

Curriculum Vitae

LYNN F. FENSTERMAKER

Associate Research Professor, Ecological Remote Sensing
(Director, Nevada Desert Research Center)
Division of Earth and Ecosystem Sciences, Desert Research Institute
Nevada System of Higher Education
755 E. Flamingo Road, Las Vegas, Nevada 89119
(702) 862-5412

EDUCATION

Ph.D.	2003	Biology, University of Nevada, Las Vegas
M.S.	1986	Agronomy, Pennsylvania State University
B.S.	1981	Environmental Resource Management, Pennsylvania State University

EXPERIENCE

2004 – Present	<i>Associate Research Professor</i> Desert Research Institute, Division of Earth and Ecosystem Sciences, Nevada System of Higher Education, Las Vegas, Nevada
1990 - 2004	<i>Ecological Remote Sensing Scientist</i> Desert Research Institute, Division of Earth and Ecosystem Sciences, Nevada System of Higher Education, Las Vegas, Nevada
1989 - 1990	<i>Soil Scientist</i> Environmental Research Center, University of Nevada, Las Vegas.
1987 - 1989	<i>Assistant to the Director</i> Environmental Research Center, University of Nevada, Las Vegas.
1984 - 1987	<i>Scientist</i> Lockheed Engineering and Mgmt Services Company, Inc., Las Vegas, Nevada.
1979 - 1984	<i>Laboratory/Field Technician</i> Agronomy Department, the Pennsylvania State University.
1981 - 1983	<i>Research/Teaching Assistantship; Assistant Coach, Soil Judging Team</i> Agronomy Department, the Pennsylvania State University.

PROFESSIONAL INTERESTS

Dr. Fenstermaker has experience and interests in the use of remotely sensed data to assess, map, and monitor the effect of environmental stressors, particularly climate change, on vegetation at small and large scales. Related research has focused on the use of remote sensing to estimate evapotranspiration for riparian and phreatophytic zones. Dr. Fenstermaker is actively involved in two research efforts to examine the potential effects of elevated CO₂ and other global change variables on the Mojave Desert ecosystem. She is the Director of these two statewide research programs and is conducting research using remote sensing and field spectrometry to examine plant responses to climate change treatments. Other areas of research have focused on the use of remote sensing to map land use/land cover, monitor environmental status and trends, and the development of quality assurance/quality control procedures for spatial data. Dr. Fenstermaker has experience in soil characterization and basic soil science from work conducted at the Pennsylvania State University Soil Characterization Laboratory and as a participant with and Assistant Coach of the Penn State Soil Judging Team (1978-1984). Dr. Fenstermaker has participated in several community and K-12 mentoring programs to inform students about ecological and remote sensing research as well as the rewards of a career in science.

TEACHING EXPERIENCE

2005-07 Member of PhD graduate candidate committee at the University of Nevada Las Vegas
2000 Remote Sensing Ecology Course, University of Nevada, Las Vegas (Spring semester)
1999 Plant Physiology Laboratory, University of Nevada, Las Vegas (Fall semester)
1981-83 Assistant Coach, Pennsylvania State University Soil Judging Team

ADVANCED TRAINING

UCAR Advanced Study Program Colloquium on Terrestrial Biosphere and Atmosphere Interactions held at NCAR, Boulder, CO, July 15-26, 1996.

Imaging Spectrometer Data Analysis Techniques, by the Program for Industrial Excellence in Remote Sensing (PIERS) at the University of Colorado, Boulder, June 7-11, 1993.

Analysis of AVHRR Data Workshop, ASPRS, Denver, Colorado, March, 1990.

ARC/INFO, NETWORK, GRID/GRID TOPO geographic information system training course provided by the Environmental Systems Research Institute at Las Vegas, Nevada. May and January, 1986.

Hydrologic Info Systems Workshop, EROS Data Center, Sioux Falls, SD, October, 1985.

