

LINDSEY SUZANNE SMART

lssmart@ncsu.edu

[NCSU Landscape Dynamics Lab](#)

[Project Website](#)

(585) 704-1699

SHORT BIO

As a landscape ecologist interested in socio-ecological systems (SES) research, Smart combines her knowledge of ecological processes with information on human decision-making to better understand adaptive capacity and resilience in complex SES systems. She employs geospatial modeling and spatial statistics to better understand the multi-faceted and multi-scalar dynamics of human-environment interactions and their consequences on ecosystem health, social vulnerability, and the provision of ecosystem services. Her research focuses on the explicit integration of social science methodologies and ecological processes into agent-based models of land-use and land cover change. She uses these computational models to explore ecosystem services trade-offs under alternate future scenarios of land-use management activities and sea level rise adaptation strategies.

SKILLS

Comprehensive knowledge of statistical concepts, techniques, and data management methodologies, particularly as they relate to environmental and spatial statistics.

Experienced in the application and processing of both passive and active remote sensing technologies (LiDAR) to measure biophysical and ecological processes.

Experienced in sampling design development, data collection protocol writing, and data analyses for long term monitoring projects.

Proficient in Microsoft Office Suite, ArcGIS 9- ArcGIS 10 & GRASS, ERDAS Imagine & ENVI, and Python.

Proficient in the statistical software environment R, and supporting libraries and packages.

Familiar with ArcGIS Online, ArcGIS Viewer for Flex, Flex API, Portfolio, MaxEnt, NatureServe Vista, MARXAN, FragStats, FlamMap, FUSION, RULE, & ArcScene.

EDUCATION

Ph.D. FORESTRY AND ENVIRONMENTAL RESOURCES

In Progress

Center for Geospatial Analytics, Forestry and Environmental Resources, College of Natural Resources
North Carolina State University, Raleigh, NC

MASTER OF ENVIRONMENTAL MANAGEMENT

May 2009

Nicholas School of the Environment
Duke University, Durham, NC

Concentration: Ecosystem science and conservation with a concentration in integrated studies of ecosystem management and restoration, using GIS as a tool.

Coursework: Environmental Statistics; spatial analysis; Conservation GIS; remote sensing; landscape ecology; wetland ecology and restoration; land use planning; environmental law.

Honors: Nicholas School of the Environment Merit Scholarship.

Master's project: Development and analysis of LiDAR-derived forest metrics as indicators of spatial heterogeneity and habitat suitability for the improved management of an endangered species in the coastal plain of North Carolina.

CERTIFICATE IN GEOSPATIAL ANALYSIS

May 2009

Nicholas School of the Environment
Duke University, Durham, NC

BACHELOR OF ARTS *cum laude*

May 2007

Bucknell University, Lewisburg, PA

Major: Biology. *Minor:* Anthropology. Cumulative GPA: 3.59 of 4.0

Activities: Associate member of Phi Sigma Xi Scientific Research Society, Environmental Residential College, Head Start mentor, Bucknell Dance Company.

Summer study: Marine mammal ecology, Duke Marine Laboratory, 2006.

PEER-REVIEWED PUBLICATIONS

Smart, L.S., J.J. Swenson, N.L. Christensen, J.O. Sexton, Three-dimensional characterization of pine forest type and red-cockaded woodpecker habitat by small-footprint, discrete-return lidar, *Forest Ecology and Management*, Volume 281, 1 October 2012, Pages 100-110, ISSN 0378-1127, 10.1016/j.foreco.2012.06.020.

PEER-REVIEWED PUBLICATIONS (IN PREPARATION)

Smith, J. W., **Smart, L. S.**, Sanchez, G. M., Van Berkel, D., Koch, J., Dorning, M. A., Baggio, J., & Meentemeyer, R. K. (2015). Methodological and analytical frontiers for linking human dimensions theory and methods to landscape-scale agent-based models of dynamic landscape-scale processes. Manuscript in preparation.

Smith, J. W., **Smart, L. S.**, Dorning, M. A., Dupey, L. N., Meley, A., Picard, B., Koch, J. A., & Meentemeyer, R. K. (2015). Tradeoffs facing landowners in urbanizing regions. Manuscript in preparation.

