawaii, May 2008.
- Teal, Martin J.; Goodell, Christopher R., "Hawaii Technical Dam Breach Studies: Hydraulic Studies and Dam Break Scenarios", Proceedings, World Water Congress 2008, Honolulu, Hawaii, May 2008.
- Goodell, Christopher R.; Grindeland, Thomas R.; Bogavelli, Shali, "Simplified PMF Determination for Dam Breach Studies", Proceedings, Dam Safety 2007, Association of State Dam Safety Officials, Austin, Texas, September 2007.
- Goodell, Christopher R. and Swenson, Larry, "Using the HEC-RAS 4.0 Hydraulic Modeling Software to Improve Fish Passage Design for Tide Gates", American Fisheries Society Conference, San Francisco, CA, 2007.
- Goodell, C. and Warren, C., "Flood Inundation Mapping using HEC-RAS", Obras y Proyectos, Edition No. 2, Universidad Catolica de la Santisima Concepcion, Concepcion, Chile, Spring 2006.
- Novak, Susan J. and Goodell, Christopher R. "Using HEC-RAS 3.1.3 to Model and Design Tide Gate Systems", Proceedings, West Coast Symposium on the Effects of Tide Gates on Estuarine Habitats and Fishes, Charleston, OR, November 2006.

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Goodell, Christopher R.; Evans, Dale; and Bradley, Jeffrey B. "Sediment Management for Dam Removal: An HEC-6 Modeling Approach," Proceedings, Watershed Management Conference, Williamsburg, VA, July 2005.

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"Hydraulic Analysis of the Anacostia River System using HEC-RAS", Model Study Report, Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, CA, May 2003.

"HEC-RAS User's Manual, Version 3.1", Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, CA, 2003.

"HEC-RAS Hydraulic Reference Manual, Version 3.1", Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, CA, 2003.

Goodell, Christopher R. "Development of a 2-D Finite Difference Model for the Analysis of Fish Bypass Spillways". International Institute for Hydraulic Engineering (IHE), Delft, The Netherlands, September 2000.

Goodell, Christopher R. and Dach, Robert, "Development of Surface Bypass Spillway Baffles on Lower Columbia River Projects", American Fisheries Society Conference, Monterey, CA, 1997.