

# DANICA SCHAFFER-SMITH

Arizona State University &  
The Nature Conservancy  
334 Blackwell Street, Suite 300,  
Durham, NC 27701

[d.schaffer-smith@tnc.org](mailto:d.schaffer-smith@tnc.org)  
[dschaffer-smith.weebly.com](http://dschaffer-smith.weebly.com)

## EDUCATION

**Ph.D. Environmental Science and Policy** (May 2018). Nicholas School of the Environment, Duke University, Durham, NC. Advisor: Dr. Jennifer Swenson.

**M.E.S.M. Environmental Science and Management, Conservation Planning** (June 2010). Bren School of Environmental Science & Management, University of California, Santa Barbara.

**B.S. Environmental Science, Minor in Biology** (May 2006). The University of Redlands, CA

## RESEARCH INTERESTS

I am interested in how we can meet the challenges of global environmental changes that affect both human and natural systems, particularly hydrological processes and ecosystem function. In my research I apply satellite remote sensing and geospatial analysis to conservation and resource management problems to support evidence-based, locally appropriate solutions.

## PUBLICATIONS

- Schaffer-Smith, D.**, Myint, S.W., Muenich, R.L., Tong, D., & DeMeester, J.E. 2020. [Repeated Hurricanes Reveal Risks and Opportunities for Social-Ecological Resilience to Flooding and Water Quality Problems](#). *Environmental Science & Technology*. doi: 10.1021/acs.est.9b07815
- Walker, N.J., **Schaffer-Smith, D.**, Swenson, J.J., & Urban, D.L. 2019. [Improved connectivity analysis using multiple low-cost paths to evaluate habitat for the endangered San Martin titi monkey \(\*Plecturocebus oenanthe\*\) in north-central Peru](#). *Landscape Ecology*. doi: 10.1007/s10980-019-00837-4
- Schaffer-Smith, D.**, Tomscha, S.A., Jarvis, K.J., Maguire, D.Y., Treglia, M.L., & Liu, J. 2018. [Network analysis as a tool for quantifying the spatial, temporal, and cross-scale dynamics of metacoupled systems: an example using global soybean trade](#). *Ecology & Society*, 23 (4): 3. doi: 10.5751/ES-10460-230403
- Schaffer-Smith, D.**, Swenson, J.J., Reiter, M.E., & Isola, J.E. 2018. [Quantifying shorebird habitat in managed wetlands by modeling shallow water depth dynamics](#). *Ecological Applications*, 28(6): 1534-1545. doi: 10.1002/eap.1732
- Barbaree, B.A., Reiter, M.E., Hickey, C.M., Elliot, N.K., **Schaffer-Smith, D.**, Reynolds, M.D., Page, G.W. 2018. [Dynamic surface water distributions dictate shorebird movements within a highly modified interior landscape](#). *Landscape Ecology*. doi: 10.1007/s10980-018-0638-8

- Schaffer-Smith, D.**, Swenson, J.J., Barbaree, B.A., & Reiter, M.E. 2017. [Three decades of Landsat-derived spring surface water dynamics in an agricultural wetland mosaic](#); Implications for Migratory Shorebirds. *Remote Sensing of Environment*, 193: 180-192. doi:10.1016/j.rse.2017.02.016
- Austin, K.G., González-Roglich, M., **Schaffer-Smith, D.**, Schwantes, A.M., & Swenson, J.J. 2017. [Trends in size of tropical deforestation events signal increasing dominance of industrial-scale drivers](#). *Environmental Research Letters*. doi: 10.1088/1748-9326/aa6a88
- Schaffer-Smith, D.**, Swenson, J.J. 2016. Open Source Remote Sensing and (Some) GIS for Ecologists. *Remote Sensing and GIS for Ecologists Using Open Source Software*. Wegmann, M., Leutner, B., & Dech, S. Eds. *Landscape Ecology*. doi:10.1007/s10980-016-0468-5
- Schaffer-Smith, D.**, Swenson, J.J., & Bóveda-Penalba, A.J. 2016. [Rapid conservation assessment for endangered species using habitat connectivity models](#). *Environmental Conservation*, 43(3): 221-230. doi:10.1017/S0376892915000405

### ***In Review***

Mirahla, L., Muenich, R.L., **Schaffer-Smith, D.**, Myint, S.W. Spatiotemporal land use changes and environmental degradation surrounding CAFOs. *Nature Communications*.

