JESSICA J. MITCHELL
Montana Natural Heritage Program – Spatial Analysis Lab
NS 313, University of Montana, Missoula, Montana 59812
406-243-5196 (office) • 336-977-4596 (mobile)

EDUCATION AND CERTIFICATIONS

IDAHO STATE UNIVERSITY, Pocatello, ID
Ph.D., Engineering and Applied Sciences – Geosciences (2011)
Applications in LiDAR and Hyperspectral remote sensing to improve the characterization of low-height sparse vegetation ecosystems

IDAHO STATE UNIVERSITY, Pocatello, ID
M.S., Geographic Information Science (2007)
Spectral and spatial detection limits of leafy spurge (*Euphorbia Esula* L.): Sensor comparisons and matched filtered behavior

UNIVERSITY OF MARYLAND, Baltimore County, MD
B.S., Geography and Environmental Systems (2001)
Independent research in collaboration with Baltimore Ecosystem Studies: anthropogenic inputs and heavy metal concentrations along roadside soil gradients

UTAH STATE UNIVERSITY, Logan, UT
National Environmental Policy Act (NEPA) Certification (2004)
Natural Resource and Environmental Policy Program WETLAND

WETLANDS TRAINING INSTITUTE, Kalispell, MT
Wetland Delineation Certification (2003)

PROFESSIONAL EXPERIENCE

Director, Montana Natural Heritage Program's Spatial Analysis Lab, University of Montana, 2018

Assistant Research Professor, University of Montana, Department of Ecosystem and Conservation Science, 2018

Assistant Professor, Appalachian State University, Department of Geography and Planning and Department of Geological and Environmental Sciences (Affiliate Status), 2014 - 2018

Co-Director, Computer Visualization Lab, College of Arts and Sciences, Appalachian State University (2014 – present)

Visiting Assistant Professor, University of Delaware, Department of Geosciences, 2013 - 2014

Affiliate Research Associate, Boise State University (formerly Idaho State University), Boise Center Aerospace Lab, 2011 - Present

Visiting Instructor, University of North Carolina Wilmington, 2012 - 2013

Postdoctoral Associate (Joint Appointment), Idaho State University, Boise Center Aerospace Lab and the Department of Energy, Idaho National Lab, Unmanned Vehicle Technologies, 2011

Ph.D. Research Fellow, Geosciences Department, College of Engineering, Idaho State University, 2007 – 2010

Graduate Research Assistant, Geosciences Department, Boise Center Aerospace Lab, Idaho State University, 2005 – 2007

Environmental Planner, Biota Research and Consulting, Inc., Jackson, Wyoming, 2002–2005 (full-time); 2006 – 2012 (contract)

Environmental/Transportation Planner, Edwards and Kelcey, Baltimore, Maryland**,** 2001 – 2002

EXTERNALLY FUNDED RESEARCH

Economic Impact of Hemlock Woolly Adelgid (HWA) in Western North Carolina, Whitehead, J., Callahan, S., Giguere, C., Mitchell, J. and Owen, M. $59,401 (03/01/2018 – 06/30/2018). North Carolina Policy Collaboratory

Leveraging NEON data to investigate remote sensing of biodiversity variables and scaling implications, Mitchell, J. $288,852 (2017 -2019), National Science Foundation, Macrosystems Biology, Early NEON Science, Early Career Award.

Offer to Perform Small Scale Foliar-Pigment Analysis Methods Test for NEON. Mitchell, J. and Madritch, M. $5,141 (2017), Batelle Ecology, Inc. (National Ecological Observatory Network).

Research Opportunity Award Supplemental for Collaborative Research: Modeling the Tradeoffs within Food-, Fear-, and Thermal-Scapes to Explain Habitat Use by Mammalian Herbivores. Forbey, J. and Mitchell, J. $24,905 (2016-2017), National Science Foundation Facilitating Research at Primarily Undergraduate Institutions.

Workshop-NEON: training in scientific discoveries with NEON's AOP, Nancy Glenn, Ramon Arrowsmith, Christopher Crosby, Alejandro Flores, Jessica Mitchell, Dar Roberts, Susan Ustin. $100,000 (December 2015 – December 2017), National Science Foundation Macrosystem Biology.

