Laura A. Hempel

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EDUCATION

PhD in Geology, *Oregon State University (OSU).* **2012- Aug. 2018 (anticipated)**

Focus- Hydrology and Fluvial Geomorphology, *Cumulative GPA: 3.98*

BA in Earth Sciences and Environmental Studies, *Dartmouth College.* **2008-2012**

Focus- Hydrology and Fluvial Geomorphology, *Summa Cum Laude*

SKILLS

Software

Expertise in: Microsoft Word, Excel, Access, and Powerpoint (10+ yrs); ArcGIS (8+ yrs); 2D Hydrodynamic models Nays2D and FaSTMECH (5 yrs); PHABSIM (5 yrs); Coding with R Statistical Software (4 yrs); Bedload Assessment for Gravel-bed Streams (BAGS) (6 yrs); Cloud Compare (6yrs); Agisoft (6 yrs)

Skills in: Sigma plot (2+ yrs); HEC-RAS (3+ yrs); Streamflow Record Extension Facilitator; Envision Model (for evaluating the impact of different land/water use scenarios on ecosystem services)

Exposure to: Leica Cyclone, C++, MATLAB, Maximum Entropy Modeling (MAXENT)

Field Skills

- Led, trained, and coordinated field crews to conduct instream flow studies and habitat surveys (7+ yrs)
- Extensive work in remote areas and in inclement weather (8+ yrs)
- Extensive experience surveying topographic and water surface elevations (incl. experience with auto-level, laser level, and total station) (8+ yrs)
- Extensive experience using stream flow meters to measure discharge (incl. experience with salt slug injection, March McBirney, ADV, and ADCP) (8 yrs)
- Extensive experience collecting Wolman pebble counts (8yrs)
- Experience locating placement, installing, and monitoring of stream gages (6 yrs)
- Extensive experience building and maintaining rating curves (6 yrs)

Skills in Data Collection, Analysis, & Synthesis

- Designed and implemented field surveys used for instream flow studies, hydraulic modeling, climate modeling, sediment transport modeling, and ecological/habitat modeling (7 yrs)
- Generated and analyzed technical instream flow and climate change data (5 yrs)
- Organized and managed extensive and complex datasets (8 yrs)
- Developed data collection protocols for quality control and data accuracy (5 yrs)
- Designed and implemented schemes to archive databases (5 yrs)
- Summarized, analyzed, and interpreted complex datasets and published findings in technical reports or peer-reviewed journals (8 yrs)
- Performed statistical analyses, with an emphasis on spatial statistics (4 yrs)
- Produced detailed tables, figures, and maps for publication (8 yrs)
- Generated and/or analyzed high resolution topography for instream flow studies, including work with structure from motion, terrestrial laser scans, and LiDAR datasets (5 yrs)
- Organized, authored, and prepared successful applications and grant proposals (8 yrs)
- Trained in effective science communication directed towards a range of audiences including researchers, government agencies, natural resource managers, and members of the public (8 yrs)
- Interpreted and summarized results from an ecological niche model for publication (1 yr)
- Developed innovative techniques, strategies, and tools to address impacts of changing instream flows

on stream channel morphology and habitat availability (6 yrs)

Relevant Coursework and Training

Hydrology and Ecology

Physical hydrology	Open Channel Hydraulics	Stream Ecology
Snow Hydrology	River Engineering	Fluvial Geomorphology/Surface Processes
Fluid Mechanics	Environmental Monitoring	

Climate and Environmental Modeling

Remote Sensing	Digital Terrain Modeling	Environmental Data Analysis
GIS in Water Resources	Hydrologic Modeling	

Earth Science and Environmental Policy

Soil Science and Ecology	Tectonic Geomorphology	Isotope Geochemistry
Minerology	Sedimentology and Stratigraphy	Physics
Organic Chemistry	Geoscience Communication	International Environmental Issues
Environmental Economics	Environmental Justice	Environmental Problem Analysis

Short Courses

Introduction to Modeling River Flow and Morphodynamics with FaSTMECH and Nays 2D [*USGS, 2016*]
White Water Rescue [*OSU, 2014*]

WORK EXPERIENCE

NSF Graduate Research Fellow, *OSU* **2015-present** (anticipated Aug. 2018)