### ***In Preparation***

**Schaffer-Smith, D.**, Myint, S.W., Muenich, R.L., Tong, D., DeMeester, J.E. How do riparian buffer policies affect floodplain vegetation ecosystem services? *Environmental Research Letters*.

**Schaffer-Smith, D.**, Swenson, J.J., Reiter, M.E., Isola, J.E. Shorebird response to flood dynamics during spring migration at a globally important stopover site 1997 – 2015. *Ecography*.

### **AWARDED GRANTS & FELLOWSHIPS**

AI for Earth (2020, \$15,000 to R. Muenich)

North Carolina Environmental Enhancement Grant (2020, \$100,000 co-I with J. DeMeester)

North Carolina SeaGrant (2019, \$93,913 co-I with K. Martin, G. Sanchez, A. Garcia, J. DeMeester)

WWF-Duke Partnership grant (2018, \$200,000 to J. Swenson and M. Jeuland)

NatureNet Science Fellowship (2018, 2-yr stipend and \$50,000 research budget)

P.E.O. Scholar Award (2017, \$15,000)

Nicholas School Conservation Fellowship (2017, Fall semester stipend support)

Graduate School Summer Research Fellowship (2017, 3 months of stipend support)

Graduate Training Enhancement Grant, NCAR Data Analytics workshop (2016, \$975)

Nicholas School Internship Fund (2016, \$2,000 to N. Walker)

NSF Geography and Spatial Sciences Doctoral Dissertation Research Improvement (2015, \$15,996)

Graduate School Domestic Travel Award (2015, \$1,300)

Nicholas School Internship Fund (2014, \$1,500 to M. Ernest)

Center for Latin American Studies Research Award (2014, \$3,000 to M. Ernest)

Center for Latin American Studies Research Travel Grant (2014, \$750 to M. Ernest)

NASA-MSU Professional Enhancement Award (2014, \$750)  
NASA Earth and Space Science Fellowship (2013, 3 years of stipend support)  
Center for Latin American Studies Mellon Research Travel Grant (2013, \$1,500)  
Planet Action Satellite Imagery Grant (2012)  
GeoEye Foundation Satellite Imagery Grant (2012)  
Bren School Corporate Partners Fellowship (2009, \$6,000)  
Monica Florian Prize for Land Development, Building, and Land Use Policy Issues (2008, \$5,000)

### **ADDITIONAL RESEARCH CONTRIBUTIONS**

DeMeester, J.E., **Schaffer-Smith, D.**, Spoon, W., Benjamin, G., Myers, K., Cox, K., Emerson, D., Bashaw, J., Young, T., Owens, J., & Hickey, J. 2019. Identifying Environmental Flow Requirements for the Cape Fear River: Background Literature Review and Summary.

Anderson, A., Koh, K., **Schaffer-Smith, D.**, Shapiro, E., & Su, W.\* 2010. Using Surface Winds to Improve the Accuracy of Fire Spread Modeling for Hazard Assessment: A Case Study in Santa Monica Mountains National Recreation Area, California. Group Master's Thesis, Bren School of Environmental Science and Management. \*Authors contributed equally.

**Schaffer-Smith, D.**, Shapiro, E., & Uecker, J.\* 2010. Wetland and Riparian Protection Priorities in Napa and Sonoma Counties. Prepared for the Bay Area Open Space Council's Upland Habitat Goals Program as part of a Conservation Planning course at the Bren School of Environmental Science & Management. \*Authors contributed equally.

**Schaffer-Smith, D.** 2009. Riparian Invasive Species Survey and Stewardship Effectiveness Analysis Report. Prepared and presented for the Irvine Ranch Conservancy.

**Schaffer-Smith, D.** 2009. Recruitment Patterns in Coastal Sage Scrub in the Northern Irvine Ranch Wildlands. Prepared and presented for the Irvine Ranch Conservancy.

**Schaffer-Smith, D.** 2006. Pellet Analysis of Predaceous Birds in the Mojave Desert. Honors Thesis, University of Redlands, Department of Environmental Studies.

Avalos, G., et al. 2005. Impacts of the Guápiles-Siquirres-Limón Highway on Avifauna in Braulio Carrillo National Park. Report and Presentation for the Ministry of Agriculture and the Environment, Costa Rica.

