

CAROLYN S. FISH

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EDUCATION

Doctor of Philosophy in Geography, 2014-2018 (expected)

The Pennsylvania State University

Dissertation Topic: How do maps influence the discourse surrounding climate change?

Advisor: Dr. Cindy Brewer

Master of Science in Geography, 2008-2010

Michigan State University

Thesis: Change Detection in Animated Choropleth Maps

Advisor: Dr. Kirk Goldsberry

Bachelor of Science in Geography (GIScience concentration), 2005-2008

The Pennsylvania State University

Graduated with Distinction

PROFESSIONAL EXPERIENCE

Professional Experience (Non-Academic)

- 2011-2014 *Cartographic Product Engineer*
Esri, The Environmental Systems Research Institute, Redlands, CA
- Developed visualizations of space-time cluster analysis for spatial statistics data exploration tools
 - Designed animation for maps featured on ABC News's Good Morning America: <http://abcnews.go.com/GMA/video/memorial-day-gas-price-revelations-13701307>
 - Designed multi-scale basemaps to be used across desktop and mobile devices
 - Developed cartographic designs for templates to simplify workflows for GIS users
 - Tested and provided feedback on the usability of ArcGIS to Esri software developers
 - Designed iconic point symbols of significant activities and critical incidents
- 2010 *Field GIS Data Collection Manager*
Remote Sensing and GIS, Michigan State University, East Lansing, MI
- Led GPS collection effort of streets signs for the City of Appleton, WI (~50,000 signs)
 - Managed a crew of three field data collectors and delegated assigned duties to crew
 - Coordinated with City of Appleton officials to assure accurate and complete data collection

Research Experience (Academic)

- 2015-2016 *Research Assistant*
Penn State University Libraries, Penn State University, University Park, PA
Supervisors: Dr. Nathan Piekielek
- 2015 *Writing/Cartographic Assistant*
Department of Geography, Penn State University, University Park, PA
Supervisor: Dr. Anthony Robinson

- Designing maps of student engagement in Maps and the Geospatial Revolution MOOC
- Writing a draft on the geographic patterns of student engagement in the Maps and the Geospatial Revolution MOOC

- 2014-2015 *Research Assistant*
 Department of Geography, Penn State University, University Park, PA
 Supervisor: Dr. Kirby Calvert
- Developed new lab course material for a new energy mapping course
 - Supervised two undergraduate students research projects on solar energy map evaluation
 - Developed methodology for flow mapping of historical shipping data
- 2010 *Research Assistant*
 Department of Geography, Michigan State University, East Lansing, MI
 Supervisor: Dr. Kirk Goldsberry
- Developed new lab course material for the Online Introduction to GIS course (5 lab assignments)
 - Developed, conducted, and analyzed a human-subjects cartographic experiment designed to assess design choices on map animation comprehension
 - Designed new physiographic maps of Michigan for both print and web

Teaching Experience (Academic)

- 2008-2010 *Teaching Assistant: Map Design (GEO 423) and Thematic Cartography (GEO 426)*
 Department of Geography, Michigan State University, East Lansing, MI
- Developed and updated lab assignments (19 lab assignments)
 - Taught lab material and evaluated students' map designs (~1000 maps)

<i>Semester</i>	<i>Course</i>	<i># of students</i>	<i>1=Excellent, 5= Poor</i>
S 2010	GEO 426	23	1.57
F 2009	GEO 423	29	1.31
S 2009	GEO 426	15	1.31
F 2008	GEO 423	21	1.64

- 2009 *Virtual Course Instructor: Physical Geography*
 Department of Geography, Michigan State University, East Lansing, MI
- Developed new test material for future offerings of the course
 - Guided 100+ students through the online course material
 - Evaluated students' responses on homework and tests

- 2007 *Teaching Intern: Introduction to Cartography*
 Department of Geography, The Pennsylvania State University, University Park, PA
- Assisted students with lab material
 - Helped students troubleshoot software issues

PUBLICATIONS

Peer-Reviewed Articles

- 2013 Schaetzl, R. J., Enander, H., Luehmann, M.D., Lusch, D.P., **Fish, C.**, Bigsby, M., Steigmeyer, M., Guasco, J., Forgacs, C., and Pollyea, A. (2013) Mapping the physiography of Michigan with GIS. *Physical Geography* 34(1): 2-39.

