

David R. Breininger**Work:**

Conservation Biologist
NASA Ecological Programs
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10/05/2020 short version

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Experience & Expertise

- Thirty-nine years' experience integrating research, monitoring, land management, conservation area design, environmental assessment, regulatory analyses, and education.
- Emphasizes on field studies, mark-recapture, remote sensing, radio telemetry, geographical information systems, statistical modeling, population analyses and landscape modeling.
- Collaborations with scientists and managers on international, national, regional, and local topics
- Expertise emphasizes endangered species biology, biodiversity conservation, fire ecology, habitat quality, landscape dynamics, population demography, dispersal biology, community composition and adaptive management.

Education

2009 *Ph.D., Conservation Biology*, University of Central Florida

1981 *M.S., Ecology*, Florida Institute of Technology

1978 *B.S., Marine Biology*, Florida Institute of Technology

Employment History

2020-present *Chief Scientist, Herndon Solutions Group, Kennedy Space Center Ecology Program (KSC)*

Conduct studies on endangered species, habitat, and ecosystem dynamics to support adaptive management and regulatory compliance

2015-2020 *Senior Scientist, Integrated Mission Support Services, KSC Ecology Program*. Conduct studies on endangered species, habitat, and ecosystem dynamics to support adaptive management and regulatory compliance

2015-present *Courtesy Faculty, University of Central Florida*. Support strategic decision making on passive versus active translocation strategies and support genomic, immunogenetic and disease studies.

2009-2015. *Lead Wildlife Biologist, InoMedic Health Applications, KSC*. Studies on endangered species, habitat and ecosystem dynamics to support adaptive management and develop strategies for regulatory compliance, restoration, and habitat management. Coordinate 5 biologists.

1995-2009. *Senior Scientist and Lead, Dynamac Corporation, KSC*. Conducted studies on wildlife and habitat dynamics to support environmental management, mitigation, restoration, and habitat management. Coordinated 4- 8 biologists and managed subcontracts.

1993-1995. *Research Scientist Florida Institute of Technology* Conducted field studies and population risk modeling to support the Brevard County Scrub Conservation and Development Plan.

1984-1994. *Lead (1994), Supervisor, (1991-1993), Wildlife Biologist (1984-1990), Bionetics Corporation, KSC*. Conducted studies to predict and interpret environmental impacts and develop strategies for mitigation, restoration, and habitat management. Coordinated 4-7 biologists.

1982-1984. *Engineer, Planning Research Corporation*. Analyzed regulatory requirements and prepared regulatory documents for NEPA, endangered species, ground water, and surface water, floodplain, and wetland topics to support the KSC Environmental Management Branch.

1982. *Teacher, Brevard County School District*. Taught math and biology.

1981. *Research Assistant, Technology Incorporated, KSC*. Studied effects of the launches on vegetation.

1978-1981. *Graduate Teaching Assistant, Laboratory Supervisor, Florida Institute of Technology*, Field and lab instruction in Florida, Great Smokey Mountains, Central and Southern Rocky Mountains.

Honors and Awards Since College

2017 Charlie Corbeil Conservation Award, Preserve Brevard
 2017 KSC Engineer/Scientist of the Year, NASA
 2016 Outstanding Alumni Knight, University of Central Florida
 2016 Regional Director's Conservation Award, U.S. Fish and Wildlife Service
 2014 Employee of the Month, NASA Medical and Environmental Support Contract
 2009 Most Productive, NASA Life Sciences Support Contract
 1997 Visionary Award, NASA Life Sciences Support Contract
 1996 JFK Award for Leadership, NASA Life Sciences Support Contract
 1995 Conservation Colleague Award, Nature Conservancy

Appointments

2016- present Research Associate, University of Central Florida
 2015- present Board of Directors, Allen Broussard Conservancy
 2009- present Board, Florida Institute of Conservation Science
 1997- present Brevard County Environmentally Endangered Lands Selection and Management Committee
 1997- present Florida Scrub-Jay Recovery Team
 2014-2018 Judge, River Fest Sustainability Award, Keep Brevard Beautiful
 2013- 2017 Editorial board, *Advances in Ecology*
 2010-2011 Research Professor, Florida Institute of Technology
 2010-2016 Graduate Faculty Scholar, University of Central Florida
 1999–2001 Florida Scrub-Jay Fire Strike Team Advisory Board
 1999-2000 Brevard County Crucial Habitat Conservation Planning Committee
 1998-1999 Interagency Fire Science Team
 1995-1997 South Florida Ecosystem Multi-Species Recovery Team
 1997-1998 Florida Ornithological Society's Grants and Awards Committee Chair
 1994-1996 Florida Ornithological Society's Research Awards Committee
 1994-1995 Florida Scrub-Jay Habitat Conservation Guidelines Committee
 1994-1995 Indian River Lagoon Biodiversity Symposium Planning Group, National Estuary Program
 1993 Scientific Advisory Group for the Brevard County Scrub Habitat Conservation Plan, Chair

Project leadership examples

- Developing a population viability analyses approach for Florida scrub-jay metapopulations
- NASA Ecological Monitoring Program Project Review and Advisory Board
- Developing an approach to estimate invasive species (feral pig), emerging predators, and rare species using camera trapping and auditory receivers
- Developing a two-phase approach to diamondback terrapin population estimation
- Coordinated adaptive management program for scrub-jay habitat and population management
- Developing a research and monitoring program to predict and interpret how land cover and habitat management influenced Florida scrub-jay habitat and population dynamics
- Developing endangered species compensation plan for new spaceport development
- Developed spatially explicit Florida grasshopper sparrow metapopulation model
- Initiated a program to develop occupancy approaches to monitor southeastern beach mouse
- Developing modeling approach to predict how land cover and conservation scenarios influenced eastern indigo snake survival and population viability

- Performed indigo snake telemetry studies on Avon Park Bombing Range and east central Florida
- Mentored graduate students on field studies and capture-recapture analyses of wildlife species
- Assembled team to do metapopulation analyses of California least terns from Baja to Oregon
- Assembled scientific team to do populations analyses of snowy plovers at Vandenberg Air Force Base
- Quantified how bird communities varied because of habitat, fire, and water management
- Developing an approach to prioritize species of conservation concern for monitoring and research
- Impact studies of unauthorized habitat destruction to Florida scrub-jays as potential Endangered Species Act violations to aid law enforcement
- Characterized wildlife species of biodiversity concern on Vandenberg Air Force Station
- Investigated how gopher tortoise gopher tortoise densities were influenced by water table, vegetation composition, time-since-fire, and habitat structure
- Mentored high school students and teachers in NASA Education Programs (e.g. SHARP)
- Conducted monitoring of wildlife responses to launches on KSC and Cape Canaveral Air Force Station
- Assisted in development and publication of a Indian River Lagoon Biodiversity Symposium
- Developed habitat relationship model to predict wildlife species composition by land cover type
- Characterized how groundwater regulatory changes could affect KSC operations and develop a compliance approach
- Preparing, reviewing, and editing NEPA documents
- Reviewing laws, regulations, agreements, and NEPA documents to summarize KSC environmental monitoring requirements
- Developed an approach to monitor vegetation responses to space shuttle exhaust

Continuous Improvement

Integrated population models (Bayesian hierarchical statistics with R & JAGS), Kery, Schaub, Abadi
 Landscape state and transition modeling with ST-SIM, APEX RMS Colin Daniels
 MBA (1/2 course work completed, Florida Institute of Technology)
 Capture-recapture statistical analyses using MARK, Colorado State University
 Model Selection and Multi-Model Statistical Inference, David Anderson
 Habitat Evaluation Procedures, Colorado State University
 Advanced ARC/INFO, ESRI
 Global Positioning Systems, Trimble
 ENVI Image Processing, Research Systems, Inc.
 Fire Suppression and Standards for Survival, U.S. Fish and Wildlife Service
 Interagency Prescribed Fire, Florida Department of Agriculture
 Aircraft Safety, U.S. Fish and Wildlife Service
 Population Risk assessment, Applied Biomathematics
 Dozens of Environmental Law, Permitting & Regulatory classes
 Certified Scuba Diver (>500 open water dives)
 Hundreds of First Aid, CPR, and Safety classes

Other Professional Activities:

- 24 proposals funded totaling ~ 3 million dollars as Co-PI or PI
- Peer review of >50 manuscripts for >30 science journals
- Greater than 200 invited lectures
- Newspaper, radio, education, or television interviews > 20 times.
- Organized workshops on biodiversity, adaptive management, scrub biology, and fire ecology

Scientific Publications (93): *Journal Articles (57), Book Chapters (4), Conference Proceedings (7), Published Reports (19), Trade Magazines (4), Theses (2).* Examples:

