

Joel Stephen Sholtes, PhD, PE

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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 Asst. Teaching Professor, Civil Engineering. Colorado Mesa University – University of Colorado Boulder Partnership. Grand Junction, CO.
Teaching upper-level undergraduate courses including Hydraulics, Hydrology, Advanced Surveying and GIS, Senior Design, and Statistics and Probability.
- 2016 – 2018 Hydraulic Engineer, Bureau of Reclamation, Lakewood, CO.
Worked 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 Environmental Scientist, Ecosystems Strategies, Inc., Poughkeepsie, New York

Software and Modelling

Scripting Languages: R, Matlab, and Python for collection, assimilation, and analysis of large datasets, geospatial and remote sensing data analysis, and 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, HEC-HMS, SRH-2D (two-dimensional hydraulic model).

Teaching and Mentoring

- 2019 – Present Undergraduate Research Advisor, Colorado Mesa University, Grand Junction, CO
- Streamflow estimation in Colorado ungauged basins (2019-2020): *Advising three undergraduate researchers on hydrologic research project involving field data collection of hydrologic parameters (soil moisture, stream flow, rainfall, snow metrics) on Grand Mesa, Colorado as part of small watershed monitoring project led by Stephanie Kampf, Colorado State University.*
 - Spatial and Temporal Distribution of Snowmelt and Snow Persistence in the Upper Colorado River Basin (2019-2020). Megan Kline. *Using of MODIS snow cover remotely-sensed data and digital elevation model of the Grand Mesa, Colorado to evaluate topographic controls of snow cover and inter-annual variability of snow cover and water yield.*
 - Quantifying the Hydrologic Impacts of Natural Infrastructure: Evaporative Losses in Centralized vs Distributed Storage. (2021). Christian Mendez. *Comparing reservoir evaporation to distributed evaporation from hypothetical beaver ponds in a water supply watershed using WREVP model.*
- 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 semesters.
- 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.**, Jagt K., Blazewicz M. (*In Prep*). Mapping fluvial geomorphic hazards in valley margins: the Fluvial Hazard Buffer. Target Journal: *Earth Surface Processes and Landforms*.
- 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*.

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. Jespersen, K., Lloyd, R. Holme, H., and Ventling, C. (2022). River corridor collaborations-planning and implementing cross-jurisdictional river planning and management. Riparian Restoration Conference. Grand Junction, CO.
- *Sholtes, J. (2021). Longitudinal variability of unit stream power and geomorphic response to floods with applications for river corridor management. Hydrologic Sciences and Water Resources Engineering Seminar Series, University of Colorado, Boulder.
- Sholtes, Jagt, K., Blazewicz, M., and Sturm C. (2020). The Colorado Fluvial Hazard Zone Mapping Program. Colorado Association of Stormwater and Floodplain Managers. (Online).
- Sholtes, J. (2020). Colorado and Colorado Basin Hydrology. Water Course. Ruth Powell Hutchins Water Center. Colorado Mesa University, Grand Junction, CO.
- Sholtes, J.S. Holste, N., Bradley, D.N., Ubing, C., Randle, T. (2020). Side channel evolution and design. 40th Annual Researchers Meeting of the Upper Colorado River Endangered Fish Recovery Program and the San Juan River Basin Recovery Implementation Program. Durango, CO.
- Sholtes, J.S. (2019). Endangered Species Recovery in an Urbanizing River Corridor. Sustaining Colorado Watersheds Conference, Avon, CO.
- Sholtes, J.S., Ubing, C., Knutson, M., Wilson, I. Nielsen, J. (2019). The potential for restoring thermal refuges in rivers for cold-water fishes. Federal Interagency Sedimentation and Hydrologic Modeling (SEDHYD) Conference. Reno, NV.
- Sholtes, J.S., Jagt, K., Blazewicz, M. (2019). The geography of fluvial geomorphic hazards in river corridors. Federal Interagency Sedimentation and Hydrologic Modeling (SEDHYD) Conference. Reno, NV.

