Curriculum Vitae
Sean T. Hammond
Assistant Professor

Department of Earth System Science & Policy

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Research Interests: The biotic and abiotic factors impacting forest community assembly and maintenance of species diversity; Plant allometry; Food security; Human macroecology; History of transgenic crops; Mechanisms limiting the size and duration of nation-states.

Education:

2011	Ph.D., Botany, Cornell University (Advisor: Karl J. Niklas)
2005	M.S., Plant Cell and Molecular Biology, Cornell University (Advisors: Lisa Earl, Bruce I. Reisch)
1999	M.S., Applied Molecular Biology, University of Maryland, Baltimore County (Advisor: Julia Wolf)
1996	B.S., Biotechnology, Rochester Institute of Technology (Advisor: Jean Douthwright)

Peer-Reviewed Publications (h-index 12; i10-index 13):

18.) K. J. Niklas, **S. T. Hammond**. 2019. "Biophysical Effects on the Scaling of Plant Growth and Form." *Integrative and Comparative Biology.* 59(5). (**Invited article**) doi.org/10.1093/icb/icz028.

17.) K. J. Niklas, **S. T. Hammond**. 2019. "On the Interpretation of the Normalization Constant in the Scaling Equation." *Frontiers in Ecology and Evolution.* 6 (212). (**Invited article**) doi: 10.3389/fevo.2018.00212.

16.) **S.T. Hammond**, James H. Brown, Joseph R. Burger, Tatiana P. Flanagan, Trevor S. Fristoe, Norman Mercado-Silva, Jeffrey C. Nekola, Jordan G. Okie. 2015. "Food Spoilage, Storage and Transport: Implications for a Sustainable Future." *Bioscience.* 65 (8). (**Cover article**) doi: 10.1093/biosci/biv081.

15.) Niklas, K.J., **S.T. Hammond**. 2014. "Assessing Scaling Relationships: Uses, Abuses, and Alternatives." *International Journal of Plant Sciences.* 175 (7): 754-763. (**Editorial focus piece**) doi: 10.1086/677238.

14.) Burnside, W. R., E. B. Erhardt, **S.T. Hammond** and J. H Brown. 2014. "Rates of Biotic Interactions Scale Predictably with Temperature." *Oikos.* 123 (12): 1449-1456. doi: 10.1111/oik.01199.

13.) Brown, J.H., J.R. Burger, W.R. Burnside, M. Chang, A.D. Davidson, T.S. Fristoe, M.J. Hamilton, **S.T. Hammond**, A. Kodric-Brown, N. Mercado-Silva, J.C. Nekola. 2013. "Macroecology Meets Macroeconomics: Resource Scarcity and Global Sustainability." *Ecological Engineering*. 65: 24-32. doi: 10.1016/j.ecoleng.2013.07.071.

12.) Nekola, J.C., C.D. Allen, J.H. Brown, J.R. Burger, W.R. Burnside, A.D. Davidson, T.S. Fristoe, M.J. Hamilton, **S.T. Hammond**, A. Kodric-Brown, N. Mercado-Silva and J.G. Okie. 2013. "The Malthusian-Darwinian Dynamic and the Trajectory of Civilization." *Trends in Ecology and Evolution*. 28 (3): 127-130. doi: 10.1016/j.tree.2012.12.001.

11.) Niklas, K.J. and **S.T. Hammond.** 2012. "Biophysical Effects on Plant Competition and Co-existence." *Functional Ecology*. 27 (4): 854-864. doi: 10.1111/j.1365-2435.2012.02035.x.

10.) Deng, J., W. Zuo, Z. Wang, Z. Fan, M. Ji, G. Wang, J. Ran, C. Zhao, J. Liu, K.J. Niklas, **S.T. Hammond** and J.H. Brown. 2012. "Insights Into Plant Size-Density Relationships From Models and Agricultural Crops." *PNAS* 109 (22): 8600-8605. doi:10.1073/pnas.1205663109.

