Timothy J. Sheehan

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I have over 30 years of computer programming and software engineering experience as well as M.S. degrees in geology, computer science, and biology. I am currently working on a Ph.D. in Environmental Science. My software engineering experience ranges from porting climate models to run on massively parallel supercomputers to critical, high data volume, real-time systems. I now focus on the design, implementation, and utilization of computational models for ecological study. Specific areas in which I work include wildfire ignitions, dynamic global vegetation models, and hierarchical, fuzzy logic-based decision support modeling.

EDUCATION

2014-Present – Ph. D. studies, Oregon State University, Environmental Science. Projected graduation date June, 2017.

2011 – Master of Science, University of Oregon, Biology.

1993 – Master of Science, University of Colorado, Computer Science.

1989 – Master of Science, University of Missouri, Geology.

1982 – Bachelor of Science, University of Missouri, Geology.

EMPLOYMENT HISTORY

2011-Present – Ecological Modeler, Conservation Biology Institute Corvallis, Oregon.

2009-2011 – Research Assistant, University of Oregon, Eugene and Oregon State University Corvallis, Oregon.

2008-2010 – Ecological Model Programmer, Conservation Biology Institute Corvallis, Oregon.

2008-2009 – Instructor, Lane Community College Eugene, Oregon.

2001-2007 – Software Engineer, NASDAQ Stock Market and Brut ECN.

2000-1998 – Research Assistant, Department of Computer Science, University of Oregon, Eugene, Oregon.

1996-1998 – Director of Special Projects, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

1993-1996 – Parallel Applications Programmer, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

1992-1993 – Applications Programmer (Student Assistant), National Center for Atmospheric Research, Boulder, Colorado.

SELECT PROJECT EXPERIENCE

Environmental Evaluation Modeling System (EEMS). Design, implementation, and maintenance of EEMS software framework for hierarchical fuzzy logic modeling. Implementations for Arc ModelBuilder user interface, as well as for CSV and NetCDF file formats. Implemented many EEMS modes for research projects and provided user training.

Conservation Biology Institute California Project. I am part of a team working on modeling future potential vegetation, carbon, and fire in the state of California under selected climate futures. This work involves collaborating on improving and running the MC2 Dynamic Global Vegetation Model (DGVM). My specific work includes improving the MC2 fire module to use stochastic fire ignitions instead of assumed ignitions. After model runs are complete, work will include output analysis to characterize and constrain projected climate and land use effects across California.

Integrated Scenarios of climate, hydrology and vegetation for the Northwest. Using the MC2 DGVM, I modeled future potential vegetation across the western conterminous United States under 40 climate futures with and without fire suppression. I analyzed effects of climate change on fire and vegetation in the northwestern United States and contributed to broader analyses across western United States.

LandCarbon – United States Geological Survey. Development, testing, and tuning of the MC2 dynamic global vegetation model (DVGM). Utilization of the model for carbon flux modeling over the conterminous United States. Producing scripts for and performing data analysis.

Utah/Colorado Plateau Stepdown – United States Bureau of Land Management. Worked with managers and fellow scientists to design fuzzy logic models for site sensitivity, climate exposure, and potential impacts. Implemented models, provided results and analysis, co-wrote report on work.

Rapid Ecological Assessments of Colorado Plateau and Sonoran Desert Ecoregions – United States Bureau of Land Management. Implemented Enviornmental Evaluation Modeling System (EEMS), a hierarchical, fuzzy-logic decision support modeling framework to analyze different aspects of the present and projected ecological condition of the Colorado Plateau and Sonoran Desert ecoregions. In addition, performed GIS analysis of data for the project.

Wind, Wings, and Wilderness – Packard Foundation. Created and executed EEMS decision support logic models for the ecological evaluation of wind energy impacts in the Southern Sierras and Tehachapis. Co-designed interactive tools for the on-line exploration and analysis of data. Presented tools and results to BLM managers.

