PENELOPE C. B. MITCHELL, Ph.D.

Global Water Security Center, The University of Alabama

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EDUCATION

Ph.D., Geography, University of Alabama, Tuscaloosa, Alabama	2023
M.S. Geography, University of Alabama, Tuscaloosa, Alabama	2022
M.S. Environmental Studies, University of West Florida, Pensacola, Florida	2011
Graduate Geographic Information Systems Certificate, University of West Florida	2009
B.S. Environmental Studies/Policy, University of West Florida	2007

POSITIONS & EMPLOYMENT

2023-	Human-Environmental Analyst, University of Alabama, Global Water Security Center
2019-2023	Ph.D. Candidate and Graduate Research Assistant, University of Alabama, Department of Geography, Laboratory for Location Science
2017-2018	Instructional Designer, University of West Florida, Hal Marcus College of Science & Engineering, Pensacola, FL
2015-2019	Lecturer, Johns Hopkins University, Advanced Academic Programs, M.S. Geographic Information Systems Program, Baltimore, MD
2012-2018	Instructor/GIS Analyst, University of West Florida, Online Geographic Information Systems Certificate Program, Pensacola, FL
2010-2011	GIS Analyst, Escambia County Board of County Commissioners, Pensacola, FL
2009-2011	Assistant Manager, Florida Department of Environmental Protection, Ecosystem Restoration Section, Pensacola, FL
2005-2008	Environmental Specialist, Florida Department of Environmental Protection, Ecosystem Restoration Section, Pensacola, FL

PUBLICATIONS

Mitchell, P., Curtin, K.M., Magliocca, N.R. (In Press, 2023) "Race, Rurality and Geographic Accessibility to Medication for Opioid Use Disorder in the U.S.", *Journal of Maps*.
https://doi.org/10.1080/17445647.2023.2270632

Montello, D., Curtin, K.M, Bae, C., **Mitchell, P**. (2023) "With a Little Help from My Friends (and Even a Few Strangers): An Overview of Collective Spatial Cognition", in *Research Advances in Collective Spatial Cognition*. eds. K.M. Curtin and D. Montello, Taylor and Francis. https://doi.org/10.4324/9781003202738

Esposito, D., Schaumann, D., Rondinelli, M., Camardo, D., Kalay, Y.E., Curtin, K.M., **Mitchell, P**. (In Press 2023) "Modeling and Simulating the Impact of Human Spatial and Social Behavior on Infection Spread in Hospitals", in *Research Advances in Collective Spatial Cognition*. Eds. K.M. Curtin and D. Montello, Taylor and Francis. https://doi.org/10.4324/9781003202738

Curtin, K.M., **Mitchell, P**., Rondinelli, M. (In Press 2023) "Spatial Analytic Tools and Techniques to Inform Research of Team Spatial Cognition", in *Research Advances in Collective Spatial Cognition*. eds. K.M. Curtin and D. Montello, Taylor and Francis. https://doi.org/10.4324/9781003202738

Pawloski L.R., **Mitchell P**, Curtin K.M. (Accepted 2023) "Obesity in children and adolescence in Thailand: Access and education issues for programming and policy in a post COVID-19 world.", *Health Workforce Education Journal*. no. 1 (August 22, 2023): 36–48.

Magliocca, N. R., Price, A. N., **Mitchell, P. C.**, Curtin, K. M., Hudnall, M., & McSweeney, K. (2022). Coupling agent-based simulation and spatial optimization models to understand spatially complex and co-

evolutionary behavior of cocaine trafficking networks and counterdrug interdiction. IISE Transactions, 1–23. https://doi.org/10.1080/24725854.2022.2123998

Mitchell, P., Samsel, S., Curtin, K., Price, A., Turner, D., Tramp, R., Hudnall, M., Parton, J., Lewis, D. (2022) "Geographic Disparities in Access to Medication for Opioid Use Disorder across US Census Tracts based on Treatment Utilization Behavior", *Social Science and Medicine*, 302, 114992. https://doi.org/10.1016/j.socscimed.2022.114992

Price, A., Curtin, K.M., Magliocca, N.R., Turner, D., **Mitchell, P**., McSweeney, K., Dolliver, D.S. (2022) "Maximal Covering for Interdiction (MCI): A Family of Models in Support of Realistic Interdiction Location Decision Making", *Transactions in GIS*, 26(4), 1962–1980. https://doi.org/10.1111/tgis.12921