9.) Brolly, M., I.H. Woodhouse, K.J. Niklas and **S.T. Hammond.** 2012. "A Macroecological Analysis of SERA Derived Forest Heights and Implications for Forest Volume Remote Sensing." *PLoS One* 7 (3): e33927. doi:10.1371/journal.pone.0033927.

8.) **Hammond, S.T.** and K.J. Niklas. 2012. "Computer Simulations Support a Core Prediction of a Contentious Plant Model." *American Journal of Botany* 99 (3): 508–516. doi:10.3732/ajb.1100415.

7.) **Hammond, S.T.** and K.J. Niklas. 2011. "Modeling Forest Self-Assembly Dynamics Using Allometric and Physical First Principles." *Bioscience* 61 (9): 663–676. **(Cover article)** doi:10.1525/bio.2011.61.9.5.

6.) **Hammond, S.T.** and K.J. Niklas. 2011. "Computer Simulations of Plant Biodiversity in Stable and Unstable Environments: a Test of the Neutral Biodiversity Theory." *Journal of Biological Systems* 19 (1): 1–17. doi:10.1142/S0218339011003762.

5.) **Hammond, S.T.** and K.J. Niklas. 2009. "Emergent Properties of Plants Competing in Silico for Space and Light: Seeing the Tree From the Forest." *American Journal of Botany* 96 (8): 1430. **(Cover article)** doi:10.3732/ajb.0900063

4.) Gunter, K.K., M. Aschner, L.M. Miller, R. Eliseev, J. Salter, K. Anderson, **S. Hammond** and T.E. Gunter. 2005. "Determining the Oxidation States of Manganese in PC12 and Nerve Growth Factor-Induced PC12 Cells." *Free Radical Biology and Medicine* 39 (2): 164–181. doi:10.1016/j.freeradbiomed.2005.03.004.

3.) Gunter, T.E., L.M. Miller, C.E. Gavin, R. Eliseev, J. Salter, L. Buntinas, A. Alexandrov, **S. Hammond** and K.K. Gunter. 2004. "Determination of the Oxidation States of Manganese in Brain, Liver, and Heart Mitochondria." *Journal of Neurochemistry* 88 (2): 266–280. doi:10.1046/j.1471-4159.2003.02122.x.

2.) Weber, J., S. Wilke-Mounts, **S.T. Hammond** and A.E. Senior. 1998. "Tryptophan Substitutions Surrounding the Nucleotide in Catalytic Sites of F 1-ATPase." *Biochemistry* 37 (35): 12042–12050. doi:10.1021/bi981089c.

1.) Weber, J., **S.T. Hammond**, S. Wilke-Mounts and A.E. Senior. 1998. "Mg 2+ Coordination in Catalytic Sites of F1-ATPase." *Biochemistry* 37 (2): 608–614. doi:10.1021/bi972370e.

Manuscripts in preparation or under revision (not inclusive):
3.) **S.T. Hammond** and J.H. Brown. "Janzen-type mortality promotes diversity in silico." Under revision.
2.) **S.T. Hammond**. Untitled manuscript outlining the development of the first plasmid used in the biolistic process. In prep.
1.) **S.T. Hammond.** Untitled manuscript about the historic development of allometric theory and it's outgrowth from eugenics. In prep.

Other Publications:
4.) **Hammond, S.T**. "Sibling Rivalries." University of New Mexico BioBlog. http://unm-bioblog.blogspot.com/2014/02/sibling-rivalries.html

3.) **Hammond, S.T.** "Unintended Consequences." University of New Mexico BioBlog. http://unm-bioblog.blogspot.com/2013/12/unintended-consequences.html

2.) **Hammond, S.T.** "In the Garden of Vida: A Simple, Spatially Explicit Tree-Growth Model able to Simulate Individual and Community Dynamics." PhD dissertation, Department of Plant Biology, Cornell University. 2011.

1.) Fletcher A., K. Gunter, **S. Hammond** editors. "*The Big Red Book: The Best of Gracies Dinnertime Theatre (1995-1999).*" Hell's Kitchen. 1999.

