

**UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TENNESSEE
WESTERN DIVISION**

Favian Busby and Michael Edgington, *on
their own behalf and on behalf of those
similarly situated*;

Petitioners-Plaintiffs,

v.

Floyd Bonner, Jr., *in his official capacity*,
Shelby County Sheriff, and the Shelby County
Sheriff's Office,

Respondents-Defendants.

Case No. _____

**DECLARATION OF DR. NINA H. FEFFERMAN IN SUPPORT OF
PETITIONERS-PLAINTIFFS' MOTION
FOR A TEMPORARY RESTRAINING ORDER**

I, Nina Fefferman, certify under penalty of perjury that the following statement is true and correct pursuant to 28 U.S.C. § 1746:

1. I am over the age of 18 and I am competent to make this declaration.

2. I am a full Professor at the University of Tennessee, Knoxville in both the Department of Ecology and Evolutionary Biology and the Department of Mathematics. I am also the Director of the Mathematical Modeling Consulting Center at the National Institute for Mathematical and Biological Synthesis, and the Associate Director of the University of Tennessee One Health Initiative. My research focuses on complex adaptive systems, with a focus on the interplay between individual behavior and infectious disease epidemiology. Complex adaptive systems are systems that have a large number of components that interact and adapt such that the system is more complicated than its various parts—for example, living organisms, economies, or cities.

3. I have worked for the past 16 years as a researcher of the epidemiology, ecology, and evolution of infectious disease, pandemic preparedness, national biosecurity, and infrastructure protection. I hold a Master's degree in mathematics from Rutgers University and a PhD in Biology from Tufts University.

4. For over a decade, I was one of the primary researchers of the Command, Control, and Interoperability Center for Advanced Data Analytics, a U.S. Department of Homeland Security ("DHS") Center of Excellence, where I ran a research group focusing on the mathematics of both biosecurity and cybersecurity. As part of my role in that center, I actively contributed models and policy recommendations to DHS and its affiliate agencies for how to manage and mitigate pandemic threats from H1N1 2009 flu, Ebola in West Africa, and Zika virus. I have also consulted for various additional state and federal

agencies and private companies, domestically and abroad, in the area of outbreak management since 2004.

5. My C.V., attached as **Exhibit A**, includes a full list of my honors, experience, and publications.

6. I am donating my time reviewing materials and preparing this report. Any live testimony I provide will also be provided *pro bono*.

7. I have not previously testified as an expert at trial or by deposition.

I. Opinion

8. As an expert in infectious disease dynamics, it is my opinion that individuals who can safely and appropriately remain in the community should not be brought into the Shelby County Jail system at this time. Individuals who are already in those facilities should be evaluated for release. A careful evaluation of procedural and housing guidance should be created for those who remain in jail facilities until at least such time as the epidemic in the broader community has been contained to the extent that the public recommendations relax all measures of social distancing.

9. These steps could substantially reduce the number of COVID-19 infections in both the jail and the surrounding community, and reduce the risk that the Shelby County healthcare system becomes overwhelmed.

II. Risk of COVID-19 Within Jails and Wider Community

10. The health of persons in jail and the health of the rest of the community are inherently linked. The two populations must interact, because jails constantly release people into the wider community, admit new people from the wider community, and rely on staff and vendors who regularly mix with the wider community. Further, many jails

rely on local hospitals to treat incarcerated persons requiring advanced medical care, adding to the burden on the limited resources of local healthcare systems.

11. The existence of jail-driven disease dynamics result in worse health outcomes for the entire population. Cases of infection occurring within a jail cause additional cases of infection, hospitalization and deaths in the wider community.¹ This is not surprising; it reflects the features of the jail population and the jail system itself. The conditions of incarceration degrade the health of incarcerated people, leaving them more vulnerable to infection and severe outcomes from infection.² As an epidemiological result of decreasing individual robustness to disease, the vulnerability of the whole jail population increases.

12. Jails with disease prevalence higher than the general populations they serve will therefore act as sources of infection. Jails will continue to re-seed infection into the wider community, undermining the wider community's efforts to contain or mitigate outbreaks, or even introduce disease into non-infected communities. This cannot be resolved by ceasing release of people from jail, because a substantial number of staff and vendors regularly pass between the jails and the wider community.