- Cox, J.A., T. Engstrom, D.R. Breininger, E.L. Hewett Ragheb. 2020. Interpreting smoke signals: fire ecology and land management for four federally listed birds. **Frontiers in Ecology and Evolution** 8:267.
- Eaton, M., D. Breininger, Nichols, J., Fackler, P., McGee, S., Smurl, M., DeMeyer, D., Baker, J. Zondervan, M. 2020. Integrated hierarchical models to inform management of transitional habitat and the recovery of a habitat specialist. **Ecosphere**.
- Bauder, J.M., D.R. Breininger, M.R. Bolt, M.L. Legare, C.L. Jenkins, B.B. Rothermel, and K. McGarigal. 2020. Movement barriers, habitat heterogeneity, or both? Testing hypothesized effects of landscape features on home range sizes in eastern indigo snakes. **Journal of Zoology** 311: 204–216.
- Breininger, D.R., E.D. Stolen, D.J. Breininger and R.D. Breininger, and C.R. Hall. 2019. Sampling rare and elusive species: east coast diamondback terrapin population abundance. **Ecosphere** 10:1-15.
- Breininger, D.R., D.M. Oddy, E.D. Stolen, D. K. Hunt. 2018. Influence of sex and transients on survival and detection probabilities of the southeastern beach mouse. **Journal of Mammalogy** 99: 946–951.
- Breininger, D.R., R.D. Breininger, and C.R. Hall. 2017. Effects of surrounding land use and water depth on seagrass dynamics with attention to a catastrophic algal bloom. **Conservation Biology** 31:67-75.
- Breininger, D. R., M. J. Mazerolle, M. R. Bolt, M. L. Legare, J. H. Drese, J. E. Hines. 2012. Using multistate models to quantify habitat fragmentation impacts of eastern indigo snake survival. **Animal Conservation** 15:361-368.
- Duncan, B., P. A Schmalzer, D.R. Breininger, E.D. Stolen. 2015. Comparing fuels reduction and patch mosaic fire regimes for reducing fire spread potential, a spatial modeling approach. **Ecological Modeling** 314:90-99.
- Stolen E.D, D M. Oddy, M. L. Legare, D. R. Breininger, S.L. Gann, S. A. Legare, S. K Weiss, K. G. Holloway-Adkins. 2014. Preventing tracking-tube false detections in occupancy modeling of southeastern beach mouse. **Journal of Fish and Wildlife Management** 5:270-281.
- Johnson, F. A., D. R. Breininger, B. W. Duncan, J. D. Nichols, M. C. Runge, B. K. Williams. 2011. A Markov decision process for managing habitat for Florida Scrub-Jays. **Journal of Fish and Wildlife Management** 2:234-2470.
- Williams, B. K., M. J. Eaton, D. R. Breininger. 2011. Adaptive resource management and the value of information. **Ecological Modeling** 222:3429-3436.
- Breininger, D. R., J.D. Nichols, B. W. Duncan, E. D. Stolen, G. M. Carter, D. Hunt, J. H. Drese. 2010. Multistate modeling of habitat dynamics: factors affecting Florida scrub transition probabilities. **Ecology** 91:3354-3364.
- Breininger, D. R., J. D. Nichols, G. M. Carter, D. M. Oddy. 2009. Habitat-specific breeder survival of Florida Scrub-Jays: inferences using multistate models. **Ecology** 90:3180-3189
- Carter, G. M., E. D. Stolen, D. R. Breininger. 2006. A rapid approach to modeling species-habitat relationships. **Biological Conservation** 127:237-244.
- Akçakaya, H. R., J. L. Atwood, D. R. Breininger, C. T. Collins, B. W. Duncan. 2003. Metapopulation dynamics of the California Least Tern. **Journal of Wildlife Management** 67:829-842
- Breininger, D. R., B. A. Burgman, H. R. Akçakaya and M. O. O’Connell. 2002. Use of metapopulation models in conservation planning, Pages 405-427 in K. J. Gutzwiller, editor. **Concepts and Applications of Landscape Ecology in Biological Conservation**. Springer-Verlag, N.Y.
- Breininger, D. R., V. L. Larson, B. W. Duncan, R. B. Smith, D. M. Oddy, and M. F. Goodchild. 1995. Landscape patterns of Florida Scrub-Jay habitat preference and demographic success. **Conservation Biology** 9:1442-1453.
- Breininger, D. R., M. J. Provancha and R. B. Smith. 1991. Mapping Florida Scrub-Jay habitat for purposes of land-use management. **Photogrammetric Engineering and Remote Sensing** 57: 1467-1474.

PAUL A. SCHMALZER

EDUCATION

Western Maryland College, B.A. Biology 1976
The University of Tennessee, M.S. Ecology 1978
The University of Tennessee, Ph.D. Ecology 1982

EXPERIENCE

Thirty-eight years of experience in the design and implementation of ecological research, environmental impact analysis, and biological surveys. Expertise in terrestrial plant ecology, fire ecology, restoration ecology, vascular flora, vegetation sampling, and vegetation data analysis.

HERNDON SOLUTIONS GROUP

Senior Plant Ecologist, Kennedy Space Center, Florida. October 2020-Present

Conduct studies of Kennedy Space Center vegetation, fire ecology, and restoration of scrub and wetlands vegetation. Conduct studies of rare plant distributions and ecology. Provide technical guidance to the Vegetation Studies Group. Maintain KSC Herbarium.

INTEGRATED MISSION SUPPORT SERVICES

Senior Plant Ecologist, Kennedy Space Center, Florida. November 2015-September 2020

Conduct studies of Kennedy Space Center vegetation, fire ecology, and restoration of scrub and wetlands vegetation. Conduct studies of rare plant distributions and ecology. Provide technical guidance to the Vegetation Studies Group. Maintain KSC Herbarium.

UNIVERSITY OF CENTRAL FLORIDA, DEPARTMENT OF BIOLOGY

Courtesy Research Associate, Orlando, Florida. March 2016-Present

INNOVATIVE HEALTH APPLICATIONS/INOMEDIC HEALTH APPLICATIONS

Technical Lead, Plant Ecologist, Kennedy Space Center, Florida. October 2009-October 2015

Conduct studies of Kennedy Space Center vegetation, fire ecology, and restoration of scrub and wetlands vegetation. Conduct studies of rare plant distributions and ecology. Provide technical guidance to the Vegetation Studies Group. Maintain KSC Herbarium.

DYNAMAC CORPORATION

Technical Lead, Plant Ecologist, Kennedy Space Center, Florida. January 1995 - September 2009

Conduct studies of Kennedy Space Center vegetation, fire ecology, and restoration of scrub and wetlands vegetation. Conduct studies of rare plant distributions and ecology. Provide technical guidance to the Vegetation Studies Group. Maintain KSC Herbarium. Monitor scrub restoration efforts on Cape Canaveral Air Force Station. Directed studies of effects of rocket launches on Cape Canaveral Air Station. Directed study of threatened and endangered species on Patrick Air Force Base. Directed study of historical vegetation of the Indian River Lagoon Basin. Conducted studies of the flora and rare plants of Canaveral National Seashore. Conducted studies of the occurrence and distribution of rare scrub plants in Brevard County.

THE BIONETICS CORPORATION

Technical Lead, Plant Ecologist, Kennedy Space Center, Florida. 1993-1994.

Conducted studies of Kennedy Space Center vegetation, fire ecology, and restoration of scrub and wetlands vegetation. Provided technical guidance to the Vegetation Studies Group.

Plant Ecologist, Kennedy Space Center, Florida. 1982-1993.

Conducted studies of the vegetation of Kennedy Space Center in relation to environmental variables, successional patterns, fire effects, and space center operations. Contributed to studies of animal habitat use. Conducted studies of vegetation, exotic plants, and potential environmental impacts and coordinated studies of fire history and soil erosion on Vandenberg Air Force Base, California.

FLORIDA INSTITUTE OF TECHNOLOGY

Research Scientist, Plant Ecologist (part time). Melbourne, Florida. 1993-1995.

Brevard County Scrub Habitat Conservation Plan. Helped develop proposal to conduct study of scrub habitat in Brevard County in relation to Florida Scrub-Jay habitat requirements and other rare or declining scrub species. Specific duties include plant sampling protocol, scrub plant identification, report preparation, and graduate student training.

BREVARD COUNTY

Member, Environmentally Endangered Lands Selection and Management Committee (volunteer). 1990-Present.

Helped develop criteria for determination of environmentally endangered lands and priorities for acquisition. Examined numerous sites, prepared reports, and made recommendations regarding acquisition. Helped prepare proposals to State of Florida Conservation and Recreational Lands (CARL) Program, Florida Forever Program, and the Florida Community Trust. Helped develop management criteria and reviewed management plans. Conducted numerous site visits to examine management activities and requirements.

THE UNIVERSITY OF TENNESSEE

Graduate Research Assistant, Ecology Program, Knoxville, Tennessee, 1979-1982.

National Park Service Obed River Vegetation Project. Conducted vegetation survey, prepared vegetation map, conducted survey for endangered and threatened plants and critical plant habitats, prepared floristic list, and prepared report.

National Park Service contract to H.R. DeSelm: Classification of the Vegetation of the Interior Low Plateau. Helped to gather and synthesize literature on vegetation of the Interior Low Plateau and to prepare report.

National Park Service contract to H.R. DeSelm: Evaluation of Five Potential National Natural Landmarks in Tennessee. Helped to gather field data and available information on topography, geology, soils, and vegetation of five proposed National Natural Landmarks in Tennessee.

Hilton Smith Fellowship, 1978-1979.

Graduate Teaching Assistant, 1977-1978.

Taught general biology, prepared lectures and conducted labs.

Non-Service Fellowship, 1976-1977.