Teaching Experience:
Current Courses:
- Sustainability & Society (ESSP 160); Fall semesters, University of North Dakota.
- Environmental Change: Adaptation & Mitigation (ESSP 330); Spring semesters, University of North Dakota.
- The Biosphere (ESSP 504); Fall semesters, University of North Dakota.
- Earth System Modeling and Simulation (ESSP 520); Spring semester, University of North Dakota.
- Guest lecturer on system modeling in sustainability for Sustainability Science (ESSP 200); University of North Dakota.

Courses Taught in the Past:
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- The Biosphere, Lecture (ESSP 501); University of North Dakota, 2016-2017.

- The Biosphere, Recitation (ESSP 501R); University of North Dakota, 2016-2017.

- The Biosphere, Lab (ESSP 501L); University of North Dakota, 2016-2017.

- DDT is Good for Me—How Monsanto became a Life Science Company (HC 407); Oregon State University, 2016.

- Guest lecturer on RNAi technology in crop breeding and pest control for Genes and Chemicals in Agriculture—Value and Risk (FES 435), Instructors: Steve Straus and David Stone. Oregon State University, 2015.

- Seminar in Integrative Biological and Biomedical Science (SiBBs; Bio 503); University of New Mexico, 2014.

- BioBlog (Bio 402/502); University of New Mexico 2014.Topics in Integrative Biological and Biomedical Science (TiBBs; Bio 520); University of New Mexico, 2013.

- Teaching Assistant: Introduction to Chemistry (Chem 206). Instructor: John H. Terry; Cornell University, 2007

- Guest Lecturer on biolistic transformation and plant selection: Viticulture and Vineyard Management I (Hort 443). Instructors: Bruce Reisch, Peter Cousins and Chris Owens; Cornell University, 2005, 2006.

- Teaching Assistant: Principles of Biology (BioG 110). Instructors: Peter Davies & Carolyn Eberhard; Cornell University, 2004.

- Teaching Assistant: Introductory Botany (BioPL 241). Instructors: Karl Niklas &Thomas Silva; Cornell University, 2003.

Research Supervision:

Current Graduate Students (major advisor):
Emily Theaker (M.S. candidate)

Past Graduate Students (major advisor):
Shelby Osborne (M.S. candidate)
Kane Hammond (M.S. candidate)

Current Graduate Committee:
Lance DiAngelis (Ph.D. candidate)
Nana Owusu-Amponsah (PhD. candidate)
Sean McCloat (Ph.D. candidate)

Past Graduate Committee:
 Mansurat Abdulmalik Ali (M.S. 2019)
 Irina Tsiryapkina (M.S. 2019)
 Mojtaba Shahabi (M.S. 2020)
 Zachary Young (M.S. 2020)
 Michael Garcia (Ph.D. 2020)
 Morgan Burke (Ph.D. 2021)

Spring 2019:
 Sophus A. Hammond, student at Valley Middle School, Grand Forks, ND. Project title: *The Art of Photogra-Tree-- Using leaves as photographic paper.*
 2nd place: Junior Division Sweepstakes Runner-Up
 Winner, Junior Division: University of North Dakota Department of Chemical Engineering award
 Winner, Junior Division: University of North Dakota Department of Biomedical Sciences award

Spring 2018:
 Sophus A. Hammond & Cayden Reed, students at Valley Middle School, Grand Forks, ND. Built and tested an autonomous aquatic robot to clean up plastic waste. Project title: *The Story of A.N.T.S: Aquatic Networked Trash Sweeper.*
 Third place: North Dakota State Science & Engineering Fair, Northeast Region
 Winner, Junior Division: Otter Tail Power Company, project related to energy or electricity
 Winner, Junior Division: University of North Dakota Department of Engineering
 Winner, Junior Division: Navy, project that has applications useful to Navy.
 Winner, Junior Division: Air Force, project that has applications useful to Air Force.