MEMBERSHIPS

American Society of Photogrammetry and Remote Sensing
American Society of Agronomy
Ecological Society of America

AWARDS AND HONORS

1997 George C. and Jane B. Maxey Award (\$1000)
1994 Fellowship, Southwest Region of Soroptimist International (\$1000)

RESEARCH GRANTS

2010-2011 Principle Investigator: Updated Estimation of Annual Phreatophytic Evapotranspiration for White River, Spring and Snake Valleys. Southern Nevada Water Authority (\$95,000)
2010-2011 Principle Investigator: Assessing the Envelope of Interannual Variation in Vegetation Response to Climate in Spring Valley, NV. NSF EPSCoR (\$25,000)
2010-2011 Co-Investigator: IPA-New Technologies for Rapid Ecological Assessment. Desert Research Institute (\$10,000)
2009-2013 Co-Investigator: Desert Terminal Lakes – Water Resources Evaluation Program. DOI Bureau of Reclamation (\$3,300,000)
2009-2011 Co-Principle Investigator: Soil Moisture Determination for Ecosystem, Precipitation and Hydrological Modeling. NV System of Higher Education (\$33,776)
2009-2011 Co-Principle Investigator: Soil Moisture Determination for Ecosystem, Precipitation and Hydrological Modeling. NASA NV Space Grant (\$33,776)
2009-2010 Co-Investigator: IPA – Relating Moisture Content and Reflectance Spectra of Biological Soil Crust to Carbon Flux. Desert Research Institute (\$16,137)
2009-2010 Principle Investigator: Hot Spring Microbial Spectra. Desert Research Institute (\$9910)
2008-2013 Component Lead: Nevada Infrastructure for Climate Change Science, Education and Outreach. NSF EPSCoR (\$15,000,000)
2007-2009 Principle Investigator: Accuracy Assessment of Basin ET Estimates. Southern Nevada Water Authority (\$80,000)
2006-2007 Co-Principle Investigator: Global Change and Ecosystem H₂O & CO₂ fluxes in the Mojave and Negev Deserts. International Arid Lands Consortium. (\$100,000)
2004-2008 Subcontract Principle Investigator: Estimating Basin Evapotranspiration for Spring Valley and White River Valley, Nevada: Remote Sensing Component; Southern Nevada Water Authority (\$139,200)

RESEARCH GRANTS Cont.

2001-2007	Co-Principle Investigator: Responses of a Mojave Desert Ecosystem to Simulated Global Change; DOE-PER (\$728,724)
2000-2011	Co-Principle Investigator: Biotic Processes Regulating the Carbon Balance of Desert Ecosystems, DOE-TCP I and II (\$2,250,000; 2,532,230; \$804,551)
2000-2004	Subcontract Principle Investigator: Long-term Comparative Study of Golf Courses Irrigated with Re-use versus Municipal Water: Remote Sensing Component; Toro Corporation and Las Vegas Valley Water Authority (\$64,000)
1998	Co-Principle Investigator: Detecting Change in Arid Vegetation Cover Using Hyperspectral Data; DOE and State of NV (\$160,000)
1998	Principle Investigator: Effect of Dust on Plant Spectra; DOE, (\$17,000)
1998-2001	Co-Principle Investigator: Constructing a Long-Term Ecological Research Program at the NTS; NSF (\$500,000)
1995-2000	Program Manager: Remote Sensing Research; U.S. Govt (\$3,557,115)
1996-1997	Principle Investigator: Estimation of Evapotranspiration; SNWA (\$30,000)
1996-1997	Principle Investigator: Background FACE Spectra; DRI (\$13,326)

PUBLICATIONS

Books/Book Chapters:

Fenstermaker, LF, RL Jasoni, JA Arnone III, DA Devitt and C Kratt. (Accepted) Impact of pixel versus footprint approaches on empirically derived ET estimates from Landsat TM. Proceedings of Remote Sensing and Hydrology 2010 Symposium, Jackson Hole, WY, IAHS Publ 3XX, 2011, 4 p.

Smith, SD, TN Charlet, LF Fenstermaker and BA Newingham. (2009) Effects of Global Change on Mojave Desert Ecosystems, 41 pp in RH Webb, LF Fenstermaker, JS Heaton, DL Hughson, EV McDonald, DM Miller (editors), The Mojave Desert: Ecosystem Processes and Sustainability, University of Nevada Press, Reno NV.

The Mojave Desert: Ecosystem Processes and Sustainability (2009) RH Webb, LF Fenstermaker, JS Heaton, DL Hughson, EV McDonald, DM Miller (editors), University of Nevada Press, Reno NV.

Fenstermaker, LF (2003) Estimation of Evapotranspiration at Different Scales Using Traditional and Remote Sensing Techniques. PhD Dissertation, University of Nevada Las Vegas, Las Vegas, NV.