PROJECT HISTORY:

National Aeronautics and Space Administration, Kennedy Space Center, 1982-Present. Principal investigator. Designed and implemented vegetation monitoring program for Kennedy Space Center, Florida including long-term studies of changes after fire. Conduct studies of effects of Space Shuttle launches on terrestrial vegetation and soils and help maintain long-term databases of launch deposition patterns.

National Aeronautics and Space Administration, Kennedy Space Center, 1992-Present. Principal investigator. Collaborate on the design and implementation of a scrub restoration program for

Kennedy Space Center. Monitor vegetation changes after combinations of cutting and burning to restore long-unburned scrub habitat. Monitor survival and growth of scrub species planted in former agricultural sites.

National Aeronautics and Space Administration, Kennedy Space Center, and U.S. Fish and Wildlife Service, Merritt Island National Wildlife Refuge. 2010-2011. Principal investigator. Design and implement program monitoring vegetation response to restoration of hardwood swales in scrub and flatwoods landscapes on Kennedy Space Center/Merritt Island National Wildlife Refuge.

U.S. Air Force, 45th Space Wing, 2010-2011. Co-investigator. Compile floristic inventory of selected wetlands areas on Cape Canaveral Air Force Station as part of a comprehensive survey of flora and fauna.

National Park Service, Canaveral National Seashore, 2002-2004. Principal investigator. Compile floristic inventory and survey for threatened and endangered plants on Canaveral National Seashore, Florida.

Brevard County Natural Resources Management Office, 2004-2005. Principal investigator. Conduct surveys for threatened and endangered scrub plants in Brevard County, Florida.

Brevard County Natural Resources Management Office, 2003-2004. Principal investigator. Conduct surveys for selected threatened and endangered plants in Brevard County, Florida.

U.S. Air Force, 45th Space Wing, 1998-2003. Principal investigator. Designed and coordinated the implementation of a scrub restoration program for Cape Canaveral Air Force Station, Florida. Monitored vegetation changes after combinations of cutting and burning to restore long-unburned scrub habitat.

National Aeronautics and Space Administration, Kennedy Space Center, Remediation Program, 1998-2000. Co-principal investigator. Helped to design and implement baseline chemical characterization study for Kennedy Space Center, Florida. Responsible for technical direction of soil and groundwater sections of the study.

U.S. Air Force, 45th Space Wing, 1995-1998. Principal investigator. Coordinated and helped to design program to monitor effects of Delta, Atlas, and Titan rocket launches on the environment of Cape Canaveral Air Force Station, Florida.

U.S. Air Force, 45th Space Wing, 1995-1997. Principal investigator. Coordinated and helped to design threatened and endangered species survey for Patrick Air Force Base, Florida.

St. Johns River Water Management District, 1995-1997. Co-principal investigator. Coordinated and helped to design project to map historical vegetation of the Indian River Lagoon Basin, Florida

GRADUATE STUDENT COMMITTEES:

Shannon Boyle, Florida Institute of Technology, M. S. Biology, December 1996
Theresa K. Burcsu, University of North Carolina Chapel Hill, M. A. Geography, July 1998
Lisa Earnest, University of South Florida, M.S. Marine Science, University of South Florida, December 1998

PROFESSIONAL SERVICE

Florida Native Plant Society: Chair, Science Advisory Committee, 2006-Present

Southern Appalachian Botanical Society: Editor, *Castanea*, 2001-2003
Southeastern Chapter, Ecological Society of America: Vice-Chair, 1993-1995; Secretary-Treasurer, 2000-2002; Chair, 2002-2004

PROFESSIONAL ACTIVITIES

American Association for the Advancement of Science
American Institute of Biological Sciences
Association of Southeastern Biologists
Brevard County Environmentally Endangered Lands Selection and Management Committee.
Ecological Society of America
Florida Academy of Science
Florida Native Plant Society
International Association for Vegetation Science
International Association for Wildland Fire
Natural Areas Association
Society of Wetland Scientists
Southern Appalachian Botanical Society
Tennessee Academy of Science
Torrey Botanical Society

CERTIFICATIONS

Certified Senior Ecologist, Ecological Society of America, 1994-Present

HONORS

NASA Kennedy Space Center Engineer/Scientist of the Year, 2018, Contractor Division
Florida Native Plant Society, Silver Palmetto Award, 2018
Florida Native Plant Society, Silver Palmetto Award, 2009
Florida Native Plant Society, Green Palmetto Award, 2005
The Nature Conservancy, Florida Chapter Conservation Colleague Award, 1995
NASA Manned Flight Awareness Award of Merit, 1989
Phi Kappa Phi, The University of Tennessee, 1982
H.P. Sturdivant Biology Award, Western Maryland College, 1976

PUBLICATIONS/TECHNICAL REPORTS/PRESENTATIONS

Published Papers:

- Schmalzer, P.A., C.R. Hinkle, and H.R. DeSelm. 1978. Discriminant analysis of cove forests of the Cumberland Plateau in Tennessee. p. 62-86. In: P.E. Pope (ed.). Proceedings Central Hardwoods Forest Conference II. Purdue University, West Lafayette, Indiana.
- Schmalzer, P.A., C.R. Hinkle, and H.R. DeSelm. 1980. Vegetation patterns in a section of the Obed Wild and Scenic River, Cumberland County, Tennessee. p. 256-272. In: H.E. Garrett and G.E. Cox (eds.). Proceedings Central Hardwood Conference III. University of Missouri, Columbia.
- Schmalzer, P.A., T.S. Patrick, and H.R. DeSelm. 1985. Vascular flora of the Obed Wild and Scenic River, Tennessee. *Castanea* 50:71-88.
- Provancha, M.J., P.A. Schmalzer, and C.R. Hall. 1986. Effects of the December 1983 and January 1985 freezing air temperatures on select aquatic poikilotherms and plant species of Merritt Island, Florida. *Florida Scientist* 49:199-212.

- Hinkle, C.R., C.R. Hall, M.J. Provancha, P.A. Schmalzer, A.M. Koller, Jr., and W.M. Knott, III. 1988. The use of remotely sensed environmental data and geographic referenced data management for environmental impact assessments. Chemical Propulsion Information Agency (CPIA) Publication 485.
- Schmalzer, P.A. 1988. Vegetation of the Obed River gorge system, Cumberland Plateau, Tennessee. *Castanea* 53:1-32.
- Schmalzer, P.A. 1989. Vegetation and flora of the Obed River gorge system, Cumberland Plateau, Tennessee. *Journal of the Tennessee Academy of Science* 64:161-168.
- Breining, D.R. and P.A. Schmalzer. 1990. Effects of fire and disturbance on plants and birds in a Florida oak/palmetto scrub community. *American Midland Naturalist* 123:64-74.
- Levine, J.S., W.R. Cofer, III, D.I. Sebach, R.P. Rhinehart, E.L. Winstead, S. Sebach, C.R. Hinkle, P.A. Schmalzer, and A.M. Koller, Jr. 1990. The effects of fire on biogenic emissions of methane and nitric oxide from wetlands. *Journal of Geophysical Research* 95:1853-1864.
- Breining, D.R., P.A. Schmalzer, and C.R. Hinkle. 1991. Estimating occupancy of gopher tortoise (*Gopherus polyphemus*) burrows in coastal scrub and slash pine. *Journal of Herpetology* 25:317-321.
- Schmalzer, P.A., C.R. Hinkle, and A.M. Koller, Jr. 1991. Changes in marsh soils for six months after a fire. p. 272-286. In: J.S. Levine (ed.). *Global Biomass Burning Atmospheric, Climatic, and Biospheric Implications*. The MIT Press. Cambridge, Massachusetts.
- Schmalzer, P.A. C.R. Hinkle, and J.L. Mailander. 1991. Changes in community composition and biomass in *Juncus roemerianus* Scheele and *Spartina bakeri* Merr. marshes one year after a fire. *Wetlands* 11:67-86.
- Duncan, B.W. and P.A. Schmalzer. 1992. Using ARC/INFO to monitor Space Shuttle launch effects and validate a spatial predictive model. p. 499-506. In: *Proceedings of the Twelfth Annual ESRI User Conference, Volume 1*. Environmental Systems Research Institute, Inc. Redlands, California.
- Schmalzer, P.A. and C.R. Hinkle. 1992. Recovery of oak-saw palmetto scrub after fire. *Castanea* 57:158-173.
- Schmalzer, P.A. and C.R. Hinkle. 1992. Soil dynamics following fire in *Juncus* and *Spartina* marshes. *Wetlands* 12:8-21.
- Schmalzer, P.A. and C.R. Hinkle. 1992. Species composition and structure of oak-saw palmetto scrub vegetation. *Castanea* 57:220-251.
- Hinkle, C.R., W. McComb, J.M. Safley, Jr., and P.A. Schmalzer. 1993. Mixed mesophytic forests. p. 203-253. In: W.H. Martin, S.G. Boyce, and A. C. Echternacht (eds.). *Biodiversity of the Southeastern United States: Upland Terrestrial Communities*. John Wiley & Sons, Inc., New York.
- Schmalzer, P.A. and C.R. Hinkle. 1993. Effects of fire on nutrient concentrations and standing crops in biomass of *Juncus roemerianus* and *Spartina bakeri* marshes. *Castanea* 58:90-114.