- 2011 **Fish, C.**, Goldsberry, K.P., and Battersby, S. (2011) Change blindness in animated choropleth maps: an empirical study. *Cartography and Geographic Information Science* 38(4): 350-362.

Peer-Reviewed Extended Abstracts

- 2015 **Fish, C.** and Calvert, K. *Understanding Map Design for Energy Policy, Planning, and Technology Implementation*. The 27th Annual Meeting of the International Cartographic Association, Rio de Janeiro, Brazil, August 25, 2015.
- 2010 Goldsberry, K. and **Fish, C.** *Legibility of transitions in dynamic geovisual displays: determining the influence of change blindness in geovisual analytics*. The 6th Meeting of GIScience, Zurich, Switzerland, September 15, 2010.
- 2009 **Fish, C.** and Goldsberry, K. *Evaluating the influence of tweening on human change perception in animated choropleth maps*. The 24th Annual Meeting of the International Cartographic Association, Santiago, Chile, November 18, 2009.

Book Chapters

- 2015 **Fish, C.** and Brewer, C.A. (2015) "GIS as a tool for mapmaking" In: (Monmonier) *The History of Cartography Project, Volume 6*". University of Chicago Press; Chicago, Illinois.

Other Publications

- 2015 **Fish, C.** 2015. Cartographic Challenges in Animated Mapping. In: *Proceedings of the 27th International Cartographic Conference, Pre-conference Workshop on Envisioning the Future of Cartographic Research*. Curitiba, Brazil: August 21.
- Abbott, L., Barrett, A., Eissler, S., **Fish, C.**, Lacey Goldberg, Mainzer, S., & Olsen, M. (2015). *Community Perceptions of Local Foods: A mixed methods approach in State College, PA*. University Park, PA: Hamer Center for Community Design.

PRESENTATIONS AND LECTURES

Conference Presentations

- 2015 Robinson, A. C. (presenter), **Fish, C.**, Quinn, S. *Visualizing Geographic Patterns in MOOC Data*. Esri Education GIS Conference. San Diego, CA. July 18-21, 2015.
- Calvert, K., Brownson, J., **Fish, C.** (panelist), Renne, D., Rannalli, J., Lingfors, D. Panel: *Mapping solar energy futures: Emerging trends in geospatial decision-support*. Solar 2015: American Solar Energy Society (ASES) Conference, State College, PA, July 29, 2015.
- Fish, C.** (presenter) and Calvert, K. *Web-based Renewable Energy Map Design Evaluation*. 110th Annual Meeting of the Association of American Geographers, Chicago, IL, April 21-25, 2015.
- Fish, C.** (presenter), Stephens, P., and Mathason, M. *Web-based Renewable Energy Map Design Evaluation*. 2015 No Boundaries Conference, University Park, PA, April 11, 2015.
- 2013 **Fish, C.** (presenter). *Designing and testing point symbols*. 2013 North American Cartographic Information Society (NACIS) Conference, Greenville, SC, October 9-11, 2013.
- 2012 **Fish, C.** (Presenter), Rosenshein Bennett, L., and Scott, L. *Visualizing Space-Time Cluster Analysis*. 2012 North American Cartographic Information Society (NACIS) Conference, Portland, OR, October 17-19, 2012.
- 2011 Buckley, A. (presenter), Field, K., and **Fish, C.** *Methods for Space Time Visualization: Take 3*. 2011 North American Cartographic Information Society (NACIS) Conference. Madison, WI, October 12-14, 2011.