- *Project title: Hydrograph Shape Controls Channel Morphology and Sediment Transport Patterns in a Sand-gravel Flume*
- Research seeks to identify how the magnitude and timing of different instream flows, including both base flows and flood flows, lead to different channel morphologies and habitats
- Designed and conducted physical experiments, which involved training and overseeing lab assistants
- Created a novel experiment that generated results for an emerging area of research
- Managed, analyzed, interpreted, and evaluated integrity of highly detailed, extensive datasets
- Analyzed data using spatial statistics, extensive computing in ArcGIS, extensive coding and analysis with R computing package, and 2D flow modeling (Nay2D and FaSTMECH)
- Developed a data management scheme to archive and integrate project data into an accessible, transferable, electronic database
- Results from this study were presented at numerous scientific conferences, and are being written for publication in a peer-reviewed journal

Graduate Research Assistant, ***OSU*** **2012-2015**

- *Project title: Hydrologic and Geomorphic Sensitivity to Climate Change in the Central Oregon Cascades*
- Research seeks to identify the impact of climate change on instream flows and channel morphology, and to identify which streams will be most vulnerable to significant geomorphic change and ecological disturbance
- Designed and implemented extensive field campaigns that involved coordinating, instructing, and reviewing work performed by field assistants (over 10 people)
- Specific field duties included: travel to remote areas, identifying appropriate survey locations and transects for flow measurements, identifying appropriate data collection requirements to meet project goals, walking in cold, swift streams and in inclement weather (incl. during a rain-on-snow event in the Cascades!); surveying ground and water elevations with a total station, using stream flow meters, conducting Wolman pebble counts, conducting geomorphic habitat surveys, and collecting data for use in habitat and flow models

- Maximized limited project budget by recruiting student volunteers
- Managed, analyzed, and interpreted extensive datasets, which included use of Excel, ArcGIS, R computing package, 1D flow and habitat models (PHABSIM, HEC-RAS), and 2D flow models (Nay2D, FaSTMECH)
- Developed a data management scheme to archive and integrate project data into an accessible, transferable, electronic database
- Used modeled climate change data and instream flow data to identify streams that will experience the largest shifts in base flows and flood flows, and the streams that will be most sensitive to those changes
- Results from this study were presented at numerous scientific conferences, and were published in a knowledge-to-action report that was written for water resource managers, government agencies, and members of the public

Senior Honors Thesis Researcher, ***Dartmouth College*** **2010-2012**

- *Project title: Hydrologic Controls of Mercury (Hg)-contaminated Sediment Deposition onto a Floodplain*
- Compared contamination distribution in end-member hydrologic systems to determine whether flood frequency controlled contaminant distribution; sites included a highly contaminated, flow regulated river and a free-flowing river with only background level atmospheric Hg deposition
- Designed and implemented extensive field campaigns that involved coordinating, instructing, and reviewing work by field assistants
- Specific field duties included: travel to remote areas, identifying the ideal streams/locations to meet the project objective, assessing appropriate data collection requirements, identifying appropriate transects for flow measurements, walking in cold, swift streams and in inclement weather (i.e., during New England winter), Wolman pebble counts, surveying ground and water elevation with an auto-level and total station, and using stream flow meters
- Data analysis involved GIS, 1D flow modeling, Hg-contaminant analysis, and radionuclide detection
- Research was funded by three research grants, which I applied for and received, and was published in my senior thesis report.

NSF Research Experience for Undergraduates, *Texas A&M University* **2011**

- *Project title: Soil CO_2 and CH_4 Fluxes in a Costa Rican Premontane Wet Forest*
- Worked with faculty advisors, Dr. Gunnar Schade and Dr. Chris Houser, to quantify the rate and variability of soil gas flux in a remote premontane wet forest located in Costa Rica
- Conducted experiments to identify the components of soil gas flux attributed to forest litter, roots, and microorganisms
- Used static soil chambers to collect gas samples in the field, and analyzed samples using gas chromatograph and CO_2-H_2O infrared absorption gas analyzer