- Schmalzer, P.A., C.R. Hall, C.R. Hinkle, B.W. Duncan, W.M. Knott III, and B.R. Summerfield. 1993. Environmental monitoring of Space Shuttle launches at Kennedy Space Center: the first ten years. American Institute of Aeronautics and Astronautics Conference Paper AIAA93-0303. 16p.
- Swain, H., C.R. Hinkle, and P.A. Schmalzer. 1993. Stewardship at the local level: a case study for Brevard County, Florida. p. 452-462. In: W.E. Brown and S.D. Veirs, Jr. (eds.). Partners in Stewardship: Proceedings of the 7th Conference on Research and Resource Management in Parks and on Public Lands. George Wright Society. Hancock, Michigan.
- Breining, D.R., P.A. Schmalzer, and C.R. Hinkle. 1994. Gopher tortoise (*Gopherus polyphemus*) densities in coastal scrub and slash pine flatwoods in Florida. Journal of Herpetology 28:60-65.
- Duncan, B.W. and P.A. Schmalzer. 1994. Using a geographical information system for monitoring Space Shuttle Launches: determining cumulative distribution of deposition and an empirical test of a spatial model. Environmental Management 18:465-474.
- Duncan, B.W., D.R. Breining, P.A. Schmalzer, and V.L. Larson. 1995. Validating a Florida Scrub Jay habitat suitability model, using demography data on Kennedy Space Center. Photogrammetric Engineering and Remote Sensing 61:1361-1370.
- Schmalzer, P.A. 1995. Biodiversity of saline and brackish marshes of the Indian River Lagoon: historic and current patterns. Bulletin of Marine Science 57:37-48.
- Duncan, B. W., S. Boyle, P. A. Schmalzer and D. R. Breining. 1996. Spatial quantification of historic landscape change within two study sites on John F. Kennedy Space Center. Proceedings of the Sixteenth Annual ESRI User Conference. Published on CD-ROM and on the World Wide Web at www.esri.com.
- Schmalzer, P.A. and C.R. Hinkle. 1996. Biomass and nutrients in aboveground vegetation and soils of Florida oak-saw palmetto scrub. Castanea 61:168-193.
- Schmalzer, P. A. B. W. Duncan, V. L. Larson, S. Boyle, and M. Gimond. 1996. Reconstructing historic landscapes of the Indian River Lagoon Basin. p. 849-854. In: Proceedings of Eco-Informa'96: Global Networks for Environmental Information, Volume 11. Environmental Research Institute of Michigan, Ann Arbor.
- Schmalzer, P. A., and S. R. Boyle. 1998. Restoring long-unburned oak-saw palmetto scrub requires mechanical cutting and prescribed burning (Florida). Restoration & Management Notes 16(1):96-97.
- Duncan, B.W., S. Boyle, D.R. Breining, and P.A. Schmalzer. 1999. Coupling past management practice and historic landscape change on John F. Kennedy Space Center. Landscape Ecology 14:291-309.
- Schmalzer, P.A., S.R. Boyle, and H.M. Swain. 1999. Scrub ecosystems of Brevard County, Florida: a regional characterization. Florida Scientist 62:13-47.
- Duncan, B.W., V.L. Larson, and P.A. Schmalzer. 2000. Modeling historic landcover: an evaluation of two methodologies for producing baseline reference data. Natural Areas Journal 20(4):308-316.

- Duncan, B.W. and P.A. Schmalzer. 2001. Modeling past and present fire behavior on Kennedy Space Center, Florida. Proceedings of the Twenty-first Annual ESRI User Conference. Published on CD-ROM and on the World Wide Web at www.esri.com.
- Duncan, B.W. and P.A. Schmalzer. 2001. Spatial fire behavior modeling: simulating past and present fire spread distributions along the east coast of Central Florida. Pp. 8-11 *in* D. Zattau. (ed.). Proceedings of the Florida Scrub Symposium 2001. U.S. Fish and Wildlife Service. Jacksonville, Florida. 63 pp.
- Schmalzer, P. A. and F. W. Adrian. 2001. Scrub restoration on Kennedy Space Center/Merritt Island National Wildlife Refuge, 1992-2000. Pp. 17-20 *in* D. Zattau. (ed.). Proceedings of the Florida Scrub Symposium 2001. U.S. Fish and Wildlife Service. Jacksonville, Florida. 63 pp.
- Schmalzer, P. A., M. A. Hensley, and C. A. Dunlevy. 2001. Background characteristics of soils of Kennedy Space Center, Merritt Island, Florida: selected elements and physical properties. *Florida Scientist* 64:161-190.
- Schmalzer, P. A. and M. A. Hensley. 2001. Background characteristics of groundwater in the Surficial Aquifer of Kennedy Space Center, Merritt Island, Florida. *Florida Scientist* 64: 250-273.
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- Schmalzer, P.A. 1995. Reestablishing Florida oak-saw palmetto scrub species in abandoned agricultural land. Abstract of presented paper in: *The ASB Bulletin* 42(2):160-161.
- Schmalzer, P.A. 1995. Vegetation establishment and development in a restored, nontidal coastal wetland. Abstract of presented paper in: Supplement to the Bulletin of the Ecological Society of America 76(2):239.
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- Hinkle, C.R. and P. A. Schmalzer. 1996. The Environmentally Endangered Lands Program in Brevard County, Florida. Abstract of presented paper in: The ASB Bulletin 43(2):107.
- Oddy, D.M., P.A. Schmalzer, E.D. Stolen, V.L. Larson, and B.W. Duncan. 1996. Monitoring effects from Titan, Atlas, and Delta rockets on threatened and endangered species at Cape Canaveral Air Station. Abstract of presented poster in: Supplement to Bulletin of the Ecological Society of America 77(3):331.
- Schmalzer, P.A., S. Boyle, and H. Swain. 1996. Scrub ecosystems of Brevard County, Florida. Abstract of presented paper in: The ASB Bulletin 43(2):157-158.
- Schmalzer, P.A., and S. R. Boyle. 1997. Effects of fire and mechanical treatments on reestablishing openings in Florida oak-saw palmetto scrub. Abstract of presented paper in: Bulletin of the Ecological Society of America 78(4):179.
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- Hinkle, C.R., D. DeFreese, P.A. Schmalzer, D. Cox, R. Parkinson, M. Hames, and A. Birch. 1998. From land acquisition to management, a local conservation program matures. Abstract of presented poster in: The ASB Bulletin 45(2):88.
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- Schmalzer, P.A., S.R. Boyle, and C. A. Dunlevy. 1999. Dynamics of openings in Florida oak-saw palmetto scrub created by intense, prolonged burning. Abstract of presented poster in: Ecological Society of America 1999 Annual Meeting Abstracts. p. 304.
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- Duncan, B.W. and P.A. Schmalzer. 2001. Modeling past and present fire behavior: Kennedy Space Center, Florida. Abstract submitted for ESRI Conference.
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- Hinkle, C.R. and P.A. Schmalzer. 2001. Environmentally Endangered Lands Acquisition and Conservation Program in Brevard County, Florida. Abstract of presented poster in: Southeastern Biology 48(2):98.
- Schmalzer, P. A. 2001. Growth of oak-saw palmetto scrub through 10 years after fire. Abstract of presented paper in: Program Abstracts of the 28th Annual Natural Areas Association Conference. p. 36-37.
- Schmalzer, P.A. and F.W. Adrian. 2001. Survival and growth of scrub species planted in a former agricultural site. Abstract of presented paper in: Florida Scientist 64(Suppl. 1):19.
- Schmalzer, P.A. and F.W. Adrian. 2001. Survival and growth of scrub oaks and saw palmetto planted in a former agricultural site. Abstract of presented paper in: Southeastern Biology 48(2):127.
- Schmalzer, P. A. and F. W. Adrian. 2001. Scrub restoration on Kennedy Space Center/Merritt Island National Wildlife Refuge, 1992-2000. Abstract of presented paper in: Program of the Florida Scrub Symposium 2001. p. 9-10.
- Schmalzer, P.A., S.R. Turek, T.E. Foster, C.A. Dunlevy, and F.W. Adrian. 2001. Reestablishing Florida scrub in a former agricultural site: Survival and growth of planted species. Abstract of presented paper in: Ecological Society of America 2001 Annual Meeting Abstracts. p. 200.