- Goldsberry, K. (presenter) and **Fish, C.** *Space-Time Legibility: Using Design to Mitigate Geovisual Failures*. 107th Annual Meeting of the Association of American Geographers, Seattle, WA, April 12-16, 2011.
- 2010 **Fish, C.** (presenter) and Goldsberry, K. *Animated choropleth maps and human change detection*. The 106th Annual Meeting of the Association of American Geographers, Washington, DC, April 14-18, 2010.
- Goldsberry, K. (presenter) and **Fish, C.** *Change We Can Perceive In: Change Legibility In Dynamic Displays of Geographic Information*. 106th Annual Meeting of the Association of American Geographers, Washington, DC, April 14-18, 2010.
- 2009 **Fish, C.** (presenter) and Goldsberry, K. *The Effects of Smooth Transitions in Animated Choropleth Maps on Human Change Detection*. 2009 North American Cartographic Information Society (NACIS) Conference. Sacramento, CA, October 7-10, 2009.
- Fish, C.** (presenter) and Goldsberry, K. *Change Blindness and Animated Choropleth Maps*. Michigan State Geography Department Colloquia Series. East Lansing, MI, October 2, 2009.
- Fish, C.** (presenter) and Goldsberry, K. *Quantifying the Influence of Tweening in Animated Maps*. 105th Annual Meeting of the Association of American Geographers, Las Vegas, NV, March 22-28, 2009.
- 2008 Roth, R.E. (presenter), Stryker, M., **Fish, C.**, Schoch, D., and Brewer, C.A. *ScaleMaster.org: Multi-scale Mapping Made Easy*. 2008 North American Cartographic Information Society (NACIS) Conference. Missoula, MT, October 8-11, 2008.
- M. Allen, **C. Fish**, and S. Herb (all authors were presenters). *The Cultural and Literary Map of Pennsylvania*. 104th Annual Meeting of the Association of American Geographers, Boston, MA, April 15-19, 2008.

Technical Workshops

- 2013 **Fish, C.** (presenter). *Basemaps*. 2013 Esri International Users Conference, San Diego, CA, July 8-12, 2013
- Fish, C.** (presenter). *Military Aspects of Weather*. 2013 Esri International Users Conference, San Diego, CA, July 8-12, 2013
- Fish, C.**, Campos, N., and Funk, M. (all authors were presenters). *ArcGIS for the Military: managing the operational factors*. Esri International Users Conference, San Diego, CA, July 8-12, 2013
- Fish, C.** and Funk, M. (all authors were presenters). *ArcGIS for the Military: analyzing the operational environment*. Esri International Users Conference, San Diego, CA, July 8-12, 2013
- Fish, C.** and Funk, M. (all authors were presenters). *ArcGIS for the Military: analyzing the operational environment*. Esri Federal GIS Conference, Washington, DC, February 25-27, 2013.
- 2012 **Fish, C.** and Conklin, B. (all authors were presenters). *Creating Basemaps for the Defense and Intelligence Communities*. 2012 Federal GIS Conference, Washington, DC, February 22-24, 2012.
- Fish, C.** and Conklin, B. (all authors were presenters). *Exploring the ArcGIS Defense and Intelligence Resources*. 2012 Federal GIS Conference, Washington, DC, February 22-24, 2012.

External Invited Talks

- 2014 **Fish, C.** *Designing Point Symbols*. *University of Kentucky MapShop Workshop for the New Maps+ Online Digital Mapping Initiative*. October 13th 2014.

Wilson, M., **Fish, C.** (panelist), Woodruff, A., Czaplowski, J., and Foster, M. Professional Cartography. *Geography 109: Digital Mapping*. University of Kentucky, Lexington, KY: October 14th, 2015.