Dean of Faculty Researcher, *Dartmouth College* **2011**

- *Project title: Reconstructing Holocene Climate Change from Glacial Lake Sediments*
- Examined glacial lake sediment cores from Scoresby Sund, Greenland to recreate glacial fluctuations during the late-Holocene and temporal climate change patterns under advisor Dr. Meredith Kelly
- Analysis included loss on ignition, sediment grain size analysis, and macrofossil extraction for radiocarbon dating
- Results from this work were published in a peer-reviewed journal (*Quaternary Science Reviews)*

James O. Freedman Presidential Scholar, *Dartmouth College* **2010- 2011**

- *Project title: Bioaccumulation and Trophic Transfer of Nanoparticles*
- Worked in a trace elements lab under Dr. Brian Jackson to detect cadmium, zinc, and selenium quantum dots in aquatic invertebrates, using ICP-MS and field flow fractionation-ICP-MS

Microbiology Lab Technician, *USGS Microbiology Lab in FL* **2009- 2010**

- *Project title: A National U.S. Soil Survey for Human and Agricultural Pathogens*
- Extracted DNA from soil samples, ran gel electrophoresis, and qPCR reactions to detect *B. anthracis, F. tularensis,* and *Y. pestis* under advisor Dr. Dale Griffin, as part of a national soil survey
- Summarized and interpreted results from an ecological niche, or species distribution, model (Maxent)
- Results from this work are being prepared for publication in a peer-reviewed journal

Water Quality Analyst, *Leon County Waste Water Management in FL* **2007**

- Compiled water quality measurements into databases, and analyzed lake water quality trends in *Excel*
- Attended water management meetings for Leon County and Dept. of Environmental Protection
- Assisted with water and soil sampling in lakes and riverbeds to determine whether pollutant concentrations exceeded EPA standards

SERVICE & LEADERSHIP

Graduate Liaison to Strategic Planning Committee, *OSU* **2017-present**

- Support the faculty Strategic Planning Committee and gather graduate student input on the future of the College on topics including: diversity, graduate funding, College culture, and graduate programs

Vice Chair of Graduate Student Committee (GSC), *OSU* **2013-present**

- Vice president of GSC, a student group that acts as a liaison between the students and the Deans to voice student concerns within the College
- Organize graduate-level and College-level events, run meeting, and oversee activities including outreach and travel funding
- Maintain webpage and compile quarterly newsletter

Promotion and Tenure Student Committee, *OSU* **2017**

- Served as a graduate student representative on a faculty promotion and tenure committee
- Collaborated with a team of graduate students to compose evaluation letters summarizing letters of candidate's teaching and advising activities

TEACHING & OUTREACH

Teaching Assistant, *OSU* **2017-present**

- Lead and organize labs for courses including Hydrogeology and Sedimentology and Stratigraphy
- Involves communicating scientific concepts to students with diverse backgrounds

Undergraduate Thesis Advisor, *OSU* **2016-2017**

- Oversaw undergraduate student on his senior thesis, "Sediment response to varying hydrographs"
- Under my direction, this student won an Undergraduate Research, Innovation, Scholarship and Creativity grant for his work and presented his research at an International Scientific Conference

Outreach for Oregon Students, *OSU* **2015- present**

- Took initiative to lead outreach and science communication presentations on dam removal (using a working physical model) for the general public and elementary school students
- Presentation venues included Hatfield Marine Science Day, OSU State of the University Address, the Science & Math Learning Experiences (SMILE) program at OSU, and local classrooms

Hydrophiles* Service Learning Committee, *OSU **2012-2015**

- Helped find, organize, publicize, and implement water-related outreach events as a member of the

service learning committee within Hydrophiles, a water-related student group at OSU
- Maintained and updated Service Learning webpage on Hydrophiles website

Howard Hughes Medical Institute Science Mentor, *Montshire Museum VT* **2011**
- Team-taught a series of six interactive 90-minute science classes using lesson that aligned with state science standards at the 4th grade level; trained by professional science educators

Women in Science* Peer Mentor, *Dartmouth College **2009**
- Mentored two underclass women majoring in science during their first year at Dartmouth
- Gave advice on classes, majors, and research opportunities based on personal experience

PUBLICATIONS

Hempel, LA, Hassan, M, Eaton, BE, Grant, GE, Lewis, S (*in prep*). Hydrograph Shape Controls Channel Morphology and Organization in a Sand-gravel Flume

