

# Mark Cable Rains

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## Education

Ph.D. (2002), Hydrologic Sciences, UC Davis, Davis, California  
M.S. (1994), Forest Resources, University of Washington, Seattle, Washington  
B.A. (1990), Ecology, Behavior, and Evolution, UC San Diego, San Diego, California

## Additional Short Course Education

Professional Development in Higher Education Leadership Program (2015-2016), University of South Florida, Tampa, Florida (80 Hours)  
State University System of Florida Department Chair's Workshop (2015), Mission Inn, Howie-in-the-Hills, Florida (24 Hours)  
The Environmental Sampling Field Course (2011), The Nielsen Environmental Field School, Anchorage, Alaska (32 Hours)  
Rainwater Harvesting (2010), American Rainwater Catchment Systems Association, Tampa, Florida (16 Hours)  
River Morphology and Applications (1996), Wildland Hydrology, Pagosa Springs, Colorado (40 Hours)  
Applied Fluvial Geomorphology (1995), Wildland Hydrology, Pagosa Springs, Colorado (40 Hours)

## Professional Experience

Professor (2016-current), Associate Professor (2009-2016) & Assistant Professor (2003-2009), School of Geosciences, University of South Florida  
Chair and Director (2015-current), School of Geosciences, University of South Florida  
Acting Associate Chair (2013 [two mo.], 2014 [two mo.]), School of Geosciences, University of South Florida  
Associate Editor for Watershed and Wetland Hydrology (2015-current) and for Aquatic Ecology (2011-2015), Journal of the American Water Resources Association  
President (2005-current), Coshow Environmental, Inc., Temple Terrace, Florida  
Vice Chairman, Board of Directors (2015-current), Lumina Youth Choirs, Tampa, Florida  
Chairman, Board of Directors (2013-2015), Tampa Bay Children's Chorus, Temple Terrace, Florida  
Member (2013-2014), Science Advisory Board Panel for the Review of the EPA Water Body Connectivity Report, U.S. Environmental Protection Agency  
Fellow (2008), Dr. Kiran C. Patel Center for Global Solutions, University of South Florida  
Postgraduate Researcher (2002-2003), Department of Land, Air, and Water Resources, University of California, Davis  
Research Assistant (1997-2002), Department of Geology, University of California, Davis  
Staff Scientist (1997-2003), David Magney Environmental Consulting, Ojai, California  
Research Associate (1995-1996), Smithsonian Environmental Research Center,

Edgewater, Maryland

Senior Associate (1996-1997), Associate (1994-1996), & Technical Assistant (1993-1994), L.C. Lee & Associates, Inc., Seattle, Washington

Research Assistant (1991-1993), College of Forest Resources, University of Washington, Seattle, Washington

**Awards and  
Certifications**

1<sup>st</sup> Place, Natural Resources/Environment Category, Future of the Region Awards (2015), Tampa Bay Regional Planning Council

Level II Scientific and Technological Achievement Award (2009), U.S. Environmental Protection Agency

Silver Telly Award in the Category of Best Use of Animation (2009), Telly Awards

Patel Faculty Research Fellow (2008), Dr. Kiran C. Patel Center for Global Solutions

Level I Scientific and Technological Achievement Award (2007), U.S. Environmental Protection Agency

Professional Wetland Scientist (Certification #1299)

Xi Sigma Pi National Honors Society of Foresters

**Professional  
Organizations**

Representative for the University of South Florida, Consortium of Universities for the Advancement of Hydrologic Science, Inc., 2004-current

American Geophysical Union

American Water Resources Association

Geological Society of America

International Association of Hydrological Sciences

National Ground Water Association

Society of Wetland Scientists

U.S. National Ramsar Committee

**Teaching  
Specialization**

I teach a variety of courses in the hydrologic sciences, including interdisciplinary courses which address the interactions between hydrology, geomorphology, ecology, and the human environment.

**Teaching  
Accomplishments**

**Undergraduate**

Course Title: GLY4822C Fluid Earth 2: Hydrogeology

Course Description: Undergraduate lecture/laboratory course in hydrogeology.

Number of Credits: 4

Number of Times Taught: 12

Course Title: GLY4947L Hydrogeology Field Methods/GLY4948L Hydrogeology Laboratory Methods

Course Description: Undergraduate field/laboratory methods courses taught simultaneously, part of the 6-credit USF Geology Summer Field School.

Number of Credits: 1/1

Number of Times Taught: 13

Course Title: GLY4780 Ecohydrology of Mexican Mangroves  
Course Description: Undergraduate field course in which students design and conduct field studies on the structure and function of mangroves and the roles they may play in maintaining traditional fishing and developing ecotourism economies.  
Number of Credits: 2  
Number of Times Taught: 3

Course Title: GLY4780 Ecohydrology Field Studies  
Course Description: Undergraduate field course in which students design and conduct ecohydrology field studies on selected topics.  
Number of Credits: 2  
Number of Times Taught: 3

Course Title: GLY4930 Water in Society and the Environment  
Course Description: Undergraduate reading/discussion course introducing students to the complex relationships among water, society, and the environment.  
Number of Credits: 2  
Number of Times Taught: 1

Course Title: GLY4930 Water in Grand Canyon  
Course Description: Undergraduate lecture/field course covering the effects of water resources development in the American West on the Colorado River in Grand Canyon. The course had two parts: 2 months of lecture/discussion at USF and a 6-day field trip on the Colorado River in Grand Canyon.  
Number of Credits: 3  
Number of Times Taught: 1

Course Title: GLY4930 Ecohydrology  
Course Description: Undergraduate lecture course covering hydrological processes along the atmosphere-plant-soil continuum and the ways in which hydrological processes control ecological structure and function in all ecosystems.  
Number of Credits: 1

Course Title: GLY4930 Fluvial Hydrology & Geomorphology  
Course Description: Undergraduate lecture course covering the mechanics of open-channel flows, primarily to understand the potential energy available to do work, and the geomorphic responses to work, including channel initiation, sediment transport, and channel adjustment.  
Number of Credits: 3  
Number of Times Taught: 3

Course Title: GLY4947L Evapotranspiration  
Course Description: Undergraduate field/laboratory methods course.  
Number of Credits: 1  
Number of Times Taught: 1

Course Title: GLY4905 Independent Study  
Course Description: Directed research for undergraduate students.  
Number of Credits: Variable  
Number of Times Taught: 3

### **Graduate**

Course Title: GLY6824 Ecohydrology  
Course Description: Graduate lecture course covering hydrological processes along the atmosphere-plant-soil continuum and the ways in which hydrological processes control ecological structure and function in all ecosystems.  
Number of Credits: 3

Number of Times Taught: 6

Course Title: GLY6573 Fluvial Hydrology & Geomorphology

Course Description: Graduate lecture course covering the mechanics of open-channel flows, primarily to understand the potential energy available to do work, and the geomorphic responses to work, including channel initiation, sediment transport, and channel adjustment.

Number of Credits: 3

Number of Times Taught: 4

Course Title: GLY6739 Topics in Ecohydrology (cross listed with BSC 6932 Topics in Ecohydrology and co-taught with Dr. Tom Crisman)

Course Description: Graduate discussion course facilitating cross-discipline interactions between graduate students across the physical and biological sciences.

Number of Credits: 1

Number of Times Taught: 6

Course Title: GLY6739 Global Biogeochemistry (co-taught with Drs. Jonathan Wynn, Matt Pasek, Tom Crisman, and Kathleen Scott)

Course Description: Graduate lecture course in biogeochemistry.

Number of Credits: 4

Number of Times Taught: 1

Course Title: GLY6739 Ecohydrology of Mexican Mangroves

Course Description: Graduate field course in which students design and conduct field studies on the structure and function of mangroves and the roles they may play in maintaining traditional fishing and developing ecotourism economies.

Number of Credits: 2

Number of Times Taught: 2

Course Title: GLY6739 Water in Society and the Environment

Course Description: Graduate reading/discussion course introducing students to the complex relationships among water, society, and the environment.

Number of Credits: 2

Number of Times Taught: 1

Course Title: GLY6739 Water in Grand Canyon

Course Description: Graduate lecture/field course covering the effects of water resources development in the American West on the Colorado River in Grand Canyon. The course had two parts: 2 months of lecture/discussion at USF and a 6-day field trip on the Colorado River in Grand Canyon.

Number of Credits: 3

Number of Times Taught: 1

Course Title: GLY6905 Independent Study

Course Description: Directed research for graduate students.