Fall 2013-Fall 2014:
 Eli Echt-Wilson & Albert Zuo, students at La Cueva High School, Albuquerque, NM, working on a project related to the three-dimensional structure of trees and their ability to harvest light. Project title: *A Detailed Computational Model of Tree Growth.*
 •**Winner:** 2014 New Mexico Supercomputing Challenge.
 •**Winner:** 2014 New Mexico State Science and Engineering Fair.
 •**Third place:** 2014 Intel Society for Science and the Public
 •**Best student presentation of an oral paper, Physiology Section:** 2014 Botanic Society of America.
 •**Regional Finalist:** 2014 Siemens Competition in Math, Science, & Technology.

•Grand Prize in team category: 2014 Siemens Competition in Math, Science, & Technology. Students were awarded a $100,000 monetary prize. https://youtu.be/MFRTx0ubHFw

Spring 2013:

Walid Hasan, Israel Montoya, Nico Ponder, Ronald Rosa, & Roderick Van Why, students at the Albuquerque Institute for Mathematics and Science, working on a project related to human macroecology. Project title: *Examining the Scaling Relationship Between City Size and Food Ecology.*

Professional History:

2016-Present   Assistant Professor: Department of Earth System Science & Policy, University of North Dakota.

2014-2016   Research Assistant Professor: Department of Forest Ecology Ecosystems and Society, Oregon State University. Working with Christopher Still as part of the NSF funded Macrosystems project "Thermal Controls on Ecosystem Metabolism and Function: Scaling from Leaves to Canopies to Regions." My role within the project was to help automate data acquisition from FLIR cameras in the field, integrate the data into forest simulations, and extend computer models such as MAESPA.

2011-2014   Research Assistant Professor: Department of Biology, University of New Mexico. Working with James Brown as part of the NSF funded "Experimental Macroecology: Effects of Temperature on Biodiversity" project. My role within the project was to help integrate field data and theory, and to develop and run computer simulations testing what mechanisms promote plant species diversity.

2007-2010   Doctoral Research: Cornell University, Plant Biology (Research advisor: Karl J. Niklas): Developed a computer program (Vida) that is capable of simulating the behavior of real plant populations and entire communities based on the simplifying assumption that species ensemble behavior is determined by competition for space and light. Vida was then used to test assumptions about canonical scaling relationships present in trees, and effects of environmental disturbance on simulated species richness.

2003-2007   Masters and Doctoral Research: Cornell University, Plant Breeding (Research advisor: Bruce I. Reisch): generated several gene cassettes which express the sGFP variant under different promoters, troubleshot and repaired of a prototype biolistic device, established and maintained embryogenic cell lines from anthers and ovaries harvested from *Vitis vinifera* (Chardonnay), regenerated adult plants from embryogenic cell lines, introduced minimal gene cassettes to tobacco and *V. vinifera* cell lines via

biolistics, carried out qualitative and quantitative ELISA, collected xylem sap from *V. vinifera* canes using a large pressure-bomb, assayed xylem sap from *V. vinifera* for endochitinase activity, detected sGFP in transgenic *V. vinifera* tissues via fluorescence microscopy and ELISA.

2002-2003   Laboratory rotations, Cornell University, Plant Biology (Principle investigators: Alan Colmer, Steven D. Tanksley, Stephen Winans): Visualized *Arabidopsis* leaf infection with strains of bacteria expressing GFP, wrote a series of scripts in Perl to datamine ESTs in tomato and potato to identify unique ESTs in potato, visualized the colonization of *Arabidopsis* roothairs by *Agrobacterium tumefaciens* expressing GFP.

2001-2002   Laboratory technician, Boyce Thompson Institute for Plant Research (Principle investigator: David Stern): Worked to identify mutants in RNA polymerases targeting the mitochondria in maize. Duties included growing and crossing elite and mutant maize lines, mutant screening via PCR and RFLP analysis, and transient expression of transgenes in maize cultures introduced via ballistic techniques. Was also responsible for the maintenance and upkeep of public computers used the laboratory.

1999-2001   Laboratory technician, University of Rochester (Principle investigator: Thomas Gunter): Worked in isolating mitochondria from rat liver, heart, and brain tissue. Measured metabolism of mitochondria and cultured cells using dissolved oxygen sensors, designed and constructed new electronics for use with oxygen probes, trained lab members in various molecular biology techniques and basic animal tissue culture.

