

**Contact Information**

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**Education**

PhD – 2004 Natural Resource Economics, Division of Resource Management, West Virginia University, Morgantown, WV. Dissertation title: “Integrating Spatial Analysis and Decision Support Systems for Natural Resource Management.”

MS - 1995 Agricultural and Resource Economics, Division of Resource Management, West Virginia University, Morgantown, WV. Thesis title: “Prioritizing Acid Mine Drainage Affected Watersheds for Reclamation: A Compromise Programming Approach.”

BS - 1992 Agriculture Business Management, College of Agricultural Science, Pennsylvania State University, University Park, PA. Student research: “Small Fruit Grower Willingness to Adopt Alternatives to Chemical Controls.”

**Positions**

- 2017 – present Professor  
Division of Resource Economics and Management  
West Virginia University
- 2016 – present Program Coordinator  
GIS and Spatial Analysis Certificate  
West Virginia University
- 2016- present Faculty Associate  
Teaching and Learning Commons  
West Virginia University
- 2011 - 2017 Associate Professor  
Division of Resource Management  
West Virginia University
- 2007 - 2011 Assistant Professor  
Division of Resource Management  
West Virginia University
- 2006 Visiting Assistant Professor  
Joint position with the Division of Resource Management and the Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV
- 2004 - 2005 Landscape Scientist

- Canaan Valley Institute, Thomas, WV
- 1999 - 2004 Research Coordinator  
Natural Resource Analysis Center, West Virginia University, Morgantown, WV
- 1999 - 2003 Principal  
Spatial Analytics LLC, Cheat Lake, WV
- 1995 - 1999 GIS Analyst  
Natural Resource Analysis Center, West Virginia University, Morgantown, WV
- 1992 (4 months) GIS Technician  
Water's Edge Technologies, A Division of Gannet Flemming, Lemont, PA.

### **Recognition and Awards**

- 2020- Davis and Michael Professor of Resource Economics and Management, Davis College of Agriculture, Natural Resources and Design, West Virginia University.
- 2019–2020 James and Karen Caveney Alumni Association Faculty Excellence Award, West Virginia University. <https://faculty.wvu.edu/home/internal-awards-fellowships-and-grants/caveney-award-recipient>
- 2020 – Gamma Sigma Delta National Honor Society of Agriculture, Most Improved National Chapter – WV Chapter of GSD. Award presented as President of the Chapter.
- 2018 Keynote at the West Virginia Water Conference, WATER: Exploring the Understanding, Significance, and Power of Life's Critical Resource, The Good, the Bad, and the Ugly of West Virginia Pipelines. Morgantown, WV.
- 2018 WV Public Radio, The Allegheny Front, Interviewed story about the impact of pipeline and well pad construction on water quality. <https://www.alleghenyfront.org/are-pipelines-to-blame-for-decline-in-ancient-salamanders/>
2017. Neuron: The West Virginia Quarterly Journal of Science and Research. Higher Education Policy Commission. Cover story, Stream of Potential with WVU's Michael Strager. Winter 2017. Available at <https://wvresearch.org/wp-content/uploads/2017/03/winter-2017-Neuron-1.pdf>
- 2016 Nominated for the American Water Resource Association 2016 Integrated Water Resources Management Award. The submitted project was titled "Integrated Water Resource Management to Ensure the Protection of Surface Water Supplied for West Virginia Residents."
- 2016 Best Professional Poster, WV Association of Geospatial Professionals, Annual Conference for the poster titled "Terrestrial Vertebrate Species Distribution Modeling for the Mountaintop Removal Mining Region of Appalachia. Co-authored with Jacquelyn M. Strager.
- 2016 Nominated for a National Food and Agricultural Sciences Excellence in College and University teaching as part of the Association of Public and Land-grant Universities and American Association of State Colleges and Universities.

- 2016 Expert witness for the West Virginia Department of Environmental Protection for work in response to the 2014 chemical spill in Charleston, WV in January of 2016. The final ruling by the WV Environmental Quality Board supported my scientific approach to delineating zones of critical concern above public water intakes.
- 2015 Protecting water resources research was featured in the Association of American Colleges and Universities national production of The Academic Minute posted in the earth science, ecology, and geology section and broadcast on public radio at <http://academicminute.org/2015/05/michael-strager-wvu-protecting-water-resources/>
- 2015 Spring Semester Faculty Development Leave
- 2015 West Virginia University Foundation Outstanding Teaching Award
- 2014 The paper titled “Combining RapidEye Satellite Imagery and LiDAR for Mapping of Mining and Mine Reclamation with A. Maxwell, T. Warner, and M. Pal was the recipient of the Talbert Abrams Award for best paper published in 2014 in Photogrammetry Engineering and Remote Sensing.
- 2014 Faculty Enhancement Grant Award, Kaye C. Daniel Faculty Development, Davis College of Agriculture, Forestry and Design, West Virginia University.
- 2014 College Teaching Award, Davis College
- 2014 Division Teaching Award, Division of Resource Management, Davis College
- 2014 Division Research Award, Division of Resource Management, Davis College
- 2013 Division Teaching Award, Division of Resource Management, Davis College
- 2013 Division Research Award, Division of Resource Management, Davis College
- 2013 The paper titled “Hierarchical classification of stream condition: a house–neighborhood framework for establishing conservation priorities in complex river scapes” with G. Merovich, J. T. Petty, and J. B. Fulton was recognized as the spotlight article in the Journal of Freshwater Science.
- 2012 Recipient of a Davis-Michael Mid-Career Faculty Development Program Grant. Spatial Optimization.
- 2009 Division Research Award, Division of Resource Management, Davis College
- 2008 Accepted application in a Center for Spatially Integrated Science Workshop with \$1,200 travel stipend to attend *Geographically Weighted Regression* at Penn State University, University Park, PA, June 2008.
- 2006 Accepted application in a Center for Spatially Integrated Science Workshop with \$1,000 travel stipend to attend *GIS and Spatial Modeling for the Undergraduate Social Science Curriculum* at Ohio State University, Columbus, OH, June 2006.
- 1995 Outstanding Thesis Award from the College of Agriculture and Forestry 1995, Northeast Resource and Environmental Economics Thesis Representative from WVU.

1992 Graduate Research Assistantship, Division of Resource Management, College of Agriculture and Forestry, West Virginia University from Aug 92 through May 95.

### Summary of Research Interests

My research interests are in using appropriate spatial and decision analysis techniques to aid in the analysis and management of natural resources. I have applied Geographic Information Systems, spatial analysis, and remote sensing for forestry, water quality, wildlife, recreation and conservation planning. Much of my work has resulted in the development of spatial decision support to aid in prioritizing areas, evaluating alternatives and examining trade-offs when managing natural resources.

### Research Grants

Project Title	Investigators (PI listed first followed by co-PIs)	Funding Period	Source	Project Total	Amount Allocated for Strager
Modeling Interdependent FEW Systems in the US and China: Nexus for Sustainability, Markets and Trade of Energy and Agricultural Commodities	L. Elbakidze X. Etienne J. Hubbart M. Strager	Sept 2019 to Aug 2022	National Science Foundation	\$494,888	\$10,688
Critical Planning Areas: Quantifying Water Use and Water Stress Across Multiple Scales	N. Zegre M. Strager	Aug 2019 to Dec 2020	WV Department of Environmental Protection	\$50,348	\$25,783
Unmanned Aerial Systems for Pipeline Inspection, Monitoring, and Landscape Analysis	M. Strager P. Kinder S. Grushecky	Oct 2019 to Dec 2022	US Department of Transportation	\$206,920	\$206,920
Davis College Farm and Forest Properties: Inventory and Opportunities	P. Kinder M. Strager J. Strager	Jan 2019 to Jun 2020	Davis College, West Virginia University	\$68,497	\$12,345
Development of Wetland Water Quality Standards for West Virginia	J. Anderson M. Strager J. Hubbart E. Kellner	Oct 2018 to Dec 2022	US Environmental Protection Agency	\$453,731	\$70,910
Spatial Decision Support: Optimizing Drone Data Acquisition for Natural Resource Management	M. Strager C. Yuill L. Elbakidze	Jan 2018 to Dec 2023	USDA National Institute of Food and Agriculture HATCH Accession number: 1015648	NA	NA
Modeling Flood Risk Potential in West Virginia	M. Strager N. Zegre	Mar 2018 to Feb 2019	US Geological Survey, State Water Resources Research	\$50,823	\$48,840

			Institute Program		
Statewide High-Resolution Land Cover Classification for West Virginia	M. Strager P. Kinder	June 2018 to June 2019	WV Division of Natural Resources	\$20,000	\$20,000
Updating Zone of Critical Concern for Source Water Area Protection plans	M. Strager	Oct 2017 to Sept 2018	WV Bureau for Public Health: Office of Environmental Health Services State	\$15,114	\$15,114
Water and energy; applying state-of-the-art spatial technologies to minimize impacts to surface water in oil and gas development	E. Merriam M. Strager J. T. Petty P. Ziemkiewicz P. Kinder	Mar 2018 to Feb 2019	Estate of Albert O'Brien Energy Research Fund West Virginia University	\$22,699	\$2,559
Improving Water Management, Treatment and Recovery in Oil and Gas Production	P. Ziemkiewicz H. Finklea L. Lin S. Grushecky E. Morrissey M. Strager	July 2006 to July 2012	US NSF- Experimental Program to Stimulate Competitive Research	\$6,250	\$1,250
Quantifying the Success and Long-Term Ecological and Socioeconomic Benefits of Watershed-Scale AMD Remediation Efforts within West Virginia	M. Strager J. T. Petty E. Merriam P. Ziemkiewicz	Sept 2016 to Dec 2018	U.S. Department of the Interior Office of Surface Mining Reclamation and Enforcement	\$199,960	\$53,958
Experimental Program to Stimulate Competitive Research: Appalachian Freshwater Initiative (WVU Davis College award listed only)	J. Taylor F. King U. Toledo J. Maher  M. Strager is a Research Task Leader	Aug 2015 to July 2020	U.S. National Science Foundation -	\$2,802,173	\$241,234
Delineating Zones of Critical Concern for Source Water Protection in WV	M. Strager N. Zegre	July 2014 to Sept 2016	WV Department of Health and Human Resources Bureau for Public Health	\$65,432	\$42,457
Stream Stats development for West Virginia: FY16 ongoing support	M. Strager J. Strager J. Fletcher	Sept 2015 to Sept 2016	U.S. Geological Survey	\$25,000	\$25,000
Geospatial Technical Assistance toward the Development and Implementation of a StreamStats Hydrologic	J. Fletcher M. Strager	Sept 2014 to June 2016	U.S. Geological Survey	\$50,000	\$50,000

Modeling Framework for West Virginia					
Updating Zones of Critical Concern for Source Water Protection in WV	M. Strager N. Zegre	July 2014 to June 2015	WV Division of Health and Human Resources Bureau for Public Health	\$50,000	\$46,269
Delineating Zones of Peripheral Concern to Protect Source Water in WV	M. Strager	Apr 2015 to Dec 2015	WV Division of Environmental Protection	\$30,686	\$30,686
Mapping Stream Corridor Characteristics in the Chesapeake Bay Watershed.	M. Strager	June 2014 to June 2015	U.S. Geological Survey	\$60,000	\$60,000
Developing Updated Hydrological Inputs for Streamstats in WV	J. Fletcher M. Strager	May 2013 to Dec 2015	U.S. Geological Survey	\$46,006	\$46,006
Mapping Fluvial Landforms in Floodplains Related to Ecosystem Functions	M. Strager	June 2013 to Dec 2014	U.S. Geological Survey	\$40,000	\$40,000
Development of the Watershed Futures Model Decision Support Tool	M. Strager	Apr 13 to June 2014	WV Water Research Institute	\$41,000	\$41,000
Value Added Data and Models for Streamflow calculations of WV Watersheds	S. Lamont M. Strager	Feb 2012 to Jun 2013	WV Department of Environmental Protection	\$32,745	\$6,312
Wetland Modeling in WV Phase II	M. Strager J. Strager	April 2012 to June 2013	WV Division of Natural Resources	\$38,370	\$38,370
Development of a Spatially Explicit Surface Coal Mining Predictive Model	M. Strager	Oct 2012 to Oct 2013	The Nature Conservancy	\$96,459	\$96,459
Predicting fire severity and impacts to ephemeral and intermittent streams after large-scale prescribed fire	M. Strager	Jan 2013 to Dec 2016	U.S. Forest Service	\$26,000	\$26,000
Impacts of Mountaintop Mining on Terrestrial Ecosystem Integrity	P. Wood M. Strager	Jan 2012 to Dec 2013	U.S. Geological Survey	\$52,181	\$7,800
Assessment and mining impacts on ecosystem health and diversity: Subtask 1 Landscape Characterization	M. Strager	Jan 2012 to Dec 2015	Appalachian Research Initiative for Environmental Science	\$250,242	\$250,242
Value Added Data and Models for Hydrological Analysis of WV Watersheds	M. Strager S. Lamont J. M. Strager	Jun 2011 to Dec 2013	WV Department of Environmental Protection	\$105,395	\$105,395
Wetland Inventory of West Virginia	M. Strager J. Strager	May 2011 to Jul 2011	WV Division of Natural Resources	\$34,000	\$34,000