Number of Credits: Variable

Number of Times Taught: 1

**Additional Short  
Courses Taught**

Hydrogeomorphic Approach to Assessing Wetland Function (2009), Jicarilla Apache Natural Resource Department, Durango, Colorado

Hydrogeomorphic Approach to Assessing Wetland Function (2005), Jicarilla Apache Natural Resource Department, Durango, Colorado

Ecology and Management of Vernal Pool Grasslands (2003), UC Davis Extension, Davis, California

Understanding Riparian Processes (2002), UC Davis Extension, Davis, California

The Hydrogeomorphic Approach to Assessment of Functions of Waters of the U.S., Including Wetlands, in the Kenai River Watershed (1997), National Wetland Science Training Cooperative, Soldatna, Alaska

The Hydrogeomorphic Approach to Assessment of Functions of Waters of the U.S., Including Wetlands, on the Central California Coast (1996), National Wetland Science Training Cooperative, San Francisco, California

The Hydrogeomorphic Approach to Assessment of Functions of Waters of the U.S., Including Wetlands, in the Santa Margarita Watershed, California (1994), National Wetland Science Training Cooperative, Temecula, California

**Research  
Specialization**

I conduct research on (a) local- and landscape-scale hydrological connectivity, (b) geological controls on physical and chemical hydrology, (c) the roles that hydrological processes play in governing ecosystem structure and function, and (d) the role that science plays in informing water-related law and policy. I pursue these efforts in a variety of surface-water and shallow-groundwater environments, including depressional wetlands, headwater streams and mainstem rivers, and mangroves and lagoons.

**Peer-Reviewed  
Publications [Boldface  
indicates me or  
students whom I have  
advised]**

*Articles, Reports, and Book Chapters*

Golden H, Creed I, Ali G, Basu N, Neff B, **Rains M**, McLaughlin D, Alexander L, Ameli A, Christensen J, Evenson G, Jones C, Lane C, Lang M (In Review) Scientific tools for integrating geographically isolated wetlands into land management decisions. *Frontiers in Ecology and the Environment*

Creed IF, Lane CL, Alexander L, Basu NB, Calhoun A, Cohen MJ, Craft C, D'Amico E, DeKeyser E, Fowler L, Golden HE, Jawitz JW, Kalla P, Kirkman LK, Lang M, Leibowitz SG, Lewis DB, Marton J, McLaughlin DL, Raanan-Kiperwas H, **Rains MC**, Smith L, Serran JN (In Review) Enhancing protections for vulnerable waters. *Nature*

Hiatt DL, Back JA, Kostka PK, Doyle RD, Walker CM, **Rains MC**, Whigham DF, King RS (In Review) Catchment-scale alder cover controls nitrogen fixation in boreal headwater streams. *Freshwater Science*

Gutsch M, **Callahan M**, Rosenberger A, **Rains M**, Walker C, Rinella D (In Revision) Characterization of side-channel overwintering habitats for juvenile coho salmon and their effect on outmigration timing of smolts in a south-central Alaskan river. *Transactions of the American Fisheries Society*

**Stringer CE**, **Rains MC** (In Revision) Water sources in mangroves in three hydrogeomorphic settings on the Costalegre, Jalisco, Mexico. *Wetlands Ecology and Management*

**Flower HD**, **Rains MC**, Lewis DB, Zhang J-Z (Reviewed, Revised, Resubmitted) Rapid and intense phosphorus desorption with saltwater intrusion into carbonate aquifer solids. *Estuaries and Coasts*

**Callahan MK**, Whigham DF, **Rains MC**, Rains KC, King RS, Walker CM, Maurer J, Baird SJ (In Press) Nitrogen subsidies from hillslope alder stands to streamside wetlands and headwater streams, Kenai Peninsula, Alaska. *Journal of the American Water Resources Association*

**Flower H**, **Rains M**, Lewis D, Zhang J-Z, Price R (2016) Saltwater intrusion as potential driver of phosphorus release from limestone bedrock in a coastal aquifer. *Estuarine, Coastal and Shelf Science* 10.1016/j.ecss.2016.11.013

Cohen MJ, Creed IF, Alexander L, Basu N, Calhoun A, Craft C, D'Amico E, DeKeyser E, Fowler L, Golden HE, Jawitz JW, Kalla P, Kirkman LK, Lane CR, Lang M, Leibowitz SG, Lewis DB, Marton J, McLaughlin DL, Mushet D, Raanan-Kiperwas H, **Rains MC**, Smith L, Walls S (2016) Do geographically isolated wetlands impact landscape functions? *Proceedings of the National Academy of Sciences* 113:1978-1986. DOI: 10.1073/pnas.1512650113

**Flower H, Rains MC**, Lewis DB, Zhang J-Z, Price R (2016) Control of phosphorus concentration through adsorption and desorption in shallow groundwater of subtropical carbonate estuary. *Estuarine, Coastal and Shelf Science* 169:238-247 DOI: 10.1016/j.ecss.2015.10.024

**Kleindl WJ, Rains MC**, Marshall L, Hauer FR (2015) Fire and flood expand the floodplain Shifting Habitat Mosaic concept. *Freshwater Science* 34:1366-1382

**Rains MC**, Leibowitz SG, Cohen MJ, Creed IF, Golden HE, Jawitz JW, Kalla P, Lane CR, Lang MW, McLaughlin DL (2015) INVITED COMMENTARY: Geographically isolated wetlands are part of the hydrological landscape. *Hydrological Processes* 30:153-160 DOI: 10.1002/hyp.10610

Mushet DM, Calhoun AJK, Alexander LC, Cohen MJ, DeKeyser ES, Fowler L, Lane CR, Lang MW, **Rains MC**, Walls SC (2015) Geographically isolated wetlands: rethinking a misnomer. *Wetlands* DOI 10.1007/s13157-015-0631-9

**Callahan MK, Rains MC, Bellino JC**, Walker CM, Baird SJ, Whigham DF, King RS (2015) Controls on temperature in salmonid-bearing headwater streams in two common hydrogeologic settings, Kenai Peninsula, Alaska. *Journal of the American Water Resources Association* 51:84–98

Ross M, Stewart M, Trout K, **Rains M** (2014) Hydrology of a Clay Settling Area. Publication No. 03-150-251. Florida Industrial and Phosphate Research Institute, Bartow, Florida

Verhoeven JTA, Laanbroek HJ, **Rains MC**, Whigham DF (2014) Effects of increased summer flooding on nitrogen dynamics in impounded mangroves. *Environmental Management* 139:217–226

**Rains MC**, Landry S, Rains KC, Seidel V, Crisman TL (2013) Using net wetland loss, current wetland condition, and planned future watershed condition for wetland conservation planning and prioritization, Tampa Bay Watershed, Florida. *Wetlands* 33:949–963

Nilsson KA, **Rains MC**, Lewis DB, Trout KE (2013) Hydrologic characterization of 56 geographically isolated wetlands in west-central Florida using a probabilistic method. *Wetland Ecology and Management* 21:1–14

Vacher HL, Juster T, McIlrath J, **Rains M** (2012) Geology of National Parks Modules for the Spreadsheets Across the Curriculum Library. In Weber, S. (Ed.), *Proceedings of the 2011 George Wright Society Conference on Parks, Protected Areas, and Cultural Sites*. The George Wright Society, Hancock, Michigan

**Rains MC** (2011) Water sources and hydrodynamics of closed-basin depressions, Cook Inlet Region, Alaska. *Wetlands* 31:377–387

**Hammersmark CT**, Dobrowski S, **Rains MC**, Mount JF (2010) Simulated effects of stream restoration on herbaceous vegetation distribution. *Restoration Ecology* 18:882–893

Kleindl W, **Rains MC**, Hauer FR (2010) HGM is a rapid assessment: Clearing the confusion. *Wetland Science and Practice* 27:17–22

**Stringer CE, Rains MC**, Kruse S, Whigham D (2010) Controls on water levels and salinity in a barrier island mangrove, Indian River Lagoon, Florida. *Wetlands* 30:725–734

**Exner-Kittridge MG, Rains MC** (2010) A case study on the accuracy and cost/effectiveness in simulating reference evapotranspiration in west-central Florida. *Journal of Hydrologic Engineering* 15:696–703

Kish GR, **Stringer CE**, Stewart MT, **Rains MC**, Torres AE (2010) A Geochemical Mass-Balance Method for Base-Flow Separation, Upper Hillsborough River Watershed, West-Central Florida, 2003-2005 and 2009. U.S. Geological Survey Scientific Investigations Report 2010–5092. US Government Printing Office, Washington, DC

Stein ED, Brinson M, **Rains MC**, Kleindl W, Hauer FR (2010) A response to Tom Hruby. (Response to “A reply by Tom Hruby” to “Wetland assessment alphabet soup: How to choose (or not choose) the right assessment method”, *Wetland Science & Practice* 26:20–24.) *Wetland Science and Practice* 27:8–9

Stein ED, Brinson M, **Rains MC**, Kleindl W, Hauer FR (2009) Wetland assessment alphabet soup: How to choose (or not choose) the right assessment method. *Wetland Science and Practice* 26:20–24

**Hammersmark CT, Rains MC**, Wickland AC, Mount JF (2009) Vegetation – water-table relationships in a hydrologically-restored riparian meadow. *Wetlands* 29:785–797

**Murphy KE, Rains MC, Kittridge MG**, Stewart M, Ross MA (2008) Hydrological connectivity between clay settling areas and surrounding hydrological landscapes in the phosphate mining district, peninsular Florida, USA. *Journal of the American Water Resources Association* 44:980–995

