Curriculum Vitae

Education

- 1998 – 2001, M.S., Geography, Department of Geography, Portland State University, Portland, OR.
  Area of Emphasis: Biogeography, Geospatial Sciences, Landscape Eclolgy, GIS, Forest Ecology
- 1988 – 1992, B.A., University of Oregon, Eugene, OR.
  Major: English Literature *Minor*: Environmental Studies

Research and Work Experience

2008 – Present: Spatial Analyst, US Environmental Protection Agency, Western Ecology Division, Corvallis, OR

- I work as a geographer / spatial analyst, providing geospatial support for the EPA National Aquatic Resource Surveys (NARS) and helping build national predictive models and maps of watershed integrity and aquatic condition. I develop approaches primarily in Python and R, as well as using ArcGIS, to process landscape data for spatial designs and modeling, and to interact with the National Hydrography Dataset Plus (NHDPlus). The NARS support work involves providing the spatial framework and geospatial analysis support for the national lakes, rivers and streams, wetlands, and coastal surveys. I have active collaborations with colleagues from other EPA labs (NHEERL AED, MED, GED),divisions (NERL, NCEA), offices and regions (OW, Regions 6 and 7), as well as other agencies and universites (USGS, Utah State, Desert Research Institute). I do extensive work with open source GIS tools in both R and Python, am interested in methods for spatial data visualization using tools such as Bokeh in Python and R Shiny in R, and I am a user and proponent of reproducible research techniques using Git / R Markdown / knitr/ Python notebooks.

2005 – 2008: GIS Specialist, U.S. Forest Service, Rocky Mountain Research Station Fire Sciences Lab, Missoula, MT

- Worked on the USFS Landfire program on the fire regimes team. Ran and modified fire / landscape simulation models (LANDSUM, VDDT), processed spatial data using scripting languages (Python and AML), and performed advanced spatial analysis on fire and fuels data using SQL, Python, VBA, and R. Processed raster data using map algebra for analysis of national fire and fuels mapping products. Interacted and worked closely with personnel from partner agencies such as USGS EROS data center and the Nature Conservancy.

2003 – 2005: Biologist, U.S. Forest Service, Rocky Mountain Research Station Fire Sciences Lab, Missoula, MT

- Managed research project examining historical fire regimes in Utah. Work included planning, locating, installing and taking measurements at research plots using increment borers, chainsaws, gps unit and rangefinder, as well as using dendrochonology techniques and software (COFECHA, FHX2) for dating fire-scarred samples. Processed, summarized, analyzed data and prepared reports on fire history data collected. Performed spatial analysis and map production using ArcMap software and AML scripts. Performed statistica analyses on data using SAS.

2001 – 2003: Ecologist, U.S. Forest Service, Pacific Northwest Research Station Forestry Sciences Lab, Portland, OR

- Supervised field crew for the Forest Inventory and Analysis (FIA) program, and prepared field methods and summarized data during winter. Performed database development in Access and Oracle of inventory plot data for Oregon, Washington, and California. Work required advanced photo interpretation, plant identification, forest pathogen identification, and use of laser rangefinder, GPS, data logger, increment

borer, and clinometer. Prepared plot maps and performed spatial queries using ArcGIS, helped model forest mortality from plot data as part of a pilot study.

2000 – 2003: Instructor, Portland Community College, Portland, OR

- Taught two 1 credit geography field courses each term, one on Mt. St. Helens and one on the Oregon High Desert. Delivered day-long courses focusing on geography and natural history of the areas. Developed course curriculum, supervised approximately 50 community college students on day long field classes, and graded student papers.

1999 – 2001: Assistant Editor, Himalayan Research Bulletin, Portland State University, Portland, OR

- Managed layout and editing of international journal on geographic and cultural research on the Himalayas. Performed journal layout using Adobe Pagemaker, Adobe Photoshop, and Adobe Illustrator software. Performed general office management tasks such as updating membership, correspondence, billing and mailing.

1999: Research Assistant, Portland State University Department of Geography, Portland, OR

- Assisted in research project on tree-islands (kipukas) in lava flows at Newbarry Crater National Monument, examining fire history and insect outbreaks. Collected tree increment cores, identified plants using plant keys, and measured fuel loading on sample plots.

