

Joel Stephen Sholtes, PhD, PE

Hydraulic Engineer

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Colorado Mesa University
University of Colorado, Boulder
Civil Engineering Partnership Program
Grand Junction, CO

Education

- Ph.D. Civil and Environmental Engineering, Colorado State University (2011-2015)
EPA STAR Fellow
NSF I-WATER IGERT Fellow
Dissertation Title: *On the magnitude and frequency of sediment transport in rivers*
Advisor: Brian Bledsoe, Ph.D., P.E.
- M.A. Physical Geography, University of North Carolina, Chapel Hill (2007-2009)
Environmental Fellow, UNC Institute for the Environment
Thesis Title: *Hydraulic analysis of stream restoration on flood wave propagation*
Advisor: Martin Doyle, Ph.D.
- B.S. Environmental Science, Duke University, North Carolina (2000-2004)
Graduated with distinction. Thesis Title: *Water supply watershed protection: The future of Durham, N.C.'s water supply*
Advisor: Melba (Sally) Schauman, Ph.D., R.L.A.

Professional Positions

- 2019 – Present Instructor, Civil Engineering, Colorado Mesa University – University of Colorado Boulder Partnership. Grand Junction, CO.
Teaching upper level undergraduate courses including Hydraulics, Hydrology, Advanced Surveying, Senior Design, and Statistics and Probability.
- 2016 – 2018 Hydraulic Engineer, Bureau of Reclamation, Lakewood, CO.
Work on a range of river-related design and research projects involving habitat, channel, and floodplains using hydraulic and sediment transport modelling tools. Technical lead on "Fluvial Hazard Zone" mapping program development for the State of Colorado, Colorado Water Conservation Board (\$700K budget).
- 2015 – 2016 Post-Doctoral Researcher, Colorado State University, Fort Collins, CO
Conducted research on Colorado Front Range river response to the September 2013 floods to link magnitude of channel change to mechanistic and geomorphic driving and boundary condition variables. Developed a protocol for mapping fluvial hazards in river corridors for the State of Colorado.
- 2015 – 2016 Special Advisor, Platte River Recovery Implementation Program, Kearney, NE
Technical advisor on sediment transport, geomorphic monitoring, and sediment augmentation efforts as they relate to habitat recovery in the Platte River.
- 2014 – 2016 Hydraulic Engineer (part time), Kleinschmidt and Associates, Inc.
Technical advisor on river restoration, fish passage, and geomorphic hazard related projects.
- 2009 – 2011 Watershed Scientist II, Brown and Caldwell, Inc., Atlanta, Georgia
Worked as a hydrologist, geomorphologist, and hydraulic engineer on water quality studies, TMDL implementation program development, storm water management and design, and watershed restoration planning and design.
- 2006 – 2007 Conservation Specialist, Department of Water Management, City of Durham, North Carolina
Developed water conservation programs, monitored and reported on city-wide water consumption, conducted supply and demand forecasting, partnered with institutional water users for technical extension.
- 2004 – 2005 Project Manager, Ecosystems Strategies, Inc., Poughkeepsie, New York

Software and Modelling

Scripting Languages: R, Matlab, and Python for collection, assimilation, and analysis of large datasets, geospatial data analysis and modeling, and physically-based numerical modeling.

GIS Applications: QGIS and ESRI suite for hydrologic and terrain analysis applications.

Numerical Models: Custom 1D hydraulic and sediment transport models in R and Matlab, HEC-RAS, SRH-2D (two-dimensional hydraulic and mobile bed model).