**Rains MC**, Dahlgren RA, Williamson RJ, Fogg GE, Harter T (2008) Geological control of physical and chemical hydrology in vernal pools, Central Valley, California. *Wetlands* 28:347–362

**Hammersmark CT, Rains MC**, Mount JF (2008) Quantifying the hydrologic effects of stream restoration in a montane meadow environment. *River Research and Applications* 24:735–753

Leibowitz SG, Wigington, Jr. PJ, **Rains MC**, Downing DM (2008) Non-navigable streams and adjacent wetlands: addressing science needs following the Supreme Court's Rapanos decision. *Frontiers in Ecology and Environment* 6:364–371

Nadeau T-L, **Rains MC** (2007) Contribution of headwaters to downstream integrity: Introduction to the JAWRA special issue. *Journal of the American Water Resources Association* 43:1–4

Nadeau T-L, **Rains MC** (2007) Hydrological connectivity of headwaters to downstream waters: state-of-the-science and future directions. *Journal of the American Water Resources Association* 43:118–133

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2006) Geological control of physical and chemical hydrology in vernal pool wetlands, Central Valley, California. In Kovar, K, Z. Hrkal, and J. Bruthans (Eds.), *Hydrology and Ecology: The Groundwater/Ecology Connection*, 25-28. Czech Association of Hydrogeologists, Prague, Czech Republic

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2006) The role of perched aquifers in hydrological connectivity and biogeochemical processes in vernal pool landscapes, Central Valley, California. *Hydrological Processes* 20:1157–1175

**Rains MC**, Mount JF, Larsen EW (2004) Local shallow groundwater drawdown and baseflow cessation due to regional groundwater pumping. In Lowrance, R. (Ed.),

Riparian Ecosystems and Buffers: Multi-Scale Structure, Function, and Management. American Water Resources Association, Middleburg, Virginia, TPS-04-2, CD-ROM

**Rains MC**, Mount JF, Larsen EW (2004) Simulated changes in shallow groundwater and vegetation distributions under different reservoir operations scenarios. *Ecological Applications* 14:192–207

**Rains MC** (2003) Hydrogeologic principles useful in predicting the effects of stream flow alterations on shallow groundwater and associated riparian vegetation. *Stream Notes* July:3–6

**Rains MC** (2003) The role of groundwater in resource conservation efforts. *Conservation Biology* 17:933–934

**Rains MC**, Mount JF (2002) Origin of shallow ground water in an alluvial aquifer as determined by isotopic and chemical procedures. *Ground Water* 40:552–563

**Rains MC** (2000) Avoiding an Ozymandian fate. *Conservation Biology* 14:587–588

Whigham DF, Lee LC, Brinson MM, Rheinhardt RD, **Rains MC**, Mason JA, Kahn H, Ruhlman MB, Nutter WB (1999) Hydrogeomorphic (HGM) assessment - a test of user consistency. *Wetlands* 19:560–569

#### *Edited Volumes*

Nadeau T-L, **Rains MC** (Eds.) (2007) Featured Collection: Headwaters Hydrology. *Journal of the American Water Resources Association* 43

#### *Theses and Dissertations*

**Rains MC** (2002) Surface and Ground-Water Origins and Interactions and Vegetation Distributions in Riverine and Reservoir-Fringe Systems: A Case Study in Support of Reservoir Management Efforts. Ph.D. Dissertation, University of California, Davis, California

**Rains MC** (1994) Plant Community Structure Along Environmental Gradients Defined by Hydrology, Redox Potential, and Shade in Pacific Northwest Palustrine Wetlands. M.S. Thesis, College of Forest Resources, University of Washington, Seattle, Washington

**Peer-Reviewed  
Published Teaching  
Materials [Boldface  
indicates me or  
students whom I have  
advised]**

**Rains MC**, Vacher L (2012) What is the Discharge of the Congaree River at Congaree National Park? Spreadsheets Across the Curriculum, Module SSACgnp.GB.MCR1.4. Tampa: University of South Florida Libraries

Vacher L, **Rains MC**, Norris M (2011) Nitrate levels in the Rock Creek Park Watershed, Washington, DC, 2: Variability. Spreadsheets Across the Curriculum, Module SSACgnp.TD367.LV1.10. Tampa: University of South Florida Libraries

**Rains MC**, Vacher L, Norris M (2011) Nitrate levels in the Rock Creek Park Watershed, Washington, DC, 1: Measures of Central Tendency. Spreadsheets Across the Curriculum, Module SSACgnp.TD367.MCR1.5. Tampa: University of South Florida Libraries

**Rains MC** (2010) Salmon use of geomorphically restored streams at Point Reyes National Seashore. Spreadsheets Across the Curriculum, Module SSACgnp.GB661.MCR1.3. Tampa: University of South Florida Libraries

**Rains MC** (2010) Comparing stream discharge in two watersheds in Glacier National Park. Spreadsheets Across the Curriculum, Module SSACgnp.GB661.MCR1.2. Tampa: University of South Florida Libraries

**Rains MC**, Shelley DC, Vacher L (2009) Flood days and good canoeing days at



Congaree National Park. Spreadsheets Across the Curriculum, Module SSACgnp.GB.MCR1.1. Tampa: University of South Florida Libraries

**Non-Peer-Reviewed  
Technical Reports  
[Boldface indicates  
me or students whom  
I have advised]**

University of South Florida School of Geosciences (2016) Assistance to Develop Methods for the Ecohydrologic Classification and Assessment of Northern Tampa Bay and Northern District Sandhill and Xeric Wetland and Lake Types. University of South Florida, School of Geosciences, Tampa, Florida

Rains KC, **Rains MC** (2015) Mangrove and Mangrove-Fringe Wetlands in Ostional, Nicaragua: Current Conditions and Pathways Forward. University of South Florida, School of Geosciences, Tampa, Florida

Lee LC, Lis RA, Nutter WL, **Rains MC**, Stewart SR, Hurst WC (2015) US Department of Justice Expert Team Report: Duarte Nursery, Inc. et al US Army Corps of Engineers/United States v. Duarte Nursery, Inc. et al. Prepared for the Environment and Natural Resource Defense Section, U.S. Department of Justice, Washington, DC

Rodewald AD, Aldous A, Ali G, Allan JD, Benda L, Bernhardt ES, Brooks RP, Fausch K, Fennessy S, Gooseff M, Harvey J, Hawkins C, Johnson LB, Josselyn M (Resigned prior to publication), Kalin L, Kolm K, Meyer JL, Murphy M, Patten D, **Rains M**, Reddy R, Rosi-Marshall E, Stanford J, Sullivan M, Tank J, Valett M, Wohl E (2014). SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence. Prepared for the U.S. Environmental Protection Agency, Washington, DC

**Rains MC**, Landry S, Crisman T, Seidel V (2012) Prioritizing Habitat Restoration Goals in the Tampa Bay Watershed. Technical Publication #10-12 of the Tampa Bay Estuary, St. Petersburg, Florida

**Rains MC**, Rains KC, Kleindl WJ, Landry S, Crisman TL, Brown A, van Maurik L (2011) Wetland Inventory and Evaluation, St. Lucie County, Florida. Prepared for St. Lucie County, Fort Pierce, Florida

Three Parameters Plus and Coshow Environmental (2010) Baseline Physical Habitat Conditions of Wetlands in Snake Valley, Utah. Final Report: Volume 1. Prepared for the Utah Department of Natural Resources, Salt Lake City, Utah

Three Parameters Plus and Coshow Environmental (2010) Baseline Physical Habitat Conditions of Wetlands in Snake Valley, Utah. Final Report: Volume 2. Prepared for the Utah Department of Natural Resources, Salt Lake City, Utah

Bauder ET, Bohonak AJ, Hecht B, Simovich MA, Shaw D, Jenkins DG, **Rains M** (2009) A Draft Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Vernal Pool Depressional Wetlands in Southern California. San Diego State University, San Diego, California

Walker C, King R, **Rains MC**, Whigham D, Baird S, **Bellino J** (2009) Headwater Stream Wetland Settings and Shallow Ground Water Influence: Relationships to Juvenile Salmon Habitat on the Kenai Peninsula, Alaska. U.S. EPA Region 10 Wetland Program Development Program Final Report

**Rains MC** (2009) Preliminary Report on Water Levels in Various Habitats in Barrier Island Mangroves, Indian River Lagoon, Florida. Prepared for the Smithsonian Environmental Research Center, Edgewater, Maryland

**Rains MC** (2008) Preliminary Report on Water Levels in Various Habitats in Barrier Island Mangroves, Indian River Lagoon, Florida. Prepared for the Smithsonian Environmental Research Center, Edgewater, Maryland

Kleindl WJ, **Rains MC**, Hauer FR, Doskocil J, White J (2008) Jicarilla Rapid Assessment of Functions (JRAF): A Protocol for the Rapid Assessment of Functions on Riverine Floodplains in the San Juan River System. Prepared for the Jicarilla Apache Nation, Dulce, New Mexico