Fenstermaker, LF, TN Charlet, TE Huxman, JS Coleman, RS Nowak and SD Smith, (2002) Global Climate Change Research in the Nevada Desert. Pages 97-106 in DA Charlet (*editor*). Nevada Environmental Issues, Kendall/Hunt Publishing Company, Dubuque, IA.

Fenstermaker, LK, editor, (1994) Remote Sensing Classification Accuracy Assessment: A Compendium. American Society for Photogrammetry and Remote Sensing, Bethesda, MD, ISBN 1-57083-002-9, 413p.

Fenstermaker, LK, editor (1988) Remote Sensing Applications for Acid Deposition. A Proceedings prepared for the U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory, Las Vegas, Nevada under cooperative agreement no. CR814002-01, published by the University of Nevada, Las Vegas, 180 p.

Fenstermaker, LK, (1986) Diurnal Reflectance and Emittance Characteristics of a Desert Surface. MS Thesis, The Pennsylvania State University, State College, PA.

Invited Papers (peer reviewed):

Fenstermaker, LK and JR Miller, (1994) Identification of Fluvially-Redistributed Mill Tailings Using High Spectral Resolution Aircraft Data. Photogrammetric Engineering and Remote Sensing, 60(8):989-995.

Journal Papers (peer reviewed):

Arnone III, JA, RL Jasoni, LF Fenstermaker, RS Nowak, and SD Smith (ready for submission) Elevated CO₂ reduces net ecosystem carbon uptake but does not reduce H₂O losses.

Devitt D, LF Fenstermaker, MH Young, B Conrad, BM Bird and M Baghzouz. (Accepted) Evapotranspiration of mixed shrub communities in phreatophytic zones of the Great Basin. Ecohydrology.

Baghzouz M, DA Devitt, LF Fenstermaker and MH Young. 2010. Monitoring vegetation phenological cycles in two

different semi-arid environmental settings using a ground based NDVI system: A potential approach to improve satellite data interpretation. *Remote Sensing*, 2:990-1013, doi:10.3390/rs2040990