Willamette Valley Coupled Natural Human Systems – National Science Foundation. Developed a plugin module to link the FlamMap explicit fire modeling program with the Envision agent-based modeling system. Modeled wildfire ignition probabilities within the Willamette Watershed, showing that the spatial probabilities of lightning and human ignitions are driven by different factors.

Linked Computing Project – Oak Ridge National Laboratory. Oversaw and performed software engineering to link two geographically separated massively parallel computers to run a single application. At the time the computers – an Intel Paragon at Oak Ridge, National Laboratories in Oak Ridge, TN, and an Intel Paragon at Sandia National Laboratories in Albuquerque, NM – were two of the largest supercomputers in the world.

PROFESSIONAL MEMBERSHIPS

American Geophysical Union

Ecological Society of America

Natural Areas Association

Union of Concerned Scientists

Phi Kappa Phi Honor Society

PUBLICATIONS

Bachelet, D., Ferschweiler, K., Sheehan, T. J., Sleeter, B. M., & Zhu, Z. (2017). Translating MC2 DGVM Results into Ecosystem Services for Climate Change Mitigation and Adaptation. *Climate*, 6(1), 1.

Bachelet, D., Gough, M., Sheehan, T., Baker, B., Ferschweiler, K., & Strittholt, J. (2017). Climate consoles: Pieces in the puzzle of climate change adaptation. *Climate Services*, 8, 36-43.

Bachelet, D., Ferschweiler, K., Sheehan, T., Baker, B., Sleeter, B. M., & Zhu, Z. (2017). Human footprint affects US carbon balance more than climate change. In Reference Module in Earth Systems and Environmental Sciences. New York, NY. Elsevier.

Brown, M., D. Bachelet, M. Gough, and T. Sheehan, 2016. Great Basin land managers provide detailed feedback about usefulness of two climate information web applications. Submitted (10/27/16) to *Climate Risk Management*.

Bachelet, D., K. Ferschweiler, T. Sheehan, J. Strittholt, 2016. Climate change effects on southern California deserts. *Journal of Arid Environments* 127: 17-29.

Sheehan, T., M. Gough, 2015. A platform-independent fuzzy logic modeling framework for environmental decision support. *Ecological Informatics* 34: 92-101.

Bachelet, D., T. Sheehan, K. Ferschweiler, and J. Abatzoglou, 2016. Simulating vegetation change, carbon cycling and fire over the western US using CMIP5 climate projections. In: K. Riley, P. Webley, M. Thompson (eds.) *Natural Hazard Uncertainty Assessment: Modeling and Decision Support*. AGU Geophysical Monographs.

Bachelet, D., K. Ferschweiler, T. Sheehan, B. Sleeter, Z. Zhu, 2015. Projected carbon stocks in the conterminous US with land use and variable fire regimes. *Global Change Biology* 21(12): 4548-4560. doi: 10.1111/gcb.13048

Sheehan, T., D. Bachelet, K. Ferschweiler, 2015. Projected major fire and vegetation changes in the Pacific Northwest of the conterminous United States under selected CMIP5 climate futures. *Ecological Modelling* 317: 16-29. http://dx.doi.org/10.1016/j.ecolmodel.2015.08.023

Peterman, W., D. Bachelet, K. Ferschweiler, T. Sheehan, 2014. Soil depth affects simulated carbon and water in the MC2 dynamic global vegetation model. *Ecological Modelling* 294: 84-93

Koch, J., J.M. Sulzman, J.P. Bolte, R.J. Pabst, T.A. Spies, T. Sheehan, K.A. Olsen, J.D. Kline. 2012. An agent-based modelling approach to project future habitat suitability for northern spotted owl in central Oregon. *Proceedings of the 2012 International Congress on Environmental Modelling and and Software*, Leipzig, Germany.

Sheehan, T. 2011. Modeling Wildfire and Ignitions for Climate Change and Alternative Land Management Scenarios in the Willamette Valley, Oregon. Unpublished Masters Thesis: University of Oregon – Eugene.