¹ Eric Lofgren, Kristian Lum, Aaron Horowitz, Brooke Madubuonwu, Nina Fefferman, *The Epidemiological Implications of Incarceration Dynamics in Jails for Community, Corrections Officer, and Incarcerated Population Risks from COVID-19*, MEDRXIV 2020.04.08.20058842, doi: <https://doi.org/10.1101/2020.04.08.20058842> 15–16 (May 4, 2020) (submitted for review).

² David C. McClelland, Alexander Charles, and Emilie Marks, *The need for power, stress, immune function, and illness among male prisoners*, 91 J. OF ABNORMAL PSYCH. 61, 68 (1982); Elizabeth T. Jacobs, and Charles J. Mullany, *Vitamin D deficiency and inadequacy in a correctional population*, 31 NUTRITION 659, 661-662 (2015); Fiona G. Kouyoumdjian, et al., *Do people who experience incarceration age more quickly? Exploratory analyses using retrospective cohort data on mortality from Ontario*, 12 PLOS ONE 1, 7 (2017); U.S. DEPARTMENT OF JUSTICE, SPECIAL REPORT, *Medical Problems of State and Federal Prisoners and Jail Inmates 2011–12* 1 (Revised Oct. 4, 2016), available at <https://www.bjs.gov/content/pub/pdf/mpsfj1112.pdf>.

13. Outbreaks of disease in jails are exacerbated by both the continuous introduction of potential new sources of infection (for example, as a result of new admissions or by staff) and by the maintenance of higher rates of contact amongst susceptible incarcerated people, due to the density and structure of jail housing arrangements. These dynamics drive the resulting efficacy of any proposed interventions.

14. The living conditions within the jail spread disease. Incarcerated people cannot practice social distancing due to the lack of space, overcrowding, or the requirement of constant supervision. Incarcerated people are moved in groups from jail to court or, where court proceedings are halted due to this pandemic, forced to remain in their cells or dorms in close proximity to each other. Incarcerated people often have limited access to products and equipment necessary to practice good personal hygiene, such as soap, or hand sanitizer or cleaning products.

15. There are strategies that can help to slow the spread of disease and improve individual health outcomes for people incarcerated within the jail system. For example, increased physical/social distancing measures; decreased population density; improved facility sanitation, access to free personal hygienic care, such as warm water, soap, free hand sanitizer, and free cleaning products; increased time spent outside; better nutrition and increased access to free medical care.

16. However, these improvements are unlikely to occur quickly enough or significantly enough to improve the epidemiological risks of COVID-19 for people living within the jail system or the wider community.

17. Further, it is becoming increasingly important to deter every single case of COVID-19 infection possible, including infected incarcerated people, so that the capacity of the local healthcare system in Shelby County, including ICU beds, does not become overwhelmed.

18. Tennessee's Safer at Home order expired on April 30, 2020 and many counties, including Shelby County, have commenced phased reopening of businesses.³ Shelby County commenced Phase 1 of its "Back to Business plan" on May 4, 2020, which included reopening offices, restaurants, hair salons and gym facilities.⁴

19. As social distancing mandates are lifted, it is reasonable to assume that within weeks the number of COVID-19 cases in the Shelby County community will increase substantially and that the number of serious COVID-19 cases requiring hospitalization will also increase. It is estimated that Shelby County currently has up to 480 ICU beds⁵ for a population of over 937,166 people.⁶ As of May 13, 2020, more than 70% of those ICU beds were occupied.⁷ An increase in COVID-19 cases could quickly overwhelm the limited capacity of the local healthcare system, even if the county implements some strategies to increase surge capacity. By preventing the infection of

³ TENNESSEE OFFICE OF THE GOVERNOR, *Gov. Lee Announces Safer at Home Order Will Expire April 30, Tennessee Begins Phased Reopening Next Week* (Apr. 20, 2020), <https://www.tn.gov/governor/news/2020/4/20/gov--lee-announces-safer-at-home-order-will-expire-april-30--tennessee-begins-phased-reopening-next-week.html>.

⁴ City of Memphis Mayor Jim Strickland, *Grid for Sector-Specific Phasing* (accessed May 16, 2020), <https://bactobusiness.memphistn.gov/phases/>.