Integrating High Resolution 3D Laser Scans with Spectral Libraries to Improve Remotely Sensed Vegetation Mapping in North Carolina, Mitchell, J. (Principal Investigator) $24,516 (July 2015 - June 2016), North Carolina Space Grant Consortium, New Investigator Program

Graduate Research Associate Mentoring Program (GRAM), Mitchell, J. $24,000 in graduate student support of faculty research (August 2015 – May 2017).

Scalable vegetation structure for ecosystem modeling in the western US, Glenn, N. F., Ustin, S., Lejo, A., Mitchell, J., (co-Investigator) Shrestha, R. $377,625 ($59,240 to Appalachian State University) (January 2014 - January 2017), NASA Research Opportunities in Space and Science (ROSES), Terrestrial Ecology Program.

Focal habitat feature identification for Teton County, Wyoming, Campbell, T. and Mitchell, J. (co-Investigator), $84,204 (2013-2014), Teton County, Wyoming.

Unmanned aerial vehicle-based remote sensing & data fusion for energy & environmental applications, Anderson, M., Hruska, R., Lee, R., and Mitchell, J. $300,000 (2011-2012), INL Laboratory Directed Research and Development

Development of full-waveform LiDAR capabilities for water resources and vegetation monitoring, Heath, G., Glenn, N., Mitchell, J. $300,000 (2011-2012), INL Laboratory Directed Research and Development

INSTITUTIONAL RESEARCH

Hemlock Impact Assessment, Jessica Mitchell (Principal Investigator), $7,643 (January 2016 – June 2017), Research Cluster Proposal, Appalachian State University Office of Research and Research Institute for Environment, Energy and Economics.

Faculty Reassigned Time, $3,400 (08 August 2016 – 10 December 2016) Office of Research

*GIS Assessment Grant***,** $2,380 for GIScience faculty and staff (R. Hale, J. Colby, M. Sugg)

Faculty Summer Grant, $5,000, The College of Arts and Sciences Dean's Office. 2017 Summer Support.

Student Fellowships

NASA Develop National Program, Megan Maloney, NASA Goddard Space Flight Center. Summer 2018

SAFE Student Grant, $1700 Megan Maloney, Hughlene and Bill Frank Endowment, The College of Arts

and Sciences Dean's Office. 2017 Summer Support.

North Carolina Space Grant Consortium Undergraduate Research Scholarship, $5,000, Lauren Anderson. 2014 Summer Support.

RECENT PROPOSALS, PENDING AND UNFUNDED

CO2 Emissions Uncertainty, Marland, G., Marland, E., Colby, C., Mitchell, J., Swarthout, B. and Thaxton, C. $59,000 (02/2017), NASA Research Opportunities in Space and Science (ROSES), Carbon Monitoring System Program, unfunded

Collaborative Research: Effects of Climate Change on Woody-Vegetation Structure and Function in Semiarid Ecosystems, Glenn, N., Flores, L., Ustin, S., Mitchell, J. $450,710 (2016-2021), National Science Foundation MacroSystems Biology: Research on Biological Systems t Regional to Continental Scales, unfunded

Setting quantitative geodiversity targets for Conserving Nature's Stage using integrated NASA Earth Observation Platforms. Mitchell, J. $91,507 (2017-2019), NASA Research Opportunities in Space and Science (ROSES), Biodiversity Program, unfunded

Acquisition of a field spectroradiometer to integrate education with applied biological and geosciences research, Madritch, M. and Mitchell, J. $118,640 (2015-2018), National Science Foundation Major Research Instrumentation, unfunded

Creating functional maps and tools for monitoring, predicting and prioritizing quality habitat for sage-grouse, Forbey, J., Mitchell J., Glenn, N. $318,831 (2014-2015), Western US Fish and Wildlife Service, Greater Sage-Grouse Inter-LCC Research, unfunded

PEER REVIEWED PUBLICATIONS, DATASETS, AND BOOK CHAPTERS (*student author)

Ilangakoon, N.T., Glenn, N.F., Dashti, H., Painter, T.H., Mikesell, T.D., Spaete, L.P., **Mitchell, J.J.** and Shannon, K., 2018. Constraining plant functional types in a semi-arid ecosystem with waveform lidar. *Remote Sensing of Environment*, *209*, pp.497-509.

