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**BIOGRAPHICAL SKETCH**

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NAME	POSITION TITLE		
Gross, Louis J.	Professor of Ecology & Evolutionary Biology and Mathematics		
eRA COMMONS USER NAME (credential, e.g., agency login)			
grosslou			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Drexel University, Philadelphia, PA.	B.S.	1974	Mathematics
Cornell University, Ithaca, NY.	Ph.D.	1979	Applied Mathematics

**A. Personal Statement**

I have been a leader in the application of mathematical modeling in various areas of biology. Methods applied cover the breadth of applied mathematics, with particular expertise in dynamical systems, stochastic processes, agent-based modeling and parallel computation. Over the past three decades I have directed and organized many short courses and workshops devoted to enhancing the quantitative training of life scientists, and as Director of the National Institute for Mathematical and Biological Synthesis I oversee one of the leading international centers for research and education at the interface of mathematics and biology. My role in this project will be to help the PI (Baghdoyan) analyze preliminary data for the competing renewal application of this grant. The goal is to develop novel approaches for establishing causal relationships between simultaneous changes in levels of multiple neurotransmitters in multiple functionally related brain regions across time.

**B. Positions and Honors.****Positions and Employment**

1979-1985	Assistant Professor, Department of Mathematics and Graduate Program in Ecology, University of Tennessee, Knoxville, TN
1982 (Fall)	Visiting Biomathematics Researcher, Grassland Research Institute, Berkshire, UK
1982-1984	Faculty Research Participant (Summers), Atmospheric Turbulence and Diffusion Lab, NOAA
1986	Visiting Biomathematician
1987	Distinguished Visitor (Summer), Mathematics and Botany Departments, University of California, Davis, California
1985-1992	Associate Professor, Department of Mathematics and Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee
1992- 1997	Professor, Department of Mathematics and Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee
1997-	Professor, Departments of Ecology and Evolutionary Biology and Mathematics, University of Tennessee, Knoxville, TN
1998 -	Director, The Institute for Environmental Modeling, University of Tennessee
2008 -	James R. Cox Distinguished Professor of Ecology and Evolutionary Biology and Mathematics
2008- 2015	Director, National Institute for Mathematical and Biological Synthesis
2010-	Alvin and Sally Beaman Distinguished Prof of Ecology & Evolutionary Biology and Mathematics
2015-	Director Emeritus, National Institute for Mathematical and Biological Synthesis

**Honors and Memberships**

1992-2001	Science Alliance Center of Excellence Award, University of Tennessee
1999	Chancellor's Research Scholar, University of Tennessee
2000-2001	Vice Chair, Ecological Society of America, Theoretical Ecology Section
2000-2002	National Research Council: Mathematics and Computer Science Panel Member, Bio2010 Committee on Undergraduate Preparation for Future Biology Researchers
2001-2002	Chair, Ecological Society of America, Theoretical Ecology Section
2002-2003	President-Elect, Society for Mathematical Biology
2002.2003	National Research Council: Chair, Committee on Education in Biocomplexity Research
2003-2005	President, Society for Mathematical Biology
2004-2005	National Research Council, Committee on Environmental Decision Making: Principles and

## Criteria for Models

2004	Top 10 Tennessee Scientists, Tennessee Business Magazine
2004-2005	Chair, Board of Governors, Mathematical Biosciences Institute (NSF – Ohio State University)
2006	Distinguished Scientist Award, American Institute of Biological Sciences
2008	Annual Meeting Program Chair and Committee co-Chair, Ecological Society of America
2008-2014	Board on Life Sciences Member, National Academies and National Research Council
2009	Elected Fellow, Biological Sciences Sec, American Association for the Advancement of Science
2009-2012	Treasurer, American Institute of Biological Sciences
2014	Director, National Science Foundation IDEAS Lab in Biology Education