Pilot Test the Ecological Approaches to Environmental Protection Developed Capacity Research Projects C-06(A) and C-06(B)	J. Anderson W. Veselka M. Strager H. Ghadimi L. Lin J. T. Petty T. Katzner D. Welsch T. Miller	Mar 2011 to May 2012	National Academy of Sciences Strategic Highway Research Program II	\$360,628	\$7,624
West Virginia Forest Regeneration Project: Pilot Assessment	D. McGill M. Strager E. Heitzman	Jan 2011 to Dec 2011	WV Division of Forestry	\$18,500	\$3,700
Appalachian Assessment of Natural Assets – Forests	F. Boettner M. Strager J. Deng K. Arano	Oct 2010 to Dec 2011	Appalachian Regional Commission	\$149,911	\$9,800
DNR-Based Population Demographics of Black Bears in Maryland	J. Edwards M. Strager J.T. Petty	May 2010 to May 2012	WV Division of Natural Resources	\$87,990	\$3,812
A Hierarchical Alternative Futures Analysis for the Mountaintop Removal Valley Fill Mining Region of West Virginia	J. T. Petty M. Strager J. Futon P. Ziemkiewicz	Jun 2010 to Dec 2012	U.S. Environmental Protection Agency	\$355,628	\$144,094
Development of a Zone of Critical Concern Decision Support System for WV	M. Strager J. Fletcher	Apr 2010 to Jun 2011	WV Division of Health and Human Resources Bureau for Public Health	\$93,247	\$93,247
Kanawha River Basin Nutrient Trading Feasibility Assessment	R. Herd M. Strager A. Collins N. Zegre	Jun 2009 to Jun 2011	U.S. Environmental Protection Agency	\$190,952	65,132
Appalachian Assessment of Natural Assets – Water	J. Deng M. Strager R. Jackson J. Anderson T. Harris	Oct 09 – Sept 10	Appalachian Regional Commission	\$200,000	\$18,259
An Inventory and Recreational Analysis for Cheat Lake, WV	M. Strager C. Pierskalla	May 09 – Jun 10	Allegheny Energy	\$25,000	\$25,000
WCMS Development Maintenance and Training for FY 2009	J. Fletcher M. Strager J. Strager	Nov 08 – Jun 09	WV Department of Environmental Protection	\$125,000	\$10,650
Determining the Scale Dependency of Soil Quality Indicators and Specific EPIC Output Parameters for Selected BMP's Using Field and Map Information – Objective 1 – Areas of Concern	M. Strager	Jul 08 – Sep 09	Natural Resource Conservation Service	\$10,000	\$10,000

Decision Support System for Sage Grouse Management	M. Strager	Jul 08 – Sep 09	Natural Resource Conservation Service	\$22,784	\$22,784
Modeling Impacts of Produced Water from CBNG E&P Activities	J. Fletcher M. Strager C. Yuill, R. Eli	Apr 08 – Jan 10	U.S. Department of Energy	\$342,180	\$18,564
Using GIS Technology to Identify and Rank the Risk and Susceptibility of Sites in the Mid-Atlantic Area to the Emerald Ash Borer	M. Strager J. Strager J. McNeel	Sept 07- Dec 10	U.S. Forest Service	\$100,000	\$100,000
Development of a WCMS-HSPF Groundwater Model Component for Underground Mine Hydrologic Assessment	J. Fletcher R. Eli M. Strager	Sept 07 – Mar 09	Office of Surface Mining Reclamation and Enforcement	\$99,963	\$13,333
WCMS Low flow Calculations Update	J. Fletcher M. Strager	Jun 07- Dec 07	WV Department of Environmental Protection	\$50,000	\$8,500
West Virginia Wetland Inventory and Modeling Project	M. Strager C. Yuill P. Mazik	Jun 07- Dec 10	WV Division of Natural Resources	\$50,000	\$50,000
WV 244 – Strategies for Restoring West Virginia Streams Impaired by Historic Acid Mine Drainage: Technical Support of WVDEP Implementation of AML	R. Herd J.T. Petty M. Strager P Ziemkiewicz	May 07 – Nov 08	WV Department of Environmental Protection	\$472,148	\$62,748
Identifying and Delineation of Conservation Areas in Six WV Counties and Refinement and Customization of a Conservation Area GIS Tool to Assist in County-Level Planning	M. Strager P. Mazik	Jun 07 – Dec 10	WV Division of Natural Resources	\$75,000	\$75,000
Decision Support System for Sage Grouse Management	M. Strager	May 06 – Jun 09	Natural Resource Conservation Service	\$107,350	\$107,350
Development of a Habitat Restoration and Conservation Prioritization Tool for Songbirds and Mussels in the Appalachian Mountains	P. Wood M. Strager P. Mazik	Sept 06 – Dec 09	U.S. Geological Survey	\$169,450	\$28,364
WCMS Development, Maintenance and Training for FY 2007	J. Fletcher M. Strager J. Strager	Sep 06 – Jun 07	WV Department of Environmental Protection	\$100,000	\$9,800
Witness and Corner Tree Mapping for Identifying Pre-settlement Vegetation	M. Strager	Jun 06 – May 08	US Forest Service	\$25,000	\$25,000



Conditions in the Monongahela National Forest, West Virginia					
Effective Strategies for Reducing Nutrient Loads from the Opequon Creek Watershed	D'Souza A.Collins M. Strager	Jun 06 – Jun 09	U.S. Geological Survey	\$100,542	\$17,851
Visual Nature Studio Land Model Simulation and Analysis of the New River Gorge	M. Hasenmyer M. Strager	Sep 06 – Feb 07	National Park Service	\$2,450	\$774
Combining a Pairwise Comparison Approach and Statistical Analysis to Aid Land Conservation in the Northern Neck, Virginia	M. Strager	Feb 06 – Dec 06	U.S. National Park Service – Chesapeake Bay Program	\$4,663	\$4,663
Estimating Ambient Water Quality in AMD Impacted Watersheds and WCMS/Updates/Training	J. Fletcher M. Strager Cromwell J. Strager	Jan 06 – Jun 06	WV Department of Environmental Protection	\$100,000	\$18,200
Adapting a Landscape-Scale Predictive Model for Cerulean Warbler Abundance to the Central Appalachian Coalfields Region	P. Wood M. Strager J. Strager	Oct 04 – Jun 06	U.S. Fish and Wildlife Service	\$12,000	\$4,800
Determining the Scale Dependency of Soil Quality Indicators and Specific EPIC Output Parameters for Selected BMP's Using Field and Map Information	Pena-Yewtukhiw M. Strager	May 04 - Jun 09	Natural Resource Conservation Service	\$30,714	\$10,000
Invasive Species Mapping and Modeling for the Kiski-Conemaugh River Basin, PA	M. Strager C. Yuill	Apr 04 – Dec 05	U.S. Department of Agriculture Animal and Plant Health Inspection Service	\$41,000	\$41,000
A Hierarchical Watershed Classification System for Identifying Restoration Priorities and Impact Vulnerability in Mined Watersheds of the Mid-Atlantic Highlands	J. T. Petty M. Strager P Ziemkiewicz J. Stiles	Jan 04 – Jan 07	U.S. Environmental Protection Agency Science to Achieve Results	\$607,566	\$14,840
Wetland Vegetation Monitoring Study Along the Conemaugh River/Reservoir, PA	M. Strager J. Rentch C. Yuill	Aug 03 – Dec 06	U.S. Geological Survey	\$38,421	\$25,406
Parcel Prioritization for the Cacapon Watershed, West Virginia	M. Strager	Apr 02 – Sept 03	Canaan Valley Institute	\$11,000	\$11,000
Bureau of Mines Abandoned Mine Land and Watershed Modeling System	J. Fletcher M. Strager C. Yuill	Sept 00 – Jul 02	Maryland Department of Environment	\$35,000	\$6,100

Wetland and Stream Mitigation Banking Program Feasibility Study	J. Anderson M. Strager J.T. Petty S. Kite R. Fortney	Oct 02 – Oct 07	WV Division of Highways	\$251,726	\$12,076
Parcel Prioritization for the Cacapon Watershed, WV	M. Strager R. Rosenberger	Dec 02 – Jul 03	Canaan Valley Institute	\$19,800	\$16,500
GIS Tools for Cumulative Hydrological Impact Assessment	J. Fletcher M. Strager R. Eli	Oct 01 – Jan 06	WV Department of Environmental Protection	\$762,469	\$42,820
Canaan Valley Institute Master Affiliation Agreement	J. Fletcher M. Strager J. Strager	Dec 01 – Dec 02	Canaan Valley Institute	\$80,000	\$33,400
GIS Technical Support for Managing Camp Dawson US Army Training Grounds	J. Fletcher M. Strager	Dec 00 – Jul 02	U.S. Army Corps of Engineers	\$42,934	\$18,680
Enhanced Decision Support for TMDLs	P. Ziemkiewicz M. Strager	Apr 00 – Dec 01	WV Department of Environmental Protection	\$101,015	\$35,643
GIS Spatial Modeling Support and Consultation	J. Fletcher M. Strager	Aug 00 – Aug 02	Canaan Valley Institute	\$44,000	\$44,000
Mountaintop Removal Mining and Land Use	C. Yuill M. Strager	Oct 99 – Jan 01	WV Legislature Joint Comm. on Government and Finance	\$45,000	\$18,400
Abandoned Mine Pool Flooding of the Pittsburgh, Ohio, and Irwin Pools	P Ziemkiewicz J. Fletcher J. Donovan M. Strager	Mar 99 – Oct 02	Parsons Infrastructure Technology Group	\$149,945	\$8,500
<b>TOTAL:</b>				<b>\$11,071,148</b>	<b>\$4,801,696</b>

### Working Publications

**Strager, M. P.**, J. M. Strager, N. Zegre. Flood potential and prediction modeling in WV using terrain variables. Water, IN PREP.

**Strager, M. P.** Forest composition changes in WV. Landscape Ecology. IN PREP.

Clipp, H. and **M. P. Strager**. Relative influence of climate vs. land cover patterns on the occurrence of an Appalachian Mountain Joint Venture High Priority Species. Biological Conservation. IN REVIEW.

Grushecky, S. T., **M. P. Strager**, K. J. Harris. An analysis of land cover change from unconventional oil and gas development in the Appalachian region. Journal of Environmental Management. IN REVIEW.

Wang, J., Y. Wang, **M.P. Strager**. A Multi-Stage Spatial Analysis Decision Approach to Facility Siting for Biomass Energy Production in the Northeastern United States. Applied Energy. IN REVIEW.

Pourmohammadi, P., **M. P. Strager**, M. Dougherty, D. Adjero. Analysis of Urban-Rural Land Development Drivers Using Multi-Source Spatial Data and Regression Models, *Journal of Applied earth observation and geoinformation*, IN REVIEW.

Pourmohammadi, P., **M. P. Strager**, H. Ghadimi, C. Yuill, and M. Dougherty. Mapping ecosystem services through land use/cover change; a non-monetary investigation of landscape change trade-offs. *Land*. IN REVIEW.

Ajanaku, B., **M. P. Strager**, A. R., Collins. GIS-based Multi-Criteria Decision Analysis of Utility-Scale Wind Farm Site Suitability in West Virginia. *GeoJournal*. IN REVIEW

Merriam, E. R., J. T. Petty, **M. P. Strager**, J. M. Strager. Spatial variability in TDS contributes to increased source water vulnerability in an intensively mined and actively developing Appalachian River basin. *Science of the Total Environment*. IN REVIEW.

### **Published Peer Reviewed Publications**

60. Oliver, M., **M. P. Strager**. 2020. A Spatial Analysis of high and low farmer participation in the USDA NRCS Conservation Technical Assistance Program. *Journal of Water and Soil Conservation*. IN PRESS.

59. **Strager, M. P.**, A. M. Klein Hentz, P. Kinder, S. Grushecky. 2020. Using unmanned aerial vehicles to model surface runoff during well pad development. *Journal of the American Society of Mining and Reclamation*. ISSN Number 2328-8744. Vol 9, No. 1.pp. 51-69.

58. Pourmohammadi, P., D. Adjero, **M. P. Strager**, Y. Z. Farid. 2020. Predicting developed land expansion using deep convolutional neural network. *Environmental Modeling and Software*. Vol 34, 104751. <https://doi.org/10.1016/j.envsoft.2020.104751>

57. **Strager, M. P.** 2019. GIS&T and Natural Resource Management. *The Geographic Information Science & Technology Body of Knowledge (4th Quarter 2019 Edition)*, John P. Wilson (ed.). DOI: 10.22224/gistbok/2019.4.2

56. Maxwell, A. E., **M. P. Strager**, T. A. Warner, C. A. Ramezan, A. N. Morgan, C. E. Pauley. 2019. Large-Area, High Spatial Resolution Land Cover Mapping using Random Forests, GEOBIA, and NAIP Orthophotography: Findings and Recommendations. *Remote Sensing*, Vol. 11, 1409, 1-27, <https://doi.org/10.3390/rs11121409>.

55. Kinder, P. J., S. Selin, **M. P. Strager**. 2018. Social network structure and dynamics in adaptive natural resource governance: A case study of stream restoration in West Virginia, USA. *Int J Recent Sci Res*. 9(11), pp. 29,499-29,507. DOI: <http://dx.doi.org/10.24327/ijrsr.2018.0911.2872>.

54. Hentz, A. M. K., C. A. Silva, A. P. Dalla Corte, S. P. Netto, **M. P. Strager**, C. Klauberg. 2018. Estimating forest uniformity in *Eucalyptus* spp. and *Pinus taeda* L. stands using field measurements and structure from motion point clouds generated from unmanned aerial vehicle (UAV) data collection. *Forest Systems*, Vol 27, Issue 2, e005. <https://doi.org/10.5424/fs/2018272-11713>

53. Hentz, A. M. K., **M. P. Strager**. 2018. Cicada (*Magicicada*) tree damage detection based on UAV spectral and 3D data. *Natural Science*, Vol. 10, (1). 31-44.