Additional Courses and Training

- 2017, Pandas Foundations, DataCamp
- 2017, Plotly and R Course, DataCamp
- 2017, Introduction to Python for Data Science, DataCamp
- 2016, SQL and R - Introduction to Database Queries, Statistics.com
- 2016, Developing Data Products, Coursera
- 2015, The Data Scientist's Toolbox, Coursera
- 2015, Exploratory Data Analysis, Coursera
- 2012, Visualization in R with ggplot2
- 2008, Introduction to PHP and MySQL, Oregon State University Extended Campus
- 2008, Introduction to Geoprocessing Scripts Using Python, ESRI Instructor-led Course
- 2008, Writing Advanced Geoprocessing Scripts Using Python, ESRI Instructor-led Course
- 2007, Introduction to ArcGIS Server, ESRI Instructor-led Course
- 2007, Learning Python Week-Long In-Person Class, Mark Lutz (author of Learning Python and Python Programming)
- 2006, Learning ArcGIS 9 Spatial Analyst, ESRI Virtual Campus
- 2006, ArcGIS GeoProcessing and the ModelBuilder, Kessler GIS
- 2006, Skills for the GeoDatabase, Kessler GIS
- 2005, Working With Rasters in ArcGIS 8, ESRI Virtual Campus
- 2005, Introduction to SQL, Oregon State University E-Campus Course
- 2003, SAS Programming 1: Essentials, SAS Institute

Research Products and Presentations

Peer Reviewed Articles

Thornbrugh, D.J., S.G. Leibowitz, R.A. Hill, **M.H. Weber**, Z.G. Johnson, A.R. Olsen, J.E. Floteemersch, and J.L. Stoddard. 2018. Ecological Indicators. 85: 1133-1148.

Hill, Ryan A., E.W. Fox, S.G. Leibowitz, A. R. Olsen, D. J. Thornbrugh, **M.H. Weber**. 2017. Predictive Mapping of the Biotic Condition of Conterminous-USA Rivers and Streams. Ecological Appllications. 27: 2397-2415.

Herlihy, A, J.Sifneos, G. Lomnicky, A. Nahlik, M. Kentula, T. Magee, **M. Weber** and A. Trebitz. In Press. The response of wetland quality indicators to human disturbance indicators across the United States. Environmental Monitoring and Assessment.

Fox, E.W., R.A. Hill, S.G. Leibowitz, A.R. Olsen, D.Thornbrugh, and **M.H. Weber**. 2017. Assessing the accuracy and stability of variable selectioni methods for random forest modeling in ecology. Environmental Monitoring and Assessment. 189(7)

Omernik, J., G. Griffith, R. Hughes, J. Glover, and **M. Weber**. 2017. How misapplication of the Hydrologic Unit Framework diminishes the meaning of watersheds. Environmental Management.

Omernik, J, S. Paulsen, G. Griffith, and **M. Weber**. 2016. Regional patterns of total nitrogen concentrations in the National Rivers and Streams Assessment. Journal of Soil and Water Conservation. 71(3): 167-181.

Leibowitz, S.G, R. Comeleo, P.J. Wigington, **M. Weber**, E. Sproles, and K. Sawicz. 2015. Hydrologic Landscape Characterization for the Pacific Northwest, USA. Journal of the American Water Resources Association. 52(2): 473-493.

Hill, R.A, **M. Weber**, S. Leibowitz, A. Olson, and D. Thornbrugh. 2015. The Stream-Catchment (StreamCat) Dataset: A Database of Watershed Metrics for the Conterminous United States. Journal of the American Water Resources Association. 52(1): 120-128.

Xue, J. V. Zartarian, B. Mintz, **M. Weber**, K. Bailey, and A. Geller. 2015. Modeling tribal exposures to methyl mercury from fish consumption. Science of the Total Environment. 533: 102-109.

Payton, Q.C., M. McManus, **M. Weber**, A. Olsen, and T. Kincaid. 2014. Micromap: A package for linked micromaps. Journal of Statistical Software. 63(2):.1-16.

Symanzik, J., D. Xiaotian, **M. Weber**, Q. Payton, and M. McManus. 2014.. Linked Micromap plots for South America – general design considerations and specific adjustments. Revista Colombiana de Estadistica. 37 (2):451-469.