- Wohlfahrt, G, A Haslwanter, L Hörtnagl, RL Jasoni, LF Fenstermaker, JA Arnone III and A Hammerle, (2009) On the consequences of the energy imbalance for calculating surface conductance to water vapour. *Agricultural and Forest Meteorology* 149:1556-1559.
- Young, MH, TG Caldwell, DG Meadows and LF Fenstermaker, (2009) Variability of soil physical and hydraulic properties at the Mojave Global Change Facility, Nevada: implications for water budget and evapotranspiration. *Journal of Arid Environments*, doi:10.1016/j.jaridenv.2009.01.015
- Wohlfahrt, G, LF Fenstermaker and JA Arnone III. (2008) Large annual net ecosystem CO₂ uptake of a Mojave Desert ecosystem. *Global Change Biology*, 14:1475-1487.
- Devitt, DA, RL Morris, M Baghzouz, M Lockett, LK Fenstermaker (2005) Water quality changes in golf course irrigation ponds transitioning to reuse. *Hort Science*, 40(7): 2151-2156.
- Devitt, DA, RL Morris, LF Fenstermaker, M Baghzouz and DS Neuman (2005) Foliar Damage and Flower Production of Landscape Plants Sprinkle Irrigated with Reuse Water. *Hort Science*, 40(6):1871-1878.
- Devitt, DA, RL Morris, and LF Fenstermaker. (2005) Foliar Damage, Spectral Reflectance and Tissue Ion Concentrations of Trees Sprinkle Irrigated with Waters of Similar Salinity but Different Chemical Composition. *Hort Science*, 40(3):819-826.
- Smith SD, TE Huxman, SF Zitzer, TN Charlet, DC Housman, JC Coleman, LK Fenstermaker, JR Seemann, and RS Nowak (2000) Elevated CO₂ increases productivity and invasive species success in an arid ecosystem. *Nature* 408: 79-82.
- McGwire, K, T Minor and L Fenstermaker (2000) Hyperspectral Mixture Modeling for Quantifying Sparse Vegetation Cover in Arid Environments. *Remote Sensing of Environment*, 72(3):360-374.
- Devitt, DA, A Sala, SD Smith, JA Cleverly, LK Shaulis, and R Hammett (1998) Bowen Ratio Estimates of evapotranspiration for *Tamarix ramosissima* stands on the Virgin River in southern Nevada. *Water Resources Research*, 34(9):2407-2414.
- Fenstermaker-Shaulis, LK, A Leskys, and DA Devitt (1997) Utilization of remotely sensed data to map and evaluate turfgrass stress associated with drought. *Journal of Turfgrass Management*, 2(1):65-81.
- Hibbard, KA and LK Shaulis (1997) UCAR colloquium on advances in ecosystem-atmosphere interactions. *Bulletin of the Ecological Society of America* 78:164-165.
- Lunetta, RS, RG Congalton, LK Fenstermaker, JR Jensen, KC McGwire, and LR Tinney (1991) Remote Sensing and Geographic Information System Data Integration: Error Sources and Research Issues. *Photogrammetric Engineering and Remote Sensing*, Vol. 57, No. 6, pp. 677-687.
- Conferences:**
- LF Fenstermaker and MH Young (2009) Carbon Flux and Spectral Response of Biological Soil Crust to Soil Moisture Status. ASA-CSSA-SSSA 2009 International Annual Meeting, November 1-5, 2009, Pittsburgh, PA.
- Young, MH, LF Fenstermaker and J Zhu (2009) Near-Surface Water Content and Carbon Flux in Biological Soil Crust. AGU Chapman Conference Examining Ecohydrological Feedbacks of Landscape Change Along Elevation Gradients in Semiarid Regions, October 4-8, 2009, Boise and Sun Valley, ID.
- Fenstermaker, LF, BA Newingham, SD Smith and TN Charlet (2009) Spectral Assessment of Mojave Global Change Treatment Effects. Abstracts, The Ecological Society of America, 94th Annual Meeting, August 2-7, 2009, Albuquerque, NV, PS 6-63.
- Fenstermaker, LF and EA Knight (2007) Assessing Climate Change Treatment Effects with a Radio Control Helicopter Multispectral Platform. Abstracts, The Ecological Society of America, 92nd Annual Meeting, August 5-10, 2007, San Jose, CA, PS 66-122.
- Fenstermaker, LK, DA Devitt, DE Pataki, and SD Smith (1999) Spatial Variations in Evapotranspiration of a Riparian *Tamarix* Community. Abstracts, The Ecological Society of America, 84th Annual Meeting. August 8-

12, 1999, Spokane WA, p. 249.

Gamon JA, LK Fenstermaker, and DA Sims (1999) Optical detection of early CO₂ treatment effects at the Nevada Desert FACE Facility. Ecological Society of America, Annual Meeting, Spokane WA.

Shaulis, LK, DA Devitt, and SD Smith (1997) Estimation of *Tamarix* Evapotranspiration Using Remotely Sensed Data. Agronomy Abstracts, 1997 Annual Meetings of the American Society of Agronomy, Crop Science Society of America, and the Soil Science Society of America. October 26-31, Anaheim, CA, p. 257.

Fenstermaker, LK (1992) Identification of Mill Tailings within the Carson River Superfund Site. Proceedings, International Symposium on Spectral Sensing Research, Nov 15-20, Maui, HI, Vol. 2, pp. 997-1007.

Fenstermaker, LK (1991) Proposed Approach for National to Global Scale Error Assessments. Proceedings, GIS/LIS '91, Atlanta, GA, Vol. 1, pp. 293-299.

Fenstermaker, LK (1990) Delineation of Mine Tailings in Southeastern Kansas. Proceedings, 1990 ACSM-ASPRS Annual Convention, Denver, Colorado. Vol. 4 pp. 121-125.

Brotten M, L Fenstermaker, and J Shafer (1987) An Automated GIS for Ground Water Contamination Investigation, Proceedings - Solving Ground Water Problems with Models Conference, Denver Colorado, NWWA/IGWMC.

Foresman, TW, and LK Fenstermaker (1986) Spatial Data Research for Hazardous Waste Sites, Proceedings - National Conference on Hazardous Wastes and Hazardous Materials, Atlanta, Georgia.

Fenstermaker, LK (1986) Applications of GIS to Environmental Assessment: EMTS, a case study. CHATTMAP '86, Chattanooga, Tennessee.