Mitchell, J., Glenn, N., Dahlin, K., Ilangakoon, N., Dashti, H. and Maloney, M *. 2018. Integrating Hyperspectral and LiDAR Data in the Study of Vegetation. In Thenkabail, P., Lyon, J., and Huete, A. [Eds.] *Hyperspectral Remote Sensing of Vegetation*, 2nd Edition, CRC Press, *in press.*

Maloney, M. *, Dashti, H., **Mitchell, J.,** Ilangakoon, N., Spaete, L., Qi, Yi, Neufeld, H., Colby, J., Ustin, S. and Glenn, N. Biomass and density field data improve watershed mapping of foliar Nitrogen in dryland shrubs with airborne imaging spectroscopy. Ecological Indicators, *in preparation*.

Glenn, N.F., L.P. Spaete, R. Shrestha, A. Li, N. Ilangakoon, J. Mitchell, S.L. Ustin, Y. Qi, H. Dashti, and K. Finan. 2017. *Shrubland Species Cover, Biometric, Carbon and Nitrogen Data, Southern Idaho, 2014*. ORNL DAAC, Oak Ridge, Tennessee, USA. [dataset] https://doi.org/10.3334/ORNLDAAC/1503

Olsoy, P.J., **Mitchell, J.,** Glenn, N.F. and Flores, A.N., 2017. Assessing a Multi-Platform Data Fusion Technique in Capturing Spatiotemporal Dynamics of Heterogeneous Dryland Ecosystems in Topographically Complex Terrain. *Remote Sensing*, *9*(10), p.981.

Mitchell, J. and McDade, B.* 2017. Direct and Remote Sensing. In J. Pine (Ed.) *Technology in Emergency Management*, 2nd edition, NJ: Hoboken, John Wiley & Sons, Inc.

Li, A., Zhao, W., **Mitchell, J**., Glenn, N., Germino, M., Sankey, J. and Allen, R. 2017. Aerodynamic roughness length estimation with lidar and imaging spectroscopy in a shrub-dominated dryland. *Photogrammetric Engineering and Remote Sensing*, 83 (6), 415 – 427.

Mitchell, J. and McDade, B.* Direct and Remote Sensing. In J. Pine (Ed.) *Technology in Emergency Management*, 2nd edition, NJ: Hoboken, John Wiley & Sons, Inc., January 2017 contract deadline.

Mitchell, J., Glenn, N., Anderson, M. and Hruska, R., 2016. Flight Considerations and Hyperspectral Image Classifications for Dryland Vegetation Management from a Fixed-wing UAS. *Environmental Management and Sustainable Development*, 5(2), 41-57.

Olsoy, P., **Mitchell, J.,** Glenn, N., Levia, D., and Clark, P. 2015. Estimation of big sagebrush leaf area index with terrestrial laser scanning, *Ecological Indicators, 61 (2), 815-821.*

Li, A., Glenn, N. F., Olsoy, P. J., **Mitchell, J.** J., & Shrestha, R. 2015. Aboveground biomass estimates of sagebrush using terrestrial and airborne LiDAR data in a dryland ecosystem. *Agricultural and Forest Meteorology*, *213*, 138-147.

Mitchell, J., Moore, C., and Glenn, N. 2013. Single and multi-date Landsat classifications of basalt to support Soil Survey efforts, *Remote Sensing*, 5(10), 4857-4899.

Hruska, R., **Mitchell, J.**, Anderson, M. and N. Glenn, N, Halford, A. and Baun, C. 2012. Radiometric and geometric analysis of hyperspectral imagery acquired from an Unmanned Aerial Vehicle (UAV), *Remote Sensing*, 4, 2736-2752.

Mitchell, J., Glenn, N., Sankey, T., Derryberry, D. and Germino, M. 2012. Hyperspectral remote sensing of sagebrush canopy nitrogen, *Remote Sensing of Environment*, 124, 217-223.

Mitchell, J., Glenn, N., Sankey, T., Derryberry, D., Anderson, M. and Hruska, R. 2012. Spectroscopic detection of Nitrogen concentrations in sagebrush: implications for hyperspectral remote sensing, *Remote Sensing Letters*, 3 (4), 285-294.