### **PRESENTATIONS**

**Schaffer-Smith, D.**, Myint, S.W., Muenich, R.L., Tong, D., & DeMeester, J.E. 2019. Hurricane flooding and water quality issues: opportunities for increased resilience. Poster #H53L-1942, AGU Meeting, San Francisco, California.

Muenich, R.L., Bell, M.L., **Schaffer-Smith, D.**, Mirahla, L., & Ruah, E. 2019. Advancing a regional assessment and management of large-scale animal operations. Invited Talk #H42G-01, AGU Meeting, San Francisco, California.

**Schaffer-Smith, D.**, Myint, S.W., Muenich, R.L., Tong, D., & DeMeester, J.E. 2018. Hurricane Florence highlights opportunities for reducing flooding and nutrient pollution impacts in the

- Cape Fear River Watershed, North Carolina. Poster #NH21D-3539, AGU Meeting, Washington D.C.
- Schaffer-Smith, D.**, Swenson, J.J., Reiter, M.E., & Isola, J.E.. 2017. Using Water Depth Sensors and High-resolution Topographic Mapping to Inform Wetland Management at a Globally Important Stopover Site for Migratory Shorebirds. Poster #PA23A-0368, AGU Meeting. New Orleans, Louisiana.
- Schaffer-Smith, D.**, Swenson, J.J. & Reiter, M.E.. 2016. Shorebird response to Landsat-derived flood dynamics during migration. Oral Presentation, The Wildlife Society Meeting. Raleigh, NC.
- Schaffer-Smith, D.**, Swenson, J.J. & Reiter, M.E.. 2016. Shorebird response to Landsat-derived flood dynamics during migration. Poster, NASA Biodiversity and Ecological Forecasting Team Meeting. Silver Spring, Maryland.
- Schaffer-Smith, D.**, Swenson, J.J. & Reiter, M.E.. 2016. Shorebird response to flood dynamics in the Sacramento Valley during migration. Oral Presentation, US-IALE Annual Symposium. Asheville, North Carolina.
- Schaffer-Smith, D.**, Maguire, D., Tomscha, S., Treglia, M. & Liu, J. 2016. Applying the telecoupling framework through the lens of Landscape Ecology. 2016. Oral Presentation, US-IALE Annual Symposium. Asheville, North Carolina.
- González-Roglich, M., Austin, K.G., **Schaffer-Smith, D.**, Schwantes, A.M., & Swenson, J.J. 2016. Pantropical deforestation patch dynamics. Oral Presentation, US-IALE Annual Symposium. Asheville, North Carolina.
- Schaffer-Smith, D.**, Swenson, J.J. & Reiter, M.E.. 2015. Flood Dynamics in the Sacramento Valley over the Last 30 Years: When and Where Were the Rest Stops for Shorebirds during Migration? Poster # H51N-1589, AGU Meeting. San Francisco, California.
- Schaffer-Smith, D.**, Swenson, J.J. & Bóveda-Penalba, A.J.. 2015. Rapid conservation assessment for endangered species using habitat connectivity models. Poster, BIOCON Peru International Meeting: Biodiversity and Conservation of the Tropical Andes and the Amazon Rainforest. Lima, Peru.
- Schaffer-Smith, D.**, Swenson, J.J. & Reiter, M.E. 2014. Water availability over 30 years at Owens Lake California during the peak of spring shorebird migration along the Pacific Flyway. Oral Presentation, US-IALE Annual Symposium. Anchorage, Alaska.
- Schaffer-Smith, D.**, Swenson, J.J. & Reiter, M.E. 2014. Spatiotemporal water availability during peak spring shorebird migration along the Pacific Flyway: a case study at Owens Lake, CA. Poster, NASA Biodiversity and Ecological Forecasting Team meeting. Silver Spring, Maryland.
- Murrieta-Villalobos E., **Schaffer-Smith D.**, Swenson J.J., & Bóveda-Penalba, A.J. 2013. Modelos de conectividad para un primate endémico en peligro critic de extinción: El mono tocón de San Martín (*Callicebus oenanthe*). Poster, II Simposio de Primatología. Iquitos, Peru.
- Swenson, J., **Schaffer-Smith, D.**, & Bóveda-Penalba, A.J. 2013. Connectivity between habitat patches for an endangered endemic primate, *Callicebus oenanthe*, in San Martín Peru. Invited talk, Association for Tropical Biology and Conservation & Organization for Tropical Studies. San José, Costa Rica.
- Schaffer-Smith, D.** 2006. Pellet Analysis of Predaceous Birds in the Mojave Desert. Oral presentation, Desert Tortoise Council Annual Symposium. Tucson, Arizona.