1998-1999   Masters Research, University of Maryland, Baltimore County (Research advisors: Julia Wolf, Daphne Blumberg): Worked to express a cystine rich *Dictyostelium discoideum* gene product in a soluble form by targeting the expressed protein to the periplasm of *E. coli*. Was responsible for gene amplification, plasmid ligation, electroporation of cells, DNA sequencing, and Northern and Western blotting.

1996-1998   Laboratory technician, University of Rochester (Principle investigator: Alan Senior): Created site-specific mutations of *E. coli* F1-ATPase beta subunit and conducted various protein assays to examine the ATP and ADP binding characteristics.

1994-1995   Laboratory manager, Rochester Institute of Technology (Principle investigator: Irene Evans): Maintained lab, scheduled work schedule for other students, rewrote outdated protocols, and ran SDS-Page gels to detect proteins present in the vitreous humour of calf eyes.

Presentations:

2022   **Hammond, S.T.** *How to help preserve civilization in a way that will make you uncomfortable.* UND Zero Waste Week, University of North Dakota, Grand Forks, ND.(talk)

2021   **Hammond, S.T.** *"I love humidity," said no one ever: Wet bulb 35°C and human habitability.* Ethics of Sustainable Health Panel, University of North Dakota, Grand Forks, ND.(talk)

2018   **Hammond, S.T.** and Shelby Osborne. *Predictive Ecology: Simulating long-term changes in forest populations, with applications for chestnut reintroduction.* Annual American Chestnut Foundation Meeting, Huntsville, AL. (poster)

2018   **Hammond, S.T.** *Naïve Analysis of Pre-Industrial Terrestrial and Naval Polities: Systematics of Size.* Gordon Research Conference: Unifying Ecology Across Scales, Biddeford, ME. (poster)

2018   **Hammond, S. T.** *City Mouse and Country Mouse: How Human Environments Shape Your Views on Sustainability.* University of North Dakota, Aerospace 50th Anniversary Community Open House, University of North Dakota, Grand Forks, ND.(talk)

2018   **Hammond, S. T.** *Where are all the Aliens? Why the Search for Extra-Terrestrials Matters for Human Civilization.* University of North Dakota, Aerospace 50th Anniversary Community Open House, University of North Dakota, Grand Forks, ND.(talk)

2016   **Hammond, S.T.** *Individual-Based Models and Predictive Ecology: Seeing the Forest through the Trees.* Department of Earth System Science and Policy, University of North Dakota, Grand Forks, ND (invited talk)

2016   **Hammond, S.T.** *How Food, Storage, and Transportation Shape Civilization: Network Connectivity, Transport Time, and System Stability.* Department of Earth System Science and Policy, University of North Dakota, Grand Forks, ND (invited talk)

2016   **Hammond, S.T.** *Individual-Based Models and Predictive Ecology: Seeing the Forest through the Trees.* Managing Idaho's Landscapes for Ecosystem Services, University of Idaho, Moscow, ID (invited talk)

2016   **Hammond, S.T.** *How Food, Storage, and Transportation Shape Civilization: Network Connectivity, Transport Time, and System Stability.* Managing Idaho's Landscapes for Ecosystem Services, University of Idaho, Moscow, ID (invited talk)