52. Liebermann, H., J. L. Schuler, **M. P. Strager**, A. K. Hentz, A. E. Maxwell. 2018. Using unmanned aerial systems for deriving forest stand characteristics in mixed hardwoods of West Virginia. *Journal of Geospatial Applications in Natural Resources*. Vol 2, (1). 23-52.
51. **Strager, M. P.** 2018. Protecting Surface Water Drinking Supplies in WV with Zones of Critical Concern. West Virginia Emergency Management Approaches. In Valcik, N., and D. Dean – (Eds.), *Using Geospatial Information Systems for Public Organizations*. Chapter 9, pp. 266-290. Routledge/ Taylor and Francis, New York, NY.
50. Notingham, A. C., J. A. Thompson, P. F. Wood, **M. P. Strager**. 2018. Mapping pedomemory of spodic morphology using a species distribution model. *Geoderma*. (IN PRESS) <https://doi.org/10.1016/j.geoderma.2017.10.044>
49. Thompson, P. A., S. A. Welsh, **M. P. Strager**, A. A. Rizzo. 2018. A multiscale investigation of habitat use and within-river distribution of sympatric sand darter species. *Journal of Geospatial Applications in Natural Resources*. Vol 2, (1). 1-22.
48. Hopkins, K. G., S. Lamont, P. R. Claggett, G. B. Noe, A. C., Gellis, C. B. Lawrence, M. J. Metes, J. M. Strager, **M. P. Strager**. 2018. Stream Channel and Floodplain Metric Toolbox: U.S. Geological Survey data release, <https://doi.org/10.5066/F7X34WF4>.
47. **Strager, M. P.**, Hentz, A., Strager, J. M., Kinder, P., Kimmet, J. 2017. Use of UAVs for the Inventory and Analysis of Stream Habitat. Wildtrout 2017. <https://www.wildtroutsymposium.com/>
46. Dhama, I., J. Deng, **M. P. Strager**, J. Conley. 2017. Suitability-sensitivity analysis of nature-based tourism using geographic information systems and analytic hierarchy process. *Journal of Ecotourism*. 16(1):41-68.
45. Tri, A. N., J. W. Edwards, C. W. Ryan, C. P. Carpenter, P. C. Carr, M. A. Tennent, **M. P. Strager**, J. T. Petty. 2017. Harvest rates and cause-specific mortality of American black bears in the wildland-urban interface of the Mid-Atlantic region, USA. *URSU*, 28(2):1-13.
44. **Strager, M. P.**, M. Thomas -Van Gundy, A. E. Maxwell. 2016. Predicting post-fire change in West Virginia, USA from remotely-sensed data. *Journal of Geospatial Applications in Natural Resources*. 1(2): 1-17.
42. Maxwell, A. E., T. Warner, **M. P. Strager**. 2016. Predicting palustrine wetland probability using random forest machine learning and digital elevation data-derived terrain variables. *Photogrammetric Engineering and Remote Sensing*. 82(6):437–447.
42. Merriam, E. R., Petty, J. T., **M. P. Strager**. 2016. Watershed planning within a quantitative scenario analysis framework. *Journal of Visual Experiments* (113), e54095, doi:10.3791/54095.
41. Tri, A. N., J. W. Edwards, **M. P. Strager**, J. T. Petty, C. W. Ryan, C. P. Carpenters, M. A. Tennent, P. C. Carr. 2016. Habitat use by American black bears in the urban-wildland interface of the Mid-Atlantic, USA. *Ursus*. 27(1):45-56.
40. Dhama, I., J. Deng, **M. P. Strager**, J. Conley. 2016. Suitability-sensitivity analysis of nature-based tourism using geographic information systems and analytic hierarchy process. *Journal*

of *Ecotourism*. pp. 1-28. doi:10.1080/14724049.2016.1193186. Available online at <http://dx.doi.org/10.1080/14724049.2016.1193186>.

39. **Strager, M. P.**, J. M. Strager, J. S. Evans, A. E. Maxwell, J. Dunscomb, B. Kreps. 2015. Combining a spatial model and demand forecasts to map future surface coal mining in Appalachia. *PLoS ONE* 10(6): e0128813. doi:10.1371/journal.pone.0128813.
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#### **Papers published in conference proceedings (peer reviewed abstract only)**

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Cottrell, L., K. Viggiano, E. Murphy, E. Bowen, D. Lacombe, S Wilkinson, T. Harris, J. Strager, **M. Strager**. 2016. Best practices learned from the Choose to Change Project: Nutrition Education and Intervention for Preschool Children. USDA NIFA Poster Abstract. *Journal of Nutrition and Education Behavior*. 49(7): S115-S116.

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**Strager, M. P.**, J. M. Strager, W. Ayersman. 2009. Assessing the potential risk of emerald ash borer (*Agrilus planipennis*) establishment and spread using GIS. International Forest Biosecurity Conference Popular Summary Paper, Rotorua, NZ.

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**Strager, M. P.**, V. Maskey, B. Gutta, R. Herd, J. Fulton, J. T. Petty, J. Stiles, J. Svetlik, P. Ziemkiewicz. 2008. A Hydrologically networked watershed model for evaluating AMD treatment scenarios. American Society of Mining and Reclamation, Proceedings.

Petty, J. T., B. Gutta, R. Herd, J. Fulton, J. Stiles, **M. P. Strager**, J. Svetlik, P. Ziemkiewicz. 2008. Strategic restoration of West Virginia watersheds impaired by historic acid mine drainage. American Society of Mining and Reclamation, Proceedings.

Joshi, S., **M. P. Strager**. Selecting conservation areas cost-effectively in the Eastern Panhandle Region of West Virginia. Northeast Agricultural and Resource Economics Meeting in Quebec, Canada, June 30, 2008.

Maskey, V., **M. P. Strager**, C. Yuill. Alternative futures analysis for the Little Kanawha River Basin in West Virginia. W2133 Benefits and Costs of Natural Resource Policies Affecting Public and Private Lands, Annual Meeting, Feb 17-21, 2008.

Hasenmyer, M.G., **M. P. Strager**. 2007. Your view or mine? Visualization of the watershed conflicts in the New River Gorge, WV. Theme: Visualizing Change: Consensus or Compromise? Council of Educators in Landscape Architecture, State College, PA.

Bjorgo-Thorne, K. A., **M. P. Strager**. 2007. Spatial data modeling of fish habitat in a large river. American Society of Photogrammetry and Remote Sensing Annual Conference Proceedings, Tampa, FL.

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Davis, J., J. Deng, J., **M. P. Strager**. 2007. Country roads and scenery: A GIS watershed analysis for Monroe County, WV. 13th International Symposium on Society and Resource Management, Park City, UT.

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- Eli, R. N., J. J. Fletcher, T. A. Galya, **M. P. Strager**, S. J. Lamont, Q. Sun, E. V. Hoeg. 2005. Cumulative Hydrologic Impact Assessment of West Virginia Coal Mine Permits Using HSPF and WCMS. Proceedings of the ASCE-EWRI Watershed Management Conference.
- Fletcher, J. J., R. N. Eli, **M. P. Strager**, Q. Sun, J. B. Churchill, S. J. Lamont, T. A. Galya, and A. N. Schaer. 2004. The Watershed Characterization and Modeling System (WCMS): Support tools for large watershed CHIA and NPDES analyses. Proceedings of the Advanced Integration of Geospatial Technologies in Mining and Reclamation, Atlanta, GA.
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- Strager, M. P.** and J. J. Fletcher. 2001. An interdisciplinary approach to watershed analysis with GIS: The Watershed Characterization and Modeling System, Proceedings of the Integrated Decision Making for Watershed Management Symposium, Chevy Chase, MD.
- Edwards, B. F., D. Vasquez, D. Smith, and **M. P. Strager**. 2000. Geostatistical and fractal description of the Cheat River Watershed, U.S. DOE, National Energy Technology Conference Proceedings Appalachian Rivers III Conference, Morgantown, WV.
- Strager, M. P.**, J. J. Fletcher, and C. B. Yuill. 2000. Not in My Watershed! – An interactive tool for land use change analysis, ESRI Users Conference Proceedings, San Diego, CA.
- Strager, M. P.**, J. J. Fletcher, J. M. Rowe, and C. B. Yuill. 1999. Customized watershed management tools for desktop GIS. Proceedings of the ASPRS Annual Conference, Portland, OR.
- Strager, M. P.** and J. J. Fletcher, C. B. Yuill. 1998. Hydrological modeling of acid mine drainage in the Cheat River Watershed, West Virginia. ESRI Users Conference Proceedings, San Diego, CA.
- Neese, C. P., Gribko L. S., C. B. Yuill, and **M. P. Strager**. 1997. Assessing species variation within forest cover types delineated using color-infrared aerial photographs. Proceedings 11th Annual Central Hardwood Forest Conference, Columbia, MO.
- Strager, M. P.**, C. B. Yuill, and J. J. Fletcher. 1997. A decision support system for wetland wildlife management, GIS/LIS Annual Conference and Exposition Proceedings, Cincinnati OH.
- Strager, M. P.**, C. B. Yuill, P. Kinder, J. J. Fletcher, and W. Kordek. 1996. Identifying high value highland wetland complexes for wetland wildlife management opportunities. GIS/LIS Annual Conference and Exposition Proceedings, Denver CO.

## **Environmental Management Software**

The following systems were designed to aid in the management of water resources, perform landscape analysis, and help guide land conservation and planning.

#### Lake Management Information System, 2019

A web-based lake management information system was developed for Cheat Lake to allow Cube Hydro, the hydropower operator of Cheat Lake to better manage recreational assets and environmental quality at the lake.

#### Stream Channel and Floodplain Metric Toolbox, 2018

The Stream Channel and Floodplain Metric Toolbox was developed to demonstrate the feasibility of mapping fluvial geomorphic features from high-resolution bare-earth elevation data. A Python toolbox for ArcGIS was built to calculate key metrics describing channel and floodplain geometry. The link to the software <https://www.sciencebase.gov/catalog/item/59fb02d2e4b0531197b1618a>

#### WV Surface Water Time of Travel Tool, 2016

This system was developed for the WV Department of Health and the WV Department of Environmental Protection to allow users to query upstream travel times from surface water intake locations to analyze potential threats from spills to drinking water supplies. The framework was based on Strager (2012).

#### Fish Habitat Decision Support Tool, 2016

In collaboration with Downstream Strategies and Critigen, this decision support tool integrates spatial data, fish habitat models, and a prioritization model to allow alternative future scenarios to be run interactively. My role was to design and build the ranking tool and scenario analysis components as well as the cumulative hydrological analysis of watersheds. The foundation behind this tool was from Strager et al. (2009), Strager et al. (2010), and Merriam et al. (2015). Available at: <http://www.fishhabitattool.org/>.

#### Spatial Weights Land Conservation Tool, 2014

This analysis tool was created to easily incorporate user input for resource objectives and criteria preferences and output areas for land conservation for consensus building. The foundation behind this tool was from Strager and Rosenberger (2006) (2007).

#### Watershed Futures Modeler, 2013

This spatial decision support system runs within the GIS platform of ArcGIS and allows resource managers to interactively select segment level watersheds and run boosted regression trees modeling through the R statistical program. The results allow resource managers to determine water quality impacts from changing land cover and use patterns throughout a watershed. The Watershed Futures Modeler has been copy written.

#### Segment Level Watershed Conductivity Model, 2010

An ArcGIS extension for estimating instream conductivity as a result of mine disturbance. It was originally calibrated for the Coal River Watershed of West Virginia. It includes model output from boosted regression tree analysis.

#### Sage Grouse Decision Support System ArcGIS 9.x extension, 2009

Developed for the Natural Resource Conservation Service, this extension to ArcGIS allows analysts to input and combine raster datasets for prioritizing habitat corridors for Sage Grouse in Wyoming. It integrates the raster datasets with the Maxent Bayesian statistical model.

#### Overlay Analyst, 2009

This ArcGIS extension was developed for the WV Division of Natural Resources to prioritize and rank landscape areas for conservation. It allows users to aggregate and filter results as well as find multiple function areas that meet multiple objectives and criteria.

#### Cheat Lake Recreational Inventory System, 2009

Using ArcExplorer, this customized software program allows Allegheny Energy to inventory their leased property at Cheat Lake, WV and integrate a rating system for developing a water-based opportunity spectrum and carrying capacity analysis for better recreational management.

#### Mass Balance Accumulator ArcGIS 9 extension, 2008

An ArcGIS 9 extension currently in beta status to accumulate upstream attributes for segment-level watersheds and provide mass balance water quality analysis and acid mine drainage treatment cost. It was developed in collaboration with the WV Water Research Institute.

#### Spatial Compromise Programming ArcGIS 9 extension, 2006

This ArcGIS 9 extension was designed as an optimization tool for ranking spatial features with the compromise programming algorithm. It has been applied to county level parcel ranking for conservation planning and identifying high value landscape areas.

#### Watershed Characterization and Modeling System 8, 2004

Developed for the West Virginia Department of Environmental Protection Mining and Reclamation, Charleston, WV, this watershed modeling system provides hydrological analysis and water quality prediction tools for watershed managers throughout WV.

#### Cacapon and Lost River Modeling System, 2003

Developed for the Cacapon and Lost Rivers Land Trust and the Canaan Valley Institute, Thomas, WV, this GIS based application allows the Land Trust to evaluate parcels for easement acquisition for rural heritage, water quality, forestry, and agricultural conservation objectives.

#### St Mary's County Storm Water Management System, 2003

This modeling system integrates spatial data and engineering equations (TR-20 and TR-55) for urban storm water runoff management in St Mary's County, MD. It was developed for the US Army Corps of Engineers Baltimore District, MD.

#### The Landscape Analyst, 2002

Co-developed and designed with the Canaan Valley Institute, Thomas, WV, this ArcView 3 extension combines landscape ecology indices, water quality prediction tools, and a development model for prediction future growth patterns from urban areas.