Teaching and Mentoring

- 2015 – *Present* Instructor, Geomorphic and Ecologic Foundations of Stream Restoration
Johns Hopkins University, Whiting School of Engr., Engr. for Professionals Program
Co-teaching this 3-credit online course. Developed lectures, readings, and assignments. This course covers geomorphic, hydraulic, hydrologic, sediment transport, and ecological concepts along with decision making frameworks for stream restoration design and assessment.
- 2012 – 2013 Instructor, Introduction to Hydrology. Front Range Community College, Fort Collins, CO
Created lectures and course materials for this 3-credit hour, senior-level course taught within the Natural Resources department at Front Range C.C. Taught the course for two years.
- 2014 Co-Creator and Co-Instructor of ECOL 592: Interdisciplinary Water Research Seminar, Colorado State University, Fort Collins, CO.
This seminar course brought together I-WATER IGERT students and others interested in water research issues to collaborate on interdisciplinary research projects. We prepared our own lectures and activities for the class and brought in speakers to present on strategies and examples of successful interdisciplinary collaborations. Students developed and engaged in interdisciplinary research projects over the semester.
- 2014 Master's Student Mentor, Colorado State University, Dept. Civil and Env. Engineering
Independently developed a research project, collaborated with and mentored a master's student to successfully complete the project entitled, "A comparison between rating curves generated from total and suspended bed material loads in sand bed channels" by Sam Michels-Boyce.
- 2013 Workshop Leader: Climate Change and Water Supply in the Missouri River Basin
Bridging the Gap, Inc. at Shadowcliff, Grand Lake, CO.
Created materials for and facilitated a day-long workshop on water resource issues pertaining to climate change, including collaborative learning activities with the staff of this environmental non-profit.
- 2012 – 2014 Co-Creator and Facilitator, Front Range River Retreat, Fort Collins, CO
Continuing the tradition of the "River Retreat" started by my former advisor, Martin Doyle, I worked with Front Range fluvial geomorphology and stream ecology graduate students and professors to bring together river-related research groups from geology and watershed sciences, ecology, sociology, and engineering for a daylong event. These retreats involved interdisciplinary discussions of topical issues and fostered community and collaboration.

Papers in Review, Revision, or Preparation

- Sholtes, J.S.,** Nelson P.A., Bledsoe, B.P. (*In Prep*). Defining dominant discharge: a sediment yield perspective. Target Journal: *Water Resources Research*.
- Sholtes, J.S.,** Arabi, M., Bledsoe, B.P. (*In Prep*). Quantifying uncertainty in sediment yield-based dominant discharge metrics. Target Journal: *Journal of Hydrology or Water*.
- Sholtes, J.S.,** Pitlick, J., Yochum, S.E., Scott, J.A., Bledsoe, B.P. (*In Prep*). Mapping fluvial hazards at the basin scale. Target Journal: *Natural Hazards*.

Peer Reviewed Publications

- Sholtes, J.S.**, Ubing, C., Randle, T. Fripp, J., and Cenderelli, D. (2018). Managing infrastructure in the stream environment. *Journal of the American Water Resources Association*. <https://doi.org/10.1111/1752-1688.12692>
- Sholtes, J.S.** Yochum, S.E., Bledsoe, B.P., Scott, J.A. (2018). Longitudinal variability in channel response to floods. *Earth Surface Processes and Landforms*. <https://doi.org/10.1002/esp.4472>
- Yochum, S.E., **Sholtes, J.S.**, Scott, J.A., Bledsoe, B.P. (2017). Stream power framework for predicting geomorphic change: the 2013 Colorado Front Range flood. *Geomorphology*. 292, 178-192.
- Rosburg, T.T., Nelson, P.A., **Sholtes, J.S.**, Bledsoe, B.P. (2016). Effect of flow data resolution on sediment yield estimation and channel design. *Journal of Hydrology*. 538, 429-439.
- Schook, D., E. Carlson, **J.S. Sholtes**, and D.J. Cooper (2016). Effects of moderate and extreme flow regulation on Populus growth along the Green and Yampa Rivers, CO and UT. *River Res. & Applications*. 32(8), 1698-1708.
- Sholtes, J.S.** and B.P. Bledsoe (2016) Half-yield discharge: process-based metric for predicting bankfull discharge. *Journal of Hydraulic Engineering*. 04016017.
- Sholtes, J.S.**, K. Werbylo, and B.P. Bledsoe (2014) A physical context for the theoretical approach of sediment transport magnitude-frequency analysis in alluvial channels. *Water Resources Research*. 50(10), 7900-7914.
- Sholtes, J.S.** and M.W. Doyle. (2010) Impact of channel restoration on flood wave attenuation. *Journal of Hydraulic Engineering*. 137(2), 196-208.
- BenDor, T., **J.S. Sholtes**, and M.W. Doyle. (2009) Landscape characteristics of a stream and wetland mitigation banking program. *Ecological Applications*. 19(8), 2078-2092.