⁵ Corinne S Kennedy, Samuel Hardiman and Ray Padilla, *How is reopening going? These 4 graphs show trends Shelby County officials are watching*, COMMERCIAL APPEAL (May 12, 2020), <https://www.commercialappeal.com/story/news/health/2020/05/12/shelby-county-reopening-depends-data-trends-heres-what-data-shows/3099716001/>.

⁶ 2020 U.S. CENSUS, *QuickFacts Shelby County, Tennessee*, July 1, 2019 Estimate, <https://www.census.gov/quickfacts/shelbycountytennessee>.

⁷ Corinne S Kennedy, Samuel Hardiman and Ray Padilla, *How is reopening going? These 4 graphs show trends Shelby County officials are watching*, COMMERCIAL APPEAL (May 12, 2020), <https://www.commercialappeal.com/story/news/health/2020/05/12/shelby-county-reopening-depends-data-trends-heres-what-data-shows/3099716001/>.

incarcerated people and especially those most vulnerable to serious illness, and therefore preventing the resulting infections that follow in the wider community, valuable resources, including ICU beds, can be preserved.

III. Conclusion and Recommendations

20. It is my professional judgment, based on the work I have done on mitigation and containment strategies for infectious disease in humans, including COVID-19 and other diseases (such as Zika virus, Tuberculosis, *Clostridium difficile* (C. diff.), and Pandemic flu), that reducing the population of Shelby County Jail by increasing rates of return home for individuals currently incarcerated in the jail system, and decreasing admissions into the jail system, will substantially reduce the number of COVID-19 infections in the jail and the community the jail serves. Successful implementation of these strategies will also clearly yield a reduction in the source of risk to incarcerated people's families and the broader community.

21. Corrections officials can increase the rate of release from jails by evaluating release options or transfer to home confinement for those most vulnerable to serious illness or death if they contract COVID-19. This should be coupled with a decreased rate of intake, since only increasing release rates can increase infection risks for incarcerated people, as well as the staff who work at the jails and court systems, and the broader community.

22. Decreasing population density achieves tremendous benefits. It decreases the probabilities of disease transmission and supports better health for incarcerated people, which also helps to protect the health of jail staff and the community at large. Decreasing population both directly decreases disease exposure, interrupting transmission dynamics,

and also facilitates many other interventions. By reducing transmission, it also preserves the precious resources of local healthcare systems.

23. It is my professional opinion that these steps are both necessary and urgent. Each additional day the jail system continues under current operational standards will cost lives in both the incarcerated population and the broader community each jail serves.

24. The health of people in jails and prisons, whether incarcerated or employed within, is inextricably linked with community health. It is essential to protect the health of individuals who are detained in and work in these facilities, for their sake and the sake of the wider community.

I declare under penalty of perjury that the foregoing is true and correct to the best of my ability.



Nina H. Fefferman, PhD
Name

May 19, 2020 Knoxville, TN
Date

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Exhibit A

Nina H. Fefferman

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Nationality: United States of America
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e-mail: nina.h.fefferman@gmail.com

Departments: Ecology and Evolutionary Biology &
Mathematics
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University of Tennessee
Knoxville, TN 37996

Education

- 2005 PhD in Mathematical Biology from the Department of Biology, Tufts University.
Advisor: J. Michael Reed
- 2001 MS in Mathematics from the Department of Mathematics, Rutgers University.
Advisor: J. Beck
- 1999 AB in Mathematics from Princeton University

Positions

- 2020- Associate Director, UT One Health Initiative, University of Tennessee, Knoxville
- 2018- Director, Mathematical Modeling Consulting Center, University of Tennessee, Knoxville
- 2018 - Professor, Depts. of Mathematics & Ecology and Evolutionary Biology, University of Tennessee, Knoxville
- 2016 - 2018 Associate Professor, Depts. of Mathematics & Ecology and Evolutionary Biology, University of Tennessee, Knoxville
- 2015 - 2016 Program Director, Graduate Program in Ecology and Evolution, Rutgers University
- 2012 - 2016 Associate Professor, Dept. of Ecology, Evolution, and Natural Resources, Rutgers University
- 2011 - 2016 Assistant/Associate Professor, School of Public Health, University of Medicine and Dentistry of New Jersey
- 2008 - 2012 Assistant Professor, Dept. of Ecology, Evolution, and Natural Resources, Rutgers University
- 2007 - 2016 Research Assistant/Associate Professor, The Center for Discrete Mathematics and Theoretical Computer Science, Rutgers University
- 2005 - present Co-Director, Tufts University Initiative for the Forecasting and Modeling of Infectious Disease (InForMID), Tufts University School of Medicine
- 2005 - 2007 Visiting Research Associate, Center for Discrete Math and Theoretical Computer Science (DIMACS), Rutgers University
- 2005 Short Term Visitor, School of Natural Sciences, Institute for Advanced Study