#### Western Maryland Watershed Characterization and Modeling System, 2001

Developed for the Maryland Department of the Environmental, Bureau of Mines, Frostburg, MD, this watershed modeling system provides hydrological analysis and water quality prediction tools for watershed managers throughout Western MD.

#### Kiski-Conemaugh Forest Management and Analysis Tool, 2000

This ArcView 3 extension was designed to calculate landscape indicators including forest fragmentation, edge, and core areas for wildlife management and ranking watersheds for conservation. Developed for the Kiski-Conemaugh River Basin Alliance, Windber, PA.

Cumulative Hydrologic Impact Assessment Extension, 2000

Developed for the West Virginia Department of Environmental Protection, Mining and Reclamation, Charleston, WV, this watershed modeling system provides managers with tools to analyze potential mining permits and their effects throughout WV.

Kiski-Conemaugh Watershed Modeling System, 1999

Developed for the Kiski-Conemaugh River Basin Alliance, Windber, PA, this watershed modeling system provides hydrological analysis and water quality prediction tools for watershed managers in the Kiski-Conemaugh Watershed.

The Strategic Multi-Use Application and Remediation Tool, 1998

Developed for the West Virginia High Tech Consortium, Fairmont, WV, this system uses spatial locations of future road construction cut and fills and calculates volumetric results and the coal seams impacted. Results are presented in interactive 3D visualizations.

West Virginia Abandoned Mine Land Information System, 1996

Developed for the West Virginia Department of Environmental Protection, Mining and Reclamation, Nitro, WV, this management system provides query, update and retrieval of the spatial and tabular abandoned mine land information in WV.

Meadow River Wetlands Assessment and Ranking Model, 1995

Using parcel boundaries and landscape information in the Meadow River Watershed, this system prioritizes locations for wetland wildlife habitat using preference weights and input from the West Virginia Division of Natural Resources, Elkins, WV.

**Invited Presentations at Scientific Meetings (\*denotes presenter)**

**2020**

Boothe, M., M. Strager, S. Grushecky\*, and P. Kinder. Unmanned aerial systems for pipeline inspection, monitoring, and landscape analysis. Virtual Meeting of Pittsburgh Right of Way Group, Waynesburg, PA. June 9<sup>th</sup>, 2020.

Pourmohammadi\*, P., Adjeroh, D., and Strager, M. P., Mapping the land development processes using data transformation and clustering methods, International Geoscience and Remote Sensing Society, Waikoloa, Hawaii, Waikoloa, Hawaii. Oct 5-7, 2020

Ajanaku\*, B.A., Strager, M.P., Collins, A.R. GIS-based Multi-Criteria Decision Analysis of Utility-Scale Wind Farm Site Suitability in West Virginia. Southern Economic Association 90th Annual Meeting, New Orleans, LA. Nov 31-23, 2020.

Michaels\*, R., K. Eliason, T. Petty, M. P. Strager, P. Ziemkiewicz, E. Morrissey. Dynamic microbial responses to unconventional oil and gas development may alter ecosystem function in freshwater streams. Ecological Society of America. Salt Lake City, UT. Aug 3-6, 2020.

Sindupa\*, D. S., J. T. Anderson, J. A. Hubbart, R. E. Keller, M. P. Strager, E. A. Byers, C. T. Rota. West Virginia Wetland Water Quality Standards. Delaware Wetlands Conference, Wilmington, DE. Jan 29-30, 2020.

Evans\*, A.L., J.W. Edwards, C.W. Ryan, C.T. Rota, and M.P. Strager. 2020. Examining translocation protocols of reintroduced elk herds in the eastern United States. The Wildlife Society 27th Annual Conference, Louisville, KY. Sept 27-Oct1, 2020.

## **2019**

Strager\*, M. P., P. Kinder, J. M. Strager, S. Grushecky, J. Kimmet. Applying UAV Imagery to Minimize Impacts to Surface Water from Oil and Gas Development. American Society of Mining and Reclamation, Big Sky, MT, June 3-6, 2019.

Pourmohammadi\*, P., D. Adjero, M. P. Strager. Predicting Impervious Land Expansion Using Deep Deconvolutional Neural Networks. International Geoscience and Remote Sensing Symposium, Yokohama, July 28-Aug2, 2019.

Pourmohammadi\*, P., M. P. Strager. An Application of High Performance Computing (HPC) and Deep-Learning in Predicting Developed Land Expansion in an Appalachian Watershed. American Association of Geographers, Washington, DC, April 3-7, 2019.

Cribari\*, V., M. P. Strager. Assessing Long Term Changes and Landscape Disturbances in the Headwaters of Big Coal River. Nature and Society Facing the Anthropocene Challenges and Perspectives for Landscape Ecology, International Association for Landscape Ecology, Milan, Italy, July 1-5, 2019.

Strager\*, M. P., P. Kinder, S. Grushecky. Modeling Potential Runoff from a Converted Forest lot Using UAV Imagery. 12th Southern Forestry and Natural Resource Management GIS Conference, Athens, GA, Dec 9-10, 2019.

Strager\*, M. P. 2019. High temporal and spatial resolution mapping of land cover to support water research in Appalachia. Geo EDF Stakeholder Workshop, Purdue University, West Lafayette, IN. Oct 6-8, 2019.

Strager\*, M. P., A. E. Maxwell. Large-area, high spatial resolution land cover mapping using random forests, GEOBIA, and NAIP orthophotography: findings and recommendations. Appalachian Freshwater Initiative Meeting, Huntington, WV, June 11-13, 2019.

Strager\*, M. P., N. Zegre. A Two-Scaled Approach for Flood Susceptibility Prediction in Appalachia. Appalachian Freshwater Initiative Meeting, Huntington, WV, June 11-13, 2019.

Evans\*, A. L., J. W. Edwards, C. W. Ryan, C. T. Rota, and M. P. Strager. Post-release movements of reintroduced elk in West Virginia. American Fisheries Society and The Wildlife Society Joint Annual Conference, Reno, NV, September 29 – October 3, 2019.

## **2018**

Strager\*, M. P., J. M. Strager, N. Zegre. Modeling flood risk potential in WV. WV State Water Conference, Morgantown, WV, September 27-28, 2018.

Strager\*, M. P., Siting of transmission pipelines in WV, Accounting for stream crossings and total suspended solid modeling. WV State Water Conference, Morgantown, WV, September 27-28, 2018.

Klein\*, A. M. K, A. P. D. Corte, S P Netto, M. P. Strager, E. R. Schoeniger. 2018. The Development of an automated tree detection tool using UAV-based datasets. ForestSAT Conference Entering a New Era in Forest Observation and Analysis, College Park, Maryland, October 1-5, 2018.

Strager\*, M. P., N. Zegre. Terrain derivatives to aid in flood forecasting. AWRA Spring Specialty Conference GIS and Water Resources X: Spatial Analysis of Watersheds: Ecological, Hydrological, and Societal Responses, Orlando, Florida, April 22 – 25, 2018.

Strager\*, M. P. Improved landscape characterization for modeling receiving stream conditions. Spring Conference of the Institute of Water Security and Science: Advances in Water Resource Science and Management in West Virginia and the Northeastern U.S. Morgantown, WV, February 20-21, 2018.

Strager\*, M. P., N. Zegre. A two-scaled approach for flood susceptibility prediction in Appalachia. Universities Council on Water Resources Conference, Pittsburgh, PA, June 26-28, 2018.

Strager\*, M. P., P. Kinder. The unmanned aerial vehicle research program at the Natural Resource Analysis Center at West Virginia University. International Lidar Mapping Forum, Denver, CO, February 5-7, 2018.

Pourmohammadi\*, P., M. P. Strager. A sustainability approach for development: An analysis of the impact of spatial and non-spatial factors on an Appalachian Watershed. American Association of Geographers Annual Meeting, New Orleans, LA, April 10-14, 2018.

## **2017**

Hentz\*, A. K., M. P. Strager. Cicada damage detection based on UAV spectral and 3D data. Poster Presentation at SiviLaser 2017. Blackburg, VA, October 11, 2017.

Strager\*, M P., A. K. Hentz, J. M. Strager, P. Kinder, J. A. Kimmet. Use of UAVs for the inventory and analysis of stream habitat. Wildtrout Symposium, West Yellowstone, MT, September 26-28, 2017.

Strager\*, M. P., P. Kinder, J. A. Kimmet, A. K. Hentz. Drone imagery acquisition to perform volumetric analysis for landscape mapping. National Meeting of the American Society of Mining and Reclamation, Morgantown, WV, April 11-13, 2017.

Pourmohammadi\*, P., M. P. Strager. Predicting land conversion in Appalachian Watershed; A comparison of four Machine Learning Techniques. Annual Meeting of the Association of American Geographers. Boston, MA, April 5-9, 2017.

Liebermann\*, H., J. Schuler, M. P. Strager, J. McNeel. A work flow and evaluation of unmanned aerial systems derived forest tree volumes in mixed hardwood stands of West Virginia. West Virginia Society of American Foresters, Glenville State College, Glenville, WV, April 4, 2017.

Pourmohammadi\*, P., M. P. Strager. A machine learning approach for the prediction of developed land in the Upper Monongalia watershed. Poster presented at the Institute of Water Security and Science Spring Symposium, Morgantown, WV, February 28, 2017.

Guillen\*, L., N. Zegre, M. P. Strager. Model validation for calculating travel times and Zones of Critical Concern delineation for Source Water Protection in West Virginia. Poster presented at the Institute of Water Security and Science Spring Symposium, Morgantown, WV, February 28, 2017.

Strager\*, M. P. Unmanned Aerial Vehicle (UAV) research at West Virginia University in the Davis College of Agriculture, Natural Resources and Design, School of Natural Resources. International LiDAR Mapping Forum, Denver, CO, February 15, 2017.

Strager\*, M. P., H. Liebermann\*, J. A. Kimmel\*. Integrating LiDAR data & UAV imagery for forest inventory & analysis: A case study in cost effectiveness to traditional field sampling protocols. International LiDAR Mapping Forum, Denver, CO, February 15, 2017.

## **2016**

Strager\*, M. P., J. Credico, E. Riegelmann, F. Boettner. Visualizing, Ranking, and Futuring Fish Habitat using ArcGIS Server. 2016 ESRI User Conference, San Diego, CA, June 30, 2016.

Strager\*, M. P. Advanced Surface Runoff Techniques for Watershed Modeling with GIS. Southern Division of the American Fisheries Society Meeting. Wheeling WV, February 17-21, 2016.

Elbakidze\*, L., H. Stephens, M. Strager, and X. Etienne. Policy Relevant Analysis of Demand, Supply, and Utilization of Natural Resources to Facilitate Economic Growth. Governor's Energy Summit, Roanoke, WV, October 2016.

Pourmohammadi\*, P., M. P. Strager. Analysis of Land Cover and Use Change Drivers in the Central Appalachians. Annual Meeting of the Association of American Geographers. San Francisco, CA, April 2-6, 2016.

Shy\*, S. A., M. P. Strager. Analyzing the Sensitivity of a Real Time Surface Water Flow Model to Protect Public Water Intakes in West Virginia . 2016 Annual Conference of the WV Association of Geospatial Professionals, Morgantown, WV, May 3-5, 2016.

Strager\*, J. M., M. P. Strager. Terrestrial vertebrate species distribution modeling for the mountaintop removal mining region of Appalachia. 2016 Annual Conference of the WV Association of Geospatial Professionals, Morgantown, WV, May 3-5, 2016.

Nottingham\*, A. C., J. A. Thompson, M. P. Strager. Digital Soil Assessment of Landscape-Scale Forest Restoration Using a Species Distribution Model. 7<sup>th</sup> Global Workshop on Digital Soil Mapping, Aarhus University, Denmark, June 27-July 1, 2016.

Van Gundy\*, M. T., M. P. Strager. Examining Landscape Control of Fire Severity in the Central Appalachians. 2016 SAF National Convention, Madison, WI, Nov2-6, 2016.

Klingerman\*, J., J. T. Petty, M. P. Strager, F. Boettner. The Fish Habitat Tool. Association of Mid-Atlantic Aquatic Biologists meeting, Cacapon Resort, Berkeley Springs, March 31, 2016.



## 2015

Strager\*, M. P., N. P. Zegre, W. Toomey, J. M. Strager. Hydrological Modeling for the Delineation of Surface Water Zones of Critical Concern. Presentation at the American Association of Geographers Annual Meeting, Chicago, IL. April 21-25, 2015.

Strager\*, M. P. Predicting Surface Coal Mining in Appalachia. GITA Mid-Atlantic Chapter EnerGIS, Cannonsburg, PA., May 18-19, 2015.

Strager\*, M. P. and N. Zegre. Developing the Zones of Critical Concern to Protect WV Surface Waters. Presentation at the West Virginia Rural Water Resources Annual Conference. Snowshoe, WV. September 13-15, 2015.

Strager\*, M. P., N. Zegre, and S. Shy. ZCC Calculations. Presentation to the Oil and Natural Gas Industry Workshop. Charleston, WV. October 7, 2015.

Strager\*, M. P. and N. Zegre. Calculating Surface Water Time of Travel to Protect Public Water Intakes in West Virginia. Water Resources Conference of the Virginias. Stonewall Jackson Resort, Roanoke, WV. October 5-6, 2015.

Nicholson\*, M. C., J. Wickham, P. B. Wood, M. P. Strager, C. Mazzarella, W. Jenkins. Landscape Impacts of Mountaintop Mining in the Appalachian Mountains --- State of our Knowledge and a Path Forward. International Association of Landscape Ecology. Portland, OR. July 5-9, 2015.