## C. Selected peer-reviewed publications (in chronological order -80 total).

1. Gaff, H., D. L. DeAngelis, L.J. Gross, R. Salinas and M. Shorosh. "A dynamic landscape model for fish in the Everglades and its application to restoration". *Ecological Modelling* 127:33-52 (2000).
2. DeAngelis, D. L., L.J. Gross, W. F. Wolff, D. M. Fleming, M. P. Nott and E. J. Comiskey. "Individual-based models on the landscape: applications to the Everglades". P. 199-211 in J. Sanderson and L. D. Harris (eds.), *Landscape Ecology: A Top-Down Approach*. Lewis Publishers, Boca Raton, FL (2000).
3. Curnutt, J. L., E.J. Comiskey, M. P. Nott and L.J. Gross. "Landscape-based spatially explicit species index models for Everglades restoration". *Ecological Applications* 10:1849-1860 (2000).
4. Gross, L. J. "Education for a biocomplex future". *Science* 288:807 (2000).
5. Okubo, A. and L. J. Gross. Animal movements in home range. Chapter 8 in: *Diffusion and Ecological Problems* (A. Okubo and S. A. Levin, editors). Springer-Verlag, NY. (2002)
6. Comiskey, E. J., O. L. Bass, Jr., L. J. Gross, R. T. McBride, and R. Salinas. Panthers and forests in South Florida: an ecological perspective. *Conservation Ecology* 6(1): 18. [online] URL: <http://www.consecol.org/vol6/iss1/art18> (2002)
7. Brewer, C. A. and L. J. Gross. Training ecologists to think with uncertainty in mind. *Ecology* 84:1412-1414. (2003).
8. Rock, J. H., B. Beckage and L. J. Gross. 2004. Population recovery following differential harvesting of *Allium triococum* Ait. in the southern Appalachians. *Biological Conservation* 116: 227-234
9. Gross, L. J. 2004. Interdisciplinarity and the undergraduate biology curriculum: finding a balance. *Cell Biology Education* 3:85-87.
10. Wang, D., E. Carr, L. J. Gross, and M. W. Berry. "Toward ecosystem modeling on computing grids". *Computing in Science and Engineering* 7:44-52 (2005).
11. Salinas, R. A., S. Lenhart and L. J. Gross. "Control of a metapopulation harvesting model for black bears". *Natural Resource Modeling* 18:307-321 (2005).
12. Beckage, B. and L. J. Gross. "Overyielding and species diversity: what should we expect?" *New Phytologist* 172(1): 140-148 (2006).
13. Wang, D., M. W. Berry and L. J. Gross. "On parallelization of a spatially-explicit structured ecological model for integrated ecosystem simulation". *International Journal of High Performance Computing Applications* 20:571-581 (2006).
14. Whittle, A. J., S. Lenhart and L. J. Gross. "Optimal control for management of an invasive plant species". *Mathematical Biosciences and Engineering* 4(1):101-112 (2007).
15. Gaff, H. D. and L. J. Gross. "Modeling tick-borne disease: a metapopulation model". *Bulletin of Mathematical Biology* 69:265-288 (2007).
16. Fuller, M. M., D. Wang, L. J. Gross and M. W. Berry. "Current problems and future directions in computational science for natural resource management". *Computing in Science and Engineering* 9:40-48 (2007).
17. Ding, W., L. J. Gross, K. Langston, S. Lenhart and L. A. Real. "Rabies in raccoons: optimal control for a discrete time model on a spatial grid". *Journal of Biological Dynamics* 1:379-393 (2007).
18. Fuller, M. M., L. J. Gross, S. M. Duke-Sylvester and M. Palmer. "Testing the robustness of management decisions to uncertainty: Everglades restoration scenarios". *Ecological Applications*. 18:711-723 (2008).
19. Asano, E. L. J. Gross, S. Lenhart and L. A. Real. "Optimal control of vaccine distribution in a rabies metapopulation model". *Mathematical Biosciences and Engineering* 5:219-238 (2008).
20. Bodine, E. N, L. J. Gross and S. Lenhart. "Optimal control applied to a model for species augmentation". *Mathematical Biosciences and Engineering* 5:669-680 (2008).
21. Travis, C. B., L. J. Gross, and B. A. Johnson. "Tracking the gender pay gap: a case study". *Psychology of Women Quarterly* 33: 410-418 (2009).