Glenn. N., Sankey, T., Spaete, L. and **Mitchell, J.** 2011. Errors in LiDAR-derived shrub height and crown area on sloped terrain, *Journal of Arid Environments*, 75 (4), 377-382.

Spaete, L. P., Glenn, N. F., Derryberry, D. R., Sankey, T. T., **Mitchell, J.J.**, and Hardegree, S. P. 2011. Vegetation and slope effects on accuracy of a LiDAR-derived DEM in the sagebrush steppe, *Remote Sensing Letters*, 2 (4), 317-326.

Mitchell, J., Glenn, N., Sankey, T., and Derryberry, D., Anderson, M. and Hruska, R. 2011. Sagebrush canopy height and shape estimations using small footprint LiDAR, *Photogrammetric Engineering and Remote Sensing*, 77 (5), 521 – 530.

Mitchell, J. J., and Glenn, N. F. 2009. Matched filter subpixel abundance estimates in mixture-tuned matched filter classifications of leafy spurge (*Euphorbia esula* L.). *International Journal of Remote Sensing*, 30(23), 6099-6119.

Mitchell, J., and Glenn, N. F. 2009. Leafy Spurge (*Euphorbia esula*) Classification Performance Using Hyperspectral and Multispectral Sensors, *Rangeland Ecology and Management*, 62: 16-27.

PLANS AND REPORTS (PRIMARY EDITOR/AUTHOR)

Smith, H., Mitchell, J and Campbell, T. August 2014. Focal Habitat Feature Identification Project Report and Mapping for Teton County, Wyoming.

Gros Ventre Campground Rehabilitation: Environmental Assessment/ Assessment of Effect. May 2009. Prepared for the National Park Service.

Mitchell, J. and Glenn, N. February 2009. Predictive mapping of cheatgrass (*Bromus tectorum*) with MaxEnt. Prepared for Idaho Bureau of Land Management, Boise, Idaho.

Rope, R. and Mitchell, J. February 2009. Anomaly detection analysis using cumulative growing degree day. Prepared for Idaho Bureau of Land Management, Boise, Idaho.

North Highway 89 Pathway Project Environmental Assessment prepared for Teton County, WY, National Elk Refuge, and Federal Transit Administration. February 2009.

National Park Service. 2004. Fire Management Plan Environmental Assessment: Grand Teton National Park, WY. Prepared for the National Park Service

Reigel, C. J, Campbell, T. M., and Mitchell, J. J., 2003. Jackson Hole Roadway and Wildlife Crossing Study. Biota Research and Consulting, Inc. and the Jackson Hole Wildlife Foundation, Jackson, Wyoming.

SELECTED PRESENTATION (*student author)

Steele, R.*, Mitchell, J., Swarthout, R., and Forbey, J. *Spectral estimation of foliar sagebrush crude protein*. 2017. 20th Celebration of Student Research and Creative Endeavors, Student Poster Competition, 27 April, Appalachian State University, Boone, NC.

Jessica Mitchell, Andrew Poley, Megan Maloney*, Nayani Ilangakoon, Hamid Dashti, Yi Qi, Lucas Spaete, Susan Ustin, and Glenn, N. *Toward regional shrub biomass and uncertainty mapping in the western US using airborne lidar and imaging spectroscopy*. SilviLaser 2017, 10-12 October, Virginia Tech, Blacksburg, Va.

Schultz, E., *Berryhill, B. *, and Mitchell, J. *Suitability analysis of eastern hemlock stand locations for 3D terrestrial laser scanning*. 2016. 19th Celebration of Student Research and Creative Endeavors, Student Poster Competition, 21 April, Appalachian State University, Boone, NC.

Mitchell, J., Glenn, N., Ilangakoon, N. *An overview of lidar for characterizing shrub structure in the western US*. 2016. US Regional Association of the International Association of Landscape Ecology 2016 Meeting, 3-7April, Asheville, NC.

*Andersen, L., and Mitchell, J. 2015. *Building Vegetation Spectral Libraries Local to the Southern Appalachians with an Emphasis on Carolina Hemlock (*Tsuga caroliniana*).* State of North Carolina Undergraduate Research Symposium, 14 November, High Point University, High Point, NC.