Internal Invited Talks (PSU, Esri, MSU)

- 2015 **Fish, C.** and Andris, C (both presented). Introduction to GIS and Editing OpenStreetMap. *Supporting Young Women in Geography Day*. University Park, PA: April 10, 2015.
Fish, C. Being a “Professional” Cartographer. *Geography 301: Thinking Geographically*. University Park, PA: February 13, 2015.
- 2014 **Fish, C.** How Change Blindness Affects Map Reading. *Geography 160: Mapping Our Changing World*. University Park, PA: October 1, 2014.
- 2012 **Fish, C.** (Presenter), Rosenshein Bennett, L., and Scott, L. *Visualizing Space-Time Cluster Analysis*. Esri Useful Maps and Apps Presentation Series, Redlands, CA October 30, 2012
- 2009 **Fish, C.** (presenter) and Goldsberry, K. *Quantifying the Influence of Tweening in Animated Maps*. Michigan State Geography Department Colloquia Series. East Lansing, MI, March, 2009.

Poster Presentations

- 2014 **Fish, C.** and Goldsberry, K. *Are you blind to change? Evaluating the influence of tweening on human change perception in animated choropleth maps*. 2014 Annual Meeting of the Pennsylvania Geographical Society Conference, State College, PA, November 7, 2014.
*Second Place Winner of the Elaine Bosowski Map Award at the Graduate Level
- Fish, C.** and Goldsberry, K. *Are you blind to change? Evaluating the influence of tweening on human change perception in animated choropleth maps*. 2014 North American Cartographic Information Society (NACIS) Conference, Pittsburgh, PA, October 8-11, 2014.

THESIS

- 2010 **Fish, C.** (2010). *Change Detection in Animated Choropleth Maps*. Michigan State University, East Lansing, MI.

GRANTS, SCHOLARSHIPS AND AWARDS

- 2015 **Travel Grant:** North American Cartographic Information Society (\$300)
- 2015 **Scholarship:** State of the Map US (\$500 + conference registration)
- 2015 **Conference Grant:** U.S. National Committee to the ICA Conference (\$1800)
- 2015 **Scholarship:** FOSS-4G North America to attend conference (\$2000)
- 2014-2015 **Award:** Penn State College of Earth and Mineral Sciences FEGR Top-up Award (\$5000)
- 2014 **Map Award:** Elaine Bosowski Second Place Map Award at the Graduate Level (\$15)
- 2014 **Travel Grant:** North American Cartographic Information Society (\$200)
- 2010 **Travel Grant:** North American Cartographic Information Society (\$250)
- 2009 **Graduate Office Fellowship:** Michigan State University, Dept. of Geography (\$800)
- 2009 **Conference Grant:** U.S. National Committee to the ICA Conference (\$1800)
- 2009 **Travel Grant:** GIS and GIScience Specialty Group of the AAG (\$750)
- 2009 **Travel Grant:** Michigan State University, Department of Geography (\$200)
- 2009 **Travel Grant:** Michigan State, Graduate School (\$350)
- 2009 **Travel Grant:** Michigan State, College of Social Science (\$200)
- 2009 **Travel Grant:** Michigan State, Council of Graduate Students (\$200)
- 2009 **Travel Grant:** Michigan State, Robert Thomas/Gamma Theta Upsilon (\$300)
- 2008- 2009 **Masters Thesis Research Grant:** Cartography Specialty Group of the AAG (\$150)
- 2008 **Award:** Penn State University, Jeff Gockley Memorial Award (\$250)
- 2006-2008 **Scholarship:** Penn State University, Matthew J. Wilson Honors Scholarship (\$4,000)
- 2005-2008 **Dean’s List:** Penn State University

Total Awards and Grants: \$19,065

SERVICE

Mentor

2015 Patrick Stevens PSU Undergraduate-Geography

Reviewer

2015- Renewable & Sustainable Energy Reviews (1 per year)
2013- Cartography and Geographic Information Science Journal (1 per year)

External

2014-2016 **Conference Organizer:** NACIS Practical Cartography Day
2012- 2013 **Board Member:** Cartography and Geographic Information Society (CAGIS)
2012 **Session Chair:** AutoCarto 2012, Geospatial Modeling Session
2010 **Session Chair:** NACIS 2010, Practical Solutions and Applications for Mapmakers
2009- 2010 **Student Director:** Cartography Specialty Group, Association of American Geographers