Strager\*, M. P. and N. Zegre. H33H-1707: The Development of a Real Time Surface Water Flow Model to Protect Public Water Intakes in West Virginia. American Geophysical Union. San Francisco, CA. December 12-17, 2015.

## 2014

Strager\*, M. P., J. T. Petty, E. Merriam, P. Ziemkiewicz. The Watershed Futures Planner: facilitating sustainable watershed development. Appalachian Research Initiative for Environmental Science. Annual Meeting, Louisville, KY, April 28-30, 2014.

Strager\*, M. P., J. M. Strager, A. E. Maxwell. Development of a Spatially Explicit Surface Coal Mining Predictive Model. WV GIS Conference, Charleston, WV, June 2-5, 2014.

Strager\*, M. P., N. Zegre, W. Toomey. Delineation of Surface Water Zones of Critical Concern in West Virginia. Mid-Atlantic Regional Water Conference, National Conservation Training Center, Shepherdstown, WV, Sept 24-25, 2014.

Weddy\*, J. M., T. A. Miller, S. Wood, M. P. Strager, T. Katzner. Using Public Data and Satellite Imagery to Construct Natural Resource Management Databases: Wind Turbine Installations in Nevada and California. 2014. Poster Presentation. The Wildlife Society Western Section Annual Meeting, Reno, Nevada, January 27-31, 2014.

Maxwell\*, A. E., M. P. Strager, T. A. Warner. Mapping of Mining and Reclamation: A Comparison of NAIP Orthophotography and RapidEye Satellite Imagery. ASPRS Annual Conference, Louisville, KY, March 23-28, 2014.

Young\*, D., N. Zegre, P. Edwards, M. P. Strager. Catchment Streamflow Response to Climate Change Conditioned by Historic Alterations of Land-use: Forest Harvest, Succession, and Stand Conversion. American Geophysical Union. Fall Meet. Suppl., Abstract H51G-0696. December 15-19, 2014.

Young\*, D., N. Zegre, P. Edwards, M. P. Strager.. Catchment Streamflow Response to Climate Change Conditioned by Historic Alterations of Land-use: Forest Harvest, Succession, and Stand Conversion. Mid-Atlantic Regional Water Conference, USFW National Conservation Training Center, Shepherdstown, WV. September 24-25, 2014.

Young\*, D., N. Zegre, P. Edwards, M. P. Strager. Catchment Streamflow Response to Climate Change Conditioned by Historic Alterations of Land-use: Forest Harvest, Succession, and Stand Conversion. CUASHI 2014 Biennial: Water Across the Critical Zone, From Local to Global. USFW National Conservation training Center, Shepherdstown, WV. July 27-29, 2014.

Becker\*, D. A., P. B. Wood, M. P. Strager, C. Mazzarella. Identifying landscape thresholds for avian species in the mountaintop mining region. The Wildlife Society Annual Conference, Pittsburgh, PA, Oct 25-30, 2014.

Pitchford\*, J., M. P. Strager, A. Riley, L. Lin, J. Anderson. Modelling streambank erosion potential using maximum entropy in a central Appalachian watershed. . International Commission on Continental Erosion of the International Association of Hydrological Sciences Symposium, December 11-14, 2014.

Weddy\*, J. M., T. A. Miller, S. Wood, M. P. Strager, T. Katzner. Using Public Data and Satellite Imagery to Construct Natural Resource Management Databases: Wind Turbine Installations in Nevada and California. 2014. The Wildlife Society, Web and GIS Technologies for Wildlife Science and Conservation, Pittsburgh, PA, October 25-30, 2014.

## **2013**

Strager\*, M. P., A. E. Maxwell, E. Austin. Landscape Analysis in the Mountaintop Mining Region. Mountain Top Mining Workshop, Water Research Institute, West Virginia University, Morgantown, WV. Jan 18, 2013.

Petty\*, J. T., M. P. Strager, E. Merriam, P. Ziemkiewicz. Alternative Future Watershed Conditions in the Mountaintop Mining Region of the Central Appalachians. Society for Freshwater Science Annual Meeting, Jacksonville, FL, USA, May 19-23, 2013.

Merriam\*, E., J. T. Petty, M. P. Strager, E. Maxwell, P. Ziemkiewicz. Complex Land Use Thresholds and Multi-Stressor Impacts to Streams in the MTR-VF Mining Region of Central Appalachia. Society for Freshwater Science Annual Meeting, Jacksonville, FL, USA, May 19-23, 2013.

Strager, M. P., A. E. Maxwell\*, J. T. Petty, P. Ziemkiewicz. A Value of Information Study Examining the Effectiveness of Spatial Datasets for Modeling Landscape to Water Quality Relationships. Environmental Considerations in Energy Production Symposium, Charleston, WV, April 14-18, 2013.

J. T. Petty\*, M. P. Strager, E. Merriam, P. Ziemkiewicz. Scenario Analysis and the Watershed Futures Planner. Environmental Considerations in Energy Production Symposium, Charleston, WV, April 14-18, 2013.

Burnett\*, W., M. P. Strager, D. Lacombe. Club Convergence and Clustering of US State Level CO2 Emissions. Agricultural and Applied Economics Association and the Canadian Agricultural Economics Society Annual Meeting, Washington DC, Aug 4-6, 2013.

Burnett\*, W. J., M. P. Strager, J. M. Strager, B. Kreps. Forecasting Future Coal Production from Surface Mining in Central Appalachia. 2013 International Pittsburgh Coal Conference, Beijing, China, September 16-19, 2013.

## **2012**

Maxwell\*, A., M. P. Strager, A. Riley, P. Kinder. Comparison of high resolution true color imagery and LiDAR derived parameters for extracting urban forest data. WV Central Hardwood Forest, Morgantown, WV, March 26-28, 2012.

Maxwell\*, A. E., M. P. Strager, C. B. Yuill, E. Austin, W. S. Kordek. Creation of high resolution land cover and forest cover for West Virginia relative to 2011 NAIP Orthophotography, 2012 WV GIS Conference, Morgantown, WV, May 8-11, 2012.

Maxwell\*, A. E., M. P. Strager, C. B. Yuill, E. Austin, A. C. Riley. Landform alterations induced by mountaintop mining: A Case Study in the Coal River Watershed, 2012 WV GIS Conference, Morgantown, WV, May 8-11, 2012

Austin\*, E., A. E. Maxwell, M. P. Strager. Evaluating geomorphic differences resulting from mountaintop mining in the southern coal fields of West Virginia. Poster presentation at 2012 WV GIS Conference, Morgantown, WV, May 8-11, 2012.

Strager, J. M\*, M. P. Strager, W. Kordek, K. Krantz. GIS-based classification and evaluation of West Virginia's wetlands. 2012 WV GIS Conference, Morgantown, WV, May 8-11, 2012.

Arbab\*, N., A. Collins, M. P. Strager. An agent based approach for linking land-use and water quality in Opequon Creek. Southern Regional Science Association Meeting, Charlotte, NC., March 22-24, 2012.

Eisenhauer\*, P., N. Zegre, P. Edwards, M. P. Strager. Baseline groundwater chemistry characterization in an area of future marcellus shale gas development. WV Water Conference 2012, Morgantown, WV. Oct 30-31, 2012.

Sheehan, K. R., M. P. Strager\*, S. A. Welsch. Spatial scale and appropriate aquatic habitat modeling approaches. Annual Meeting of the American Fisheries Society, Minneapolis, MN, Aug 19-23, 2012.

Petty\*, J. T., F. Boettner, J. Clingerman, S. Lamont, S. Letsinger, R. Martin, J. M. Strager, M. P. Strager. Quantifying stressors and natural fish habitat quality: Linking data to fish habitat conservation. Annual Meeting of the American Fisheries Society, Minneapolis, MN, August 19-23, 2012.

Strager\*, M. P., S. Lamont, F. Boettner, J. T. Petty, J. Clingerman, S. Letsinger, J. Strager. A decision support tool to support the integration of spatial data analysis and statistical modeling

for fish and habitat condition assessments. Annual Meeting of the American Fisheries Society, Minneapolis, MN, August 19-23, 2012.

Gallagher\*, M., F. Boettner, J. T. Petty, M. P. Strager, S. Lestinger, J. M. Strager. Scaling up the Midwest regional assessment. Annual Meeting of the American Fisheries Society, Minneapolis, MN, August 19-23, 2012.

Clingerman\*, J., J. T. Petty, M. P. Strager, F. Boettner, J. M. Strager. GIS habitat modeling details of the boosted regression tree modeling process for the Midwest Regional Fish Habitat Assessment. Annual Meeting of the American Fisheries Society, Minneapolis, MN, August 19-23, 2012.

Bryant\*, J. E., S. Partington, M. P. Strager. Selecting target populations for community nutrition intervention using spatial analysis. Poster presentation at the 2012 Experimental Biology Annual Conference, San Diego, CA.

## **2011**

Maxwell\*, A.E., M. P. Strager, L. Kunkel, C. Yuill, J. T. Petty. Disturbance mapping and landscape modeling of mountaintop mining using ArcGIS. Environmental Systems Research Institute Users Conference, San Diego, CA, July 23-27, 2011.

Joshi\*, S., M. P. Strager. Assessing the effects of forest land conservation: A spatial hedonic approach. Northeast Agriculture Economics Association Meeting, Pittsburgh, PA, July 24-26, 2011.

Maxwell\*, A., M. P. Strager. Enhanced wetland detection using feature extraction, topographic derivative, and maximum entropy probabilistic modeling. SER Mid Atlantic Conference, College Park, MD. April 1-2, 2011.

Austin\*, E. M., A. C. Maxwell, M. P. Strager. Evaluating geomorphic differences resulting from mountaintop mining in the southern coal fields of West Virginia. Poster presentation at the Mid-Atlantic ESRI Users Group Meeting, Baltimore, MD, Dec 5-7, 2011.

Jones\*, M., J. E. Edwards, H. Spiker, M. P. Strager, J. T. Petty. 2011. Using Predictive Modeling to Prioritize Non-Invasive Genetic Sampling of Black Bears. MD/DE. Poster Presentation at the Wildlife Society Fall Meeting, Ohio Island Williamstown, WV, Oct 14, 2011.

Tri\*, A. N., J. W. Edwards, M. P. Strager, J. T. Petty, C. Ryan, M. Ternenent, P. Carr. 2011. Urban and Suburban Black Bear Spatial Ecology. Paper Presentation at the Wildlife Society Fall Meeting, Ohio Island Williamstown, WV, Oct 14, 2011.

## **2010**

Strager, M. P. Defining the network connections. National Park Service Rivers, Trails, and Conservation Assistance Program, Helping Communities Realize their Vision. National Conservation Training Center, Shepherdstown, WV, Nov 29 – Dec 3, 2010.

Strager, M. P. Basic maps and mapping tools; Landscape Planning and Assessment Tools; Decision Support Tools for Site/Network Selection. National Park Service Rivers, Trails, and Conservation Assistance Program, Helping Communities Realize their Vision. National Conservation Training Center, Shepherdstown, WV, Nov 29 – Dec 3, 2010.

Strager, M. P. Strategic conservation planning at various landscape scales. National Park Service Rivers, Trails, and Conservation Assistance Program, Helping Communities Realize their Vision. National Conservation Training Center, Shepherdstown, WV, Nov 29 – Dec 3, 2010.

Ayersman\*, W., M. P. Strager, J. M. Strager. Identifying infestation probabilities of emerald ash borer (*Agrilus planipennis*, Fairmaire) in the Mid-Atlantic Region. WV GIS Conference, Huntington, WV, June 7-10, 2010.

Sheehan\*, K. R., M. P. Strager. Advantages of geographically weighted regression for modeling substrate in streams. . WV GIS Conference, Huntington, WV, June 7-10, 2010.

Thomas-Van Gundy\*, M., M. P. Strager. Spatial attributes of selected witness trees on the Monongahela National Forest. Association of American Geographers. 2010 Annual Meeting, Washington DC, April 14-18, 2010.

Williams\*, D., M. P. Strager, A. Datsko, P. Villela, C. Pierskalla. An inventory and analysis system for lake recreation and management. Northeast Recreation Research Symposium, Bolton Landing, NY, April 11-13, 2010.

Petty\*, J. T., P. F. Ziemkiewicz, M. P. Strager, E. R. Merriam. Toward managing in actively mined watersheds in West Virginia. West Virginia Water Conference, Morgantown, WV, Oct 6-7, 2010.

Petty\*, J. T., P.F. Ziemkiewicz, M. P. Strager, E. R. Merriam. Towards managing impacts in actively developing mined watersheds: can we learn anything from mountaintop removal mining? Joint Meeting with ASLO and NABS, Aquatic Sciences: Global Changes from the Center to the Edge, Santa Fe, NM, June 6-11, 2010.

Sheehan\*, K. R., M. P. Strager. Directional influence of stream habitat variables on modeling stream reaches in the greater Yellowstone ecosystem. American Fisheries Society Annual Conference, Pittsburgh, PA, Sept 12-16, 2010.

Pitchford\*, J.L., J. T. Anderson, and M. P. Strager. Using weights of evidence to model streambank erosion potential. Southeast Regional Stream Restoration Conference, Raleigh, NC. Nov 15-18, 2010.

## 2009

Bernasconi, C., M. P. Strager, V. Maskey, M. Hasenmyer\*. Assessing public preferences for an urban automated transportation system: rating dependency of respondent socio-demographic characteristics. Council of Educators in Landscape Architecture Annual International Conference. Tucson, AZ, Jan 14-17, 2009.