Ross M, Stewart M, Trout K, **Rains M** (2008) Hydrology of a Clay Settling Area: Interim Report (FIPR Project No. 03-03-150S). Prepared for the Florida Institute of Phosphate Research, Bartow, Florida

**Rains MC** (2008) Preliminary Report on the Chemical Hydrology of Surface Water and Groundwater in Barrier Island Mangroves, Indian River Lagoon, Florida. Prepared for the Smithsonian Environmental Research Center, Edgewater, Maryland

**Rains MC** (2007) Preliminary Report on the Surface-Water and Groundwater Interactions in Small Pools on the Pebble Property, South-Central Alaska. Prepared for Three Parameters Plus, Inc., Palmer, Alaska

**Rains MC** (2007) Surface and Shallow Subsurface Hydrogeology of Four Sites at the Donlin Creek Gold Project, Interior Alaska. Prepared for Three Parameters Plus, Inc., Palmer, Alaska

Larsen EW, **Rains MC** (2006) Meander Migration Model Assessment for the 50- And 100-Year Storms, Whitman Property, San Antonio Creek, Ventura County, California. Prepared for Mr. John Whitman, Ojai, California

Larsen EW, **Rains MC** (2006) Meander Migration Model Assessment for the January 2005 Storm, Whitman Property, San Antonio Creek, Ventura County, California. Prepared for Mr. John Whitman, Ojai, California

Williamson RJ, Fogg GE, **Rains MC**, Harter T (2005) Hydrology of Vernal Pools at Three Sites, Southern Sacramento Valley (FHWA/CA/IR-2004/08). Prepared for the California Department of Transportation. Sacramento, California

Lee LC, Fiedler PL, Stewart SR, Partridge DJ, Mason JA, Inlander EM, **Rains MC** (2004) Draft Operational Guidebook for Assessment of the Functions of Riverine Waters/Wetlands in the Santa Margarita Watershed, Riverside & San Diego Counties, California. San Diego Regional Water Quality Control Board, Technical Publication. San Diego, California

David Magney Environmental Consulting (2002) Bankfull Discharge, Slope, and Bed-Material Particle Size on a Sand-Bed Stream in a Semi-Arid Region: Conejo Creek at Winding Brook Farm, Camarillo, California. (PN 00-0161). Prepared for the California State Coastal Conservancy, Oakland, California

David Magney Environmental Consulting with Parametrix (2001) Surface and Ground Water Interactions Between the Jemez River, Jemez Canyon Reservoir, and the Shallow Alluvial Aquifer. (PN 01-0211). Prepared for the Pueblo of Santa Ana, Bernalillo, New Mexico

David Magney Environmental Consulting (2001) General Geology, Hydrology, and Soils of the Ojai Meadows Preserve, Ojai, California. (PN 00-0031). Prepared for the Ojai Valley Land Conservancy, Ojai, California

David Magney Environmental Consulting with GeoInsight International, Secor International, and Wildlands (2000) Calleguas Creek Watershed Restoration and Preservation Plan. (PN 97-0141). Prepared for the California Coastal Conservancy, Oakland, California and U.S. Environmental Protection Agency (Region IX), San Francisco, California

David Magney Environmental Consulting (2000) Wetland Restoration Plan and

Monitoring Program for the Reinke Property, Rolling Oaks Drive, Thousand Oaks, California. (PN 00-0132). Prepared for the U.S. Army Corps of Engineers, Ventura, California and the California Department of Fish and Game, Ventura, California

David Magney Environmental Consulting (1999) Revegetation and Monitoring Plan: Ventura River at State Route 150. (PN-98-0171). Prepared for the Ojai Valley Sanitary District, Ojai, California

David Magney Environmental Consulting (1999) Harrison Property Bank Stabilization Assessment on San Antonio Creek, Ojai Valley, California. (PN 99-0081). Prepared for the U.S. Army Corps of Engineers, Ventura, California

Lee LC, **Rains MC**, Cassin JL, Stewart SR, Post R, Brinson M, Clark M, Hall J, Hollands G, LaPlant D, Nutter W, Powell J, Rockwell T, Whigham D (1999) Operational Draft Guidebook for Reference Based Functional Assessment of the Functions of Precipitation-Driven Wetlands on Discontinuous Permafrost in Interior Alaska. State of Alaska Department of Environmental Conservation/U.S. Army Corps of Engineers Waterways Experiment Station Technical Report Number WRP-DE-\_\_\_\_, Juneau, Alaska

Lee LC, Butterwick ML, Cassin JL, Leidy RA, Mason JA, **Rains MC**, Shaw LE, White EG (1997) A Report on Assessment of the Functions of Waters of the United States, Including Wetlands, on the Borden Ranch, Sacramento and San Joaquin Counties, California. Prepared for the U.S. Environmental Protection Agency (Region IX), San Francisco, California

Lee LC, Butterwick ML, Cassin JL, Leidy RA, Mason JA, **Rains MC**, Shaw LE, White EG (1997) A Draft Guidebook for Assessment of the Functions of Waters of the U.S., Including Wetlands, on the Borden Ranch, Sacramento and San Joaquin Counties, California. Prepared for the U.S. Environmental Protection Agency (Region IX), San Francisco, California

Lee LC, Brinson MM, DeWald D, Gilbert M, Kleindl WJ, Nutter WL, **Rains MC**, Whigham DF, Whited M (1997) Operational Draft Guidebook to HGM Functional Assessments in Temporary and Seasonal Depressional Waters/Wetlands in the Northern Prairie Pothole Region. Prepared for the Natural Resources Conservation Service, Washington, DC

L.C. Lee & Associates (1997) 1996 Monitoring Report: International Paper, Ticonderoga, New York. Prepared for International Paper, Ticonderoga, New York

Lee LC, **Rains MC**, Mason JA, Kleindl WJ (1996) Draft Guidebook to HGM Functional Assessments in 3rd and 4th Order Riverine Waters/Wetlands of the Central California Coast. Prepared for the U.S. Environmental Protection Agency (Region IX), San Francisco, California

L.C. Lee & Associates (1996) Final Mitigation and Monitoring Plan: University of Washington-Bothell/Cascadia Community College Collocated Campus. Prepared for the Washington State Higher Education Coordinating Board, Olympia, Washington

L.C. Lee & Associates (1996) 1995 Monitoring Report: International Paper, Ticonderoga, New York. Prepared for International Paper, Ticonderoga, New York

L.C. Lee & Associates (1995) An Analysis of the Distribution and Jurisdictional Status of Waters of the United States, Including Wetlands, at the Proposed University of Washington-Bothell/Cascadia Community College Collocated Campus Site. Prepared for the Washington State Higher Education Coordinating Board, Olympia, Washington

L.C. Lee & Associates (1995) 1994 Monitoring Report: International Paper, Ticonderoga, New York. Prepared for International Paper, Ticonderoga, New York

Lee LC, Brinson MM, Nutter WL, **Rains MC**, Olsen EA, MacLeod NA (1994) A

Preliminary Framework for Assessing the Waters of the U.S., Including Wetlands, in the Santa Margarita Watershed, Riverside and San Diego Counties, California. Prepared for the U.S. Environmental Protection Agency (Region IX), San Francisco, California

**Presentations and Posters [Boldface indicates me or students whom I have advised]**

*National and International Meetings*

Golden HE, Creed IF, Ali G, Basu NB, **Rains MC**, Alexander LC, Ameli A, Christensen J, Evenson GR, Jones CN, Lane C, Lang MW, Mclaughlin DL, Neff BP (2016) Integrating wetland connectivity into models for watershed-scale analyses: Current and future approaches. 2016 American Geophysical Union Fall Meeting, San Francisco, California

Nocita B, Connor C, Herbert G, **Rains M**, Rodriguez E, Ryan J, and Vacher HL (2016) How a Geology Alumni Society and Professional Community Contribute to the Preparation of Graduate Students for a Geoscience Career at the University of South Florida. Geological Society of America 2016 Annual Meeting, Denver, Colorado

Leibowitz SG, **Rains MC**, Creed IF, Hill RA, Weber MH, Aldred D, Jones CE, Christensen JR (2016) INVITED: Wetland Hydrological Connectivity: A Classification Approach and North American Assessment. 10th INTECOL International Wetlands Meeting, Changshu, China

**Rains MC** (2016) INVITED: Geographically Isolated Wetlands are Part of the Hydrologic Landscape. 10<sup>th</sup> INTECOL International Wetlands Meeting, Changshu, China

**Rains MC** (2016) INVITED: On Classification and Similarity: How Much Do We Really Know? Society of Wetland Scientists Annual Meeting, Corpus Christi, Texas

Leibowitz SG, **Rains MC (Presenter)** (2016) INVITED: Wetland Connectivity: Introduction and Relevance to Texas Coastal Plain Depressional Wetlands. Society of Wetland Scientists Annual Meeting, Corpus Christi, Texas

Thorslund J, Cohen MJ, Jarsjo J, Jawitz JW, **Rains MC** (2015) Exploring wetland connectivity at the catchment scale: a coupled hydro-chemical modeling approach. 2015 American Geophysical Union Fall Meeting, San Francisco, California