## **ACADEMIC APPOINTMENTS**

**Postdoctoral Research Associate**, Arizona State University, Tempe, AZ (2018 – Present).

- Plan and execute original research including generating analyzing, evaluating, interpreting, and synthesizing spatial and temporal environmental data sets to assess aquatic conservation assets, anthropogenic and climate-related stressors, and to examine the potential effectiveness of interventions to protect, restore and sustainably manage high quality water resources.
- Develop remote-sensing and machine learning method for hurricane flood extent mapping (>91% accuracy) using publicly available European Space Agency Sentinel-1 synthetic aperture radar satellite imagery, U.S. Geological Survey high-water marks and NOAA high-resolution aerial photography. Examine the potential water quality implications of repeated hurricane-induced flooding and identify opportunities to improve resilience considering social, ecological, and infrastructure vulnerabilities. Products: peer-reviewed article, associated code and data.
- Quantify changes in North Carolina floodplain vegetation. Execute Mann-Kendall trend analysis to identify statistically significant changes 2000-2018 for forest cover (National Landcover Dataset, Global Forest Change Data), as well as environmental quality and degradation indicators including summer and winter Normalized Difference Vegetation Index (NDVI), Normalized Multi-band Drought Index (NMDI) and land surface temperature.
- Project Lead for Water Quality, Team Member for the Cape Fear River Basin SRP in partnership with USACE Wilmington District and TNC North Carolina. Conduct literature review on water quality and climate change and analyze pre- and post-dam hydrographs. Facilitate environmental flows workshop with stakeholders including federal and state agencies, water utilities, and academic researchers. Products: literature review, workshop summary.

## **PROFESSIONAL EXPERIENCE**

**Senior Staff Scientist/Biologist**, Cardno ENTRIX, Concord, CA (2010-2012).

- Conducted research, fieldwork, and technical writing for NEPA/CEQA compliance projects including Habitat Conservation Plans.
- Field Lead and Technical Writer/Editor during Deepwater Horizon Natural Resources Damage Assessment, supporting the Birds and Wildlife, Marine Mammals, Shoreline, Shallow Water Sediment, Water Column, Human Use and Restoration Planning Groups.

**Restoration and Invasives Monitoring Intern**, Irvine Ranch Conservancy, Irvine, CA (2009).

- Designed and Implemented a study of post-fire Coastal Sage Scrub seedling recruitment.
- Evaluated the effectiveness of exotic plant species control programs through post-treatment inventories in 3 watersheds on the Irvine Ranch.
- Trained and supervised 6 assistants in field data collection and data management.

**Assistant Biologist-Environmental Analyst**, ECORP Consulting, Inc., Redlands, CA (2006-2008).

- Planned and conducted biological assessments, surveys for plant and wildlife species of concern, wetland delineations, exotics removal and restoration site monitoring throughout southern California.
- Ensured compliance with Incidental Take Permits, Streambed Alteration Agreements, and Mitigation and Monitoring Plans at construction sites.
- Wrote survey reports and prepared CEQA documents for public and private sector clients under >60 contracts.

## **SKILLS**

**Software:** R, Python/ArcPy, ENVI, Javascript/Google Earth Engine, FUSION, Circuitscape, Marxan, Soil and Water Assessment Tool.

**Survey and species collection permits:** Current Assistant on USGS bird banding permit under Dr. John Gerwin. Previous Authorized USFWS fairy shrimp survey permittee, State of California general collecting permit holder with rare plant collection permit authorization, Authorized assistant on California Department of Fish and Wildlife small mammal MOU.

**Languages:** Proficiency in Spanish, basic French.

## **TEACHING EXPERIENCE**

**Certificate in College Teaching Program,** Duke University (2014 - 2018)

**Co-Instructor,** Nicholas School of the Environment, Lidar Remote Sensing (2018)

**Supporting Instructor,** Nicholas School of the Environment, Satellite Remote Sensing (2016)

**Teaching Assistant,** Nicholas School of the Environment (2012 – 2013, 2016-2018).

Geospatial Analysis for Landscape Management, Landscape Ecology, Introduction to Environmental Science and Policy

**Guest Lecturer,** Arizona State University Graduate Hydrosystems Seminar (2019), Nicholas School of the Environment Satellite Remote Sensing (2019, 2018, 2017).