Selected Conference Papers, Invited Talks (*Invited)

- *Sholtes, J.S. (2017). The geography of river management and restoration. Colorado School of Mines, Division of Economics and Business. Golden, CO.
- Sholtes, J.S., Yochum, S.E., Scott, J.A. (2016). Longitudinal variability of channel response to floods. Geological Society of America. Denver, CO.
- *Sholtes, J.S. (2015). Rivers and the built environment. Colorado State University, Civil and Environmental Engineering. Fort Collins, CO.
- *Sholtes, J.S. (2015). Defining dominant discharge for stream restoration design. Colorado Stream Restoration Network. Longmont, CO. and Bureau of Reclamation, Technical Services Center, Sedimentation and River Hydraulics Group. Lakewood, CO.
- *Sholtes, J.S. (2015). Mapping fluvial hazards. Understanding Risk Conference. World Bank Global Facility for Disaster Reduction and Recovery. Boulder, CO.
- *Sholtes, J.S. (2015). A geomorphic and mechanistic framework for characterizing river response to floods. U.S.G.S. Washington Water Science Center, Tacoma, WA.
- *Sholtes, J.S. (2015). Floods, river change, and floodplain management. Colorado State University, Department of Civil and Environmental Engineering. Environmental River Mechanics (CIVE 413).
- Sholtes, J.S. (2014). On the magnitude and frequency of sediment transport in alluvial rivers. American Geophysical Union Fall Meeting. San Francisco, CA.
- Sholtes, J.S., and B.P. Bledsoe (2013) Floods and rivers in a non-stationary world. Panel Presentation, Sustaining Colorado Watersheds Conference, Avon, CO.
- *Sholtes, J.S. (2013) Climate change, hydrology, and water supply: Missouri River and Kansas City, MO. Bridging the Gap, Inc. Workshop. Grand Lake, CO.
- Sholtes, J.S. (2012) River management under climate change: Tools for planning under uncertainty. Rocky Mountain Hydrologic Laboratory Annual Meeting. Fort Collins, CO.
- Sholtes, J.S., L. Visone, E.A. Lewallen, and L. Hawks. (2011) Measuring and modeling suspended sediment yields in urbanizing Georgia piedmont watersheds. Proceedings of the 2011 Georgia Water Resources Conference. Athens, GA.

- BenDor, T., J.S. Sholtes, and M.W. Doyle. (2008) Landscape characteristics of a stream and wetland mitigation banking program. North Carolina Water Resources Research Institute Annual Conference. Raleigh, NC.
- Sholtes, J.S. and M.W. Doyle. (2008) Effect of channel restoration on flood wave attenuation. American Geophysical Union, Fall Meeting. San Francisco, CA.