Mitchell, J., Glenn, N., Dashti, H., Finan, K., Spaete, L. and Flores, A. *A canopy level investigation of specific leaf area spectral responses from sagebrush shrublands in Reynolds Creek Experimental Watershed, Idaho, USA*. 2015. NASA Carbon Cycle and Ecosystems Joint Science Workshop, 20-24 April, College Park, MD.

Mitchell, J., Olsoy, P., Forbey, J., Glenn, F., Burgess, M., Rachlow, J. and Shipley, L. *Predicting forage foodsacpes with spectroscopy and unmanned aerial vehicle (UAV) imagery*. 2013 AGU Fall Meeting, 9-13 December, San Francisco, CA.

Mitchell, J., Shrestha, R., Spaete, L., and Glenn, N. *Combined airborne LiDAR and spectral satellite data for three-dimensional fuels mapping in sagebrush-steppe*. 2013 NASA HyspIRI workshop, 29-30 May, Greenbelt, MD

Mitchell, J., Spaete, L., Glenn, N., Olsoy, P., Shrestha, R. and Glenn, N. *Optimal airborne Lidar and hyperspectral combination methods for improved quantification of sparse, low height vegetation cover*. 2013 ASPRS Annual Conference: Confluence by the Bay – A Gathering of Geospatial Insights, 24-28 March, Baltimore, MD.

Glenn, N. F. and Mitchell, J. *Toward improved hyperspectral analysis in semiarid systems.* 2012 AGU Fall Meeting, 3-7 December, San Francisco, CA.

Mitchell, J. J., Glenn, N. F., Anderson, M. O. and Hruska, R. C. *Unmanned aerial vehicle (UAV) hyperspectral remote sensing for dryland vegetation monitoring*. 2012 Whispers 4th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing. Shanghai, China.

Mitchell, J., Hruska, R., Anderson, M., and Glenn, N. *HyspIRI validation with unmanned aerial vehicle remote sensing*, 2011 NASA HyspIRI Science Workshop, 23-25 August 2011, Washington, DC.

Mitchell, J, Glenn, N.F., Sankey, T., Anderson, M.O., Hruska, R., *Hyperspectral remote sensing of sagebrush canopy nitrogen*, 34th International Symposium on Remote Sensing of Environment, Sydney, Australia, April 2011

TEACHING EXPERIENCE

Appalachian State University, 2014-2017

- GHY 3812, **Introduction to GIS,** Fall 2014, 2016, Spring 2017, Fall 2017
- GHY 4812 / 5812, **Advanced GIS, Spring** 2015
- ENV / GLY 4410 **Environmental Management and Impact Analysis**, Spring 2016, 2017
- GHY 3310, **Environmental Remote Sensing**, Spring 2015-2017
- GHY 4810 / 5810, **Digital Image Processing**, Fall 2014-2017
- ENV 1010, **Intro to Env. Science and Engineering,** Fall 2014, 2015, 2017
- ENV 4100, **Environmental Science Seminar**, Spring 2015

University of Delaware, 2013-2014

- GEOG 670, **Geographic Information Systems and Science**, Fall 2013, Spring 2014
- GEOG 471/671, **Advanced GIS**, Fall 2103
- GEOG 372, **Introduction to GIS**, Fall 2013, Spring 2014
- GEOG 473 /673, **Lidar and Hyperspectral Processing**, Spring 2014

University North Carolina Wilmington, 2012-2013

- GGY 473, **Regional and Environmental Land Use Planning**, Spring 2013
- GGY 426/526, **Environmental GIS Lab**, Fall 2012
- GGY 270, **Principles of Land Use Planning**, Fall 2012

Idaho State University 2010-2012

- GEOL 408/508, **Geotechnology Seminar,** Fall 2010
- Student project mentor and summer intern advisor, 2010 - 2012

WORKSHOPS

Instructors: Jessica Mitchell (Appalachian State University), Dar Roberts (UC Santa Barbara), Nancy Glenn (Boise State), Yi Qi (UC Davis), Nathan Leisso (NEON), Mapping Species, Composition (foliar chemistry) and Soil Properties with Properties with Spectroscopy, August 2016, Boise State University, NSF-NEON, 25 students for 3 days.