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- Schmalzer, P.A., T.E. Foster, and F.W. Adrian. 2002. Restoring long-unburned Florida oak-saw palmetto scrub. Abstract of presented poster in: *Ecological Society of America 2002 Annual Meeting Abstracts*. p. 421.
- Duncan, B.W. and P.A. Schmalzer. 2003. Fuel fragmentation and spatial fire behavior in a southeastern pyrogenic ecosystem. Abstract of presented paper in: *Southeastern Biology* 50(2):202.
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- Schmalzer, P.A. and T.E. Foster. 2003. Characteristics of long-unburned scrub on the Merritt Island/Cape Canaveral barrier island complex before restoration. Abstract of presented paper in: *Ecological Society of America 2003 Annual Meeting Abstracts*. p. 299.
- Schmalzer, P.A. T. E. Foster, and F.W. Adrian. 2003. Responses of long-unburned scrub on the Merritt Island/Cape Canaveral barrier island complex to cutting and burning. Abstract of presented paper in: *Program of the Second International Wildland Fire Ecology and Fire Management Congress, American Meteorological Society*. p. 63.
- Schmalzer, P.A., T.E. Foster, and B.W. Duncan. 2003. Rare Plants of Kennedy Space Center, Merritt Island National Wildlife Refuge, Cape Canaveral Air Force Station, and Canaveral National Seashore. Abstract of presented paper in: *Florida Scientist* 66 (Supplement 1): 50.
- Hinkle, C.R. and P.A. Schmalzer. 2004. Environmentally endangered lands acquisition and conservation program in Brevard County, Florida. Abstract of presented poster in: *Ecological Society of America 2004 Annual Meeting Abstracts*. p. 221-222.
- Schmalzer, P.A., and T.E. Foster. 2004. Rare plants of Canaveral National Seashore. Abstract of presented paper in: *Florida Scientist* 67 (Supplement 1): 48-49.
- Schmalzer, P.A., and T.E. Foster. 2004. Flora and rare plants of Canaveral National Seashore. Abstract of presented paper in: *Florida Native Plant Society 24th Annual Conference Program, Lake Buena Vista, Florida*. p. 5.
- Schmalzer, P.A. and T.E. Foster. 2004. Rare plant diversity and conservation at the local scale: An example from central Florida. Abstract of presented poster in: *Ecological Society of America 2004 Annual Meeting Abstracts*. p. 454.
- Foster, T.E. and P.A. Schmalzer. 2005. Preliminary characterization of habitat for rare scrub plants in Brevard County, Florida. Abstract of presented poster in: *Ecological Society of America 2005 Annual Meeting Abstracts*. p. 199.

- Foster, T.E. and P.A. Schmalzer. 2006. The importance of county-acquired lands for the persistence of rare scrub plants in Brevard County, Florida. Abstract of presented paper in: Florida Scientist 69 (Supplement 1): 70-71.
- Schmalzer, P.A. and T.E. Foster. 2007. Responses of Florida oak scrub vegetation to multiple cycles of cutting and burning. Abstract of presented poster. Ecological Society of America/Society for Ecological Restoration International Joint Meeting. Published on CD.
- Foster, T.E., G.A. Fox, and P.A. Schmalzer. 2008. Relationships between height growth and climatic variables for three Florida scrub oaks. Abstract of presented paper. Ecological Society of America Annual Meeting. Published on CD.
- Hinkle, C.R. and P.A. Schmalzer. 2008. Acquisition and management of environmentally endangered lands to protect biodiversity in Brevard County, Florida. Abstract of presented paper. Southeastern Biology 55(3):249.
- Foster, T.E., P.A. Schmalzer, and G. A. Fox. 2010. Correlation between climate and growth for Florida scrub oaks: A dendroecology study. Poster presented at Ecological Society of America Meeting, August 5, 2010, Pittsburgh, Pennsylvania. Abstract available online at <http://www.esa.org>.
- Schmalzer, P.A. and T.E. Foster. 2010. Responses of long-unburned oak-saw palmetto scrub to repeated cutting or burning. Poster presented at Ecological Society of America Meeting, August 5, 2010, Pittsburgh, Pennsylvania. Abstract available online at <http://www.esa.org>.
- Foster, T.E., P.A. Schmalzer, and G.A. Fox. 2011. Site differences in growth response of *Quercus myrtifolia* to climate. Abstract of presented paper. Ecological Society of America Annual Meeting. August 2011, Austin, Texas. Abstract available online at <http://www.esa.org>.
- Foster, T., P.A. Schmalzer, and G.A. Fox. 2013. Climate-growth relationships for slash pine and two dominate oaks in Florida scrub. Abstract of presented paper in Program of the Florida Native Plant Society 33rd Annual Conference. P. 16.
- Schmalzer, P.A. and T.E. Foster. 2016. Development of scrub vegetation in a former agricultural site through 23 years after planting. Paper presented at Ecological Society of America Meeting, August 9, 2016, Ft. Lauderdale, Florida. Abstract available online at <http://www.esa.org>.
- Schmalzer, P.A. and T.E. Foster. 2019. Variation of Florida scrub vegetation along gradients of soil pH and landscape age on a barrier island complex. Paper presented at Ecological Society of America Meeting, August 15, 2019, Louisville, Kentucky. Abstract available online at <http://www.esa.org>.
- Schmalzer, P.A. and T.E. Foster. 2020. Responses of Florida scrub vegetation to water additions from a groundwater treatment project. Paper presented at Ecological Society of America Virtual Meeting, August 3-6, 2020. Abstract available online at <http://www.esa.org>.

TAMMY E. FOSTER, Ph.D.

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Accomplished researcher with 19 years of experience designing and implementing ecological projects, analyzing data, and communicating results effectively.

EXPERIENCE

AUGUST 2000 – PRESENT

PLANT ECOLOGIST, KENNEDY SPACE CENTER ECOLOGICAL MONITORING PROGRAM FOR GOVERNMENT CONTRACTORS:

Integrated Mission Support Services	10/2015 to present
InoMedic Health Applications	10/2009 – 9/2015
Dynamac Corporation	8/2000 – 9/2009

- Support Ecological Monitoring Program management through assisting with the development of the program operational plan, monitoring program budget, and program deliverables to the KSC customer.
- Lead the project review and advisory board in reviewing and approving implementation of program monitoring projects that support the KSC customer needs.
- Interact directly with customer technical managers to ensure information exchange and to support informational needs.
- Collaborate on design, data analysis, and communication of results through technical summaries, reports, presentations, and publications of interdisciplinary projects.
- Serve as co-principal investigator on plant ecology studies including recovery of Florida scrub after prescribed burning and mechanical treatment, flora inventories, wetland mitigation vegetation surveys, dendrochronology, plant physiology, and eddy covariance.

MARCH 2015 - PRESENT

ADJUNCT INSTRUCTOR, SOUTHERN NEW HAMPSHIRE UNIVERSITY

- Teach online courses in Environmental Science, Biology, Chemistry, and Ecology to undergraduates mostly majoring in Environmental Science or Geoscience.
- Use web tools to create video lecture segments on course content.

EDUCATION

MAY 2014

Ph.D. INTEGRATIVE BIOLOGY, UNIVERSITY OF SOUTH FLORIDA, TAMPA, FL

Dissertation: *Water availability as the driving factor of growth and physiological function of co-occurring scrub species in central Florida.*

MAY 2002

M.S. BOTANY, UNIVERSITY OF SOUTH FLORIDA, TAMPA, FL

Thesis: *Functional groups based on leaf physiology: Are they spatially and temporally robust?*
NASA Earth System Science Fellowship (1998-2000)

DECEMBER 1996

B.S. BIOLOGY, EASTERN COLLEGE (now EASTERN UNIVERSITY), ST. DAVID'S, PA
Summa cum laude

SKILLS

- Strong problem-solving skills
- Ability to analyze complex data
- Organize and present complex ideas effectively
- Able to work independently as well as collaboratively with diverse team
- Ability to lead multi-disciplinary teams
- Detail-oriented
- Proficient in programming in R
- Experienced with Microsoft Office Suite
- Trained and proficient in use of ESRI ArcGIS
- Experienced teacher and mentor

ACTIVITIES

APPOINTED 2018 - PRESENT

Selection and Management Committee; Brevard County Environmentally Endangered Lands

PUBLICATIONS

- Foster, T. E. and J. R. Brooks. 2001. Long-term trends in growth of *Pinus palustris* and *Pinus elliottii* along a hydrological gradient in central Florida. *Can. J. For. Res.* 31(10): 1661-1670.
- Duncan, B.W., P.A. Schmalzer, and T.E. Foster. 2002. Mapping shuttle launch clouds at KSC. *GeoSpatial Solutions* 12(11): 32-37.
- Schmalzer, P.A., S.R. Turek, T.E. Foster, C.A. Dunlevy, and F.W. Adrian. 2002. Reestablishing Florida scrub in a former agricultural site: Survival and growth of planted species and changes in community composition. *Castanea* 67:146-160.
- Foster, T.E. and J.R. Brooks. 2005. Functional groups based on leaf physiology: are they spatially and temporally robust? *Oecologia* 144: 337-352.
- Foster, T.E. and P.A. Schmalzer. 2012. Growth of *Serenoa repens* planted in a former agricultural site. *Southeastern Naturalist* 11(2): 331-336
- Foster, T.E., P.A. Schmalzer, and G.A. Fox. 2014. Timing matters: The seasonal effect of drought on tree growth. *Journal of the Torrey Botanical Society* 141(3):225-241.
- Foster, T.E., P.A. Schmalzer, and G.A. Fox. 2015. Seasonal climate and its differential impact on growth of co-occurring species. *European Journal of Forest Research* 134(3):497-510.
- Schmalzer, P.A., and T.E. Foster. 2016. Flora and threatened and endangered plants of Canaveral National Seashore, Florida. *CASTANEA* 81(2) 91-127.
- Foster, T.E., E. Stolen, C. Hall, R. Schaub, B. Duncan, D. Hunt and J. Drese. 2017. Modeling vegetation community responses to sea-level rise on barrier island systems: A case study on the Cape Canaveral Barrier Island Complex, Florida USA. *PLoS One* 12(8):e0182605