Hempel, LA, Grant, GE, Lewis, S (*in prep*). Geomorphic Sensitivity to Climate Change in Mountain Streams of the Oregon Cascades

Hempel, LA, Grant, GE, Lewis, S (*in prep*). Woody debris architecture and channel morphology in mountain streams reflect differences in hydrologic regime

Silvestri, EE, Douglas, SH, Luna, VA, Jean-Babtiste, CAO, Harbin, D, **Hempel, LA**, Boe, TR, Nichols, TL, Griffin, DW (*in prep*). Evaluation of Maximum Entropy (Maxent) Modeling for predicting the distribution of *Bacillus anthracis* in soil and potential anthrax outbreaks in wildlife and livestock across the contiguous United States, *Environmental Monitoring and Assessment*

Nolin, A, Grant, GE, Safeeq, M, Lewis, S, Cooper, M, **Hempel, LA** (2014). Climate Change and Peak Flows: Knowledge-to-action to help managers address impacts on streamflow dynamics and aquatic habitat, *Final Report to the Northwest Climate Science Center*

Levy, LB, Kelly, MA, Lowell, TV, Hall, BL, **Hempel, LA**, Honsaker, WM, Lusas, AR, Howley, JA, Axford, YL (2013), Holocene fluctuations of Bregne ice cap, Scoresby Sund, east Greenland: a proxy for climate along the Greenland Ice Sheet margin, *Quaternary Science Reviews*, doi:10.1016/j.quascirev.2013.06.024.

Hempel, LA (2012), Hydrologic Controls of Hg Deposition onto a Floodplain, *Undergraduate Senior Thesis; Dartmouth College*

INVITED TALKS

Hempel, LA, 2018. The Science of Climate Change and Impacts to Human Health. *Lecture in 'Foundations of Public Health' course at Oregon State University*

Hempel, LA, Grant, GE, Hassan, MA, Eaton, BC, 2017. The role of the flow regime in river channel morphology and sediment dynamics. *Hatfield Marine Science Center Seminar*

Hempel, LA, Grant, GE, Hassan, MA, Eaton, BC, 2017. The role of the hydrograph in river channel morphology and sediment dynamics. *Workshop on Hydrograph Shape and Channel Dynamics*, *University of British*

Columbia

GRANTS & FELLOWSHIPS

Consortium of Universities for the Advancement of Hydrologic Science Pathfinder Fellowship. 2015

- $3,00 research grant

National Science Foundation Graduate Research Fellowship. 2013-2017

- $32,000/year

Provost's Distinguished Graduate Fellowship, Oregon State University. 2012

- Research fellowship at Oregon State University offered to "students of the highest quality" and receives $30,000/year

Andrew W. Mellon Grant, Dartmouth College. 2011

- Funding intended for "student-initiated research project directly related to an environmental issue/problem" and used toward senior thesis research
- $1,000

John Lindsley Fund, Dartmouth College. 2011

- $1,500 Grant funding provided for senior thesis research

James O. Freedman Senior Thesis Award, Dartmouth College. 2011

- $300 Award to previous participants of James O. Freedman Presidential Scholars program for travel to a scientific conference

Stiffler Family Undergraduate Research Grant. Dartmouth College. 2011

- Full-time leave term research grant worth $3,500 to support students working with faculty mentor

AWARDS & RECOGNITION

Upham Geology Prize, 2012
John Ebers '61 Award- Most Outstanding Undergraduate, 2012
Dartmouth Class of 1950 Student-Athlete Community Service Award, 2012
Rufus Choate Scholar, 2011
Lenker Award for Earth Sciences, 2011
Francis L. Town Scientific Prize for Environmental Studies, 2011

CONFERENCE PRESENTATIONS

Hempel, LA, Grant, GE, Eaton, BC, Hassan, MA, and Lewis, S, 2017. The role of varying flow on channel morphology: a flume experiment. *AGU Fall Meeting,* Poster, Abstract # EP41A-1829

Grant, GE, **Hempel, LA**, Hassan, MA, Eaton, BC, and Lewis, S, 2017. The geomorphically effective Hydrograph: An emerging concept for interpreting channel morphology and evolution. *AGU Fall Meeting,* Oral, Abstract # EP33D-08