Curtin, K.M., Pawloski, L.R., **Mitchell, P.**, Dunbar, J. (2020) "COVID-19 and morbid obesity: Associations and consequences for policy and practice", *World Medical and Health Policy*, 1-21, https://doi.org/10.1002/wmh3.361

HONORS & AWARDS

2023   David C. Weaver Memorial Award, David C. Weaver Endowment, University of Alabama's Board of Trustees, Department of Geography

2023   Conference Funding Award, University of Alabama, Graduate School

2023   Geographers Melinda S. Meade Student Travel Award, Health & Medical Geography Specialty Group of American Association of Geographers

2022   International Medical Geography Symposium Travel Award, Health & Medical Geography Specialty Group of American Association of Geographers

2022   Chairperson's Award, University of Alabama, Department of Geography

2022   National Alumni Association Fellowship Award, University of Alabama, Graduate School

2021   1st Place Poster Award, University Consortium for Geographic Information Science, "Geographic Disparities in Access to Medication for Opioid Use Disorder across US census Tracts based on Treatment Utilization Behavior"

2021   Conference Funding Award, University of Alabama, Graduate School

2020   Outstanding Graduate Student Award, University of Alabama, Department of Geography

2020   Conference Funding Award, University of Alabama, Graduate School

EXTERNALLY FUNDED RESEARCH ACTIVITY AS A PARTICIPATING RESEARCHER

Project: Models and Metrics of Illicit Drug Network Interdiction of Trafficking: Exploring Behavioral Responses in Narco-Trafficking Operating Networks
Source of Support: National Science Foundation
Role: Graduate Research Assistant
Status of Support: August 2021-Present
Total Award Amount (including Indirect Costs): $746,361
Summary: Funded by NSF's Disrupting Operations of Illicit Supply Networks (D-ISN), this project seeks to effectively model and measure the impact of counterdrug interdiction operations on cocaine- or 'narco'-trafficking networks. We will leverage data science analytical techniques in combination with a potentially transformative coupled agent-based and interdiction optimization modeling approach to accomplish three main research objectives. We will systematically identify (1) narco-traffickers' tendencies for relocating existing or creating new smuggling routes and/or shifting cocaine shipment conveyance methods in response to counterdrug interdiction operations; (2) how those tendencies vary with a range of alternative interdiction strategies; and (3) metrics that move beyond cocaine seizure volumes to better characterize the impacts of counterdrug interdiction of cocaine trafficking network function. These analyses will be supported by a scenario testing environment that tightly integrates a Geographic Information Systems (GIS)

front end with a modeling and data analytics backend. The testing environment will enable a comprehensive and geovisualized assessment of the effectiveness of a range of spatially optimized interdiction strategies subject to resource constraints (e.g. budget, jurisdictional, political). It will also enable the quantification of narco-traffickers' spatial and operational adaptive responses across the spectrum of interdiction scenarios, from which predictive 'behavioral profiles' will be derived, catalyzing a shift from reactive to anticipatory medium-to long-term counterdrug interdiction strategies. As a GRA on this project, research tasks include GIS testbed development, model integration and assessment, subject matter research on location modeling within the domain of illicit supply networks, coupled agent-based models with optimization models, as well as research on spatial decision support systems.

Project: A Spatial-Analytic Framework for the Optimal Placement of Interventions for Opioid Incident Deployment in Underserved Areas (OPIOID-UA)
Status of Support: Not selected for funding
Source of Support: The National Institute of Health – NIH; R-21 Research Program
Role: Key Personnel/Graduate Research Assistant
Proposal Start/End Date: 07/2021- 07/2023
Total Award Amount (including Indirect Costs): $403,591
Summary: Understanding and addressing the opioid treatment gap requires a novel, multidimensional research approach looking at varying domains of influence (physical/built environment, sociocultural environment, health care system) with varying levels of influence (community, societal) to complement established individual-biological studies and promote community and population-level health outcomes. This research seeks to examine the demographic and geographic profile of persons impacted by OUD and improve resource availability among defined health disparity populations to reduce the opioid treatment gap. The significance of this research lies in its potential to 1) use a unique combination of data to derive a dynamic demand for opioid treatment, 2) use that demand to quantitatively describe at a fine spatial scale, with a novel access metric, the level of access to healthcare resources for opioid treatment, and 3) produce a testbed decision-making environment within which multiple scenarios for healthcare distribution can be instantiated and tested for their efficacy through optimal resource allocation methods. I was primary author of 2 of 3 sections for this proposal for Federal funding.