Vukomanovic, J., Van Berkel, D., Tonini, F., Amindarbari, R., Beck, S., Chen, B., Dillon, W., Gaydos, D., Jeziorska, J., Klevtцова, A., Petras, V., Petrasova, A., Pickard, B., Sanchez, G., Shashidharan, A., Shoemaker, D., **Smart, L.**, Zhang, Q. and R. Meentemeyer. Making it spatial, makes it personal: engaging stakeholders with geospatial participatory modeling (GPM). To be submitted to *Frontiers in Ecology and Environment*.

Bhattachan, A., Jurjonas, M., Moody, A., Morris, P., Sanchez, G., Smart, L., Taillie, P., Emanuel, R., and E. Seekamp. Sea level impacts on rural coastal socio-ecological systems and the implications for decision making. To be submitted to *Ecology and Society*.

TECHNICAL & PROFESSIONAL REPORTS

Smart, L., Nordman, C., Pyne, M., White, R., Smyth, R., (2013). Field Testing a Habitat-Based Approach for Addressing At-Risk Biodiversity on Fiber-Producing Lands: Final Report. Report prepared by NatureServe for NCASI. Durham, NC, USA.

Comer, P., Crist, P., Reid, M., Hak, J., Hamilton, H., Braun, D., Kittel, G., Varley, I., Unnasch, B., Auer, S., Creutzburg, M., Theobald, D., & Kutner, L., (R. Smyth & **L. Smart** Technical Assistance) (2013). [Mojave Basin and Range: Rapid Ecoregional Assessment](#). Report prepared by NatureServe for the U.S. Department of the Interior Bureau of Land Management Rapid Ecoregional Assessments.

Faber-Langendoen, D., Hedge, C., Kost, M., Thomas, S., **Smart, L.**, Smyth, R., Drake, J., & Menard, S. (2012). [*Assessment of Wetland Ecosystem Condition across Landscape Regions: A Multi-metric Approach, Part A. Ecological Integrity Assessment Overview and Field Study in Michigan and Indiana.*](#) Report prepared by NatureServe for the U.S. Environmental Protection Agency, Office of Research and Development.

White, R., Nordman, C., **Smart, L.**, Leibfreid, T., Moore, B., Smyth, R., & Govus, T., (2011) [*Vegetation Monitoring Protocol for the Cumberland Piedmont Network, Version 1.*](#) Report prepared by NatureServe for the National Park Service. Natural Resource Report NPS/CUPN/NRR-2011/XXX. National Park Service. Fort Collins, Colorado.

Nordman, C., Russo, M., **Smart, L.**, (2011) Vegetation Types of the Natchez Trace Parkway, based on the U.S. National Vegetation Classification. NatureServe Central Database (International Ecological Classification Standard). Arlington, Va. 548 pp.

Smyth, R., **Smart, L.**, & Pyne, M. (2010). [*Species at Risk on Department of Defense Installations in the Carolinas Final Report.*](#) Report prepared by NatureServe for U.S. Fish and Wildlife Service and U.S. Department of Defense through the Legacy Resource Management Program.

CONFERENCE PRESENTATIONS AT NATIONAL AND INTERNATIONAL SYMPOSIA

Koch, J. A., Dorning, M. A., Zhang, Q., Shashidharan, A., Van Berkel, D., Sanchez, G. M., Ford (**Smart**), **L. S.**, Smith, J. W., & Meentemeyer, R. K. (2016, May). A combined ABM-CA approach of the analysis of landowner decisions and peer-influence on development patterns. Paper presented at the International Society for Ecological Modelling Global Conference 2016, Baltimore, Maryland.

Smart, L. S., Dorning, M. A., Smith, J. W., Pickard, B., Dupey, L. N., Meley, A., & Meentemeyer, R. K. (2016, April). A Bayesian approach to inform urban growth models with choice experiment data on tradeoffs facing landowners in rapidly urbanizing regions. Paper presented at the US Regional Association of the International Association for Landscape Ecology, Asheville, North Carolina

Smart, L. S., Smith, J. W., & Meentemeyer, R. K. (2016, March). Social network effects on landuse patterns in agent-based models of dynamic land change processes. Paper presented at the Association of American Geographers' Annual Meeting, San Francisco, California.