- Stys, B., T. Foster, M. Fuentes, B. Glazer, K. Karish, N. Montero, and J. Reece. 2017. Climate change impacts on Florida's biodiversity and ecology. *In* Florida's climate: Changes, variations and impacts. University Press of Florida. Pgs 339-389.
- Breininger, D.R., T.E. Foster, G.M. Carter, B.W. Duncan, E.D. Stolen, and J.E. Lyon. 2018. The effects of vegetative type, edges, fire history, rainfall, and management in fire-maintained habitat. *Ecosphere* 9(3).
- Alvarez, M., J.F. de Carvalho, A. Salmon, M.L. Ainouche, A. Cave-Radet, A. El Amrani, T.E. Foster, S. Moyer, and C.L. Richards. 2018. Transcriptome response of the foundation plant *Spartina alterniflora* to the Deepwater Horizon oil spill. *Molecular Ecology* 27:2986-3000.
- Schmalzer, P.A. and T.E. Foster. 2018. Dynamics of gaps created by burning in Florida oak-saw palmetto (*Quercus*, Fagaceae-*Serenoa repens*, Arecaceae) scrub. *Journal of the Torrey Botanical Society*. 145(3):250-262.
- Schmalzer, P.A. and T.E. Foster. 2018. Restoration of Florida Scrub vegetation in an old field site through 23 years after planting. *Restoration Ecology* doi: 10.1111/rec.12864.
- Steinmuller, H., T.E. Foster, P. Boudreau, C.R. Hinkle, L.G. Chambers. 2019. Tipping points in the mangrove march: characterization of biogeochemical cycling along the mangrove-salt marsh ecotone. *Ecosystems*. doi: 10.1007/s10021-019099411-8.
- Bolt, R., M.A. Mercadante, T.J. Kozusko, S.K. Weiss, C.R. Hall, J. Provancha, N.R. Cancro, T.E. Foster, E.D. Stolen, S.A. Martin. 2019. An adaptive managed retreat approach to address shoreline erosion at the Kennedy Space Center. *Ecological Restoration*. 37(3):171-181.
- Steinmuller, H., T.E. Foster, P. Boudreau, C.R. Hinkle, L.G. Chambers. 2020. Characterization of herbaceous encroachment on soil biogeochemical cycling within a coastal marsh. *Science of the Total Environment*. 738:139532.
- Schmalzer, P.A. and T.E. Foster. 2020. Variation of Florida scrub vegetation along gradients of soil pH and landscape age on a barrier island complex. *Journal of the Torrey Botanical Society*. 147(2):140.

Kathryn Elizabeth Becker

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Education

M.S. Biology

University of Central Florida

May, 2011

Orlando, FL

Thesis: Variability of Carbon Stock in Florida Flatwoods Ecosystems Undergoing Restoration and Management

Major Professor: Dr. C. Ross Hinkle

B.S. Botany

University of Florida

December, 2008

Gainesville, FL

Research Experience

Graduate Research Assistant

August, 2012 – August, 2018

University of Central Florida, Department of Biology

Supervisor: Dr. C. Ross Hinkle

Carbon Dynamics of the Greater Everglades Watershed and Implications of Climate Change

Graduate Research Assistant

January, 2011 - December, 2015

University of Central Florida, Department of Biology

Supervisor: Dr. C. Ross Hinkle

Measuring CO₂ flux in native and urban ecosystems using the eddy covariance method

Graduate Research Assistant

May, 2010 - June, 2011

University of Central Florida, Department of Biology

Supervisor: Dr. C. Ross Hinkle

Urban Forest Effects Model for Orlando, FL

Research Assistant

July, 2009 - August, 2009

University of Florida, Department of Botany

Supervisor: Dr. Michelle C. Mack

Anatuvuk River Fire Project

Research Assistant

January, 2009 - July, 2009

University of Florida, Department of Botany

Supervisor: Dr. Edward A.G. Schuur

Research Assistant

January, 2009 - July, 2009

University of Florida, School of Forest Resources and Conservation

Forest Biology Research Cooperative

Supervisors: Dr. Timothy A. Martin, Dr. Eric J. Jokela and Dr. Jason G. Vogel

Intensive Management Practices Assessment Center Project

Undergraduate Independent Study

August, 2008 - April, 2009

University of Florida, Department of Botany

Sponsors: Dr. Edward A.G. Schuur and Dr. Hanna Lee

Carbon and nitrogen stable isotope analysis of Alaskan permafrost soils

Teaching Experience

Graduate Teaching Associate, University of Central Florida, Ecology Laboratory August, 2010 - December, 2010

Graduate Teaching Assistant, University of Central Florida, Biology Laboratory 1 August, 2009 - April, 2010

Grants and Honors

UCF College of Graduate Studies Travel Fellowship 2011, 2012, 2013

Elsie Quarterman-Catherine Keever Award (Best Ecological Poster Presented by a Student) 2011
Ecological Society of America, Southeastern Chapter

National Garden Club Scholarship 2010 - 2011

Florida Medallion Scholarship 2002 - 2008

National SMART Grant 2008

Publications

Peer Reviewed Publications

Articles

Ekpe, E.K., **K.E. Becker**, J. Lab, C.R. Hinkle, and F. Escobedo. 2012. Orlando, Florida's Urban and Community Forests and Their Ecosystem Services. University of Florida- IFAS, EDIS FR290.

Conference Proceedings

Becker, K.E. and C.R. Hinkle. 2017. Urban NEE Drivers and Patterns in the Headwaters of the Everglades. *Greater Everglades Ecosystem Restoration (GEER) Meeting*. Coral Springs, FL.

Becker, K.E. and C.R. Hinkle. 2016. Carbon dynamics of a longleaf pine flatwoods ecosystem managed with prescribed fire. *Florida Native Plant Society 36th Annual Conference*. Daytona Beach, FL.

C.R. Hinkle, **K.E. Becker**, B. Benscoter, X. Comas, M. McClellan, M. Budny, D. Harshbarger, S. Graham. 2016. Carbon Dynamics of the Greater Everglades Watershed and Implications of Climate Change. *2016 Environmental System Science (ESS) PI Meeting*. Potomac, MD.

Becker, K.E. and C.R. Hinkle. 2013. Assessing the impact of urban land cover composition on CO₂ flux. *American Geophysical Union 45th annual Fall Meeting*. San Francisco, CA.

Becker, K.E. and C.R. Hinkle. 2012. Measuring the impact of prescribed fire management on the carbon balance of a flatwoods ecosystem in Kissimmee, Florida. *American Geophysical Union 45th annual Fall Meeting*. San Francisco, CA.

Ekpe, E.K., **K.E. Becker**, J. Lab, C.R. Hinkle and F. Escabedo. 2011. An Assessment of the Structure and Environmental Benefits of Urban Forests in Orlando, Florida. *Florida Academy of Sciences 75th Annual Meeting*. Melbourne, FL

Becker, K.E., J.M. Anderson and C.R. Hinkle. 2011. Variability of Aboveground and Belowground Carbon Stocks in Florida Flatwoods Ecosystems Undergoing Restoration and Management. *Ecological Society of America 96th Annual Meeting*. Austin, TX. Poster also presented to *Association of Southeastern Biologists* 2011. Huntsville, AL.

Becker, K.E., E.A.G. Schuur and H. Lee. 2009. Carbon and Nitrogen Isotope Distribution and Abundance in Alaskan Permafrost Soils. *Biology Undergraduate Research Symposium*. Department of Biology, University of Florida, Gainesville, FL.

Technical Reports

Sumner, D.M., C.R. Hinkle and **K.E. Becker**. 2017. Evapotranspiration (ET) at University of Central Florida urban site, daily data, Orange County, Florida, January 29, 2009 - September 27, 2012: U. S. Geological Survey data release, <https://doi.org/10.5066/F7JS9NZB>.

Becker, K.E. and C.R. Hinkle. 2014. Assessing the Carbon Flux Dynamics of a Central Florida Longleaf Pine Flatwoods Landscape Undergoing Prescribed Fire Management. Technical report to: The Nature Conservancy.

Hinkle, C.R., D. Sumner and **K.E. Becker**. 2012. Measurement and Modeling of Evapotranspiration in a Central Florida Urban Setting. Technical report to: Southwest Florida Water Management District.

Ekpe, E.K., **K.E. Becker**, J. Lab, C.R. Hinkle and F. Escabedo. 2010. An Assessment of the Structure and Environmental Benefits of Urban Forests in Orlando, Florida. Technical report to: Orlando Parks Division, Families, Parks and Recreation Department, City of Orlando, Florida.

Other Presentations

Becker, K.E. 2013. Carbon Flux Dynamics of a Subtropical Landscape: The Impact of Land Use, Land Use Change, and Land Management. *Invited Speaker*. University of Central Florida Department of Biology.

Becker, K.E. 2013. Effects of Florida Flatwoods Restoration and Management on Ecosystem Carbon Storage and Sequestration. *Invited Speaker*. The Nature Conservancy, Kissimmee, FL.