Book Chapters Technical Reports and other Publications

- Sholtes, J.S., Ubing, C., Randle, T. Fripp, J., and Cenderelli, D. (2017). Managing infrastructure in the stream environment. Advisory Committee on Water Information, Subcommittee on Sedimentation, Environment and Infrastructure Working Group. Denver, CO. 54p.
- Sholtes, J.S. and Beldsoe, B.P. (2016). River adjustment and flood hazards on the Colorado Front Range. Colorado Water Institute, Research Completion Report. Fort Collins, CO. 31p.
- Bledsoe, B.P., Baker, D., Nelson, P., Rosburg, T., Sholtes, J., Stroth, T. (2016). Design hydrology for stream restoration and channel stability at stream crossings. National Cooperative Highway Research Program (NCHRP) Project 24-40. Transportation Research Board of the National Academies of Sciences, Engineering, and Medicine. Washington, DC. 320p.
- Sholtes, J.S. and Werbylo, K. (2016). Platte River sediment transport analysis: Approach, Results & Path Forward. Platte River Recovery Implementation Program, Executive Directors Office. Kearney, NE. 13p.
- Bledsoe, B.P., **Sholtes, J.S.**, Baker, D.W. (2016) Wetland and river restoration. In Ed. V.P Singh, *Handbook of Applied Hydrology*. McGraw-Hill. 136-1 – 136-10.
- Jagt, K.F., Blazewicz, M., and Sholtes, J.S. (2015). Fluvial hazard zone delineation: A framework for mapping channel migration and erosion hazard areas in Colorado. Technical Report for Colorado Water Conservation Board, Floodplain Management Program. Denver, CO. 62p.
- Riggsbee J.A., M.W. Doyle, J.P. Julian, R.B. Manners, J. Muehlbauer, **J.S. Sholtes**, and M.J. Small (2012) The influence of aquatic organisms on in-channel processes. In: Shroder, J., Jr. and E.E. Wohl (Eds.), *Treatise on Fluvial Geomorphology*. Elsevier. 189-202.

Organized Conference Sessions and Workshops

- Wickert, A., Sutfin, N.A., Sholtes, J.S., Clubb, F. (2017). Changing the Channel: Fluvial System Response to Climate and Land-Use Change. American Geophysical Union, New Orleans, LA.
- Sholtes, J.S., Sutfin, N.A., Pitlick, J. (2016). Quantifying Geomorphic Response to Floods: from geochronologic methods to high-resolution data and state-of-the-art models. Geological Society of America. Denver, CO.
- Sholtes, J.S., Martin, D.M., Sutfin, N.A. (2014). Front Range River Retreat. Environmental Variability: Historical Range, and the (changing?) Role of Extremes. Bellevue, CO.
- Sholtes, J.S., Sutfin, N.A., Martin, D.M. (2013). Interdisciplinary research, education, and management. Front Range River Retreat. Estes Park, CO.
- Sholtes, J.S., Martin, D.M., Beckman, N. (2012). Science, Policy and River Management. Front Range River Retreat. Bellevue, CO.

Awards and Grants

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| 2018 – 2021 | PI: Side channel evolution and design: achieving sustainable habitat for aquatic species recovery. Bureau of Reclamation Science and Technology Program (\$224,000). |
| 2018 – 2019 | PI: Restoring Thermal Refuges. Bureau of Reclamation Science and Technology Program (\$28,000) |
| 2017 – 2018 | Co-PI: State of Colorado Fluvial Hazard Mapping Program (\$700,000) |
| 2015 – 2016 | Co-PI: U.S. Forest Service Challenge Cost Share Grant (\$20,000) |
| 2015 – 2016 | Co-PI: Colorado Water Institute / Colorado Water Conservation Board (\$49,500) |
| 2014 – 2015 | EPA-STAR Fellow – Air, Climate & Energy: Global Change (\$84,000) |
| 2013 | Rich Herbert Memorial Scholar Grant, American Water Resources Assoc., CO Chapter (\$4,000) |

- 2012 Edwin Eckel Memorial Fund Research Grant, Colorado Scientific Society (\$1,500)
- 2011, 2013 Borland Hydraulics Chair Scholarship, CSU Dept. of Civil and Env. Engineering (\$6,000)
- 2011 – 2014 National Science Foundation IGERT Fellowship: Integrated Water, Atmosphere Ecosystems Education and Research (I-WATER). (\$96,000)

Professional Service

- 2016 – *Present* Member of Advisory Committee on Water Information, Subcommittee on Sedimentation: Infrastructure and Environment and Climate Change and Sediment working groups.
- 2010 – *Present* Manuscript reviewer: *Restoration Ecology, Environmental Management, Earth Surface Processes and Landforms, Journal of Hydraulic Engineering, Journal of the American Water Resources Association, Science of the Total Environment.*
- 2009 – 2011 Stormwater Committee, Georgia Association of Water Professionals
Planning Committee, Georgia Watershed and Stormwater Conference, 2010.