Smith, J. W., **Smart, L. S.**, & McCreary, A. (2016, March). Hydrating the agents: Integrating the spatial and temporal availability of freshwater resources into agent based models. Paper presented at the Association of American Geographers' Annual Meeting, San Francisco, California.

Smart, L. S., & Smith, J. W. (2016, February). An agent-based model for examining the effects of social network structure on coastal land-use patterns. Paper presented at the Social Coast Forum 2016, Charleston, South Carolina.

Smith, J. W., **Smart, L. S.**, Sanchez, G. M., & Meentemeyer, R. K. (2015, June). Methodological and analytical frontiers for agent-based models of spatially dynamic landscape-scale processes. Poster presented at the International Association of Landscape Ecology Congress, Portland, Oregon.

Smart, L. S., & Smith, J. W. (2015, June). An agent-based model for examining the effects of governance structure on spatially-explicit land- and water-use patterns. Paper presented at the International Association of Landscape Ecology Congress, Portland, Oregon.

Smart, L. S., Smith, J. W., & Meentemeyer, R. K. (2015, June). An agent-based modeling framework for water resource governance: A tool to assess resilience and adaptive capacity in the coastal plain of North Carolina. Paper presented at the

International Symposium on Society and Resource Management, Charleston, South Carolina.

Smith, J. W., Meentemeyer, R. K., Sanchez, G. M., & **Smart, L. S.** (2015, April). Methodological and analytical frontiers for agent-based models of spatially dynamic landscape-scale processes. Paper presented at the Association of American Geographers' Annual Meeting, Chicago, Illinois.

COMPETITIVE GRANTS/AWARDS

Smart, L.S. (2014 – 2015). Amount: \$21,000. NC State Provost Doctoral Recruitment Fellowship.

Smith, J. W., & **Smart, L. S.** (2015-2016). Amount: \$9,200. Technical analysis to support an assessment of environmental indicators in the Albemarle-Pamlico watershed. Albemarle-Pamlico National Estuary Partnership, NC Department of Environment and Natural Resources.

PROFESSIONAL EXPERIENCE

Project Manager, Albemarle-Pamlico National Estuary Partnership, NC DENR **2013-2014**
Manage program grants and contracts; maintain a GIS repository and perform spatial analyses pertaining to the region.

- Managed EPA Section 320 funds granted to the Albemarle-Pamlico National Estuary Partnership (~500k annually)
- Wrote grant proposals, prepared technical reports, assigned budgets and timelines, and ensured timely contract execution and appropriate deliverables.
- Assisted with advisory committee meetings at least quarterly.
- Conducted conservation prioritization effort, using Marxan, for selection of N.C. Division of Marine Fisheries' "strategic habitat areas".
- Developed online interactive map (ArcGIS Online, Flex API) for the Albemarle-Pamlico region to assist resource-deficient organizations with prioritizing conservation and restoration efforts.
- Built a project tracking database (Microsoft Access) to better assess program success.

Subcontractor, Woolpert, Inc. Dayton, OH **Spring 2014**
Performing multivariate spatial analysis to assess longleaf pine condition as part of Eglin Air Force Base's long-term monitoring program.

- Performed multivariate analysis to assess changes in longleaf pine condition over time.
- Utilized ensemble modeling to forecast changes in longleaf pine community condition resulting from various management regimes.

Subcontractor, The Nature Conservancy, Atlanta, GA **Summer 2013**
Performed multivariate spatial analysis to assess longleaf pine condition as part of Eglin Air Force Base's long-term monitoring program.

- Performed multivariate analysis to assess changes in longleaf pine condition over time.
- Compared different modeling techniques and their success at forecasting changes in condition over time.
- Assessed lidar's potential for use in analysis within pilot study area on Eglin Air Force Base.
- Researched the potential for use of ensemble modeling as a potential future forecasting modeling method.

GIS Analyst/Regional Vegetation Ecologist, NatureServe, Durham, NC **2009 –2013**
Worked on a variety of regional and national projects using spatial and statistical analyses.