Mynsberge\*, A., J. M. Strager, M. P. Strager, P. M. Mazik. Predictive modeling of freshwater mussel species *Eliliptio-Dilatata* and *Elliptio Complanata* in the Appalachians. Freshwater Mollusk Conservation Society Conference, Baltimore MD, Apr 19-24, 2009.

Strager, M. P., J. T. Petty, J. Fulton\*, B. Gutta, R. Herd, J. Svetlik, P. Ziemkiewicz, V. Maskey. The Mass Balance Accumulator – An ArcGIS decision support tool for evaluating acid mine

drainage treatment sites. West Virginia Chapter of the American Fisheries Society, Huntington, WV, Mar 5-6, 2009.

Ayersman, W., M. P. Strager\*, J. M. Strager. Modeling emerald ash borer establishment and spread using GIS. Environmental Systems Research Institute Users Conference, San Diego, CA, July 13-17, 2009.

Sharma\*, B., M. P. Strager, J. Wang. Fuzzy-logic approach to log-landing site assessment for forest harvest planning. Environmental Systems Research Institute Users Conference, San Diego, CA, July 13-17, 2009.

Strager\*, M. P., J. M. Strager, W. Ayersman. Assessing the potential risk of emerald ash borer (*Agrilus planipennis*) establishment and spread using GIS. International Forest Biosecurity Conference, Rotorua, NZ, March 16-20, 2009.

Strager\*, M. P. An invasive plant species vulnerability model. Mid-Atlantic Conference – Complicating Factors in Invasive Plant Management: Circumstances Beyond Our Control? Johnstown, PA, Aug 11-12, 2009.

## 2008

Strager\*, M.P., S. Lamont, J.J. Fletcher, V. Maskey, J.B. Wiley. The development of a low flow estimation tool for watershed assessment in West Virginia. Poster Presentation at the USDA-CSREES National Water Conference, Sparks Nevada. Feb 3-7, 2008.

Karigomba, W., T. Borisova, A. Collins, G. D'Souza, M. P. Strager\*. A spatial optimization approach to watershed water quality management. Poster Presentation at the USDA-CSREES National Water Conference, Sparks Nevada. Feb 3-7, 2008.

Maskey\*, V., M. P. Strager, C. Bernasconi. Factors influencing the preferences of an automated transportation system design. PodCar City: Ithaca, Sustainable Transportation Conference, Ithaca, NY, Sept 14-16, 2008.

Martin\*, R. W., M. P. Strager, J. T. Petty. Utilizing the ArcGIS Network Analyst extension for quantifying the effects of stream network structure on local biological conditions. Southern Division of the American Fisheries Society, Wheeling, WV March 1-2, 2008.

Strager\*, J. M. and M. P. Strager. Practical applications of enhanced water resources GIS datasets. Southern Division of the American Fisheries Society, Wheeling, WV March 1-2, 2008.

Strager\*, M. P., J. T. Petty, J. Fulton, V. Maskey. A cumulative watershed network model for multiple scale restoration. Southern Division of the American Fisheries Society, Wheeling, WV March 1-2, 2008.

Mynsberge\*, A. R., J. M. Strager, M. P. Strager, P. M. Mazik. Development of a watershed-based predictive model for a freshwater mussel in the Appalachians. Southern Division of the American Fisheries Society, Wheeling, WV March 1-2, 2008.

Flanigan\*, R. D., M. P. Strager, J. R. Brooks. Predicting species composition in an eastern hardwood forest with the use of digitally derived terrain variables within a GIS. 6th Annual Southern Forestry GIS Conference, Orlando, FL, March 24-26, 2008.

Strager, M. P. and J. M. Strager\*. Extending the national hydrography dataset: A spatial framework for water resource applications in West Virginia. WV GIS Conference, Charleston, WV, June 9-12, 2008.

Joshi\*, S. and M. P. Strager. Identifying conservation priority areas in the eastern panhandle region of West Virginia. Northeast Agricultural and Resource Economics Association, June 30-July 1, 2008.

Strager\*, M. P., V. Maskey, B. Gutta, R. Herd, J. Fulton, J. T. Petty, J. Stiles, J. Svetlik, P. Ziemkiewicz. A hydrologically networked watershed model for evaluating AMD treatment scenarios. American Society of Mining and Reclamation, Richmond, VA, June 9-12, 2008.

Petty\*, J. T., B. Gutta, R. Herd, J. Fulton, J. Stiles, M. P. Strager, J. Svetlik, P. Ziemkiewicz. Strategic restoration of West Virginia watersheds impaired by historic acid mine drainage. American Society of Mining and Reclamation, Richmond, VA, June 9-12, 2008.

Strager\*, M.P., J.T. Petty, B. Gutta, J. Fulton, R. Herd, J. Stiles, J. Svetlik, P. Ziemkiewicz. An application of hydrologically networked watershed model for evaluating AMD treatment scenarios. Pennsylvania Abandoned Mine Reclamation and Coal Mine Heritage Conference, Aug 12-14, 2008, State College, PA.

## **2007**

Strager, M. P., J. T. Petty, J. M. Strager, S. Lamont\*. Accounting for watershed connectivity through a network model: Ecological insights in a mined Appalachian watershed. AWRA 2007 Annual Conference, Albuquerque, NM. Nov 12-15, 2007.

Strager\*, J. M., K. Donaldson, K. Kuhn, M. P. Strager. Development of a local resolution NHD for West Virginia. American Water Resource Association Annual Conference, Albuquerque, NM. Nov 12-15, 2007.

Bjorgo\*. K. A., M. P. Strager. Spatial data modeling of fish habitat in a large river. American Society of Photogrammetry and Remote Sensing Annual Conference. Tampa, FL. May 7-11, 2007.

Bernasconi, C., M. Strager, M. Hasenmyer\*. Visual form of the Morgantown PRT. 11<sup>th</sup> International Conference on Automated People Movers. Vienna, Austria, April 22-27, 2007.

Bernasconi\*, C., M. Hasenmyer\*. M. Strager\*. Morgantown PRT stations and design limitations. PRT Realities and Futures. The Ed Neuman Morgantown Seminar. Advanced Transit Association. Morgantown, WV. May 4-5, 2007.

Strager\* M. P. and M. Thomas-VanGundy. Historical forest resource inventory – witness tree mapping in WV. Northeast Recreation Research Symposium, Bolton Landing, NY, April 15-17, 2007.

Bjorgo-Thorne\*, K. A., M. P. Strager. Spatial data modeling of fish habitat in a large river. American Society of Photogrammetry and Remote Sensing Annual Conference, Tampa, FL, May 7-11, 2007.

Zinn\*, J. D., M. P. Strager, K. J. Hartman, J. T. Anderson. Multi-metric analysis of landscape components influencing greater sage grouse (*Centrocercus urophasianus*) occurrence: Linking

scientific knowledge, spatial Information, and decision Making. Ecological Site Description Workshop held by the Society of Range Management, Park City, UT, Oct 22-26, 2007.

Strager\*, J. M., K. Donaldson, K. Kuhn, M. P. Strager, and S. Lamont. Development of a local resolution national hydrography dataset for West Virginia. American Water Resource Association Annual Conference, Albuquerque, NM. Nov 12-15, 2007.

Mynsberge\*, A. R., G. Merovich, M. P. Strager, J. M. Strager, P. M. Mazik. Classification and ordination of freshwater mussel communities in the Appalachians. Annual proceedings of the Southeast Association of Fish and Wildlife Agencies, Charleston, WV, Oct 21-24, 2007.

Mynsberge\*, A., J. Strager, M. Strager, P. Mazik. Predictive modeling of freshwater mussel distributions in the Appalachians. Southeastern Association of Fish and Wildlife Agencies 61st Annual Conference, Charleston, WV, Oct 21-24, 2007.

Davis, J., J. Deng\*, J., M. Strager. Country roads and scenery: A GIS viewshed analysis for Monroe County, WV. 13th International Symposium on Society and Resource Management, Park City, UT, June 17-21, 2007.

Strager\*, J. M., M. P. Strager, J. J. Fletcher. Development of enhanced water resources datasets and capabilities for West Virginia. Virginia / West Virginia Water Research Symposium. Blacksburg, VA. Nov 28-30. 2007.

Fletcher\*, J. J., M. P. Strager, R. N. Elie, S. J. Lamont. WCMS – The Watershed Characterization and Modeling System: An overview of capabilities and development. Virginia / West Virginia Water Research Symposium. Blacksburg, VA. Nov 28-30. 2007.

C. D. Heatwole\*, M. L. Wolfe, W. C. Hession, B. Benham, K. Stephenson, J. Lawrence, G. D. D'Souza, A. Collins, M. P. Strager, T. Borisova. The Opequon Creek targeted watershed project – A state partnership to benefit the Chesapeake Bay. Virginia / West Virginia Water Research Symposium. Blacksburg, VA. Nov 28-30. 2007.

## **2006**

Strager\* M. P., J. T. Petty, J. M. Strager. The development of segment-level watersheds in WV and the benefits for fisheries management.” Southern Division of the American Fisheries Society Spring 2006 Conference, San Antonio, TX, Feb 8-12, 2006.

Deng\*, J., G. Walker M. P. Strager. 2006. Assessment of territorial justice using Geographic Information Systems: A case study of proximity of golf courses in Calgary, Canada. Northeast Recreation Research Symposium, Sagamore, NY, April 9-11, 2006.

Strager\*, M., J. T. Petty, and J. M. Strager. 2006. Combining a segment-level watershed model and compromise programming for adaptive management. Presented at the 2006 American Water Resources Association Summer Specialty Conference: Adaptive Management and Water Resources. Missoula, MT, June 26-28, 2006.

Goff\*, W. J. Wang, J., M. Strager. 2006. Spatial analysis of application, effectiveness, and compliance of forestry best management practices in West Virginia, USA. Presented at the American Society of Agricultural and Biological Engineers Conference, Portland, OR, July 9-10, 2006.



Hammons\*, G., J. Wang, M. P. Strager. Predicting sedimentation loading using GIS and hydrological modeling. GIS and Appalachians Conference, Morgantown, WV, May 15-19, 2006.

Borisova\*, T., G. D'Souza, M. P. Strager, C. Solomon, B. Benham. Potential benefits from a coordinated two-state pollution reduction strategy for the Opequon Creek Watershed. 2<sup>nd</sup> National Water Quality Trading Conference, Pittsburgh, PA, May 23-25, 2006.

Petty\*, M. P. Strager, and M. Hassenmeyer. Strategic watershed restoration: an alternative future for the Appalachian coal fields. Mountaintop Mining – Valley Fill Roundtable. 9th Annual Watersheds and Wetlands Meeting. Atlantic City, NJ. Oct 20 – 21, 2006.

## 2005

Svetlik\*, J. B., M. P. Strager, T. T. Phipps. Projecting alternative growth patterns in Tucker County, West Virginia: The effects of a proposed highway corridor project. North American Regional Science Association International, Las Vegas, Nevada, Nov 10-12, 2005.

Strager\*, M. P., J. T. Petty, J. Fulton, J. Stiles, P. Ziemkiewicz. The integration of landscape and water quality analyses through segment-level watersheds to aid in restoration management. Revitalizing Communities through Integrated Restoration Conference, Morgantown, WV, Oct 24-26, 2005.

Strager\*, M. P., C. B. Yuill, C. S. Schaney. Development of an invasive plant species prediction model for the Kiski-Connemaugh Watershed. Mid-Atlantic Highlands Biodiversity: Making the Connection in Your Community Conference, University of Pittsburgh at Johnstown, PA, June 16-18, 2005.

Strager, M. P. and J. L. Newland\*. Sustainable solutions for restoring degraded watersheds and riparian ecosystems: implementation, evaluation, and amelioration. EPA Office of Research and Development Conference on Collaborative Science of Environmental Solutions, Washington, DC, May 16-17, 2005.

Svetlik\*, J. B., M. P. Strager, and T. T. Phipps. Projecting land development in Tucker County, West Virginia: The effects of a proposed highway corridor project. Annual Meetings of the Northeastern Agricultural and Resource Economics Association, Annapolis, Maryland, June 12-14, 2005.

Strager, M. P., C. B. Yuill, and C. S. Schaney\*. Invasive species mapping using spatial technologies. American Society of Photogrammetry and Remote Sensing Annual Conference, Baltimore, MD, March 7-11, 2005.

Strager\*, M. P., C. B. Yuill, and C. S. Schaney. Integration of spatial technologies for cost effective invasive species management. Geotec Annual Conference, Vancouver, BC, Feb 13 -16, 2005.

Strager\*, M. P. Implementation of land conservation at the parcel level. USDA-CREES National Water Quality Conference, Research, Extension and Education for Clean Water, San Diego, CA, Feb 7-9, 2005.

Strager\*, M. P., and J. M. Strager. A spatially explicit overland flow water quality modeling approach. USDA-CREES National Water Quality Conference, Research, Extension and Education for Clean Water, San Diego, CA, Feb 7-9, 2005.

## 2004

Fletcher\*, J. J., R. N. Eli, M. P. Strager\*, Q. Sun, J. B. Churchill, S. J. Lamont, T. A. Galya, and A. N. Schaer. The Watershed Characterization and Modeling System (WCMS): Support tools for large watershed CHIA and NPDES analyses. Advanced Integration of Geospatial Technologies in Mining and Reclamation Conference, Atlanta, GA, Dec 7-9, 2004.

Eli\*, R. N., J. J. Fletcher, T. A. Galya, M. P. Strager, S. J. Lamont, Q. Sun, and J. B. Churchill. Hydrologic modeling tools for cumulative hydrologic impact assessment of West Virginia coal mine permits. Advanced Integration of Geospatial Technologies in Mining and Reclamation Conference, Atlanta, GA, Dec 7-9, 2004.