**Flower H, Rains MC**, Lewis DB, Zhang J-Z, Price R (2015) Control of phosphorus concentration through adsorption and desorption in shallow groundwater of a carbonate estuary. Society of Wetland Scientists 36<sup>th</sup> Annual Meeting, Providence, Rhode Island

Cohen MJ, Creed IF, Basu NB, Jawitz JW, Mclaughlin DL, **Rains MC** (2014) A continuum of connectivity: Geographically isolated wetlands and the conservation of landscape functions. American Geophysical Union Fall Meeting, San Francisco, California

Silvestri S, Oostdijk M, Laanbroek HJ, **Rains M**, Verhoeven JTA, Whigham DF (2014) Using remote sensing to study mangroves spatial dynamics under increased nitrogen availability and lower salinity conditions. American Geophysical Union Fall Meeting, San Francisco, California

**Rains MC**, McLaughlin DL, Cohen MJ, Golden HE, Jawitz JW, Kalla P, Lang M, Leibowitz SG, Raanan Kiperwas H (2014) Geographically isolated wetlands as part of the hydrologic landscape. Joint Aquatic Sciences Meeting 2014, Portland, Oregon

**Callahan MK**, Whigham DF, **Rains MC**, King RS, Walker CM, Maurer JR, Baird SJ (2014) Nitrogen subsidies from hillslope alder stands to streamside wetlands and headwater streams, Kenai Peninsula, Alaska. Joint Aquatic Sciences Meeting 2014, Portland, Oregon

Rains KC, **Rains MC**, Landry SM, Seidel V, Crisman TL (2014) Using net wetland loss, current wetland condition, and planned future watershed condition for wetland

conservation prioritization, Tampa Bay watershed, Florida. Joint Aquatic Sciences Meeting 2014, Portland, Oregon

**Kleindl WJ, Rains MC**, Hauer FR, Marshall L (2014) Hydrologic, geomorphic, and anthropogenic drivers of floodplain/riparian patch diversity. Joint Aquatic Sciences Meeting 2014, Portland, Oregon

Laanbroek HJ, Verhoeven JT, Whigham DF, **Rains MC** (2014) Seasonal flooding of a mangrove dominated impoundment – effects on N cycling. Joint Aquatic Sciences Meeting 2014, Portland, Oregon

Leibowitz SG, **Rains MC** (2013) INVITED: A conceptual model for evaluating hydrologic connectivity in geographically isolated wetlands. American Geophysical Union 2013 Fall Meeting, San Francisco, California

**Rains MC** (2013) INVITED: Hydrologic complexity and connectivity in geographically isolated wetland systems. Society of Wetland Scientists 34<sup>th</sup> Annual Meeting, Duluth, Minnesota

**Rains MC, Murphy K, Pechenik N, Kittridge M**, Stewart M, Trout K, Ross M (2012) INVITED: Hydrology of clay settling areas and surrounding landscapes in the phosphate mining district, peninsular Florida. 9<sup>th</sup> INTECOL International Wetlands Conference, Orlando, Florida

Akiwumi FA, Lewis DB, Landry SM, Zarger RK, **Rains MC**, Nilsson KA, Adjei CO, Feit SJ, Larson GM, Perkerson RB, Thurman PE, Crisman TL, Bell SS, Trettin CC (2012) Urban development, power relations, and water redistribution as drivers of wetland change in the Tampa Bay Region Socioecosystem. American Association of Geographers Annual Meeting, New York, New York

Verhoeven JTA, Laanbroek R, **Rains M**, Whigham DF (2011) Effects of enhanced water level fluctuations on nitrogen dynamics of impounded mangroves. Joint Meeting of the Society of Wetland Scientists, WEPOL, and Wetland Biogeochemistry Symposium, Prague, Czech Republic

Lewis DB, Zarger RK, Landry SM, Akiwumi FA, **Rains MC**, Crisman TL, Bell SS, Trettin C (2011) Urban development, power relations, and water redistribution as drivers of wetland change in the Tampa Bay Region Socioecosystem. 2011 US Regional Association of the International Association of Landscape Ecologists Symposium, Portland, Oregon

Lewis DB, Zarger RK, Landry SM, Akiwumi FA, **Rains MC**, Nilsson KA, Adjei CO, Feit SJ, Larsen GM, Perkerson RB, Thurman PE, Crisman TL, Bell SS, Trettin CC (2011) Urban development, power relations, and water redistribution as drivers of wetland change in the Tampa Bay Region Socioecosystem. Ecological Society of America 96<sup>th</sup> Annual Meeting, Austin, Texas

Vacher HL, McIlrath J, Juster T, **Rains M**, Iverson E (Presentation: **M. Rains**, Poster design: **A. Fishinger** and J. McIlrath) (2011) University Of South Florida, Geology of National Parks: Spreadsheets, quantitative literacy, and natural resources. 2011 CCLI/TUES Principal Investigators Conference, Washington, DC

**Callahan MK, Bellino J, Rains MC** (2010) Trends and controls on summer surface-water temperatures in salmonid-bearing headwater streams in two common geomorphic settings, Kenai Peninsula, Alaska. American Geophysical Union 2010 Fall Meeting, San Francisco, California

McIlrath J, Juster T, **Rains M**, Vacher HL (2010) Spreadsheets across the curriculum modules to infuse quantitative literacy and environmental-geologic content into an online geology of national parks course. Geological Society of America 2010 Annual Meeting,

Denver, Colorado

**Rains MC** (2009) Water sources and hydrodynamics of closed-basin depressions, south-central Alaska. Society of Wetland Scientists 2009 Annual Meeting, Madison, Wisconsin

**McCarten N, Rains MC, Harter T** (2009) Ecohydrology of vernal pool wetland ecosystems. HydroEco2009, International Multidisciplinary Conference on Hydrology and Ecology: Ecosystems Interfacing with Groundwater and Surface Water, Vienna, Austria

**Stringer CE, Rains MC, Kruse S, Whigham D, Verhoeven JTA, Laanbroek R** (2008) Linkages between surface and subsurface hydrology and ecological functioning of mangrove systems in Ft. Pierce, Florida. American Geophysical Union 2008 Fall Meeting, San Francisco, California

**McCarten N, Rains MC, Harter T** (2008) Seasonal, variably saturated flows in a vernal pool wetland ecosystem. American Geophysical Union 2008 Fall Meeting, San Francisco, California

Whigham DF, Baird SJ, Field C, Walker C, King RS, Back JA, **Rains MC, Bellino J** (2008) Headwater wetlands of the Kenai Lowlands, Alaska. Society of Wetland Scientists 29<sup>th</sup> Annual Meeting, Washington, DC

**Murphy KE, Rains MC, Kittridge MG, Stewart MT, Ross MA** (2007) Hydrological connectivity between clay settling areas and surrounding hydrological landscapes, peninsular Florida, USA. American Water Resources Association 2007 Annual Conference, Albuquerque, New Mexico

**Kittridge MG, Rains MC** (2007) Cost/effectiveness analysis of obtaining operational estimates of reference evapotranspiration, peninsular Florida, USA. American Water Resources Association 2007 Annual Conference, Albuquerque, New Mexico

Whigham DF, Feller I, **Stringer C, Rains M, Verhoeven JTA, van der Ven P, Baas P** (2007) INVITED: Linkages between surface hydrology and ecological functioning of mangrove ecosystems in Ft. Pierce, Florida. International Association of Landscape Ecologists 2007 World Congress, Wageningen, The Netherlands

**Rains MC, Dahlgren RA, Fogg GE, Harter T, Williamson RJ** (2007) INVITED: Geological control of physical and chemical hydrology in vernal pool wetlands, Central Valley, California. Society of Wetland Scientists 28<sup>th</sup> Annual Meeting, Sacramento, California

Leibowitz SG, Wigington PJ, **Rains MC, Downing DM** (2007) A conceptual framework for addressing information needs following the US Supreme Court's Rapanos and Carabell decisions. Society of Wetland Scientists 28<sup>th</sup> Annual Meeting, Sacramento, California

**Hammersmark CT, Rains MC, Mount JF** (2007) Hydrologic effects of a pond and plug stream restoration in a mountain meadow. Society of Wetland Scientists 28<sup>th</sup> Annual Meeting, Sacramento, California

**Stringer CE, Rains MC, Whigham D, Feller I, Verhoeven JTA** (2007) Controls on the chemical hydrology and associated ecological structure and function in mangroves, Indian River Lagoon, Florida. Society of Wetland Scientists 28<sup>th</sup> Annual Meeting, Sacramento, California

**Stringer CE, Rains MC, Whigham D, Feller I, Verhoeven JTA** (2006) INVITED: Linkages between surface and subsurface hydrology and ecological functioning of mangrove ecosystems in Ft. Pierce, Florida. Geological Society of America Annual Meeting and Exposition, Philadelphia, Pennsylvania