22. Beckage, B., W. J. Platt and L. J. Gross. "Vegetation, fire, and feedbacks: a disturbance-mediated model of savannas". *American Naturalist* **174**(6): 805-818 (2009).
23. Clayton, T., S. Duke-Sylvester, L. J. Gross, S. Lenhart and L. A. Real. "Optimal control of a rabies epidemic model with a birth pulse". *Journal of Biological Dynamics* **4**(1):43-58 (2010).
24. Beckage, B., L. J. Gross and W. J. Platt. "Grass feedbacks on fire stabilize savannas". *Ecological Modelling* **222**: 2227-223 (2011).
25. Beckage, B., L. J. Gross, and S. Kauffman. "The limits to prediction in ecological systems." *Ecosphere* **2**(11):125. doi:10.1890/ES11-00211.1 (2011).
26. Yin, L., S-L. Shaw, D. Wang, E. A. Carr, M. W. Berry, L. J. Gross and E. J. Comiskey. "A framework of integrating GIS and parallel computing for spatial control problems – a case study of wildfire control." *Int. J. Geographical Information Sci.* **26**:621-641 (2012).
27. Bodine E.N., L. J. Gross and S. Lenhart. "Order of events matter: comparing discrete models for optimal control of species augmentation." *Journal of Biological Dynamics* **6**:31-49 (2012).
28. Beckage, B., L. J. Gross, W. J. Platt, W. Godsoe and D. Simberloff. "Individual variation and weak neutrality as determinants of forest diversity." *Frontiers of Biogeography* **3**:145-154 (2012).
29. Gross, L. J. and B. Beckage. "Toward a metabolic scaling theory of crop systems." *Proceedings of the National Academy of Sciences* **109**:15535-15536 (2012).
30. Federico, P., L. J. Gross, S. Lenhart, and D. Ryan. "Optimal control in individual-based models: implications from aggregated methods." *American Naturalist* **181**: 64-77 (2013).
31. Gross, L. J. "Use of Computer Systems and Models". In: Levin S.A. (ed.) *Encyclopedia of Biodiversity*, Second Edition, Volume 2, pp. 213-220. Academic Press, Waltham, MA (2013).
32. Beckage, B., S. Kauffman, A. Zia, C. Koliba and L. J. Gross. "More complex complexity: Exploring the nature of computational irreducibility across physical, biological, and human social systems." In H. Zenil (ed.) *Irreducibility and Computational Equivalence: 10 Years After Wolfram's A New Kind of Science*, pp. 133-143. Springer, Berlin (2013).
33. Kultz, D., D. F. Clayton, G. E. Robinson, C. Albertson, H. V. Carey, M. E. Cummings, K. Dewar, S. V. Edwards, H. A. Hofmann, L. J. Gross, J. G. Kingsolver, M. J. Meaney, B. A. Schlinger, A. W. Shingleton, M. B. Sokolowski, G. N. Somero, D. C. Stanzione and A. E. Todgham. "New frontiers for organismal biology." *Bioscience* **63**: 464-471 (2013).
34. Gross, L. J. "Selective ignorance and multiple scales in biology: deciding on criteria for model utility." *Biological Theory* **8**:74-79 (2013).

**D. Research Support.**  
**ONGOING**

**Cooperative Agreement EF-0832858 9/1/08-8/31/14 and DBI-1300426 9/1/13-8/31/18**

**National Science Foundation**

**National Institute for Mathematical and Biological Synthesis**

**Role: PI (until 12/31/2014)**

This is a Synthesis Center at the interface of mathematics and biology sponsored by NSF, Department of Homeland Security and the Department of Agriculture.

**COMPLETED**

IIS-0427471 8/1/04-9/1/07

National Science Foundation

ITR: Grid Computing for Ecological Modeling and Spatial Control

Role: PI

This project developed a collection of high-performance computing methods for a variety of ecological modeling and resource management problems.

CESU 99155HS001 Gross (PI) 9/01/02-8/31/05

U.S. Geological Survey

Development of an Across Trophic-level Systems Simulation (ATLSS) for the wetland ecosystems of South Florida

Role: PI

The major goal of this project is to develop and apply a set of mathematical and computer models to aid the planning of long-term water management in South Florida associated with the restoration of the Everglades.

DMS-0010920 Gross (PI) 9/1/01-8/31/05

National Science Foundation

QEIB: Spatially-distributed population models with external forcing and spatial control

Role: PI

The major goal of this project is to develop new mathematical and computational approaches for spatial control in an ecological context, with particular applications to individual-based models. A supplement has been funded through the Undergraduate Mathematics and Biology Initiative, providing support for 6 undergraduates from biology and math to collaborate on interdisciplinary projects.

NRC-04-02-057 Stewart (PI) 9/01/02-1/31/05

Nuclear Regulatory Commission

Bayesian subsurface radiological surveying and analysis

Role: Co-PI

The goal is to add the capability for Bayesian updating for the placement and analysis of radiological samples to the Spatial Analysis and Decision Assistance software.

DEB-02-19269 Gross (PI) 9/1/02-8/31/05

National Science Foundation

ITR: Parallel and Grid Computing for Ecological Multimodeling

Role: PI

This focuses on the development of parallelization methods on a variety of platforms for ecological models that include a variety of mathematical forms and spatial and temporal scales.

IIS-0427471 Gross (PI) 9/1/04-8/31/07

National Science Foundation

ITR: Grid Computing for Ecological Modeling and Spatial Control

Role: PI

This focuses on the development of grid computing methods to assist natural resource managers in spatial aspects of natural system management and the development of a curriculum in computational science for natural resource management.

Cooperative Agreement 04IIQAG0125, Subagreement #04125IIS001 9/1/05-12/31/14

U.S. Geological Survey

Development of an Across Trophic-level Systems Simulation (ATLSS) for the wetland ecosystems of South Florida

Role: PI

The major goal of this project is to develop and apply a set of mathematical and computer models to aid the planning of long-term water management in South Florida associated with the restoration of the Everglades.