Svetlik\*, J. B. and M. P. Strager. Tools, mapping, and analysis for the urban sprawl landscape. Invited Presentation to the West Virginia Water Research Institute Conference, Stonewall Jackson, WV, Oct 28-29, 2004.

Bjorgo\*, K. J., K. Hartman, and M. P. Strager. Using spatial multiple criteria decision making to determine fish and habitat interactions within a GIS framework. American Fisheries Society Annual Meeting, Madison, WI, Aug 22-24, 2004.

Svetlik\*, J. B., M. P. Strager, and T. T. Phipps. Land use determination in a growing West Virginia County: The effects of suburban encroachment beyond the rural/urban fringe. Southern Economic Association Meeting, New Orleans, LA, Nov 21-23, 2004.

Strager\*, M. P. and P. K. Kinder. Management and policy implications of different preferences toward conservation criteria. Society for Conservation GIS, Shepherdstown, WV, Sept 27-29, 2004.

Hailu\*, Y. G. and M. P. Strager. Multi-criteria spatial analysis approach to evaluate active agricultural lands susceptibility to development in Hampshire County, West Virginia. Northeastern Agricultural and Resource Economics Association Conference, Halifax, NS, June 20-23, 2004.

Svetlik\*, J. B., M. P. Strager, and T. T. Phipps. Agricultural land price determination in a growing West Virginia county: The effects of suburban encroachment. Northeastern Agricultural and Resource Economics Association Conference, Halifax, NS, June 20-23, 2004.

Strager\*, M. P. and R. S. Rosenberger. An analysis of criteria preferences in prioritizing areas for conservation. Northeastern Agricultural and Resource Economics Association Conference, Halifax, NS, June 20-23, 2004.

Strager\*, M. P. and C. B. Yuill. A land preservation framework for the Cacapon Watershed of West Virginia. West Virginia GIS Conference, Morgantown, WV, May 9-10, 2004.

Churchill\*, J. B., M. P. Strager, and J. J. Fletcher. Watershed analysis with GIS: The watershed characterization and modeling system. West Virginia GIS Conference, Morgantown, WV, May 9-10, 2004.

Anderson, J. T., J. D. Osbourne\*, M. P. Strager, and R. H. Fortney. A hierarchical method to prioritizing wetland and stream mitigation sites in West Virginia. 60<sup>th</sup> Annual Northeast Fish and Wildlife Conference, Ocean City, MD, April 25-28, 2004.

Strager\*, M. P., R. H. Fortney, J. T. Anderson, J. D. Osbourne, S. A. Copen, N. Angus, and N. Carte. An efficient integration of GIS and field work for identifying wetland and stream mitigation banking opportunities. West Virginia GIS Conference, Morgantown, WV, May 9-10, 2004.

Strager\*, M. P., J. T. Robards, and C. B. Yuill. Integrating geographic information systems and remote sensing for invasive plant species mapping and monitoring. West Virginia GIS Conference, Morgantown, WV, May 9-10, 2004.

Osbourne\*, J. D., J. T. Anderson, M. P. Strager, R. H. Fortney, and S. A. Copen. Results of a three level model for prioritizing wetland and stream mitigation sites. Society of Wetland Scientists, 25<sup>th</sup> Anniversary Conference, Seattle, WA, July 18-23, 2004.

Strager\* M. P., R. Fortney, J. T. Anderson, J. D. Osbourne, S. A. Copen, N. Angus, and N. Carte. A hierarchical approach for prioritizing wetland and stream mitigation sites in West Virginia. The 7<sup>th</sup> Annual National Mitigation and Conservation Banking Conference, New Orleans, NO, March 3-5, 2004.

Petty, J. Stiles, M. Strager, and P. Ziemkiewicz. A hierarchical classification system for identifying restoration priorities and impact vulnerability in mined watersheds of the Mid-Atlantic Highlands. USEPA Watershed Classification Workshop, Washington, DC. April 1<sup>st</sup>, 2004.

Petty, J., M. Strager, C. Billett, and P. Ziemkiewicz. Towards sustainable development in mined watersheds of the Mid-Atlantic Highlands. USEPA Workshop on Sustainability, Thomas, WV. June 19, 2004.

## **2003**

Strager\*, M. P., J. J. Fletcher, A. Morris, and J. Donovan. A multivariate approach to stream flow modeling in WV. American Society of Photogrammetry and Remote Sensing, Anchorage, AK, May 12-16, 2003.

Strager\*, M. P., C. B. Yuill, P. Claggett. Integrating local preferences and spatial data to prioritize lands for protection in the Cacapon River Watershed, WV. Geotec Conference, Vancouver, BC, March 16-19, 2003.

## **2002**

Strager, M. P., K. Luebke\*, and J. J. Fletcher. The St. Mary's River Watershed stormwater decision support system program. Chesapeake Bay Conference, Baltimore MD, Sept 24-26, 2002.

Strager\*, M. P. Decision support tools for environmental resource management. Northeast Agricultural Economics Summer Joint Session, Lakeview Golf Resort and Conference Center, Cheat Lake, WV, July 6-10, 2002.

## **2001**

Claggett\*, C. P. and M. P. Strager. An interactive GIS landscape change and analysis tool. International Association for Landscape Ecology Conference, Tempe, AZ, April 23–25, 2001.

Fletcher,\* J. J., Q. Sun, and M. P. Strager. Using GIS to model stream water quality and acid loading in West Virginia. 29th International Symposium on Computer Applications in the Minerals Industries, Beijing, P. R. China, April 25-27, 2001.

Strager,\* M. P. and J. J. Fletcher. An interdisciplinary approach to watershed analysis with GIS: The Watershed Characterization and Modeling System. Integrated Decision Making for Watershed Management Symposium: Processes and Tools, National 4-H Conference Center Chevy Chase, MD, Jan 7-9, 2001.

## **2000**

Strager,\* M. P., J. J. Fletcher, and C. B. Yuill. Not in my watershed! – An interactive tool for land use change analysis. ESRI Users Conference, San Diego, CA June 26 - 30, 2000.

Edwards\*, B. F., D. Vasquez, D. Smith, and M. P. Strager. Geostatistical and fractal description of the Cheat River Watershed. U.S. DOE, National Energy Technology Appalachian Rivers III Conference, Morgantown, WV, May 15-17, 2000.

Strager\* M. P., J. J. Fletcher, and C. B. Yuill. Public water protection system for West Virginia. ESRI Users Conference, San Diego, CA, June 26 - 30, 2000.

Strager,\* M. P., J. M. Strager, C. B. Yuill, and J. J Fletcher. An interactive watershed modeling tool to evaluate landscape change on stream water quality. Geospatial Information in Agriculture and Forestry, Lake Buena Vista, FL, Jan 10-12, 2000.

## **1999**

Strager,\* M. P., J. J. Fletcher, J. M. Rowe, and C. B. Yuill. A watershed management system for acid mine drainage in the Kiski-Conemaugh River Basin. Pennsylvania GIS Conference, Harrisburg, PA, May 11-13, 1999.

Strager,\* M. P., J. J. Fletcher, J. M. Rowe, and C. B. Yuill. Watershed characterization and modeling results in the Kiski-Conemaugh River Basin. Pennsylvania Environmental Council AMD/AML Conference, State College, PA, June 19, 1999.

Strager,\* M. P., C. B. Yuill, J. J. Fletcher, and J. M. Rowe. Integrated decision support tools for abandoned mine land reclamation and watershed analysis. National Association of Abandoned Mine Land Programs, Annual Conference at Seven Springs Resort, Champion, PA, Aug 22-25, 1999.

Strager,\* M. P., J. J. Fletcher, J. M. Rowe, and C. B. Yuill. Customized watershed management tools for Desktop GIS. ASPRS Annual Conference, Portland Convention Center, Portland, OR, May 17-21, 1999.

Strager,\* M. P. and J. J. Fletcher. Combining multi-criteria decision making and GIS for watershed management and planning. Northeastern Agricultural and Resource Economics Regional Conference, Morgantown, WV, June 28-29, 1999.

## **1998**

Strager,\* M. P., J. J. Fletcher, and C. B. Yuill. Hydrological modeling of acid mine drainage in the Cheat River Watershed, West Virginia. ESRI Users Conference, San Diego, CA, Jul 27-31, 1998.

Strager,\* M. P., J.J. Fletcher, and C. B. Yuill. A watershed characterization and management system for water quality modeling in Central Appalachia. ESRI Mid-Atlantic Users Group Conference, Philadelphia, PA, Nov 18-21, 1998.

Strager,\* M. P., J. J. Fletcher, and C. B. Yuill. An application for highway/environmental planning in sensitive geologic and landscape conditions. ESRI Mid-Atlantic Users Group Conference, Philadelphia, PA, Nov 18-21, 1998.

## **1997**

Strager,\* M. P., C. B. Yuill, and J. J. Fletcher. A decision support system for wetland wildlife management. GIS/LIS Annual Conference and Exposition, Cincinnati OH, Oct 15-18, 1997.

Strager,\* M. P., J. J. Fletcher, and C. B. Yuill. Hydrological modeling of acid mine drainage in the Cheat River. Annual Acid Mine Drainage Conference, Pittsburgh, PA, Oct 17-19, 1997.

## **1996**

Strager,\* M. P., C. B. Yuill, P. Kinder, J. J. Fletcher, and W. Kordek. Identifying high value highland wetland complexes for wetland wildlife management opportunities. GIS/LIS Annual Conference and Exposition, Denver, CO, Nov 20-24, 1996.

Strager,\* M. P., J. J. Fletcher, and C. B. Yuill. Using GIS to help solve water quality problems in West Virginia. 3rd Annual Earth Day Celebration, Morgantown, WV, April 30, 1996.

## **1995**

Strager,\* M. P., J. J. Fletcher, and C. B. Yuill. A water quality modeling system for economic and policy analysis. American Agricultural Economics Association, Indianapolis, IN, July 27-31, 1995.

Strager,\* M. P., J. J. Fletcher, T. T. Phipps, and C. B. Yuill. Ranking acid mine drainage affected watersheds for reclamation. American Agricultural Economics Association, Indianapolis, IN, July 27-31, 1995.

## **Summary of Teaching**

Most of my teaching interests parallel my research interests. My courses fundamentally focus on how to take spatial data and develop it into information and then to aid in decision making. I teach applied courses using geospatial technologies for natural resource management. My teaching approach is based on integrating the presentation of appropriate theory and techniques with applied problem solving for timely local and regional issues. All of the courses listed below except for ARE 629 and FOR 326 are original offerings I initiated. My typical yearly teaching load is 4 classes in the Spring and two in the Fall.

## Teaching Experience

### RESM 545 Spatial Hydrology (taught 2014 – present)

This course is co-taught with Nicolas Zegre (10%) and focuses on advanced watershed analysis and hydrological modeling with GIS. The main part of the hydrological cycle that is analyzed includes the surface runoff and transport of water across the landscape in a fate transport advection conversion context.

### RESM 540 Geospatial Modeling (formerly Spatial Statistics and Regression) (taught 2011 – present)

This course covers point pattern analysis, spatial autocorrelation, hot spot analysis, interpolation and kriging methods, and geographically weighted regression. It is an interdisciplinary graduate course which helps students analyze their spatial data.

### ARE 629 Quantitative Methods (taught 2011 –2014)

This course focuses on applied decision science and optimization techniques to complement economic and policy analysis. We focus mainly on the mechanics of implementing mathematical programming techniques to aid in decision-making most commonly known as management science or operations research.

### RESM 575 Advanced Spatial Analysis (taught 2006- present)

An interdisciplinary course designed to develop advanced Geographic Information System (GIS) and spatial analysis skills while focusing on the use of natural resource and environmental data.

### FOR 326 Remote Sensing of the Environment (taught 2006- present)

Undergraduate course introducing remote sensing technology with a focus on applications in forestry and land use management.

### RESM 440 Foundations for Applied GIS (taught 2007 - present)

This introductory GIS course builds a foundation of necessary spatial and quantitative analysis methods by emphasizing acquisition, management, manipulation, and analysis of data for the solution of spatial problems. This course is designed to build confidence and familiarity in students with the use of GIS technology with timely and appropriate local applications.

### RESM 441 Applied GIS for the Natural Sciences (taught 2007 - present)

The goal of this two credit course is to demonstrate the use of GIS to aid in environmental and natural resource management. The course builds on the foundations of GIS and covers methods to solve problems in forestry, wildlife management, watershed management, landscape ecology, and natural resources applications.

### RESM 442 Applied GIS for the Social Sciences (taught by J. M. Strager)

The focus of this one credit course is to on GIS use in the social sciences. Specifically, the course introduces students to GIS analysis methods applied to problems in business and marketing, community planning and development, health care, crime analysis, environmental justice, recreation, and other applications.

### RESM 444 Advanced GIS for Natural Resource Management (taught 2019 – present)

Provides advanced training using geographic information systems to address the spatial issues of managing natural resources.

### RESM 640 GIS Use for Aquatic Resource Management (taught 2008 to 2012)

This course covers basic methods of aquatic ecosystem characterization and data collection using GIS. In addition, this course also focuses on integrating the analysis capabilities of a GIS with aquatic concepts and models to provide additional insights and information for management.

RESM 585 GIS and Spatial Analysis Project (taught 2016 to present)

This class is primarily intended to provide the capstone experience toward the completion of the Graduate Certificate in GIS and Spatial Analysis. The class is an opportunity for students to pursue a research interest in the spatial sciences with development of an applied spatial project and paper.

**Program Development**

WVU Graduate Certificate in GIS and Spatial Analysis (effective August 2016).

