

Carnegie Institution for Science
Department of Global Ecology
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Rebecca R. Hernandez

Research Interests: global environmental change, ecological modeling, soil-plant-atmosphere interactions, and environmental sensor networks

EDUCATION

Ph.D. Stanford University, 2010-present

Environmental Earth System Science, School of Earth Sciences
Advisor: Chris Field

M.S. California State University, Fullerton (CSUF), 2006-2009

Biology, 3.9 GPA
Thesis title: Effects of disturbance of biological soil crusts on the emergence of exotic vascular plants in California sage scrub.
Committee: D.R. Sandquist (advisor), C.E. Jones, and S. Murray

B.A. University of California, Los Angeles, 2004

Geography, 3.7 GPA
Emphasis: Geographic Information Systems and Remote Sensing

Study Abroad, Environment and Conservation of O’ahu and the Big Island, Fall Quarter 2004
Wildlands Studies Program, University of California, Santa Barbara

FELLOWSHIPS, AWARDS, & GRANTS

- 2011 McKee Research Grant, School of Earth Sciences, Stanford University, \$4,000
- 2011 **William W. Orcutt Memorial Fellowship**, School of Earth Sciences, Stanford University
- 2010 Ford Diversity Fellowship, Honorable Mention
- 2010 NASA Harriet G. Jenkins Pre-Doctoral Fellowship Project, Semi-Finalist
- 2009 Microbial Ecology Section, Ecological Society of America Travel Award, \$250
- 2009 Soil Ecology Section, Ecological Society of America Travel Award, \$200
- 2009 Mentoring Summer Research Internship Program Grant, UC Riverside, \$500
- 2009 Charlie O’Neill Grant, California Native Plant Society, \$1,000
- 2009 **First Place MS/MA Oral Paper**, Sigma Chapter, Graduate Women in Science, OCGWIS, (March 7, 2009), Chapman University, Orange, CA, \$300
- 2008 **CSU Sally Casanova Pre-doctoral Scholar** (California State Universities), \$3,000
- 2008 California Garden Clubs, Lake Forest Scholarship, \$1,000
- 2008 California Garden Clubs Scholarship, \$2,000
- 2007 **First Place Poster Presenter** (Ecology and Evolution), Southern California Academy of Sciences (May 2 – 3, 2007), California State University, Dominguez Hills, CA, \$200
- 2007 Dr. David L. Walkington Memorial Scholarship (CSUF), \$800
- 2007 ASI Student Research Grant (CSUF), \$300
- 2006 **Graduate Equity Fellow** (CSUF), \$2,500
- 2006 **Evelyn L. Pruitt National Minority Fellow** (Society of Women Geographers, *sole recipient in the United States*), \$5,000
- 2006 James A. Diefenderfer Memorial Scholarship (CSUF), \$500
- 2002 **Saddleback College Biological Sciences Scholarship**, \$200

- 2002 Phi Theta Kappa Society (Saddleback College)

TEACHING

Teaching Associate, Ecology and Physiology Laboratory (BIOL 274L), Fall 2008 - Spring 2009 (4 sections)

California State University, Fullerton, Dept. of Biological Science

Instructed biology major core laboratory (6 h/week/section); lectured on ecology, environmental physiology, principles of scientific writing and oral presentation, experimental design, and statistics; directed all laboratory procedures and three weekend research-based field-trips; developed, wrote, and implemented scientific writing curriculum to be included in subsequent courses

Teaching Associate, Elements of Biology Laboratory (BIOL 101L), Fall 2006 - Spring 2008 (7 sections)

California State University, Fullerton, Dept. of Biological Science

Instructed non-major biological laboratory (3 h/week/section); lectured on foundational biological principles (biochemistry, cells, genetics, physiology, ecology, evolution); directed all laboratory procedures and one weekend field-trip; wrote administrated weekly retention enhancement exercises

Undergraduate Teaching Associate, Invertebrates (EBE 104), Spring 2004

University of California, Los Angeles, Dept. of Ecology and Evolutionary Biology

Assisted in the set-up of laboratory equipment; lectured on class Bivalvia anatomy and physiology; created class set of tardigrade slides (*Hypsibius sp.*) from live specimens; awarded "Most Enthusiastic" by EBE 104 Teaching Associates

Mathematics and Science Tutor

Private Consultant, Orange Co., CA. (August 2001 - Present)

Tutor of mathematics (pre-algebra to Calculus) and science (Biology, A.P. Biology, Earth Science) for junior high, high school, and community college students

College Mathematics Tutor

Diablo Valley Community College, Pleasant Hill, CA. (October 2000 - May 2001)

Completed Mathematics Tutor Program and tutored community college students in mathematics

EXPERIENCES

Scientist, Mount St. Helens Science Pulse 2010, 17-25 July 2010, U.S. Forest Service Pacific Northwest Research Station

Assisted in 30-year post-eruption microbial soil sampling on Pumice Plain and surrounding National Volcanic Monument

Junior Specialist (Biologist), Terrestrial Ecosystem Ecology and Image Processing, August 2009-August 2010