Brooks, J.R., J. Gibson, S. Birks, **M. Weber**, K. Rodecap, and J. Stoddard. 2014. Stable isotope estimates of evaporation: inflow and water residence time for lakes across the United States as a tool for national lake water quality assessments. Limnology and Oceanography. 59(6): 2150-2165.

Peck, D. V., A. Olsen, **M. Weber**, S. Paulsen, C. Peterson, and S. Holdsworth. 2013. Survey design and extent estimates for the National Lakes Assessment. Freshwater Science. 32 (4): 1231-1245.

Hughes, R.M., P. Kaufmann, and **M. Weber**. 2010. National and regional comparisons between strahler order and stream size. Journal of the North American Benthological Society. 301(1): 103-121.

Brown, P., E. Heyerdahl, S. Kitchen, and **M. Weber**. 2008. Climate effects on historical fires (1630-1900) in Utah. International Journal of Wildland Fire. 17(1):28-39.

Weber, M., K. Hadley, P. Frenzen, and J. Franklin. 2006. Forest development following mudflow deposition, Mount St. Helens, Washington. Canadian Journal of Forest Research. 36(2):437-449.

Chapters

Frenzen, P.M., Hadley, K.S., Major, J.J., **Weber, M.H.**, Franklin, J.F., Hardison, J.H., and Stanton, S.M. (2005). Geomorphic Change and Vegetation Development on the Muddy River Mudflow Deposit. Pages 75-91 in V.H. Dale, F. J. Swanson, and C.M. Crisafuli (eds.). Ecological Responses to the 1980 Eruption of Mount St Helens, Springer, New York, NY.

Software

Payton, Q., A.R. Olsen, **M. Weber**, M. McManus, and T. Kincaid (2014). micromap: Linked Micromap Plots. Version 1.9.2 CRAN repo: GitHub

Presentations, Workshops and Panels

- **Weber, M** and B. Weinstein. R-Fundamentals for Spatial Data and Advanced Visualization Techniques in R with Spatial Data. Day-long workshop for 2017 GIS in Action conference, Portland, OR. April 2017.
- **Weber, M.**, R. Hill, S. Leibowitz, A. Olsen, D. Thornbrugh, R. Debbout, and T. Larsen. The Stream-Catchment (StreamCat) dataset. USEPA Spring GIS Workgroup Mason-Hewitt Excellence in GIS nomination presentation. April 2016
- **Weber, M.** The SciPy Stack and Spatial Analysis. Lightning Talk at USEPA Spring GIS Workgroup Meeting. April 2016.
- Advancing US EPA Integration of Environmental and Information Sciences. Invited panelist. Organizers: Rick Ziegler, Gerry Laniak, Allan Brookes. USEPA RTP Campus, RTP, NC. Oct 2015.
- **Weber, M.** Creating Flexible Basins and Building the Stream-Catchment and Lake-Catchment Datsets. Lightning Talk at USEPA Spring GIS Workgroup Meeting. March 2015.
- **Weber, M.** Spatial Data Manipulation, Analysis and Visualization in R: The Basics. Webinar for EPA ORD R User Group. Feb 2015.
- McManus, M.and **M. Weber.** Spatial Analysis, Spatial Dta Analysis, and R. Webinar for EPA ORD Geospatial Sciences User Group. March 2014.
- Frazier, **M., Weber**, M., and L. McCoy. R for Spatial Analysis. One-Day Workshop for USEPA Western Ecology Division. June 2013
- **Weber, M.** Creating the Spatial Framework for National Aquatic Resource Surveys (NARS). The National Water Quality Monitoring Conference, Portland, OR. April 2012.
- **Weber, M.** Using R for Spatial Analysis. Webinar for ORD Geospatial Sciences User Group. Sep 2011.
- **Weber, M.** Variation in Historical Fire Regimes Across an Elevation and Forest Gradient in Utah. Ecological Society of America 89th Annual Meeting. Portland, OR. August 2004.
- **Weber, M.** The 1980 Eruption of Mount St. Helens: Mudflows and Their Impact on Forest Dynamics. USFS Fire Sciences Laboratory Seminar Series. Missoula, MT. Feb 2004.