As the lead on the Graduate Certificate in GIS and Spatial Analysis my intent was to augment the educational tracks of a wide number of students from across West Virginia University with the ability to analyze spatial data at an advanced level. The program provides advanced teaching, research and academic program support for the development of applications of applied GIS and spatial analysis across multiple disciplines. In addition to providing a more focused and deeper treatment of these skills, the certificate program provides recognition for mastery of these tools. I am currently serving as the Program Coordinator of this certificate in which I review all submitted plans of study and guide the students through the completion of the capstone experience (RESM 585) which includes proposal and final project/paper.

National Conservation and Training Center

During the past 11 years, I have been involved with the U.S. Fish and Wildlife Service at the National Conservation Training Center in Shepherdstown, WV to provide curriculum planning and development for their geospatial teaching program for USFW service professionals. The Center now offers over 20 different courses which are taught by professionals (<https://training.fws.gov/courses/programs/geospatial-statistics/catalog.html>) that are on staff or sometimes brought in from across the country. I have offered courses in Advanced GIS, Watershed Analysis and Hydrological Modeling, and taught sections of the Species Distribution Modeling course at the NCTC as part of this program.

**WVU Course Development**

Course name and credits	Year approved by Faculty Senate	Developed in online format
RESM 444 Advanced GIS Natural Resources	2017	2020
RESM 440 Foundations of Applied GIS 3 credits	2016	2016
RESM 440 Foundations of Applied GIS 2 credits	2009	2015
RESM 441 Applied GIS: Natural Science 2 credits	2011	2015
RESM 442 Applied GIS: Social Science 2 credits	2011	
RESM 444 Advanced GIS for Natural Resource Mgmt	2017	2019
RESM 445/545 Spatial Hydrology 3 credits	2016	2016
RESM 540 Geospatial Modeling 3 credits	2015	2016
RESM 575 Spatial Analysis for Resource Management	2006	
RESM 640 GIS for Aquatic Resource Management	2011	

RESM 585 GIS and Spatial Analysis Project	2016	
FOR 326 Remote Sensing of the Environment	1999	2016

### **Graduate Student Advising and Service on Committees**

Since the start of my tenure track position in 2007, my graduate committee service includes 161 committees (77 PhD, 84 MS) which have been from majors across the University. I have chaired the committees of 7 PhD and 18 MS degrees.

### **Short Courses and Workshops:**

#### Gunpowder Watershed Conservation Plan Workshop

Presented results and explanation for the Gunpowder Valley Conservancy survey and modeling approach to identify priority lands for easement acquisition. Workshop was held in Baltimore, MD and sponsored by the Chesapeake Bay Foundation. October 5, 2016.

#### Capital Region Land Conservation Strategic Planning Workshop

Responsible for leading a discussion of selecting evaluation criteria, weighting using the Analytical Hierarchy Process, and integrated them with spatial data for conservation planning. Workshop was held in Richmond, VA and sponsored by the Defenders of Wildlife. April 15-17, 2009.

#### Lower Shore Land Conservation Strategic Planning Workshop

Responsible for leading a discussion of selecting evaluation criteria, weighting using the Analytical Hierarchy Process, and integrated them with spatial data for conservation planning. Workshop was held in Salisbury, MD and sponsored by the Defenders of Wildlife. May 13-15, 2009.

#### Geostatistical Analyst Workshop

Invited Workshop Instructor for the 2009 National Fish and Wildlife Service GIS Workshop held at the National Conservation Training Center in Shepherdstown, WV. March 25, 2009.

#### Demonstration of GIS and Spatial Analysis in Fisheries and Aquatic Sciences

Organized workshop with Bill Fischer of Oklahoma State University for the Southern Division of American Fisheries Society Annual Meeting, Wheeling, WV, Mar 1-2, 2008.

#### Watershed Characterization and Modeling System (WCMS) Training Class

Two day training course covering watershed modeling and GIS hydrological concepts in the WCMS software, developed and taught for the West Virginia Department of Environmental Protection Mining and Reclamation, May 18-19, 2000, June 15-16, 2004, June 21-26, 2005, Nov 30, 2007.

#### Multi-Criteria Analysis for Land Use Planning: Theory and Techniques

Half day workshop covering basics of multi-criteria analysis and applications to land use planning integrating smart growth and stakeholder input. Developed for the Canaan Valley Institute Outreach and Highlands Action Program Team, July 22, 2004.

#### Cumulative Hydrological Impact Assessment ArcView 3 Extension Training Class



One day training course for analyzing impacts of potential mine permits in WV watersheds using the CHIA ArcView 3 GIS extension. Developed and taught for the West Virginia Department of Environmental Protection Mining and Reclamation WV, July 10, 2000.

#### Introduction to ArcView 3x for Natural Resource Management

As an authorized instructor for the ESRI based Introduction to ArcView 3x two day training course (exercises were rewritten to use West Virginia datasets), I have co-taught over 150 students since 1997.

#### Watershed Analysis and Hydrological Modeling

This course was offered as a one week 3 credit hour opportunity for US Fish and Wildlife Service personnel to extend their geospatial modeling capabilities to the area of watershed analysis and modeling with GIS. I first taught this course in October of 2014.

### **Professional Development**

- 2018 National Energy Conference: Climate Issues Update, Sponsored by the Friends of the Blackwater, West Virginia University Law School, Morgantown, WV.
- 2016 GIS Support for Hydrologic and Hydraulic Modeling and Analyses day long workshop presented at the American Water Resources Association Annual Conference in Orlando, FL.
- 2015 Land Use Change Science: Lessons Learned from Applications of Using the Land Transformation Model day long workshop presented at the American Association of Geographers, Chicago Ill
- 2015 Terra Populus Training workshop at the Association of American Geographers in Chicago, Ill.
- 2015 Camtasia Software Training workshop sponsored by TechSmith and offered in Washington, DC.
- 2009 Ecological Modeling and Decision Support Systems two hour workshop taught by Keith Reynolds at the ESRI Users Conference, San Diego CA.
- 2009 Spatial Statistics I, Intro to Spatial Pattern Analysis taught by Kevin Johnston at the ESRI Users Conference, San Diego CA.
- 2009 Spatial Statistics II, Ordinary Least Squares and Geographically Weighted Regression taught by Kevin Johnston at the ESRI Users Conference, San Diego CA.
- 2008 Globally Weighted Regression week long workshop taught by Stewart Fotheringham, Chris Brundson, Martin Charlton at the Population Research Institute, The Pennsylvania State University
- 2007 Bayesian Statistics semester long workshop taught by Dr. Wayne Thogmartin from the USGS Upper Midwest Environmental Science Center.
- 2006 GIS and Spatial Modeling for the Undergraduate Social Science Curriculum, Spatial Perspectives on Analysis for Curriculum Enhancement, six day workshop, Ohio State University, Columbus, OH

- 2005 Quantitative Geospatial Analysis in GIS, GEOTEC one day conference workshop, Vancouver, BC
- 2003 Watershed and Water Quality Management, Penn State Land Analysis Laboratory, three day workshop, University Park, PA
- 2002 Advanced ArcGIS 8, ESRI Training Course, five day workshop, Thomas, WV
- 2001 Terrain Analysis, ESRI Users Conference, ½ day workshop, San Diego, CA
- 2000 GIS Hydro–Water Resources Object Model, ESRI Users Conference, ½ day workshop, San Diego, CA
- 2000 Fuzzy Logic and Applications in GIS, ESRI Users Conference, 1 day workshop, San Diego, CA
- 1999 Assessing the Accuracy of GIS Information Created from Remotely Sensed Data: Principles and Practices, 1 day workshop, ASPRS Workshop Portland, OR
- 1997 ESRI Authorized GIS Instructor for ArcView 3x
- 1996 Environmental Resources Imagery, GIS/LIS Conference, 1 day workshop, Denver, CO
- 1996 Avenue Programming, five day ESRI Training Course, Vienna, VA
- 1995 Customizing Arc/Info with AML, five day ESRI Training Course, Vienna, VA

**Professional Activity / Service**

Reviewer: Environmental Practice (Journal of the National Association of Environmental Professionals), Journal of Forest Science, Landscape Ecology, Journal of Environmental Management, Ecological Economics, Land Economics, Environmental Systems and Decisions, Forests, Transactions of the American Fisheries Society, Journal of Water Resources, International Journal of Geographical Information Science, Landscape and Urban Planning, Computers and Geosciences, Education Research Journal, US Geological Survey, Environment Development and Sustainability, Land Economics, Applied Geography, Nature Sustainability, Restoration Ecology, Conservation Biology

- US Department of Agriculture, Agricultural Conservation Easement Program, Agricultural Land Easements Subcommittee of the West Virginia State Technical Committee.
- Member of the Pipeline Compliance Surveillance Initiative with the Allegheny Blue Ride Alliance and the Dominion Pipeline Monitoring Coalition with the goal of providing comprehensive & scientific scrutiny of construction and pre-construction activities along the proposed Atlantic Coast Pipeline route.
- Cube Hydro, coordinating the potential opportunity for WVU to buy green power energy (hydro) from the Cheat Lake Dam hydropower operation.
- The Nature Conservancy, Team Member on the Science for Nature and People Partnership Project Appalachian Coalfields to understand tradeoffs between the region’s economy, environment, and social welfare from various economic development scenarios.

- Guest Editor, Water Resources Management and Modeling in Forestry. Forests (ISSN 1999-4907) is a peer-reviewed journal of forestry and forest ecology published monthly online by MDPI.
- American Geophysical Union, Session Convener for Integrated Modeling and Optimization for Multicriteria Decision Making with Bradley Barnhart
- American Fisheries Society National Meeting, Organizing Committee for GIS Tract with Bill Fisher
- Southern Division of the American Fisheries Society Meeting GIS Symposium chair and organizer
- WV State GIS Steering Committee for Water Resources
- WV Hardwood Conference Organizing Team Member and Track Director
- Freshwater Fisheries and Climate Change Working Group, Member and participant in Climate Change project planning
- Proposal reviewer for the National Fish and Wildlife Foundation, Environmental Protection Agency, US Geological Survey, National Institutes for Water Resources
- Board of directors for the Mid-Atlantic Exotic Pest Plant Council representing WV
- WV Invasive Species Working Group committee for the Nature Conservancy
- Potomac Highlands Cooperative Weed and Pest Management Area Science and Research Advisory Committee
- USDA Natural Resources Conservation Service Serving on the Agricultural Conservation Easement Program, Agricultural Land Easements subcommittee to the WV State Technical Committee
- American Water Resources Association, Technology Committee GIS and Water Resources
- US Fish and Wildlife National Conservation Training Center Program Consultant and Instructor in the Geospatial division
- WV Association of Geospatial Professionals – Digital Elevation Workgroup Committee Member
- USDA National Institute of Food and Agriculture project proposal reviewer

### **Professional Memberships**

- American Geophysical Union 2014-2018
- American Water Resources Association 2008-
- American Fisheries Society 2006-2012
- International Society for Landscape Ecology 2005-2016
- WV Association of Geospatial Professionals 2016-

### **West Virginia University, Davis College and Division Service**

- WVU Faculty Senate Curriculum Committee 2016, 2017
- WVU Teaching and Learning Commons Faculty Associate, 2016-
- WVU Foundation Outstanding Teaching Award selection committee, 2016, 2017
- WVU Faculty Celebration Event “Outstanding Tips from Outstanding Teachers” 2016, 2017
- WVU Senate Grant reviewer 2016

- WVU and Ohio State Environmental Researchers for Shale Gas Group 2016
- WVU Extension Service GPS consultation for precision farming 2015
- WVU Entrepreneur Student Challenge judge 2016
- WVU Institute of Water Security and Science guest speaker 2017
- Davis College Promotion and Tenure Committee 2018, 2019, 2020
- Davis College Faculty Executive Committee 2017-2020
- Davis College Gamma Sigma Delta Honorary Society officer (2017-2020, Historian, Secretary, Treasure, President)
- Davis College lecture selection committee 2016
- Davis College Freshwater Planning committee 2016
- Davis College Environmentors Judge for research projects (posters)
- Davis College Veterans Professional Organization, 2017-
- Davis College Committee member for proposed major in Natural Resources 2017-
- Davis College Graduate Council committee member 2017-2019
- Davis College new student orientation raft trip faculty participant 2016, 2017
- Division Promotion and Tenure Committee 2016, 2014, 2013, 2012
- Division Energy Economics faculty search committee 2015 and 2014
- Division Natural Resource Economics PhD field exam or paper reviewer committee member 2016, 2013, 2011
- Division Awards Committee Chair, 2016-2017
- Division Digital Measures Representative, 2017-
- WVU Wakeboard Team Faculty Sponsor 2018-

### **Consulting Project Experience (GIS, Remote Sensing, Analysis and Modeling)**

- Eagle Creek, Cube Hydro, Bethesda, MD
- Water's Edge Technology, Lemont, PA
- Gannett Flemming, Harrisburg, PA
- Kiski Connemaugh River Basin Association, Johnstown, PA
- WV Bureau of Public Health, Charleston, WV
- Canaan Valley Institute, Thomas, WV
- National Park Service, Chesapeake Watershed, Annapolis, MD
- Downstream Strategies, Morgantown, WV
- First Energy, Pittsburgh, PA
- Defenders of Wildlife, Washington, DC
- US Fish and Wildlife Service, National Conservation Training Center, Shepherdstown, WV
- Sidney Center Improvement Group, Sidney Center, NY
- Neighbor space of Baltimore County, Inc. Towson, MD
- Gunpowder Valley Watershed, Towson, MD
- Cube Hydro, Raleigh, NC

**Community Service**

- Board member Friends of the Cheat, 2016-
- Officer Cheat Lake Environment and Area Recreation 2007-
- Autism Awareness 2010-
- WV Special Olympics 2014
- Monongalia County Democrats, Adopt a Highway, Morgan's Run 2017-