Center for Conservation Biology, Center for Embedded Networked Sensing (CENS), University of California at Riverside

Use of automated minirhizotrons and arrayed rhizosphere soil sensors (AMARSS) to measure carbon flux and mycorrhizal fungi dynamics in a mixed conifer forest (under P.I. Michael F. Allen, NSF EF Award #0410408, James Reserve, CA)

Mentoring Summer Research Internship Program, MSRIP (2009), Biodiversity of Biological Soil Crusts, January 2009-present

Department of Botany and Plant Sciences, University of California, Riverside (P.I. Edith B. Allen)

Designed and executed a biodiversity study of macroscopic biological soil crust components along a climatic gradient in southern California semiarid shrublands

M.S. Candidate, Biological Soil Crust Ecology and Global Environmental Change, January 2006-December 2008

Department of Biology, California State University, Fullerton, CA

Designed and implemented original Master's thesis research examining effects of disturbance of biological soil crust on exotic plant emergence in mediterranean California sage scrub

Contract Field Biologist, Oak Woodland Ecology, January 2007 – August 2007

Harmsworth Associates, Irvine, CA

Performed botanical surveys of oak species (*Quercus sp.*) in Gorman, California and composed and edited technical reports for publication

Graduate Research Assistant, Plant Ecology and Endangered Species Conservation, January 2006 – August 2006

Department of Biology, California State University, Fullerton, CA (P.I. C.E. Jones)

Field team leader; conducted floristic surveys in habitat renewal plots containing endangered Santa Ana Wolly Star (*Eriastrum densifolium spp. sanctorum*) and Riversidian alluvial scrub species, Redlands, CA

GIS Analyst, June 2004 – August 2005

Field Team, Saddleback Church, Lake Forest, CA.

Managed geodatabases, GIS training, and cartographic production for second largest church in United States
Established volunteer corps of 17 GIS professionals and lay researchers (The P.E.A.C.E. Mapping Team)
Created transportation scheme utilizing ArcGIS for truck and congregation routing to and from grocery stores for *40 Days of Community* initiative to feed the homeless of Orange County (in cooperation with Second Harvest)

Study Abroad, Environment and Conservation of O'ahu and the Big Island, Fall Quarter 2004

Wildlands Studies Program University of California, Santa Barbara

Studied island biogeography, tropical forest ecology, conservation, and botany of Hawaiian Islands
Measured coral reef degradation and effects on reef fish populations under ReefCheck.org on both islands
Removed exotic invasive plants from a tropical Hawaiian dry forest under a restoration effort

Undergraduate Research Assistant, Remote Sensing and Tropical Forest Ecology, January 2004 - May 2004

Center for Tropical Research, UCLA/Jet Propulsion Laboratory, Pasadena, CA

Performed supervised and unsupervised classifications of the Tapajós National Forest vegetation in Pará, Brazil in a carbon-cycle study monitoring effects of deforestation utilizing satellite imagery

Undergraduate Honors Research, Biological Invasions and Plant Ecology, January 2004-July 2004

Department of Geography, UCLA, Advisor: Thomas W. Gillespie

Conducted a literature review of invasion of *Cynara cardunculus* (artichoke thistle) in southern California semiarid shrublands

PUBLICATIONS (IN PREPARATION OR SUBMITTED)

Hernandez, R.R. and M. Allen (*in preparation*) Diurnal cycles of arbuscular mycorrhizae: integrating imaging and sensors

Hernandez, R.R. and M. Allen (*in preparation*) High-resolution dynamics of arbuscular mycorrhizae: temporal variation, biophysical controls, and environmental change.

Hernandez RR, Knudsen K, and R Medina (*submitted*, Journal of Arid Environments). Biological soil crust communities and their conservation in a biodiversity hotspot.

Hernandez RR and DR Sandquist (2011) Disturbance of biological soil crusts increases emergence of exotic vascular plants in California sage scrub. Plant Ecology, doi:10.1007/s11258-011-9943-x

Ochoa-Hueso CR, **Hernandez RR**, Pueyo JJ and EM Reol (2011) Spatial distribution and physiology of biological soil crusts from semi-arid central Spain are related to soil chemistry and shrub cover. Journal of Soil Biology and Biochemistry, doi:10.1016/j.soilbio.2011.05.010

Hernandez, RR and DR Sandquist (2008) The effect of disturbance of biological soil crust on the emergence of exotic plants in coastal sage scrub. Bulletin (Southern California Academy of Sciences) 107: Supplement p. 124. (*abstract*)

NON-PEER REVIEWED PUBLICATIONS

Hernandez, RR (2010) Biodiversity under a magnifying glass: exploring biological soil crusts in southern California shrublands. California Native Plant Society, Orange County Chapter, Newsletter (March/April).