Posters

- **Weber, M.**, R. Hill, S. Leibowitz, A. Olsen, and D. Thornbrugh. Towards national mapping of aquatic condition: the Stream-Catchment (StreamCat) dataset. Association for Landscape Ecology Annual Meeting. Portland, OR. April 2015.
- Payton, Q., **M. Weber**, M. McManus, and A. Olsen. Linked Micromaps: Statistical Summaries in a Spatial Context. The National Water Quality Monitoring Conference, Portland, OR. April 2012.
- **Weber, M.** and J. VanSickle. Stream ecological condition modeling at the reach and the Hydrologic Unit (HUC) scale. The National Map Conference, Lakewood, CO. May 2011.
- **Weber, M.** and J. VanSickle. Building spatially-explicit model predictions for ecological condition of streams in the Pacific Northwest. The Association for Landscape Ecology Annual Meeting. Portland, OR. 2011.

- **Weber, M.** Simulating Historic Fire Regimes for the LANDFIRE Project. The Association for Fire Ecology Annual Meeting, Fire in the Southwest Conference. Tuscon, AZ. Jan 2008.

Qualifications Memberships and Activities

Programming

Python

- I've worked with Python extensively as an integral part of work since 2005. I learned Python on the job working on the US Forest Service Landfire program where we used Python for most of our workflow scripts. Additionally, I participated in a week-long Python immersion class in person with Mark Lutz, author of Programming Python and Learning Python, while working for the LANDFIRE program. I've continued to develop my Python programming skills using both the ArcGIS ArcPy module as well as many open source spatial modules in Python, and most recently have begun using Python notebooks for reproducible research and Python modules such as Bokeh for data visualization. I am also a co-lead of the newly formed EPA Python Community of Practice.

R

- I started learning R in 2003 and have spent a great deal of time working with R for spatial analysis. I've taught several webinars and workshops on doing spatial analysis in R, and helped to author the micromap package for R. As with Python, I'm very interested in reproducible research methods in R and write the majority of my R scripts as R markdown documents which I knit into html or pdf documents using the knitr package. Additionaly, I've created most of my recent presentations and posters using some combination of knitr / LaTex / Beamer in R.

Web

- Up until last year I maintained the EPA Ecoregions website, performing routine updates and editing in html. I know HTML, CSS, and some Javascript. I'm also familiar with and using GitHub pages, Hugo, and Jekyll for content manamement.

Data Management and Analysis

GIS

- I've used ESRI ArcGIS products extensively for work for the past 15 years since first learning GIS in graduate school. I have expert level experience in using the ArcPy module in python and GIS scripting in Python, and additionally use a number of open source GIS modules in Python (fiona, rasterio, gdal, shapely, geopandas, georasters). Additionally, I've used R for much of my spatial analysis in the past 6 years, and am very familiar with the typical R libraries for spatial analysis (sp, rgdal, rgeos, raster).

Statistics

- I've taken several graduate level statistics courses, including multivariate statistics, and work closely with statisticians in my daily work. I do all my statistical work in R currently and for the past several years, and have also used SAS, SPSS, and SigmaPlot.

Data Science and Data Visualization

- Much of my daily work falls under the rubric of 'Data Science', and I use both R and Python for data management, data acquisition, data cleaning, and data transformation. I've used the libraries and modules in both languages that lend themselves to data manament / data cleaning tasks, such as tidyr, dpyr, ggplot2, reshape2, plyr, and stringr in R and pandas, numpy, abd scipy. I also use both R and Python for data visualization, using libraries such as plotly, RColorBrewer, choroplethr, micromap, ggplot2, leaflet, and shiny in R, and matplotlib, bokeh, seaborn, and ggplot. I also use PostGreSQL / PostGIS for storing, manipulating and querying spatial data.

Awards

- 2016, USEPA ORD Bronze Medal
- 2015, USEPA Office of Water Achievement in Science & Technology Award
- 2015, USEPA Western Ecology Division Certificate of Recognition
- 2013, USEPA Western Ecology Division Certificate of Recognition
- 2012, USEPA PeerOvation Top Innovation Award
- 2012, USEPA Office of Water Bronze Medal
- 2010, USEPA Office of Water Bronze Medal
- 2010, USEPA ORD Exceptional Technical Assistance to Regions / Program Offices Award
- 2007, $500 USFS LANDFIRE Program Appreciation Award
- 2005, $300 USFS Certificate of Appreciation for Fire history fieldwork

Societies

- US Chapter of the International Association of Landscape Ecology, Member
- American Association for the Advancement of Science (AAAS), Member
- AWRA, Member