Project: Autonomous Logistics Optimization Family of Tools (ALOFT) extensions, testing, and transfer to user community
Source of Support: Office of Naval Research (ONR)
Role: Graduate Research Assistant
Status of Support: June 2020-July 2021
Total Award Amount (including Indirect Costs): $737,609
Summary: Exploration of a series of interrelated logistical problems in the unmanned/autonomous context to develop mitigation strategies to inform decision-making. Project used a spatial optimization approach to logistics operations. This required integrating the tools of spatial analysis as instantiated in a Geographic Information System, with the techniques of operations research to allow the generation of logistics problem instances, optimal solutions of those logistics problems, and cartographic and statistical interpretation of results. Tasks included: updating the test bed environment to reflect latest GIS software updates and develop an automated cartographically polished geospatial output of optimal solution per scenario. Presentation of testbed to ONR to demonstrate how the work could move into additional domain areas within the Department of Defense (DoD) to evaluate operations resources, improve program planning, and procurement decision-making.

Project: Accelerating Research Advances in Collective Spatial Cognition

Source of Support: Army Research Institute for the Social and Behavioral Sciences.
Role: Graduate Research Assistant
Status of Support: January 2019-May 2020
Total Award Amount (including Indirect Costs): $296,540
Summary: Foundational research regarding how groups of people learn about space, and act on the spatial knowledge they collectively gain. Demonstrated the importance of research collaborations to break new ground in theoretical research contributions, as well as shed light on how the quantitative methods of geography can be used in novel ways to improve understanding of persistent problems outside of the domain of geography. Tasks included:

- Co-organized the Collective Spatial Cognition Specialist meeting in Santa Barbara, CA
- Reviewed and provided feedback on contributed position papers
- Contributed to publisher proposal development for edited volume
- Mentored undergraduate researchers
- Administrative tasks—continued correspondence with project contributors; project materials and reference archiving, website development

ADDITIONAL RESEARCH ACTIVITIES

- Redistricting Application Development—collaborated with LLS researchers to devise an optimization formulation and GIS tool to create ideal populations of districts by moving the fewest number of persons from one district to another where persons can only be moved to an adjacent district. Leveraged ArcGIS Pro, Python, Gurobi Solver, and Pandas data manipulation tools. Funded by Dr. James Gimpel, Professor of Political Science, University of Maryland.
- Geospatial Perspectives on the Intersection of Chronic Disease and COVID-19—Aspatial, Spatial, and Spatio-temporal Associations between negative COVID-19 outcomes and Obesity. This research builds on work from early in the COVID-19 pandemic that uses data on COVID-19 cases and mortality over time, along with estimates of the obese populations in the United States by county, to examine the aspatial, spatial, and spatio-temporal associations between morbid obesity and negative outcomes from COVID-19 and to identify potential coincident spatial and spatio-temporal clusters of morbid obesity and COVID-19 deaths. Leverages spatial analysis, spatial statistics, data science, and geovisualization.

TEACHING & CURRICULUM DEVELOPMENT

Instructor of Record
2015-2019   A.S.430.612 Cartographic Design & Visualization, Johns Hopkins University, Advanced
            Academic Programs, M.S. Geographic Information Systems Program
2014-2017   GIS3015/L Cartographic Skills, University of West Florida, Online Geographic Information
            Systems Certificate Program
2013-2017   GIS4048 Applications in GIS, University of West Florida, Online Geographic Information
            Systems Certificate Program

2013-2014   GIS Training Academy (6-week course, 9.6 CEUs)

2013   GIS4043 Introduction to GIS (content developer; not IOR) University of West Florida, Online
            Geographic Information Systems Certificate Program

Program, Curriculum and Course Development: Program, Course, and Module outcomes developed in alignment with the *Geographic Information Science and Technology Body of Knowledge.* Worked to revitalize program

content and delivery to stay current with evolving geospatial technologies and to remain competitive with other online institutions.