TRAINING

2017 Lidar Full Waveform Lidar Analysis, *NSF NEON Workshop, Blacksburg, Va*.

2015 CAMO UnScrambler Chemometrics and Multivariate Analysis for Spectroscopy Data, *Camo Inc., Newark, NJ.*

2013 Ecosystem Demography Modeling Workshop, *Moorcroft Laboratory Harvard University, Lawrence Berkeley National Lab, Berkeley, CA.*

2007 Subsurface science intensive (i.e., subsurface architecture, vadose zone processes, microbial and geochemical processes for in situ remediation, contaminant fate and transport, geophysical data collection and interpretation), *Inland Northwest Research Alliance*

2003 NEPA: Assessing Cultural Resource Impacts, *National Park Service, Grand Teton National Park, Moose, WY*

2000 Preparation and presentation of policy reports for Maryland Transportation Commission Smart Growth Task Force (Intern Fellowship), *Maryland Department of Transportation*

SERVICE AND AWARDS

PROFESSIONAL

NSF Division of Environmental Biology Proposal Reviewer, October 2017

NASA Earth and Space Science Fellowship (NESSF) Proposals, April 2017

NSF Geography and Spatial Sciences Proposal Reviewer, November 2016

NASA Carbon Cycle Science Review Panelist, Artic / Boreal and Tropical Forests programs, October, 2016

Invited Special Symposia Convener, US Regional Association of the International Association of Landscape Ecology 2016 Meeting, April 3-7, Asheville, NC. Session: LiDAR Techniques for Advancing Applications in Landscape Ecology.

Sessions Moderator (Technical and Commercial), 2013, ASPRS Annual Conference: Confluence by the Bay – A Gathering of Geospatial Insights, March 24-28th, Baltimore, MD

Peer-Reviewer, Great Basin Landscape Conservation Cooperative (GBCC) proposal round (1) National Science Foundation Proposal, Geography and Spatial Sciences Program (1) PLOS ONE (1), International Journal of Remote Sensing (4), Digital Earth (2), Journal Applied Remote Sensing (3), Precision Agriculture (2), Native Plant Journal (1), Remote Sensing of Environment (2), Remote Sensing (2), Environmental Management (1), IEEE JSTARS (2), Remote Sensing in Ecology and Conservation (1), Canadian Journal of Remote Sensing (1), European Journal of Forest Research (1)

Poster Award, 2010, ASD and IEEE Reflectance Spectroscopy Symposium, Boulder, CO

UNIVERSITY

Most Helpful Faculty & Staff Award, Appalachian State University, 2015 - 2016

GIScience Curricula Committee Member, Department of Geography and Planning, Appalachian State University, 2014 -present

Graduate Exam Committee Chair, Department of Geography and Planning, Appalachian State University, 2014 (member 2014 -2016)

Graduate Faculty Member, Department of Geography and Planning, Appalachian State University, 2014 – present

Assessment Committee Member, Department of Geography and Planning, Appalachian State University, 2017

Environmental Science Advisory Board Member, College of Arts and Sciences, Appalachian State University, 2014 – present

Faculty Search Committees, GIScience (2014) and Cartography and Geovisualization (2016), Department of Geography and Planning; Environmental Science Program Director (2017), Department of Geological and Environmental Science; Soils Processes, Department of Geosciences, Idaho State University (2010)

Session Moderator, 2009, World GIS Day, Remote Sensing Track, Idaho State University

DEGREE ADVISING

Thesis Committee Chair, Megan Maloney, Master of Arts in Geography, Appalachian State University: A comparison of methods for scaling field data for use in mapping dryland ecosystem vegetation with airborne imaging spectroscopy, August 2017

Thesis Committee Member, James Balcombe, Master of Arts in Geography, Appalachian State

University: Structure-from-motion based vegetation modeling and shade estimation, May 2015

Thesis Committee Member, Michael Orefice, Master of Science in Geology, University of Delaware: Quantifying geomorphic change to a point bar in response to high flow events using terrestrial lidar, White Clay Creek, DE. June, 2015

Dissertation Committee Member, Farzana Atique, PhD in Transportation Engineering, University of Delaware: Copula Vine Approach in Pipe Condition Monitoring, May 2014

PROFESSIONAL AFFILIATIONS

American Society of Photogrammetry and Remote Sensing
American Geophysical Union
Association of American Geographers
Society of Rangeland Management
Ecological Society of America
American Forestry Association