**Rains MC, Fogg GE, Harter T, Dahlgren RA, Williamson RJ** (2006) INVITED: Perched aquifer control of hydrogeological and biogeochemical processes in vernal pool landscapes, Central Valley, California. Geological Society of America Annual Meeting

and Exposition, Philadelphia, Pennsylvania

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2006) Geological control of physical and chemical hydrology in vernal pool wetlands, Central Valley, California. HydroEco2006, International Conference on Hydrology and Ecology: The Groundwater/Ecology Connection, Karlovy Vary, Czech Republic

Nadeau T-L, **Rains MC** (2005) INVITED: How science can inform Clean Water Act jurisdiction and policy after SWANCC: Hydrological and ecological connectivity. American Water Resources Association 2005 Annual Meeting, Seattle, Washington

**Rains MC**, Dahlgren RA, Fogg GE, Harter T, Williamson RJ (2005) INVITED: Hydrologic-soil interactions in vernal pool wetlands with claypans versus duripans. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America International Annual Meeting, Salt Lake City, Utah

**Rains MC**, Williamson RJ, Fogg GE, Harter T, Dahlgren RA (2005) Geological control of physical and chemical hydrology in vernal pools, Central Valley, California. Society of Wetland Scientists 26<sup>th</sup> Annual Meeting, Charleston, South Carolina

Suwannee River Watershed Hydrologic Observatory Design Team (2004) INVITED: The Suwannee River Hydrologic Observatory: A subtropical coastal plain watershed in transition. American Geophysical Union 2004 Fall Meeting, San Francisco, California

**Rains MC**, Williamson RJ, Fogg GE, Harter T, Dahlgren RA (2004) Geological control of physical and chemical hydrology in vernal pools, Central Valley, California. American Geophysical Union 2004 Fall Meeting, San Francisco, California

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2004) Hydrological and biogeochemical connectivity between uplands, vernal pools, and streams, Great Central Valley, California. Society of Wetland Scientists 25<sup>th</sup> Annual Meeting, Seattle, Washington

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2003) Hydrological and biogeochemical connectivity between uplands, vernal pools, and streams, Great Central Valley, California. American Geophysical Union 2003 Fall Meeting, San Francisco, California

**Rains MC**, Mount JF, Larsen EW (2003) Simulated changes in shallow groundwater and vegetation distributions under different reservoir operations scenarios. Society of Wetland Scientists 24<sup>th</sup> Annual Meeting, New Orleans, Louisiana

**Rains MC**, Mount JF (2001) Origin of shallow ground water supporting regionally-unique riparian plant and wildlife habitats as determined by isotopic and chemical procedures. American Geophysical Union 2001 Fall Meeting, San Francisco, California

**Rains MC** (2001) Regional ground water discharge as the dominant source of late season shallow ground water in riverine and reservoir fringe wetlands. Society of Wetland Scientists 22<sup>nd</sup> Annual Meeting, Chicago, Illinois

**Rains MC** (1999) Surface and ground water interactions between a stream, a reservoir, and a shallow alluvial aquifer: implications for restoration and management. Society of Wetland Scientists 20<sup>th</sup> Annual Meeting, Norfolk, Virginia

**Rains MC**, Lee LC, Butterwick M, Stein E, Mason JA, Kleindl WJ (1997) Development of a draft guidebook to HGM functional assessments in riverine waters/wetlands of the Santa Margarita watershed. Society of Wetland Scientists 18<sup>th</sup> Annual Meeting, Bozeman, Montana

**Rains MC**, Lee LC, Fiedler PL, Kleindl WJ, Mason JA (1997) Development of a draft guidebook to HGM functional assessments in riverine waters/wetlands of the central

California coast. Society of Wetland Scientists 18<sup>th</sup> Annual Meeting, Bozeman, Montana

**Rains MC** (1997) INVITED: Examples and experiences in building reference: When the rubber hits the road. Association of State Wetland Managers National Workshop and Symposium on the Future of Wetland Assessment: Applying Science Through the Hydrogeomorphic Assessment Approach and Other Approaches, Annapolis, Maryland

**Rains MC**, Lee LC, Butterwick M, Stein E, Mason JA, Kleindl WJ (1997) Development of a draft guidebook to HGM functional assessments in riverine waters/wetlands of the Santa Margarita watershed. National Workshop and Symposium on the Future of Wetland Assessment: Applying Science Through the Hydrogeomorphic Assessment Approach and Other Approaches, Annapolis, Maryland

**Rains MC**, Brinson MM, Clark M, Coshow KA, Hall J, Hollands G, Kleindl WJ, LaPlant D, Lee LC, Nutter WL, Post R, Powell J, Rockwell T, Whigham D (1997) Development of a draft guidebook to HGM functional assessments in precipitation-driven wetlands on discontinuous permafrost in interior Alaska. Association of State Wetland Managers National Workshop and Symposium on the Future of Wetland Assessment: Applying Science Through the Hydrogeomorphic Assessment Approach and Other Approaches, Annapolis, Maryland

**Rains MC**, Lee LC, Mason JA (1997) Development and use of a reference system in restoration of riverine and depressional waters/wetlands in the Puget Sound Lowlands. Association of State Wetland Managers National Workshop and Symposium on the Future of Wetland Assessment: Applying Science Through the Hydrogeomorphic Assessment Approach and Other Approaches, Annapolis, Maryland

**Rains MC**, Lee LC, Braatne JH, Mason JA (1995) An evaluation of the hydrogeomorphic approach for assessing forested wetland functions in the Puget Sound Lowlands. Society for Ecological Restoration 1995 International Conference, Seattle, Washington

**Rains MC** (1995) Vegetation zonation along hydrologic gradients in beaver pond wetlands. Society of Wetland Scientists 16<sup>th</sup> Annual Meeting, Boston, Massachusetts

*Regional Meetings, Seminars, and Colloquia*

**Rains MC**, McNutt SR (2015) The Pebble Mine, Alaska: hydrology and hazards. University of South Florida, Tampa, Florida

**Rains MC** (2015) Water sources and hydrodynamics of closed-basin depressions, Cook Inlet Region, Alaska. University of Maryland-Baltimore County, Catonsville, Maryland

**Rains MC** (2014) Water sources and hydrodynamics of closed-basin depressions, Cook Inlet Region, Alaska. Joseph E. Jones Ecological Research Center, Ichauway, Georgia.

**Rains MC**, on Behalf of the Scenarios and Modeling Cross-Cutting Theme (2014) Scenarios and Modeling Cross-Cutting Theme. 2014 FCE LTER All Scientists Meeting, Miami, Florida

**Rains MC**, Landry S, Rains KC, Seidel V, Crisman TL (2013) Net Wetland Loss (1950s-2007) and Current Wetland Condition (2007), Tampa Bay Watershed, Florida. Joint Scientific Meeting of the Society of Wetland Scientists South Atlantic Chapter, Florida Association of Environmental Soil Scientists, and Southwest Chapter of the Florida Association of Environmental Professionals, Tampa, Florida

**Rains MC**, Landry S, Rains KC, Seidel V, Crisman TL (2013) Using Wetland Loss, Current Wetland Condition, and Planned Future Condition for Wetland Conservation Planning And Prioritization, Tampa Bay Watershed, Florida. Joint Scientific Meeting of the Society of Wetland Scientists South Atlantic Chapter, Florida Association of Environmental Soil Scientists, and Southwest Chapter of the Florida Association of



Environmental Professionals, Tampa, Florida

**Rains MC** (2013) INVITED PANELIST: Jobs, Jobs, Jobs. Joint Scientific Meeting of the Society of Wetland Scientists South Atlantic Chapter, Florida Association of Environmental Soil Scientists, and Southwest Chapter of the Florida Association of Environmental Professionals, Tampa, Florida

**Rains MC**, on Behalf of the Scenarios and Modeling Cross-Cutting Theme (2013) Scenarios and Modeling Cross-Cutting Theme. 2013 FCE LTER All Scientists Meeting, Miami, Florida

**Rains MC**, Landry S, Rains KC, Seidel V, Crisman TL (2013) Using Wetland Loss, Current Wetland Condition, and Planned Future Condition for Wetland Conservation Planning And Prioritization, Tampa Bay Watershed, Florida. Environmental Research Interdisciplinary Colloquium, University of South Florida, Tampa, Florida

**Rains MC**, on Behalf of the Scenarios and Modeling Cross-Cutting Theme (2012) Scenarios and Modeling Cross-Cutting Theme. 2012 FCE LTER All Scientists Meeting, Miami, Florida

**Rains MC, Stringer CE, Fishinger A, Vacher HL** (2011) Breakout Session—Teaching with Spreadsheet Modules: Geology of National Parks, Parts I and II. 2011 Appalachian College Association Summit, Asheville, North Carolina

**Rains MC** (2011) Geological control of physical and chemical hydrology in vernal pools, Central Valley, California. University of Central Florida, Orlando, Florida

**Rains MC** (2011) Water sources and hydrodynamics of closed-basin depressions, Cook Inlet Region, Alaska. Florida Atlantic University, Boca Raton, Florida