Professional Development

Training on Community Earth System Model (CESM): Community Land Model Pacific Northwest National Laboratory	February, 2014 Richland, WA
Ethics/Responsible Conduct of Research Workshops University of Central Florida	October, 2011 Orlando, FL
Summer Course in Flux Measurements and Advanced Modeling University of Colorado Mountain Research Station	July, 2011 Nederland, CO
Collaborative Workshop: Developing a Carbon Budget for the Greater Everglades Ecosystem Participating organizations: FAU, US Geological Survey, UCF, FSU, FIU, South Florida Water Management District, Everglades National Park, and Florida Center for Environmental Studies	July, 2011 Davie, FL

Volunteer Experience

Community

Brevard County Environmentally Endangered Lands Program Selection and Management Committee Member	August 2018 - Present
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Departmental

University of Central Florida Biology Graduate Student Association Faculty Liaison May, 2010 – May, 2012	August, 2009 – August, 2018
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Mentor to Undergraduate Research Volunteers University of Central Florida, Department of Biology	May, 2010 - August, 2012
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Other

Invited Speaker at the Women in Environmental Careers Luncheon with LEAF Interns The Nature Conservancy's Disney Wilderness Preserve	September, 2016 Kissimmee, FL
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Work Experience

Environmental Program Manager, United States Air Force

Air Force Civil Engineer Center (AFCEC), Patrick Installation Support Section (ISS)
1224 Jupiter Street
Patrick Air Force Base, FL 32925
Supervisor: Michael Willard (321) 494-7199, DSN 854-7199; Contact: Yes

November 2018 – present, Biological Scientist (Environmental), GS-0401-12.
40 hours per week.
Clearance: Secret

Duties: Provide professional AFCEC environmental compliance support to the following installations: Avon Park Air Force Range, MacDill Air Force Base, and 45th Space Wing (Patrick Air Force Base, Cape Canaveral Air Force Station, Malabar Tracking Annex, Jonathan Dickinson Missile Tracking Annex (JDMTA), Ascension Island. Provide professional expertise and technical support with an emphasis in the Air Quality, Storage Tanks/POL, Natural Resources and Water Programs. Provide direct program management of these programs in direct support of Planning, Programming, Budgeting & Execution (PPBE) for Environmental Quality (EQ). Provide policy and guidance, program evaluation, resource allocation, and other direct support for all regional environmental compliance, pollution prevention, natural/cultural resources, and cleanup programs, operations and activities. Exercises professional judgement in recognizing and resolving and/or recommending solutions to difficult or unusual environmental problems. Provides consultation and advisory services to leadership and customers in support of environmental administrative issues. Executes AFCEC environmental programs IAW DoD and AF policy and all applicable laws/regulations. Provide advisory services in support of environmental administrative issues. Communicate critical issues to appropriate ISS staff, superiors, installation staff and other stakeholders. Develop specific plans for programs based on org goals and objectives. Identifies strategic sourcing opportunities and leverages a variety of exec methods to reduce cost and provide speedy delivery of products and services. Identifies program execution and contracting strategies to enable efficiencies. Develops, reviews and manages contracts for environmental projects and services.

Provides prompt professional direction and oversees a team of environmental professionals. Provide expertise and support to installations to maintain compliance with all environmental laws and regulations. Timely prepare technical legal documents and/or concise technical information for the installations for submittal to state and various federal regulatory agencies for approval. Serves as a liaison and maintains a technical dialog with my coworkers, contractors, consultants, state and federal agencies. Experience and knowledge of construction and service contracting procedures relevant to executing environmental related contracts. Effectively communicate in a formal briefing or in a public speaking forum. Utilize AF databases such as eDash, MICT, ESOHMIS, APIMS, STAR, Water Enterprise Tracking (WET), Refrigerant Management Compliance, Enforcement Actions Spills Inspections (EASI).

Air Quality and Storage Tanks Program Manager, United States Air Force

45 CES/CEIE

1224 Jupiter Street

Patrick Air Force Base, FL 32925

Supervisor: Laurie Fisher (321) 494-7288, DSN 854-7288; Contact: Yes

June 2016 – November 2018, Biological Scientist (Environmental), GS-0401-12,
40 hours per week (Air Quality Program Manager)

June 2017 – present, Biological Environmental), GS-0401-12,
40 hours per week (Air Quality and Storage Tanks Program Manager)

Clearance: Secret

Duties: Responsible for administrating the Air Quality and Storage Tank Programs for the 45TH Space Wing (45 SW) which includes Patrick Air Force Base (PAFB), Cape Canaveral Air Force Station (CCAFS), Malabar Tracking Annex (MTA), Jonathan Dickinson Missile Tracking Annex (JDMTA) and Ascension Island. Timely prepare all regulatory submittals, many require SW/CC sig. Proficient with the Air Force staffing process for documents. Adhere to Clean Air Act (CAA), Air Force Instructions (32-7040, 32-7044), Air Force Manual (32-7089), Florida Administrative Codes for Air Program and Storage Tank Programs. Utilize the Air Program Information Management System (APIMS) and Storage Tank Accounting & Reporting (STAR) for tracking air emissions and for storage tank compliance. Develop Performance Work Statements (PWS), Statement of Work (SOW) and supporting IGE's, for numerous projects. Utilize AF databases such as eDash, MICT, ESOHMIS, APIMS, STAR, Water Enterprise Tracking (WET), Refrigerant Management Compliance, Enforcement Actions Spills Inspections (EASI). Assist and mentor coworkers. Conduct Multi-Media (Air, Storage Tank, Hazardous Waste, and Water) Inspections to ensure our compliance with Federal, State and municipal regulations. Maintain a professional dialog with my coworkers, contractors, consultants, state and federal agencies. Knowledge of AF budget and funding processes. Prepare budgets for Air Quality & Storage Tank Programs through upcoming fiscal years (FY). Timely complete all Data Calls. Experience with contracting procedures for environmental related contracts. Completed and maintain current hazardous waste, safety, DoD, AF trainings as required. Experience with effectively speaking in a formal briefing, in agency meetings or to the public. Proficient

with writing technical documents for various audiences. Alternate Approving Official (AO) for 45 SW Environmental Compliance Program. Demonstrate excellent problem resolution skills, concrete action plans to resolve problems, skill in fact finding. Strong organizational skills to manage multiple tasks efficiently and effectively.

Project Manager, United States Army Corps of Engineers (ACOE)

Jacksonville District, North Permits Branch,
Cocoa Permits Section
400 High Point Drive, Suite 600
Cocoa, FL 32926
Supervisor: Irene Sadowski, (321) 504-3771, Contact: Yes

April 2008 – June 2016, Project Manager/Biologist, GS-0401-12, 40 hours per week.
June 2003 – March 2008, Project Manager/Biologist GS-0401-11. 40 hours per week.
Clearance: Secret

Duties: Responsible for timely and professionally reviewing applications for work in waters of the United States (Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403)) and within jurisdictional wetlands (Section 404 of the Clean Water Act (33 U.S.C. 1344)) under all appropriate regulations, policy and guidance. Provide excellent reliable public service. Manage one of the largest workloads in the District. Uphold the Department of Army (DA) values: loyalty, duty, respect, selfless service, honor, integrity, and personal courage. Maintain a professional dialog with my team, sponsors, state and federal agencies, applicants and consultants. Responsible for reviewing projects that involve Section 103 of the Marine Protection, Research & Sanctuaries Act of 1972 (33 U.S.C. 1413) work. As a reliable professional Project Manager I am able to evaluate all levels and types of DA permit applications, including complex and controversial projects, perform jurisdictional determinations, functional assessments, review and develop compensatory mitigation proposals that adhere to all regulatory requirements including Endangered Species Act and National Historic Preservation Act. Projects are timely reviewed, coordinated with other federal agencies, Environmental Assessments are prepared and final action is taken. As a Project Manager in the Regulatory Division I perform extensive oral and written communication with the applicant, agent, engineer, consultant, municipality, general public and other regulatory agencies. Serve as a contributing member of the Training Product Development Team (PDT) and Endangered Species Act PDT. Champion on the Efficiency PDT, which developed numerous methods to improve Regulatory Division's work efficiencies. I have managed projects from applicants that include Walt Disney World, Canaveral Port Authority, NASA, St Johns River Water Management District, Brevard County, Indian River County, and thousands of others.

May 2012 – August 2012

Acting Section Chief, United States Army Corps of Engineers

Panama City Section, GS-0401-13,
Regulatory Division, North Permits Branch, 40 hours per week.

Duties: Supervise and mentor a staff of five by applying policies, procedures and regulations related to the ACOE regulatory program in a manner that ensures decisions made are sound and balanced between technical accuracy, product quality, mission requirements, while being fair to the applicant. Review and prepare recommendations and permit decision documents that are clear and concise and reflect a thorough knowledge of the laws, policies, regulations, and precedents applicable to the Regulatory Program. Ensure that the level of detail to each evaluation (environmental assessment) commensurate with the complexity of the proposed project. Build and maintain collaborative, proactive relationships with staff, internal and external customers and stakeholders to provide quality products and services. Promote synergy, teamwork, and trust by fostering open, honest communications with internal and external stakeholders. Promote public confidence in products and projects delivered by ACOE.

December 2001 –June 2003

Environmental Manager, Florida Department of Environmental Protection (FDEP)

3319 Maguire Blvd, Suite 232

Orlando, FL 32803

40 hours per week.