GIS 3015/L Cartographic Skills:

Topics Developed: Introduction to Cartography and Map Design, Datums, Coordinate Systems, Projections, Introduction to Adobe Illustrator, Land Partitioning Systems, Cartographic Design, Map Elements and Typography, Spatial Statistics, Data Classification, Choropleth Mapping, Proportional Symbols, Isarithmic Mapping, Flow Line Mapping, Dot Mapping, NeoCartography, Volunteered Geographic Information, Web Mapping.

Achieved 2014 Internal Quality Matters (QM) Certification, met the QM rubric at 100%. External QM Certification 2015.

GIS4043 Introduction to GIS:

Video Tutorials Created: Toolbars, Data Frames, Essential Map Elements, Map Sharing, Advanced Symbology, Advanced Labeling, Metadata Styles, ESRI Products/Virtual Training/AGOL, Coordinate Systems, Projecting an Image, Calculating Geometry, Obtaining Data, Working with XY Tabular Data, Clipping Vector Data, File Geodatabases, Feature Classes, Shapefiles, Joining Data, Variable Distance Buffers, Scripting with ArcPy, Geocoding, Network Analyst, ModelBuilder.

GIS4048/5100 Applications in GIS:

Topics Developed: Introduced the applied use of GIS in the study of geo-hazards, natural disasters, urban planning, homeland security and law enforcement, and marketing/location decisions.

GIS4930 Special Topics in GIS:

Worked with SkyTruth, a non-profit environmental awareness group that uses remote sensing and mapping to expose landscape degradation associated with resource extraction, to develop a series of labs analyzing mountain top removal coal mining. Utilized ERDAS Imagine and ArcMap to perform multi-spectral analysis to classify mining areas and identify impacted areas outside of permitted mining zones.

Student Assessment and Measurement:

Detailed Analytic Rubrics developed for every assignment so that students are provided with clear description of the criteria used to evaluate their work. All criteria used to evaluate students' performance are in alignment with course learning objectives.

Advising:

Staff mentor to graduate and undergraduate teaching assistants—assigned tasks, provided feedback, assisted with time management.

Online Instructor Certifications:

Certified Quality Online Instructor, Quality Matters (QM) Program, Certified Quality Online Course Reviewer, QM Program

Related GIS Educational Activity:

ESRI International User Conference (2014), ESRI Southeast User Group (2013), Seven Hills Regional User Group (2012, 2013).

SERVICE

➢ Health & Medical Geography Specialty Group of the American Association of Geographers

May 2022 - Present: *Graduate Student Board Member*
- Organize Paper competitions
- Coordinate with board members to create events contributing to circulation of health and medical geographies knowledge
- Organize specialty-group topic-specific sessions
➢ Peer Review: *Open Rivers, Journal of Maps, Transactions in GIS, American Journal of Preventative Medicine*, Esri Press—*Cartography Plus Z*
➢ International Ecological Restoration (July 2011-August 2012)
- Volunteer: Tropical dry forest restoration—Guanacaste, Costa Rica
- Volunteer: Cloud forest restoration/sustainable land use—Intag, Ecuador
- Volunteer: Permaculture/Agrotourism—El Bolson, Argentina
- Volunteer Wetland Restoration Symposium—Southland, New Zealand
- Volunteer: Wetland restoration—Southland, New Zealand

PRESENTATIONS

Mitchell, P., Curtin, K.M., Magliocca, N.R. (2023, March) "Race, Rurality, and Complexity Driving Geographic Access to Medication for Opioid Use Disorder in the U.S." American Association of Geographers, Denver, Colorado, March 23rd-27th, 2023.

Mitchell, P., Curtin, K.M., Magliocca, N.R., Price, A., Hudnall, M. (2022, October) "Disrupting Illicit Supply Networks: Exploring Behavioral Responses in Narco-Trafficking Operating Networks in a Spatial Optimization and Simulation Testbed Environment" Applied Geography Conference AGX 2022, Virtual, October 20-22, 2022.

Mitchell, P. (2022, June) "Race, Rurality, and Complexity Driving Geographic Access to Medication for Opioid Use Disorder in the U.S." International Medical Geography Symposium, Edinburgh, Scotland, June 19th-24th, 2022.

Mitchell, P., Curtin, K.M., Magliocca, N.R., Price, A., Hudnall, M. (2022, February) "Disrupting Illicit Supply Networks: Exploring Behavioral Responses in Narco-Trafficking Operating Networks in a Spatial Optimization and Simulation Testbed Environment" American Association of Geographers, Virtual, February 25-March 1, 2022.