**Rains MC, Murphy K, Pechenik N, Exner-Kittridge M, Stewart M** (2010) Hydrology of clay settling areas and surrounding landscapes in the phosphate mining district, peninsular Florida. 2010 Water Institute Symposium, Gainesville, Florida

**Brewer LD, Stringer CE, Voytenko D, Kruse S, Rains MC** (2010) Terrain conductivity and spatial variability in a mangrove under two different hydrologic conditions, Indian River Lagoon, Florida. Northeastern Section (45th Annual) and Southeastern Section (59th Annual) Joint Meeting, Baltimore, Maryland

**Rains MC** (2009) Balancing water resources between human and natural users in coastal environments. Workshop ANID, Paso Pacifico, and International Institute of Tropical Forestry, Managua, Nicaragua

**Rains MC** (2009) Water sources and hydrodynamics of closed-basin depressions, southcentral Alaska. East Carolina University, Greenville, North Carolina

**Rains MC** (2009) Water sources and hydrodynamics of closed-basin depressions, southcentral Alaska. University of South Florida, Tampa, Florida

**Rains MC** (2008) Water sources and hydrodynamics of closed-basin depressions, southcentral Alaska. University of Florida, Gainesville, Florida

**Rains MC** (2008) Balancing limited water resources in coupled human-natural systems: A case study on the Costa Alegre, Mexico. United Nations Association of the USA Tampa Bay Chapter, Tampa, Florida

**Stringer CE, Rains MC, Kruse S, Whigham D, Verhoeven JTA, Laanbroek R** (2008) Controls on the chemical hydrology and associated ecological structure and function of mangroves, Indian River Lagoon, Florida. 2008 Water Institute Symposium, Gainesville, Florida

**Rains MC** (2008) Conservation of coupled human-mangrove systems: Research,

teaching, and capacity building on the Costa Alegre, Mexico. Meeting of the Friends of the Patel Center for Global Solutions, Tampa, Florida

**Rains MC** (2007) Ecohydrology of Mexican mangroves: Research, teaching, and community outreach on the Costa Alegre, Mexico. University of South Florida, Tampa, Florida

**Rains MC** (2006) INVITED PANELIST: A review of the state of the science. Regional Science Workshop on Headwaters and Associated Wetlands in the Mid-Atlantic Highlands Region, U.S. Environmental Protection Agency Region 3, Philadelphia, Pennsylvania

**Rains MC** (2006) INVITED PANELIST Too much, too little, just right: Optimum hydrologic regimes for the natural system. The Everglades Coalition 21<sup>st</sup> Annual Conference, Hutchinson Island, Florida

**Rains MC**, Williamson RJ, Fogg GE, Harter T, Dahlgren RA (2006) Geological control of physical and chemical hydrology in vernal pools, Central Valley, California. University of Florida, Gainesville, Florida

**Rains MC**, Williamson RJ, Fogg GE, Harter T, Dahlgren RA (2006) Geological control of physical and chemical hydrology in vernal pools, Central Valley, California. University of Nevada, Reno, Nevada

**Rains MC**, Mount JF, Larsen EW (2005) The effects of reservoir operations on shallow groundwater and vegetation distributions in reservoir-fringe ecosystems. University of South Florida, Tampa, Florida

**Rains MC, Stringer C**, Whigham D, Feller I, Megonigal P, Verhoven J (2005) Hydrological controls on ecological functions in mangrove systems, Indian River Lagoon, Florida. SFWMD/USGS Cooperative Program - Coastal (Northern) Issues Meeting, West Palm, Florida

**Rains MC**, Mount JF, Larsen EW (2004) The effects of reservoir operations on shallow groundwater and vegetation distributions in reservoir-fringe ecosystems. Wetlands Hydrology Workshop, Tampa Bay Water, Clearwater, Florida

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2004) What is ecohydrology? A definition and case study. 2004 University of South Florida Geology Alumni Society & Geology Department Internship Symposium, Tampa, Florida

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2004) Geological control of hydrological, biogeochemical, and biological processes in vernal pool landscapes, Central Valley, California. University of South Florida, Tampa, Florida

**Rains MC**, Fogg GE, Harter T, Dahlgren RA, Williamson RJ (2003) Geological control of ecological structure and function in vernal pool wetlands, Central Valley, California. University of South Florida, Tampa, Florida

**Rains MC**, Mount JF, Larsen EW (2003) The effects of reservoir operations on shallow groundwater and vegetation distributions in reservoir-fringe ecosystems. University of South Florida, Tampa, Florida

**Rains MC**, Mount JF, Larsen EW (2003) The effects of reservoir operations on shallow groundwater and vegetation distributions in reservoir-fringe ecosystems. New Mexico Tech, Socorro, New Mexico

**Rains MC**, Mount JF, Larsen EW (2003) The effects of reservoir operations on shallow groundwater and vegetation distributions in reservoir-fringe ecosystems. UC Davis, Davis, California

**Rains MC**, Ewing KE (1994) Plant community structure along environmental gradients defined by hydrology, redox potential, and shade in Pacific Northwest palustrine wetlands. University of Washington, Seattle, Washington

#### Recent Academic Funding

Title: Kenai Lowlands Salmon Research Synthesis and Design of Tools for Integrated Watershed Management  
Source of Funding: National Center for Ecological Analysis and Synthesis  
Investigators: PI – C. Walker (Kachemak Bay National Estuarine Research Reserve); co-PIs – **M.C. Rains**, D. Whigham (Smithsonian Environmental Research Center), R. King (Baylor University), C. Simenstad (University of Washington)  
Total Amount of Funding: \$182,000  
Project Start and End Dates: January 2017-June 2018

Title: Academic Affiliation Agreement with USF and FGCU  
Source of Funding: Florida Gulf Coast University  
Investigators: PI – **M.C. Rains**  
Total Amount of Funding: \$15,000  
Project Start and End Dates: July 2016-June 2017

Title: Assistance to Develop Methods for the Ecohydrologic Classification and Assessment of Northern Tampa Bay and Northern District Sandhill and Xeric Wetland and Lake Types  
Source of Funding: Southwest Florida Water Management District  
Investigators: PI – **M.C. Rains**; co-PI – S. Kruse  
Total Amount of Funding: \$32,000  
Project Start and End Dates: January 2015-December 2016

Title: North American Analysis and Synthesis on the Connectivity of “Geographically Isolated Wetlands” to Downstream Waters  
Source of Funding: US Geological Survey/National Science Foundation  
Investigators: PI – D. Mushet (USGS), C. Lane (EPA), **M.C. Rains**, and S. Leibowitz (EPA)  
Total Amount of Funding: \$43,000  
Project Start and End Dates: October 2014-September 2016

Title: Co-Leading and Participating in the Scenarios and Modeling Cross-Cutting Theme of the Florida Coastal Everglades Long-Term Ecological Research Program (Subcontract to FCE LTER III: Coastal Oligotrophic Ecosystems Research, \$3,360,000)  
Source of Funding: National Science Foundation  
Investigators: PI – **M.C. Rains**  
Total Amount of Funding: \$355,000  
Project Start and End Dates: December 2012-November 2018

Title: Development of a System for Measuring Baseline and Past Conditions of a Mangrove Wetland  
Source of Funding: Paso Pacifico  
Investigators: PI – **M.C. Rains**; co-PI – K. Rains  
Total Amount of Funding: \$9,000  
Project Start and End Dates: July 2015-December 2015

Title: RAPID: Climate Change Vulnerability in the Tampa Bay Region Socioecosystem  
Source of Funding: National Science Foundation  
Investigators: PI – R.K. Zarger; co-PIs – D. Lewis, **M.C. Rains**, S. Landry, F.A. Akiwumi, and S. Bell

Total Amount of Funding: \$89,000  
Project Start and End Dates: September 2012-August 2013

Title: ULTRA-Ex: Urban Development, Power Relations, and Water Redistribution as Drivers of Wetland Change in the Tampa Bay Urban Ecosystem  
Source of Funding: National Science Foundation  
Investigators: PI – D.B. Lewis; co-PIs – F.A. Akiwumi, T.L. Crisman, **M.C. Rains**, R.K. Zarger  
Total Amount of Funding: \$289,000  
Project Start and End Dates: January 2010-June 2013

Title: Characterization of Microhabitat Complexity of Juvenile Coho Overwintering Habitats in the Kenai Peninsula, Alaska  
Source of Funding: Alaska Department of Fish & Game  
Investigators: PI – **M.C. Rains**  
Total Amount of Funding: \$26,000  
Project Start and End Dates: June 2012-May 2013

Title: Sustainable Water Resources Development, Miches, Dominican Republic  
Source of Funding: The Rotary Clubs of San Pedro de Macoris, Clearwater, and Dunedin North; Rotary District 6950; and The Rotary International Foundation  
Investigators: PIs – **M.C. Rains**, T. Crisman  
Total Amount of Funding: \$61,000  
Project Start and End Dates: September 2011-Completion