Sheehan, T., A. Malony, S. Shende. 1999. A Runtime Monitoring Framework for the TAU Profiling System. *Proceedings of the Third International Symposium on Computing in Object-Oriented Parallel Environments* (ISCOPE'99), San Francisco, CA, December 1999.

Sheehan, T., W. Shelton, T. Pratt, P. Papadopoulos, P. LoCascio, and T. Dunigan. 1998. The locally self consistent multiple scattering method in a geographically distributed linked MPP environment. *Parallel Computing*, 24, 12-13.

Sheehan, T., R. Pennington, P. Papadopoulos, G. Geist, R. Alexander. 1997. The Seamless Computing Environment. *Intel Supercomputer Users Group Thirteenth Annual Conference Proceedings*.

Shelton, B., T. Sheehan, P. Papadopoulos, D. Mackay, P. LoCascio and T. Pratt (1997). Linked supercomputing between ORNL and SNL. *HPCU News* 1, 1.

LoCascio, P. F., A.S. Bland, T.H. Dunigan, T.J. Sheehan. 1997. *A Review of Three Generations of Memory Architecture Design Emphasizing Shared Memory Systems*. Whitepaper submitted to the Department of Energy office of Mathematical, Information and Computational Science Division.

Sheehan, T. 1993. *Porting the NCAR CCM2 from the Cray Y-MP to the Connection Machine*. Unpublished masters thesis: University of Colorado – Boulder.

Sheehan, T. 1989. *Petrogenesis of Selected Migmatites from the Vermillion Granitic Complex of Northeast Minnesota*. Unpublished masters thesis: University of Missouri – Columbia.

ORAL AND POSTER PRESENTATIONS

Sheehan,T. H. L. Romsos, W. D. Spencer, 2017. Optimizing a fuzzy logic model of forest resilience in the Sierra Nevada, California. Ecological Society of America Annual Meeting, Portland, OR, August 6-11, 2017.

Degagne, R. S., J. D. Brice, M. O. A. Gough, T. Sheehan, J. R. Strittholt, 2017. California's landscape condition: Spatial modeling to support conservation and renewable energy planning across the state. Ecological Society of America Annual Meeting, Portland, OR, August 6-11, 2017.

Sheehan, T., D. M. Bachelet, K. Ferschweiler, 2016. Who's driving?: Separating fire, CO_2, and climate change cnfluences on vegetation and carbon dynamics on MC2 results for western Oregon and Washington, United States. American Geophysical Union Fall Meeting, San Francisco, CA, Dec 12-16, 2016.

Bachelet, D. M., B. Baker, M. Brown, M. Gough, T. Mutch, T. Sheehan, 2016. Navigating the high seas of federal programs to ensure usable science delivery. American Geophysical Union Fall Meeting, San Francisco, CA, Dec 12-16, 2016.

Hantson, S. et al. (including T. Sheehan), 2016 (accepted). The status of global fire modeling: results from the Fire Model Intercomparison Project (FireMIP). American Geophysical Union Fall Meeting, San Francisco, CA, Dec 12-16, 2016.

Sheehan, T., B. Baker, 2016. A clearer vision from fuzzy logic: metrics for climate change sensitivity, exposure, and potential impacts in Utah and the Colorado Plateau. Natural Areas Conference, Davis, CA, Oct. 18-21, 2016.

Bachelet, D., K. Ferschweiler, T. Sheehan, B. M. Sleeter, Z. Zhu. 2015. From carbon numbers to ecosystem services: usable results comparing natural versus managed lands. American Geophysical Union Fall Meeting, San Francisco, CA, Dec 14-18, 2015.

Sheehan, T., D. Bachelet, K. Ferschweiler. 2015. Fire in a changing climate: stochastic versus threshold-constrained ignitions in a dynamic global vegetation model. American Geophysical Union Fall Meeting, San Francisco, CA, Dec 14-18, 2015.