- Sholtes, J.S. (2018). Managed Rivers and Native Fishes. Upper Colorado River Basin Forum. Colorado Mesa University. Grand Junction, Colorado.
- *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

- Jagt, K.F., Blazewicz, M., Sholtes, J.S., Sturm, C. (2020). Colorado fluvial hazard zone delineation protocol. Colorado Water Conservation Board. Department of Natural Resources. Denver, CO. 180p.
- 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 Bledsoe, B.P. (2016). River adjustment and flood hazards on the Colorado Front Range. Colorado Water Institute, Research Completion Report No. 238. 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., 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., Doyle, M.W., Julian, J.P., Manners, R.B., Muehlbauer, J., **Sholtes, J.S.**, 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

- Sholtes, J. (2022). Stream corridor processes and science. In: Jagt, K., Kline, M., Blazewicz, M., Sholtes, J., Boyd, K. Beyond the Line: Understanding Streams as Corridors. River Restoration Northwest Workshop.
- Sholtes, J., Ash, J., Bywater-Reyes, S., Shanahan, J. (2020). Practical Resiliency in Urban Stream Corridors Panel. CO Riparian Assoc. and CO Stream Restoration Network. aftertheflames.com/urban-stream-speakers/
- Jagt, K.F., Blazewicz, M., Sholtes, J.S., Sturm, C. (2019). Fluvial hazard zone mapping technical training workshop. Colorado Water Conservation Board and The Colorado Watershed Assembly. Avon, CO.
- 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 Received

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| 2021-2023 | PI: Hydrologic Impacts of Stream Restoration, Badger Creek, CO. Colorado Parks and Wildlife – Wildlife Habitat Program. (\$39,000) |
| 2021-2024 | Co-PI: Dolores River Adaptive Management Support – River Monitoring Program. Colorado Water Conservation Board (\$241,000) |
| 2021 | PI: The potential for headwaters restoration as a tool for water supply resilience. Undergraduate Research Opportunity Program, University of Colorado, Boulder (\$2,000) |
| 2020-2022 | Co-PI: Grand Valley River Corridor Initiative Seed Grant, Grand Junction, CO. Colorado Riverfront Foundation + Colorado Health Rivers Fund + Mighty Arrow Foundation + CWCB (\$65,000) |
| 2020 – 2023 | Co-PI: The potential for restoring thermal refuges in rivers for cold-water salmonids. Bureau of Reclamation, Pacific Northwest Region, Science and Technology Program (\$249,500) |
| 2019 – 2020 | PI: Spatial and Temporal Distribution of Snowmelt and Snow Persistence in the Upper Colorado River Basin. Student Water Research Grant. Ruth Powell Hutchins Water Center at Colorado Mesa University. (\$5,000) |
| 2019 – 2020 | Co-PI: Streamflow estimation in Colorado ungauged basins. Colorado Water Institute / Colorado Water Conservation Board. (\$50,000) |
| 2018 – 2022 | Co-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 Scoping Grants. Bureau of Reclamation Science and Technology Program (\$28,000) |

- 2017 – 2020 Co-PI: State of Colorado Fluvial Hazard Mapping Program. Colorado Water Conservation Board (\$700,000)
- 2015 – 2016 Co-PI: River Adjustment and Flood Hazards on the Colorado Front Range. U.S. Forest Service Challenge Cost Share Grant (\$20,000)
- 2015 – 2016 Co-PI: River Adjustment and Flood Hazards on the Colorado Front Range. 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 & Academic Service

- 2021 – *Present* Curriculum Committee Member, Civil, Environmental and Architectural Engineering, University of Colorado, Boulder.
- 2020 – *Present* Colorado River Initiative Executive Committee. Mesa County, CO.
- 2020 – *Present* One Riverfront Commission Board Member. Mesa County, CO.
- 2016 – 2019 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*, *Water*, *Water Resources Research*
- 2009 – 2011 Stormwater Committee, Georgia Association of Water Professionals
Planning Committee, Georgia Watershed and Stormwater Conference, 2010.