- Performed statistical screening of metrics, attributes, and indices of ecological integrity for EPA's Region 5 Wetlands Ecological Integrity Assessments.

- Generated overall sampling design, field material preparation, data analysis, and report writing for NPS vegetation map accuracy assessments in the Cumberland Piedmont Network and the National Capital Region.
- Developed sampling design and site selection process for an NPS long term monitoring project in the Cumberland Piedmont Network. Analyzed data and conducted power analysis for first phase of data collection.
- Performed predictive habitat/species distribution modeling using Maximum Entropy methods for NCASI and BLM. For the NCASI project, also developed a sampling method to test the performance of the models via ground-truthing efforts.
- Assisted in data collection efforts in the field, including GPS collection and woody species identification.
- Assisted with a spatially explicit national assessment of “gap” species and ecosystems for the National Fish and Wildlife Foundation to help with prioritizing their conservation efforts.
- Managed national raster datasets of land cover, impervious surface, climate change data and more for a U.S. Army Corps of Engineers project.
- Developed a conservation prioritization of species at risk in the Carolinas for the USFWS.
- Assisted with NatureServe Vista application along the GA coast.
- Generated sensitivity indices for natural communities as part of a BLM project, using NatureServe’s CCVI.
- Developed a spatially explicit web-based field guide of Rock Creek Park for the National Park Service in Washington D.C.

Part-Time Consultant, Enduring Conservation Outcomes, Savannah, GA

Fall 2012

- Developed a conservation plan for St. Catherine’s Island in Georgia.
- Developed conceptual ecological models for the natural communities on the island.
- Assessed and documented potential threats to the ecological communities on the island.

Part-Time Consultant, Enduring Conservation Outcomes, Savannah, GA

Spring – Summer 2011

Data entry for a Multiple Species Habitat Conservation Plan Species Status Database.

- Extensive use of Microsoft Excel and Microsoft Access for data entry of species information for a multi- jurisdictional conservation database.
- Developing a user’s manual for the database to ensure that data can be efficiently and intuitively managed.

Landscape Ecology Laboratory GIS Research Assistant, Duke University

Spring 2009

- Analyzed remotely-sensed imagery to model impervious surfaces through time in the RTP/Durham area of NC.
- Results aided in the examination of impervious surface impacts on the surrounding watersheds and their water quality.

GIS Fundamentals Teaching Associate, Duke University

Fall 2009

- Provided technical assistance and support to a graduate level class of over 90 students in Geospatial Information Systems.
- Taught critical GIS topics including: creating and validating topology, digitizing, constructing geodatabases, remote sensing and classification, and accuracy assessment.

Data Entry/GIS Research Assistant, Department of Biology, Duke University

2007-2009

- Performed extensive data entry and QA/QC for a long-term research database (Amboseli Baboon Project).
- Principle investigator for analysis of multi-spectral imagery and derivation of vegetation indices to assess phenological changes in and around a Kenyan reserve in relation to elephant crop raiding.

Conservation Intern, North Carolina Coastal Land Trust, Wilmington, NC

Summer 2008

Responsible for ecosystem management planning and development and stewardship activities for preserves and easements in coastal North Carolina.

- Prepared forest/preserve management plan for a significant nature preserve abutting USMB Camp Lejeune. Set precedent for the first cooperative proposal with Lejeune.
- Performed extensive field work, gained in-depth knowledge of monitoring and stewardship activities, and conducted biological inventories.
- Collected GPS data/ surveys for mapping of significant natural heritage areas.

Environmental Statistics Teaching Assistant, Duke University

Fall 2008

- Teaching assistant for a graduate level course in introductory environmental statistics, with a strong emphasis on teaching students how to use the statistical program R.
- Extensive use of statistical software program R and R Commander.

SERVICE

Journal Article Reviews

2014 - Present

- *Annals of the American Association of Geographers* (with Jordan W. Smith)
- *Northwest Science*

Carolina Wetlands Association

2014 - Present

- Regional Coordinator and Stakeholder Engagement Committee (Chair)
- Science Committee (Member)