2015	**Hammond, S.T.** *Human Macroecology: Food, Storage, Transportation, and Human Civilization.* Research Across Boundaries seminar series, Oregon State University, Corvallis, OR
2014	**Hammond, S.T.** *Individual Growth and Group Dynamics.* Oregon State University, Corvallis, OR. (invited talk)
2014	**Hammond, S.T.** *Don't Stand So Close to Me: Distance-Dependent Mortality Promotes Species Diversity in silico.* Botanical Society of America 2014 meeting, Boise, ID. (talk)
2014	**Hammond, S.T.** *Differences in Distance-Related Mortality have Profound Impacts on Simulated Tree Species Diversity.* Gordon Research Conference: Unifying Ecology Across Scales, Biddeford, ME. (poster)
2014	Eli Echt-Wilson, Albert Zuo, and **Sean T. Hammond**. *A Three-Dimensional, Biomechanical-Based Tree Growth Model Exhibiting Realistic Plastic Growth.* Macrosystems PI Meeting. National Science Foundation, Arlington, VA. (poster)
2014	**Hammond, S.T.** *Human Macroecology: Food, Storage, Transportation, and Human Civilization.* Western Spring Sectional Meeting for the American Mathematical Society. Albuquerque, NM. (invited talk)
2014	**Hammond, S.T.** *Heat Fluxes Leading to Unequal Growth Potential in Trees.* NSF Macrosystems Meeting, Norman, OK. (invited talk)
2014	**Hammond, S.T.** *Let Them Eat Bread: Network Connectivity, Transport Time, and System Stability.* Monmouth College, Monmouth, IL. (invited talk)
2013	**Hammond, S.T.** *The Intermediate Disturbance Hypothesis and Janzen-type Mortality Promotes Species Diversity In Silico.* NSF Macrosystems Meeting, Sevilleta, NM. (talk)
2013	**Hammond, S.T.** *Don't Stand So Close To Me: Density Dependent Mortality Promotes Species Abundance In Silico.* University of Nebraska, Lincoln. (invited talk)
2013	**Hammond, S.T.** *Density Dependent Mortality In Silico and what it tells us about Real World Diversity.* NSF Macrosystems Meeting, Sevilleta, NM. (talk)
2013	**Hammond, S.T**. *Predictive Ecology: We know more than we give ourselves credit for.* Macroecology/Biodiversity Workshop, University of California, Berkeley, CA. (talk)
2013	**Hammond, S.T** and K.J. Niklas. *Vida: a Spatially-Explicit, Individual Based Forest Model.* Macroecology/Biodiversity Workshop, University of California, Berkeley, CA. (poster)

2012   **Hammond, S.T.** and J.H. Brown. *Janzen-Connell Density Dependent Mortality Effects Impact Species Diversity In Silico* 97th Ecological Society of America Annual Meeting, Portland, OR. (poster)

2012   **Hammond, S.T.** and J.H. Brown. *Janzen-Connell Density Dependent Mortality Effects Impact Species Diversity In Silico.* Gordon Research Conference: Metabolic Basis of Ecology, Biddeford, ME. (poster)

2012   **Hammond, S.T.**, J.W. Voordeckers, J.H. Brown, B.J. Enquist, Z. He, M. Kaspari, R.B. Waide and J. Zhou. *Experimental Macroecology: Effects of Temperature on Biodiversity.* NSF MacroSystems Biology PI Meeting, Boulder, CO. (poster)

2011   **Hammond, S.T.** *In the Garden of Vida: A simple model able to simulate individual plants, populations and communities.* Department of Biology, University of New Mexico, Albuquerque, NM. (invited talk)

2009   **Hammond, S.T.** *Emergent Properties of Plants Competing in silico for Space and Light.* Science Colloquium, Wells College, Aurora, NY. (invited talk)

2007   **Hammond, S.T**. *Transfer of Transgenic Protein Products Across a Graft Union to Non-transgenic Vitis Tissues.* Lake Erie Regional Grape Project and the Grape Production Research Fund Reporting Session, Dunkirk, NY. (invited talk)

2005   **Hammond, S.T.** *Grape Expectations: Transfer of Transgenic Protein Products Across a Graft Union to Non-transgenic Vitis Tissues.* Semi-annual Plant Breeding Presentations, Cornell University, Ithaca, NY. (invited talk)

2001   T.E. Gunter, L. Miller, L. Buntias, R. Eliseev, **S.T. Hammond**, A. Alexandrov, C. E. Gavin and K.K. Gunter. *Measurements of the Oxidation State of Manganese Inside Brain, Heart, and Liver Mitochondria Using XANES Spectroscopy.* Infacon Nine Meeting, Quebec, Canada. (poster)