Mitchell, P., Curtin, K.M. (2022, February) "Opioid Use Disorder Spatial Risk Assessment Framework" American Association of Geographers, Virtual, February 25-March 1, 2022.

Mitchell, P., Curtin, K.M. (2022, February) "Opioid Use Disorder Spatial Risk Assessment Framework" University of Alabama Department of Geography Colloquium, February 11, 2022, Tuscaloosa, Alabama.

Mitchell, P., Curtin, K.M., Magliocca, N.R., Price, A., Hudnall, M. (2021, November) "Disrupting Illicit Supply Networks: Exploring Behavioral Responses in Narco-Trafficking Operating Networks in a Spatial Optimization and Simulation Testbed Environment" Southeastern American Association of Geographers, Florence, AL (November 21-22, 2021).

Pawloski, L., Curtin, K.M, **Mitchell, P**., Ahmad, H., Rasheed, T. (2021, September) "COVID-19 and obesity: Implications for obesity prevention and global health interventions." Scientific Conference of College of Health Sciences at Hawler Medical University, Kurdistan Region, Iraq, Virtual, September 6-7, 2021.

Mitchell, P., Samsel, S., Curtin, K.M., Price, A., Turner, D., Tramp, R., Hudnall, M., Parton, J., Lewis, D. (2021, April) "Geographic Disparities in Access to Medication for Opioid Use Disorder across US Census

Tracts based on Treatment Utilization Behavior." Annual Southeastern Universities Graduate Research Symposium, Virtual, April 19-23, 2021

Mitchell, P., Samsel, S., Curtin, K.M., Price, A., Turner, D., Tramp, R., Hudnall, M., Parton, J., Lewis, D. (2021, April) "Geographic Disparities in Access to Medication for Opioid Use Disorder across US Census Tracts based on Treatment Utilization Behavior." American Association of Geographers, Virtual, April 7-11, 2021.

Mitchell, P., (2020, December) "Disparities in Access to Medication for Opioid Use Disorder: A Geographic Framework for Optimal Placement of Interventions for Opioid Incident Deployment in Underserved Areas (OPIOID-UA)", Invited Presentation, University of Alabama Opioid Working Group.

Mitchell, P. (2020, January) "A Framework for Response to Complex Spatial Problems: Optimal Opioid Intervention Response", University of Alabama Department of Geography Colloquium, Tuscaloosa, Alabama.

POSTERS

Mitchell, P., Samsel, S., Curtin, K., Price, A., Turner, D., Tramp, R., Hudnall, M., Parton, J., Lewis, D. (2021, June) "Geographic Disparities in Access to Medication for Opioid Use Disorder across US Census Tracts based on Treatment Utilization Behavior", University Consortium for Geographic Information Science Symposium, Virtual, June 7-9, 2021.

PAST WORK EXPERIENCE

2009-2011   **Assistant Manager Ecosystem Restoration Section**
Florida Department of Environmental Protection, Pensacola, Florida
Assisted management of over $1,000,000 in federal and non-federal grant funding and project activities related to estuarine, dune, and stream restoration projects within the Florida panhandle. Program grant writer; GIS analyst (site suitability analyses); managed GIS databases of past and present restoration sites; secured state and federal permits for project sites; volunteer/intern recruiter and coordinator; community outreach coordinator; section media contact.

2010-2011   **GIS Analyst**
Escambia County Board of County Commissioners, Pensacola, Florida
Funded by the Division of Forestry. Created broad spectrum land use map of Escambia County Florida, analyzed land use coverage to generate an economic benefit analysis of tree coverage within the county. Report used by city/county planners to preserve tree coverage as well as target areas in need of tree installations. Software used: ArcGIS, CityGreen.

2005-2008   **Environmental Specialist**
Ecosystem Restoration Section, Florida Department of Environmental Protection, Pensacola, Florida
Seagrass restoration in the Florida panhandle funded by NOAA Coastal Management Program. Managed seagrass propagation lab, coordinated seagrass salvage operation—recovering seagrass from permitted marine construction sites and transplanting to suitable receiver sites, performed monitoring of transplant sites, cataloged all transplant sites into GIS database, prepared grant reports.