Internal (PSU/Esri/MSU)

2015-2016 **President:** Graduate Students in the PSU Department of Geography
2015-2016 **President:** Supporting Women in Geography at Penn State
2015 **Organizer/Moderator:** no)Boundaries *Communicating Your Discipline* Panel Session
2015 **Organizer:** Supporting Young Women in Geography Day, GIS/OpenStreetMap Editing
2011- 2013 **Organizer:** Esri Useful Maps and Apps Presentation Series
2009- 2010 **Co-President:** Michigan State Geography Graduate Group
2009- 2010 **Department Steward:** Graduate Employees Union
2009 **Graduate Assistant:** Geography Graduate Student Orientation
2009 **Social Coordinator:** Geography Graduate Group
2008 **Secretary:** Geography Graduate Group
2007- 2008 **Undergraduate Representative:** Supporting Women in Geography Club

Community

2015-present **Co-Organizer:** Maptime State College
2011- 2013 **Volunteer:** Court Appointed Special Advocate for Foster Children (CASA)
2005- 2008 **Volunteer:** Penn State Dance Marathon, Moral/OPP
2005- 2007 **Volunteer/Tutor:** Stormbreak Youth Group Home for Foster Children
2005 **Volunteer:** Habitat for Humanity, Penn State Chapter

Professional Affiliations

Association of American Geographers
Cartography and Geographic Information Society
Cartography Specialty Group of the Association of American Geographers
Gamma Tau Upsilon, Geography Honor Society
Geography Graduate Student Group, Michigan State Department of Geography
Graduate Student Affinity Group of the Association of American Geographers
Graduate Students in the Department of Geography at Penn State
Phi Beta Kappa, Lambda Chapter of Pennsylvania
North American Cartographic Information Society
Supporting Women in Geography
Toastmasters International

RELEVANT COURSEWORK

GEOG 502	Research Scholarship in Geography	Penn State University
GEOG 530	Human-Environment Seminar	Penn State University

GEOG 560	Seminar in GIScience	Penn State University
HDFS 519	Methods of Statistical Analysis	Penn State University
GEOG 500	Introduction to Geographic Research	Penn State University
GEOG 597A	Geoinformatics and Data Mining	Penn State University
HDNRE 574	Human Dimensions of Natural Resources	Penn State University
GEO 886	Research Design and Methods	Michigan State University
GEO 874	GIScience Seminar	Michigan State University
GEO 428	Digital Terrain Analysis	Michigan State University
GEOG 497K	Advanced Web Mapping	Penn State University
GEOG 485	GIS Programming	Penn State University
GEOG 468	GIS Design and Evaluation	Penn State University
GEOG 467	Advanced Cartographic Design	Penn State University
GEOG 463	Geographic Information Management	Penn State University
GEOG 464	Analysis and GIS	Penn State University
GEOG 454	Spatial Analysis	Penn State University
GEOG 363	Geographic Information Systems	Penn State University
GEOG 362	Remote Sensing and Image Analysis	Penn State University
GEOG 361	Introduction to Cartography	Penn State University
GEOG 121	Mapping Our Changing World	Penn State University

INTERNSHIPS

Bednar Cartography Intern, 2007-2008

Pennsylvania Center for the Book, The Pennsylvania State University Libraries, University Park, PA

- Developed a proof of concept & functional requirements document for an interactive literary map
- Evaluated cartographic methods to portray dynamic geographic data on the web including researching available web mapping and interactive software options for the map

GIS Intern, 2007

Engineering Services Office of Physical Plant, The Pennsylvania State University, University Park, PA

- Assisted with the conversion of Penn State's campus utility data from CAD to GIS
- Introduced high school students to GIS and GPS at the Penn State Geospatial Technology Camp

GIS Intern, 2007

Land Analysis Lab, The Pennsylvania State University, University Park, PA

- Collected and color-corrected aerial orthophotos for 3D visualization of Roanoke River on display at the North Carolina Aquarium
- Digitized paper maps of sewer systems in Pennsylvania