2000   T.E. Gunter, L. Miller, A. Alexandrov, L. Buntias, R. Eliseev, **S.T. Hammond** and K.K. Gunter. *Measurement of the Oxidation State of Manganese Inside Mitochondria Using XANES Spectroscopy.* Third Albany Conference on Frontiers of Mitochondrial Research, Rensselaerville, NY. (poster)

2000   K.K. Gunter, L. Miller, A. Alexandrov, L. Buntias, R. Eliseev, **S.T. Hammond** and T.E. Gunter. *A Comparison of the Oxidation State of Intramitochondrial Manganese Under Conditions Chosen to Induce Oxidation and Between Brain, Heart, and Liver Mitochondria.* Third Albany Conference on Frontiers of Mitochondrial Research, Rensselaerville, NY. (poster)

1996   J. A. Douthwright, **S.T. Hammond**, J.C. Nemesh, M.M. Schertler. *Innovative Teaching Materials: Using Student Poster Sessions to Promote Active Learning.* 96th Annual American Society for Microbiology Meeting, New Orleans, LA. (poster)

Computational Research:

2014-Present A.) Investigating the influence of tree canopy temperature and relative humidity on individual tree growth rates, and simulating how variations in rates influence community species diversity over time. This is done by linking computer models operating at different timescales (Vida and Maespa; years versus minutes), and integrating energy flux equations into Vida.

B.) Refining a model of 3d tree growth that uses biomechanics to accurately predict several allometric relationships found in trees.

2007-2014 Developed a computer program (SERA/Vida) that is capable of simulating the behavior of real plant populations and entire communities based on the simplifying assumption that species ensemble behavior is determined by competition for space and light. Vida was then used to test assumptions about canonical scaling relationships present in trees, and effects of environmental disturbance on simulated species richness.

2007   Produced a series of scripting tools that allow one to easily generate two-dimensional, to-scale models of plants using an L-system language that is transparent to the user. Rather than entering complex L-system rules, the user enters physical plant data—internode length, leaf width, etc—and the tools generate L-system codes which are automatically rendered for the user.

Programming, Schema, and Markup Languages:

Python, Fortran, R, C, C++, JavaScript, Lua, Perl, AppleScript, GPX, HTML, XML

Modeling:

SERA, Vida, Mastra, Maespa, 3-PG, 3dTree, Food Transport Simulator
Selected projects available at https://github.com/seanth?tab=repositories

Working Group Experience:

2011-2016 *Human Macroecology Group.* Department of Biology, University of New Mexico, Albuquerque, NM.

Research Grants and Fellowships:

2021	JDOSAS Seed Grant: Video Games as Pedagogy: Generation, Detection, and Characterization of Procedural Exoplanets in a Game as a Teaching Tool
2006:	JM Kaplan Research Program Fund Viticulture Consortium-East Charles R. Bullis Memorial Fund
2005:	Charles R. Bullis Memorial Fund
2004:	Charles R. Bullis Memorial Fund American Vineyard Foundation
2002-2003:	Plant Cell and Molecular Biology Fellowship, Cornell University

Service and Outreach:

Judge	2017-2022. Graduate Research Achievement Day.
Book Review	**Hammond, S.T.** 2015. "Life on Earth through Green-Coloured Glasses." *Bioscience*. doi: 10.1093/biosci/biv038.
Book Review	**Hammond, S.T.**, J.H. Brown, J.R. Burger, M.R. Chang, T.P. Flanagan, T.S. Fristoe, A. Kodric-Brown, J.G. Okie. 2013. "Bankrupting Nature for the (temporary) Wealth of Nations." *Trends in Ecology and Evolution.* doi: 10.1016/j.tree.2013.06.008.
Reviewer	*American Naturalist, Annals of Botany, Bioscience, Ecology and Evolution, Ecology Letters, Forest Ecology and Management, Journal of Systems Biology, Journal of Theoretical Biology, New Phytologist, Oxford University Press, PLOS ONE, Proceedings of the National Academy of Sciences, Tree Physiology, Trends in Ecology and Evolution.*