NON-DEGREE COURSEWORK

Wildland Weeds Field Course: Control and Management Techniques, CAL-Invasive Plant Council, 08'
Cartography: Creating Better Maps, ESRI Pre-Conference Seminar, 04'

RESEARCH AND COMPUTATIONAL METHODS

Programming Languages:

C++ (novice)
R: A statistical language and environment (expert)
Python (proficient)
Matlab (proficient)

Applications:

ENVI, remote sensing (proficient)
Rootfly, fine root and mycorrhizal hyphae analysis (expert)
ArcGIS, geographic Information Systems, geodatabases, and maplex (expert)

Computational Techniques

Data mining, R (novice)
Modeling, R (proficient)
Spatial statistics and analysis (proficient)

Field and Laboratory Research Methods:

Microbial Ecology: root staining and mounting for mycorrhizal fungi, manual minirhizotrons, automated minirhizotrons, soil sensor networks (expert)
Canopy Monitoring: SC-1 porometer, Qubit/Vernier gas analyzers, LiCor gas analyzers, pressure bombs, spectrometers, and fluorescence meters, environmental sensors and data loggers (expert)
Aquatic Ecology: biological oxygen demand (BOD)/YSI oxygen meters (aquatic primary productivity) (expert)
Animal Ecology: Qubit/Vernier gas analyzers (CO₂ exchange in animals) (expert)
Botany: broad knowledge of California flora, taxonomic identification, use of dichotomous keys (expert)

PRESENTATIONS

Rebecca R. Hernandez, and Michael F. Allen (Poster) High-resolution mycorrhizal hyphae dynamics: temporal variation, biophysical controls, and global environmental change. American Geophysical Union Fall Meeting, Biogeosciences (13-17 December 2010)

Rebecca R. Hernandez, and Michael F. Allen (Oral Talk) Mycorrhizal fungi dynamics: temporal variation, temperature thresholds, and global environmental change. The Science of Climate Change: Trends, Perspectives and Projections. Interdepartmental Graduate Symposium, UC Riverside, California (24 April 2010)

Rebecca R. Hernandez (Oral Talk) Mycorrhizal hyphae dynamics and biophysical controls: implications for global climate change. Western Mycorrhiza Meeting, White Mountain Research Station (15-18 April 2010).

Kuni Kitajima, Rebecca R. Hernandez, Mike Taggart, and Michael F. Allen (Poster) Effects of environmental variables on production and mortality of fine roots, rhizomorphs, and hyphae. Center for Embedded Networked Sensing (CENS) 7th Annual Research Review, University of California, Los Angeles (28 October 2009)

Rebecca R. Hernandez, Kerry Knudsen, and Edith B. Allen (Poster) Macroscopic biodiversity of late-successional biological soil crusts in southern California shrublands. Mentoring Summer Research Internship Program (MSRIP), Summer Research Symposium, University of California, Riverside (13 August 2009)

Rebecca R. Hernandez and Darren R. Sandquist (Oral Talk) Effects of disturbance of biological soil crust on emergence of exotic plants in California sage scrub. Ecological Society of America (ESA) Conference, Albuquerque, New Mexico (2-7 August 2009)

Rebecca R. Hernandez (Invited Talk) What is an ecologist? Career Week, Trabuco Hills High School, Mission Viejo, California (11 June 2009)

Rebecca R. Hernandez & Darren R. Sandquist (Oral Talk) Effects of disturbance of biological soil crust on the emergence of exotic plants in California sage scrub. Sigma Chapter, Graduate Women in Science, Chapman University, Orange, California (1 March 2008)

Rebecca R. Hernandez & Darren R. Sandquist (Poster) The effects of disturbance of biological soil crust on the germination of exotic plants in coastal sage scrub. Southern California Academy of Sciences California State University, Dominguez Hills, CA (2-3 May 2007)

Participant, ESRI's International GIS Users Conference, San Diego, California (5–12 August 2004)

SERVICE

GSAC, Graduate Student Advisory Committee, Department of Environmental Earth System Science, Stanford University, May 2011 – May 2012

Chair and Founder, The First Annual Women of the Department of Global Ecology Luncheon, 27 May 2011, Stanford University

Co-Chair/Co-Coordinator, The Science of Climate Change: Trends, Perspectives and Projections. Interdepartmental Graduate Symposium; co-designed, co-planned, and co-executed the first SCC Graduate Symposium, UC Riverside, California (24 April 2010, 9 – 5 pm)

PRESS RELEASE

Don't go there: what looks like dirt can be a biological matrix. July 21, 2009, CSU Fullerton Inside, R.L. Hudson
O.C. Scientist: breaking fragile soil crust makes weeds grow wild. July 15, 2009, Orange County Register, P. Brennan
Graduate Student Receives National Recognition. December 12, 2006, CSU Fullerton Inside, D.C. Ramos

PROFESSIONAL ASSOCIATIONS

Member, American Geophysical Union
Member, Ecological Society of America
Member, Ecological Society of America, Plant Population Ecology
Member, Ecological Society of America, Microbial Ecology
Member, Rancho Santa Ana Botanical Garden, Claremont, CA
Member, Society of Women Geographers
Member, Southern California Academy of Sciences

AVOCATIONS

Mentoring
Food activism
Cooking, baking, and bread making
Hiking, mountain biking, yoga
Cartography
Country western line dancing