Feehan, S, **Hempel, LA**, and Grant, GE, 2017. Effects of hydrograph shape on sediment transport and size. *AGU Fall Meeting,* Poster, Abstract # EP41A-1826

Hempel, LA, Grant, GE, and Lewis, S, 2017. Channel morphology and woody debris architecture inmountain streams reflect differences in hydrologic regime. *GSA Fall Meeting,* Poster, Abstract # 72-14

Hempel, LA, Eaton, BC, Hassan, MA, and Grant, GE, 2017. Hydrograph shape controls channel morphology and organization in a sand-gravel flume. *Canadian Geophysical Union,* Oral

Hempel, LA, Grant, GE, Hassan, MA, and Eaton, BC, 2016. Hydrograph shape controls channel morphology and organization in a sand-gravel flume. *AGU Fall Meeting,* Oral, Abstract #EP53E-08

Feehan, S, Ruggerio, P, **Hempel, LA**, Anderson, DL, and Cohn, N, 2016. Characterizing feedbacks between environmental forcing and sediment characteristics in fluvial and coastal systems. *AGU Fall Meeting,* Poster, Abstract #EP23A-0935

Grant, GE, **Hempel, L A,** and Lewis, S, 2016, Hydrologic control of channel morphology and organization in gravel-bed streams: field studies and flume experiments. Computational Methods in Water Resources, Toronto, Canada

Hempel, LA, Grant, GE, Grant, GE, and Lewis, S, 2015. Hydrologic regime controls pattern and architecture of woody debris in mountain streams. *AGU Fall Meeting,* Oral, Abstract #EP53E-08

Grant, GE, Nolin, AW, Selker, JS, Lewis, S, **Hempel, LA,** Jefferson, A, Walter, C, Roques, C, 2015. No snow no flow: How montane stream networks respond to drought. *AGU Fall Meeting,* Oral, Abstract #H41M-08

Lewis, SL, Grant, GE, Nolin, AW, **Hempel, LA,** Jefferson, AJ, and Selker, JS, 2015. How low will they go? The response of headwater streams in the Oregon Cascades to the 2015 drought. Geological Society of America Annual Meeting, Abstract.

Hempel, LA, Grant, GE, and Lewis, S, Safeeq, M, 2014. Change in bedload transport frequency with climate warming in gravel-bed streams of the Oregon Cascades. *AGU Fall Meeting,* Poster, Abstract #EP33A-3619

Safeeq, M, Grant, G, Lewis, S, Nolin, AW, **Hempel, LA,** Cooper, M, and Tague, C, 2014. Integrated snow and hydrology modeling for climate change impact assessment in Oregon Cascades. *AGU Fall Meeting,* Poster, Abstract #H43J-1093

Hempel, LA, Grant, GE, and Lewis, S, 2014. A comparison of hydrology and channel hydraulics in headwater streams of the central Oregon Cascades. *Water Resources Symposium, Oregon State University* Oral Session III.

Hempel, LA, Grant, GE, and Lewis, S, 2013. A comparison of hydrology and channel hydraulics in headwater streams of the central Oregon Cascades. *AGU Fall Meeting,* Poster, Abstract #EP53B-0831

Hempel, L., Grant, GE, and Lewis, S 2013. Hydrology and channel hydraulics in headwater streams of the central Oregon Cascades. Summer Institute for Earth Surface Dynamics, University of Minnesota, Minneapolis, MN.

Hempel, LA, Jackson, B, and Renshaw, CE, 2012. Mercury Accumulation and Redistribution on Near-Channel Floodplains. *AGU Fall Meeting,* Poster, Abstract #H53J-1674

Hempel, LA, Pfohl, A, and Schade, G, 2011. Soil CO_2 and CH_4 fluxes in a Premontane Wet Forest. *AGU Fall Meeting,* Abstract #B11A-0459

Levy, L., **Hempel, LA,** Kelly, MA, Lowell, TV, and Hall, BL, 2011. Holocene Fluctuations of the Bregne Ice Cap, Scoresby Sund, eastern Greenland. *AGU Fall Meeting,* Abstract #PP31A-1846