Title: Groundwater Discharge to Salmon-Bearing Headwater Streams, Kenai Peninsula, Alaska II (Subcontract to Headwater Stream Rearing Habitat, \$303,000)  
Source of Funding: Alaska Sustainable Salmon Fund  
Investigators: PI – **M.C. Rains**  
Total Amount of Funding: \$26,000  
Project Start and End Dates: May 2010-September 2012

Title: Wetland Inventory and Evaluation Study  
Source of Funding: St. Lucie County, Florida  
Investigators: PI – **M.C. Rains**; co-PI – T. Crisman  
Total Amount of Funding: \$85,000  
Project Start and End Dates: April 2010-November 2013

Title: Water-Quality Sampling, Training, and Capacity Building on the North-East Coast of the Dominican Republic  
Source of Funding: USF Institute for the Study of Latin America and the Caribbean  
Investigators: PIs – **M.C. Rains**, T. Crisman  
Total Amount of Funding: \$6,000  
Project Start and End Dates: January 2010-December 2010

Title: Changes in Groundwater Discharge to the Oligotrophic Ecotone (Subcontract to FCE LTER II: Coastal Oligotrophic Ecosystems Research, \$1,744,000)  
Source of Funding: National Science Foundation  
Investigators: PI – **M.C. Rains**  
Total Amount of Funding: \$30,000  
Project Start and End Dates: November 2009-October 2010

Title: Development of a Coordinated Watershed Approach for Linking Compensatory Mitigation and Tampa Bay Habitat Restoration Goals  
Source of Funding: Tampa Bay Estuary Program  
Investigators: PI – T. Crisman; co-PIs – S. Bell, S. Landry, **M.C. Rains**, and M. Stewart

Total Amount of Funding: \$95,000  
Project Start and End Dates: July 2009-March 2012

Title: Geology of National Parks: Spreadsheets, Quantitative Literacy, and Natural Resources

Source of Funding: National Science Foundation

Investigators: PI – H.L. Vacher; co-PIs – **M.C. Rains**, J. Harden, and T. Juster

Total Amount of Funding Requested: \$197,000

Project Start and End Dates: January 2009-December 2010

Title: FCE LTER II – Supplement for International Collaboration with the Ecosistemas Arrecifales del Pacifico Program of the Mexican ILTER Network (Supplemental to FCE LTER II: Coastal Oligotrophic Ecosystems Research, \$1,744,000)

Source of Funding: National Science Foundation

Investigators: PI – **M.C. Rains**; Sr. Personnel – Francisco de Asís Silva Bátiz, Enrique Godínez Domínguez (Universidad de Guadalajara)

Total Amount of Funding: \$6,000

Project Start and End Dates: July 2008-November 2009

Title: Groundwater Discharge to Salmon-Bearing Headwater Streams, Kenai Peninsula, Alaska (Subcontract to Headwater Stream Wetland Settings and Shallow Ground Water Influence: Relationships to Juvenile Salmon Habitat on the Kenai Peninsula, Alaska, \$185,000)

Source of Funding: Environmental Protection Agency

Investigators: PI – **M.C. Rains**

Total Amount of Funding: \$26,000

Project Start and End Dates: June 2007-May 2009

Title: Investigating a Harm Standard Based Upon Chapter 40D-2.301 FAC

Source of Funding: Southwest Florida Water Management District

Investigators: PIs – D. Martin, S. Emery; co-PIs – **M.C. Rains**, M. Stewart

Total Amount of Funding: \$150,000

Project Start and End Dates: October 2006-April 2008

Title: Investigating Environmental Impacts and Climate Change of Creating a Lake in the Hyperarid Sahara Desert

Source of Funding: National Science Foundation

Investigators: PIs – A. Said, M.A. Ross; Sr. Personnel – **M.C. Rains**, M. Stewart, K. Trout, and H. Fuelberg (Florida State University)

Total Amount of Funding: \$30,000

Project Start and End Dates: September 2006-April 2007

Title: Linkages Between Surface and Subsurface Hydrology and Ecological Functioning of Mangrove Ecosystems

Source of Funding: Smithsonian Institution

Investigators: PI – D.F. Whigham (Smithsonian Environmental Research Center); co-PIs – **M.C. Rains**, I. Feller (Smithsonian Environmental Research Center), J. Verhoeven (Utrecht University), R. Laanbroek (Utrecht University), W. Rodriguez (University of Rhode Island)

Total Amount of Funding: \$60,000

Project Start and End Dates: October 2004-September 2009

Title: Hydrology of Clay Settling Areas

Source of Funding: Florida Institute for Phosphate Research

Investigators: PI – M.A. Ross; co-PIs – **M.C. Rains**, M. Stewart, and K. Trout

Total Amount of Funding: \$1,189,000

Project Start and End Dates: March 2005-June 2010

Title: USF GeoPark and Botanical Gardens – Linked Resources for Community Education in Hydrogeology  
Source of Funding: Southwest Florida Water Management District  
Investigators: PI – H.L. Vacher; co-PIs – **M.C. Rains** and M. Stewart  
Total Amount of Funding: \$5,000  
Project Start and End Dates: January 2004-June 2004 (no-cost extension to March 2005)

#### **Workshops Attended**

North American Analysis and Synthesis on the Connectivity of “Geographically Isolated Wetlands” to Downstream Waters, Part II (2016), John Wesley Powell Center for Analysis and Synthesis, Ft. Collins, Colorado.

North American Analysis and Synthesis on the Connectivity of “Geographically Isolated Wetlands” to Downstream Waters, Special Session on Hydrologic Modeling (2016), John Wesley Powell Center for Analysis and Synthesis, Ft. Collins, Colorado.

North American Analysis and Synthesis on the Connectivity of “Geographically Isolated Wetlands” to Downstream Waters, Part 1 (2015), John Wesley Powell Center for Analysis and Synthesis, Ft. Collins, Colorado.

Isolated Wetlands Research Workshop (2013), Joseph W. Jones Ecological Research Center, Newton, Georgia

Quantitative Literacy and Geology in the National Parks, Workshop 524 (2012), Geological Society of America Annual Meeting, Charlotte, NC

ULTRA-Climate Workshop: Developing and Coordinating Research on Urban Vulnerability to Climate Change (2012), US Environmental Protection Agency, Washington, DC

Transforming Undergraduate Education in STEM: Making and Measuring Impacts (2011), National Science Foundation, Washington, DC

Regional Science Workshop on Headwaters and Associated Wetlands in the Mid-Atlantic Highlands Region (2006), US Environmental Protection Agency, Philadelphia, Pennsylvania

Designing Hydrologic Observatories as a Community Resource: A CUAHSI National Workshop (2004), Utah State University, Logan, Utah

Wetlands Hydrology Workshop (2004), Tampa Bay Water, Clearwater, Florida

Streamside Vegetation-Hydrologic Interactions Workshop (2003), US Forest Service, Tucson, Arizona.

Workshop on the Hydrogeomorphic Approach to Assessment of Functions of Waters of the U.S., Including Wetlands, in the Santa Margarita Watershed (1997), National Wetland Science Training Cooperative, Fallbrook, California.

Workshop on the Hydrogeomorphic Approach to Assessment of Functions of Precipitation-Driven Wetlands on Discontinuous Permafrost in Interior Alaska (1997), National Wetland Science Training Cooperative, Fairbanks, Alaska.

National Workshop and Symposium on the Future of Wetland Assessment: Applying Science Through the Hydrogeomorphic Assessment Approach and Other Approaches (1997), Association of State Wetland Managers, Annapolis, Maryland.

Workshop on the Hydrogeomorphic Approach to Assessment of Functions of Waters of the U.S., Including Wetlands, in the Northern Prairie Region (1995), National Wetland

Science Training Cooperative, Jamestown, North Dakota.

## Legal Support

Expert testimony on behalf of the defendant, *Duarte Nursery, Inc., a California Corporation; and John Duarte, an individual, Plaintiffs, v. United States Army Corps of Engineers, Defendant* (2014-current)

Expert testimony on behalf of plaintiff, *United States of America, Plaintiff, v. Matthew R. Anchordoguy, Anchordoguy and Company Limited Partnership, and John M. Barlow, Defendants* (2012-2014)

Expert testimony on behalf of plaintiff, *Jacqueline Lane, Friends of Perdido Bay, and James Lane v. International Paper and Department of Environmental Protection* (2010)

Declaration on behalf of the plaintiff (*pro bono*), *Clayton Colson and Citizens for Sanity, Inc. v. Southwest Florida Water Management District* (2009)

Expert testimony on behalf of the plaintiff (*pro bono*), *Octavio Blanco v. Win-Suncoast, Ltd. and Southwest Florida Water Management District* (2008)

Expert testimony on behalf of the plaintiff (*pro bono*), *Octavio Blanco v. Westfield Homes of Florida and Southwest Florida Waters Management District* (2006)

Technical support for defendant, *Borden Ranch Partnership and Angelo K. Tsakopoulos, Petitioners v. United States Army Corps of Engineers and Environmental Protection Agency*, 537 U.S. 99 (2002)