Fenstermaker, LK (1986) Geographic Information Systems: Environmental Assessment and Monitoring Applications. The World Health Organization Symposium on Human Exposure Assessment Local (Heal), Chattanooga, Tennessee.

Selected Reports:

Arnone III JA, RL Jasoni, JD Larsen, LF Fenstermaker, G Wohlfahrt, CB Kratt, BF Lyles, J Healey, MH Young and JM Thomas (2008) Variable evapotranspirative water losses from lowland agricultural and native shrubland ecosystems in the eastern Great Basin of Nevada, USA. Prepared for Southern Nevada Water Authority, 97 p.

Devitt D, L Fenstermaker, M Young, B Conrad, M Baghzouz and B Bird. 2008. Evapotranspiration Estimates in North Eastern Nevada Basins. Prepared for the Southern Nevada Water Authority, 83 p (text only).

Devitt DA, LK Fenstermaker, MH Young and B Conrad. 2006. Basin Wide Evapotranspiration Estimates for Spring Valley and White River Valley. Prepared for the Southern Nevada Water Authority, 60 p.

Meadows, DG, MH Young and LF Fenstermaker (2006) Geostatistical analysis of soil and hydraulic processes at the MGCF. Internal report prepared for DOE Program for Ecological Research grant, Desert Research Institute, DHS Publication No. 41225, 24 p.

Shaulis, L, G Wilson and R Jacobson (1997) Historical hydronuclear testing: characterization and remediation technologies. Prepared for the Nevada Operations Office, Department of Energy, DRI Publication No. 45158, 21 p.

Shaulis, L (1996) Review of encapsulation technologies. Prepared for the Nevada Operations Office, Department of Energy, DRI Publication No. 45146, 19 p.

Shaulis, L, and J Lancaster (1995) Summary of Spectral Analysis Workshop: The Use of Vegetation as an Indicator of Environmental Contamination. Prepared for the U.S. Navy, Port Hueneme, CA, 147 p.

Shaulis, L, and J Lancaster (1994) Changes in Plant Spectra as an Indicator of Environmental Contamination. Prepared for the U.S. Navy, Port Hueneme, CA, 29 p.

Fenstermaker, LK (1993) Remote Sensing Quality Assurance and Quality Control Issues and Guidance. Internal report prepared for the EPA, Environmental Monitoring Systems Laboratory, Las Vegas, Nevada, 16 p.

Fenstermaker, LK (1993) Remote Sensing Thematic Accuracy Assessment. Internal report prepared for the EPA, Environmental Monitoring Systems Laboratory, Las Vegas, Nevada, 26 p.

- Fenstermaker, LK (1992) Identification of Mill Tailings within the Carson River Watershed Using High Spectral Resolution Data, Internal report prepared for the EPA, Environmental Monitoring Systems Laboratory, Las Vegas, Nevada, 31 p.
- Fenstermaker, LK (1990) Delineation of Mine Waste in Southeastern Kansas Using High Resolution Aircraft Scanner Imagery. Internal report prepared for the EPA, Environmental Monitoring Systems Laboratory, Las Vegas, Nevada, 17 p.
- Fenstermaker, LK, GE Byers, TH Starks, MJ Miah, CJ Palmer, and KD Lauckner (1990) Direct Delayed Response Project Soil Characterization Comparison. Report prepared for the EPA, Environmental Monitoring Systems Laboratory, Las Vegas, Nevada, EPA/600/9-90, 370 p.
- Fenstermaker, LK (1986) Diurnal Reflectance and Emittance Characteristics of a Desert Surface, Thesis, the Pennsylvania State University, 122 p.
- Fenstermaker, LK and JS Duggan (1986) San Gabriel Basin Geographic Information System Demonstration, Los Angeles County, California. Prepared for the U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. TS-AMD-85742-0, 349 p.
- Olsen, MV and LK Fenstermaker (1985) Land Cover Classification of Aircraft MSS Data, Fort Irwin, California - Volume II. Prepared for the U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. EPA AMD-83038-83560-2.
- Olsen, MV and LK Fenstermaker (1985) Land Cover Classification of Aircraft MSS Data, Twentynine Palms, California - Volume II. Prepared for the U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. EPA AMD- 84019-84560-2.
- Fenstermaker, LK and D Becker (1985) Thermal Infrared Survey of Fish Hatcheries, Snake River, Idaho. Prepared for the U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. TS-AMD-84076e.