Sheehan, T., B. Baker, R. DeGagne, 2015. Taming data to make decisions: using a spatial fuzzy logic decision support framework to inform conservation and

land use planning. American Geophysical Union Fall Meeting, San Francisco, CA, Dec 14-18, 2015

Sheehan, T., D. Bachelet, K. Ferschweiler, J. Abatzoglou, 2015. The possible futures of PNW ecosystems. Sixth Annual Northwest Climate Conference, Coeur D'Alene Nov 3-5, 2015.

Bachelet, D., M. Brown, M. Gough, T. Sheehan, K. Ferschweiler, 2015. So you have data, now what? Sixth Annual Northwest Climate Conference, Coeur D'Alene Nov 3-5, 2015.

Bachelet, D., K. Ferschweiler, T. Sheehan, B. Sleeter, Z. Zhu, 2014. Climate change, fire and land use change effects on ecosystem resilience. International Symposium on Weather and Climate Extremes, Food Security and Biodiversity, Washington D.C. October 20-24, 2014.

Bachelet, D., K. Ferschweiler, T, Sheehan, W. Peterman, B. Sleeter, J. Abatzoglou, 2014. Coupling stress and fire to predict forest change. 98th Annual Meeting of the Ecological Society of America, Sacramento, CA, August 10-15, 2014.

Degagne, R., M.O.A. Gough, T. Sheehan, J. Strittholt. 2014, Tools for balance: using EEMS logic modeling to support conservation and renewable energy planning in California's deserts. Ecological Society of America Annual meeting, Sacremento, CA, Aug 10-15, 2014.

Sheehan, T., M.O.A. Gough, J. Abatzoglou, K. Ferschweiler, D. Bachelet, 2014. Utilization of projected climate data in conservation planning decision support models. Ecological Society of America Annual meeting, Sacremento, CA, Aug 10-15, 2014.

Spencer, W.D., H.L. Romsos, R. Degagne, T. Sheehan, D. Bachelet, 2014. A strategy and decision support framework for conserving isolated fisher (Pekania pennant) population during an era of change. Ecological Society of America Annual meeting, Sacremento, CA, Aug 10-15, 2014.

Sheehan, T., D. Bachelet, K. Fershweiler, M. Gough, J. Abatzoglou, 2014. MC2 DGVM regional results. Integrated Scenarios of the Future Northwest Environment Conference, Portland, Oregon, April 17, 2014.

Bachelet, D., N. Coop, D. Turner, T. Sheehan and K. Ferschweiler, 2014. Simulating vegetation change, carbon cycling and fire over the western US using CMIP5

climate projections. Integrated Scenarios of the Future Northwest Environment Conference, Portland, Oregon, April 17, 2014.

Sheehan, T., D. Bachelet, K. Ferschweiler, J.T. Abatzoglou, K. Hegewisch, 2013. Wildfire, vegetation change and carbon: the effect of different projected climate futures on vegetation in the Western U. S. American Geophysical Union Fall Meeting, San Francisco, CA, Dec 9-13, 2013.

Bachelet, D., K. Ferschweiler, T. Sheehan, Z. Zhu, B. M. Sleeter, 2013. Humans and fire shape the land: climate change only exacerbates the trends. American Geophysical Union Fall Meeting, San Francisco, CA, Dec 9-13, 2013.

Bachelet, D. K. Ferschweiler, T. Sheehan, D. Turner, 2013. Simulating vegetation change, carbon cycling and fire over the western US using CMIP5 climate projections. 4th PNW Climate Science Conference, Portland OR, Sep 5-6, 2013.

Bachelet, D., K. Ferschweiler, T. Sheehan, D. Conklin, K. Henifin, W. Peterman, 2012. Facilitating climate change assessments by providing easy access to data and decision-support tools on-line. 3rd Annual Pacific Northwest Climate Science Conference, Boise, ID, Oct 1-2, 2012.

Bachelet, D., J. Strittholt, B.C. Ward, T. Sheehan, T. Comendant, J.M. Lenihan, J. Osborne-Gowey, 2009. Data Basin Climate Center: where to get datasets, manipulate them, and generate practical answers. AGU Fall Meeting, San Francisco, CA, Dec 14-18, 2009.