Duties: Manage the Submerged Lands and Environmental Resource Program's (SLERP) permitting program and 8 staff; review and process complex projects, DRI's and Clearing House Projects; resolves problematic and complex projects; coordinates training for all SLERP staff; primary volunteer for speaker on behalf of the SLERP Central District; provides permitting guidance to the compliance/enforcement staff when necessary; conducts site inspections to assess the biological, ecological, water quality and proprietary impacts that a project may pose; conducts compliance inspections; counsels property owners, governmental officials, engineers, and developers and assists in the preparation of permit applications when necessary, explaining the jurisdictional responsibilities and permitting procedures within the Florida Department of Environmental Protection, Environmental Resource Program in the Central District. The Central District area comprises of eight counties: Brevard, Indian River, Lake, Marion, Orange, Osceola, Seminole, and Volusia.

Immediate supervisor: George Gionis: 407-893-3310 (retired).

September 1999 – December 2001

Environmental Supervisor, FDEP

3319 Maguire Blvd, Suite 232

Orlando, FL

40 hours per week.

Duties: Supervised the Submerged Lands and Environmental Resource Program's (SLERP) permitting staff (five employees); Review and process complex projects; Resolve problematic and complex projects; Coordinate training for all SLERP staff; Primary volunteer for speaker on behalf of the SLERP Central District; Provide permitting guidance to the compliance/enforcement staff when necessary; Conduct site inspections to assess the biological, ecological,

water quality and proprietary impacts that a project may pose; Conduct compliance inspections; Counsel property owners, governmental officials, engineers, and developers and assists in the preparation of permit applications when necessary, explaining the jurisdictional responsibilities and permitting procedures within SLERP. Immediate supervisor: Terry Zable (no longer with the FDEP) and George Gionis: 407-893-3310 (retired).

August 1990 – September 1999

Environmental Specialist (I & II): Florida Department of Environmental Protection/Florida Department of Environmental Regulation,

3319 Maguire Blvd, Suite 232

Orlando, FL

40 hours per week.

Duties: Responsible for the review and processing of environmental resource permit applications (initially dredge/fill applications); conducts site inspections to assess the biological, ecological, water quality and proprietary impacts that a project may pose; counsels property owners, governmental officials, engineers, and developers; performs informal jurisdictional determinations; review and process mangrove applications; assist in training new employees; familiar with dredge and fill, environmental resource permitting and proprietary authorization review and process.

December 1988 – December 1989

Tax and Insurance Administrator: Hazleton Laboratories Corporation, Herndon, VA

40 hours per week.

Duties: Filed all state tax returns; accounted for current and deferred taxes; prepared consolidated tax provisions; administered all insurance policies and as necessary within the corporate office.

August 1987 – November 1988

Laboratory Specialist: Akzo/Bionetics Research, Inc. Rockville, MD

40 hours per week.

Duties: Developed hybridomas for contract and commercial purposes. Included fusion, screening, cloning and partial characterization of monoclonal antibodies; use of sterile tissue culture techniques.

November 1986- August 1987

Research Technician: In Vitro Cell Line Screening Project, National Cancer Institute, Frederick Cancer Research Facility, Frederick, MD

40 hours per week.

Duties: Performed general laboratory procedures including sterile tissue culture techniques, In Vitro drug toxicity studies and data analysis using computer systems.

Education:

B.S. in Biology, Bridgewater College – May 1986

A.A. in Accounting, Northern Virginia Community College – December 1989

Additional Information

AF Training:

Approving Official Training
APIMS database
STAR database
HAZWOPPER Training
7 Habitats of Highly Effective People
Currently enrolled in Squadron Officer School (SOS)

USACE training:

13+ years of experience with Section 10/404 programs
Prospect Courses: Regulatory I, II A, II B, II C, IV, Wetlands Development & Restoration, Environmental Impact Assessment, Environmental Laws & Regulations, Cumulative Impact Assessment.

State training:

13 years of experience with the dredge/fill, wetland resource/environmental resource program
I have permitted in excess of 3,000 projects during this time frame (most of these projects were located in Brevard, Indian River, Orange and Marion Counties).
Wetland Delineation Training
Supervisory Training
Public Service Training

AWARDS:

2018 – Cash Award & Time off Performance Award
2017 – Cash Award & Time off Performance Award
2011 – Cash Award, for my contributions on the Endangered Species Act (ESA) PDT and the Efficiency PDT.
2010 – Cash Award, for managing projects.
2009 – On the Spot Award, for my selfless service at the 2009 Florida Dock and Marine Expo in Jacksonville, Florida.

Florida Department of Environmental Protection (FDEP) Employee of the Month - December 2002

FDEP, Central District Employee of the Month – October 2002

FDEP, Central District Outstanding Performance Award 2001

FDEP, Central District Superior Performance Award 2000

FDEP, Central District Award

FDEP, Central District Award

FDEP, Central District

FDEP Central District Employee of the Month – June 1995

Lisa Toland

Relevant Experience for Brevard County Environmentally Endangered Lands Selection and Management Committee Volunteer Position.

4-year postsecondary academic degree

- B.S. Chemistry, 1985
- The Pennsylvania State University, University Park, PA

Demonstrated Professional Expertise

- 17 Years, President, Toland Environmental Consulting
- 4 Years, Director, Brevard County Natural Resources Management Department
- 6 Years, Assistant Department Head, Brevard County Solid Waste

Demonstrated Knowledge of Brevard County Ecosystems, habitat types and conservation land management techniques.

- As the lead ecologist for Toland Environmental Consulting:
 - Work within all of Brevard County's ecosystems and classify wetland, upland, marine and coastal habitats according to Florida Natural Areas Inventory's Guide to Natural Communities of Florida and the Florida Department of Transportation's Florida Land Use, cover and Forms Classification System.
 - Assess scrub habitat suitability for Florida Scrub-jays, conduct presence/absence surveys for jays, prepare habitat conservation plans, and manage scrub habitat.
 - Notable examples:
 - Capron Ridge 21-acre scrub management and restoration program prior to turning the property over to the Brevard County EELs Program.
 - Sandy Point 73.5-acre scrub restoration and creation program prior to turning the property over to the Brevard County EELs program.
 - Assess habitat suitability, conduct population surveys and relocate gopher tortoises by hand shoveling, bucket trapping, and backhoe excavation as an Authorized Agent for Florida Fish and Wildlife Conservation Commission (FWC).
 - Assess habitat suitability and conduct presence/absence surveys for Florida Grasshopper Sparrows.
 - Delineate wetlands and assess wetland functional values according to State and federal rules.
 - Design and implement wetland mitigation plans including wetland creation, restoration, enhancement and long-term exotic species management.
 - Notable examples:
 - Capron Ridge wetland creation and exotic species management.
 - Brevard County EELs Grant Flatwoods Sanctuary wetland creation, restoration and enhancement program.

- Bull Creek wetland and floodplain restoration and enhancement.
 - Conduct seagrass and submerged aquatic vegetation surveys.
 - Act as an FWC approved manatee observer for projects involving in-water work in known manatee aggregation areas and travel corridors.
 - Conduct biological monitoring programs for bald eagle nesting sites.
 - Use ArcGis Desktop software and prepare GIS maps.
- As the Director of Brevard County Natural Resources
 - Prepared, amended, interpreted and enforced Brevard County's Comprehensive Plan and environmental land development regulations.
 - Oversaw, provided staff support and coordinated with the Nature Conservancy for the Brevard County's Environmentally Endangered Lands program.
 - Obtained working knowledge of EEL's Land Acquisition Manual (LAM), EELs Selection and Management Committee and EELs Procedures Committee.
 - Oversaw County staff conducting the initial scrub habitat surveys and occupancy assessments and obtained federal funding and local municipalities support to explore the creation of Countywide Habitat Conservation Plan for Florida Scrub-Jays.
 - Obtained local municipalities support for the creation of a countywide manatee protection plan.
 - Represented all 67 Florida counties for the Florida Local Environmental Regulators Association (FLERA) on the governor's technical advisory committee for the creation of the Florida's single wetland definition and wetland delineation rule.
 - Sat on the East Central Florida Regional Planning Council's technical advisory committee for the creation of the Regional Wetland Buffer Rule for Developments with Regional Impacts.
 - Oversaw the initial engineering and cost sharing studies to begin Brevard's beach renourishment programs.
 - Created Brevard County's sea turtle lighting ordinance and compliance program.
 - Reviewed and approved contamination assessment reports and remedial action plans for petroleum contaminated sites including assessing the local geology, soil profiles, vertical and horizontal permeability rates and ponding and drawdown effects on the hydrology of adjacent environmental resources including wetlands.
- As the Assistant Department Head of Brevard County Solid Waste:
 - Coordinated the construction of more than 20 million dollars in new solid waste facilities including procuring engineers and contractors, acquiring property, obtaining proper zoning, performing public relations, assisting in facility design, obtaining all environmental, building and construction permits, and implementing environmental mitigation plans.

RESUME

Robert "Oli" Johnson
2514 Ruffner Rd.
Melbourne, FL 32901
Home: 321-725-3504
Cell: 321-831-0413

Education

BS in Biology
SUNY at Geneseo
1968

MS in Bio-Environmental Oceanography
Florida Institute of Technology
1981

Experience

High School Science Teacher
Martin County High School
Stuart, FL
1976-1979

High School Science Teacher
Melbourne High School
Melbourne, FL
1981-1990

Park Ranger/Naturalist
Turkey Creek Sanctuary
Palm Bay, FL
1993-2016

Profession organizations

Turkey Creek Sanctuary Committee
Marine Resource Council
Sea Turtle Preservation Society
Florida Audubon Society