**Writing Consultant,** Bren School Communications Center (2009 – 2010).

**Tutor,** Biology, Chemistry, French and Spanish, The University of Redlands (2003 – 2006).

## **MENTORING**

Josh Frear (MEM, Expected 2021), Summer Internship, The Nature Conservancy

Kelly Shea (MS, Expected 2020), Research Assistantship

Yubin Li (PhD, Expected 2023), Research Assistantship

Yumin Wang (MEM, Expected 2021), Remote Sensing Course Project

Kimberly Myers (MEM, Expected 2020), Summer Internship, The Nature Conservancy

Ga-on Lee (MEM, Expected 2020), Remote Sensing Course Project, Master's Project

Nathan Walker (MEM 2017), Remote Sensing Course Project, Master's Project

Peter Satin (MEM 2017), Research Assistantship

Katie Warnell (MEM 2016), Remote Sensing Course Project

Bethany Williams (MEM 2016), Remote Sensing Course Project

Maggie Ernest (MEM 2015), Remote Sensing Course Project, Research Assistantship, Master's Project

Alexandria Hunt (MEM 2015), Remote Sensing Course Project

Mengjun Yu (MEM 2015), Remote Sensing Course Project

Katie Locklier (MEM 2014), Remote Sensing Course Project

## **PRESS COVERAGE**

October 2019 [The Nature Conservancy](#)

November 2017 [Mongabay](#)

May 2017 [ScienceDaily](#)

May 2017 [The Hoot Owl](#), **San Joaquin Valley Audubon**

April 14, 2017 Cambridge Core [Blog](#), **Cambridge University Press**

April 5, 2017 [News](#), **California Migratory Bird Conservation Partnership**

April 4, 2017 [Interview](#), **Capital Public Radio**, Sacramento, CA

April 3, 2017 [Rice News](#), **California Rice Commission**

March 28, 2017 [California Water News](#), **Maven's Notebook**

March 27, 2017 [ScienceDaily](#)

April 14, 2016 [Interview](#), **North Carolina Public Radio WUNC**, Durham, NC

April 12, 2016 [ScienceDaily](#)

## **SELECTED SERVICE & OUTREACH ACTIVITIES**

*Reviewer*, **Air, Soil and Water Research** (2020), *The Wildlife Society Bulletin* (2019, 2020), *Geophysical Research Letters* (2019), *Remote Sensing of Environment* (2019), *PLOS One* (2018), *Southeastern Geographer* (2017), *Landscape Ecology* (2016), *Environmental Conservation* (2016), Cambridge University Press (2014).

*Invited speaker*, **Environmental Defense Fund** North Carolina – Iowa learning exchange: flood risk and resilience models, data, and tools. Raleigh, NC (2020).

*Volunteer*, **AGU Fall Meeting**. Coding Help Desk (2019).

*Invited speaker*, **North Carolina Department of Transportation & North Carolina State University**. Improving Predictions of Flooding for Critical Transportation Infrastructure Meeting. Raleigh, NC (2019).

*Invited speaker*, **Environmental Defense Fund** Natural Solutions to Flooding Workshop. Kinston, NC (2019).

*Invited speaker*, **Wake Chapter of the Audubon Society**. Raleigh, NC (2016).

*Member*, **Duke University Judicial Board** (2016-2017).

*Invited speaker*, **Duke Student Association for Geospatial Analysis & Duke Student Association of Wetland Scientists**. Joint student group meeting (2015).

*Invited speaker*. **Point Blue Conservation Science**. Science Seminar. Petaluma, California (2015).

*Volunteer*, **Females Excelling More in Math Engineering and Science STEM** programs for girls (2014).

*Invited speaker*, **San Martín Regional Government**. Moyobamba, Peru (2013).

*Volunteer Bird Bander*, **North Carolina Museum of Natural Sciences**, Raleigh, NC (2012-Present).

*Volunteer*, **California Tiger Salamander Study**, Jepson Prairie Reserve, **UC Davis** (2011-2012).

*Volunteer*, Restoration site maintenance and monitoring, **Cheadle Center for Biodiversity and Ecological Restoration**, Santa Barbara, California (2008-2009).