Honors/Awards

- 2019 Invited Participant of the 11th. Triennial Invitational Choice Symposium
- 2019 Invited Performer/Participant, Stand Up Science – a public performance featuring stand-up comics and scientists discussing their work
- 2017 Invited Research Team Leader: AWM Women in Mathematical Biology Workshop
- 2016 Invited Speaker at the National Academy of Sciences Sackler Colloquium
- 2015 Coauthored an article chosen for the cover of *Phil Trans Roy Soc B* (issue 370.1665)
- 2012 Invited to Health Foo 2012

- 2011 Shared the Virginia Governor's Technology Award in the category of ‘Cross-Boundary Collaboration in Modeling & Simulation’ for our study ‘Strategic Default in the Context of a Social Network: An Epidemiological Approach’.
- 2010 Speaker at TEDx Midatlantic
- 2009 Rutgers University Packard Fellow Nominee
- 2007 Coauthored an article chosen for the cover of *The Lancet Infectious Diseases* (vol. 7)
- Invited to give 22 Keynote, Plenary, or Public Lectures (see Invited Talks for details), over three continents

Media Coverage (interviews and coverage):

Television/Online Video Broadcasts:

- The Washington Post, 2020
- BBC International, 2020
- WBIR News, 2019
- NJTV News, 2015
- Discovery Channel “How Stuff Works” (Season 2: “Games Unboxed”), 2011
- BBC World News Aug 21, 2007
- CBS News Aug 22, 2007
- Canada Television (CTV) Aug 21, 2007
- AT&T Tech Channel Sept, 2007

Radio Broadcasts:

- NPR Marketplace, Mar 2020
- NPR WUOT Knoxville, Mar 2017
- PRI Studio 360, Sept 2016
- New Tech City, WNYC, Oct 2014
- PRI Studio 360, Sept 2014
- PRI Studio 360, Jan 2013
- BBC UK News, Aug 2007
- National Public Radio Podcast “Science Friday”, Sept 2007
- AM900 CHML, Sept 2007
- National Public Radio “All Things Considered”, Oct 2005

Print/Online Media (2005-present):

ABC News, ABS CBN News, ARS Technical, Canadian Press (via CBC), Cell, The Daily Mail (UK), The Daily Telegraph (Australia), The Economist, Forbes, Fox News, G1.com.br (Brazil), The Gist (Slate.com), O Globo (Brazil), Gazet Van Antwerpen (Belgium), La Jornada (Mexico), KevinMD, Knox News, Medical News Today, New Scientist, NU.nl (Netherlands), PC Gamer, Reuters, TIME, The Washington Post, Science News, Slate.com, the South African Star, Tech News World, Wired, Yahoo! Entertainment, You Made I *and many more...*

Research Support

Active

2020-2021	\$198,932	NSF RAPID – DEB Coupled Social and Epidemiological Networks and COVID-19	PI
2020-2022	\$359,849	DoD Minerva DECUR - The Topology of Interdependent Multi-Domain Behavioral Systems	PI
2017-2022	\$138,964	NSF IOS - Melding Mathematical and Theoretical	UT-PI

Models of Stress			
2017-2021	\$2,498,876	NSF EEID – Co-evolutionary Epidemiology of Avian Malaria	UT-PI
Completed			
2018-2020	\$196,628	SESYNC/NIMBioS Modeling Risk Perception, Vector-borne Diseases, and Environmental Integrity	PI
2016-2019	\$99,938	NSF EAGER – CISE – Distributed Anomaly Detection	PI
2018-2019	\$2,000	Haines Morris Grant – Internal UTK Competition	Co-PI
2016-2018	\$50,000	US - Israel Binational Science Foundation (BSF)	Co-PI
2016-2018	\$190,000	NSF RAPID – DEB – Modeling Zika Virus Control	PI
2015-2018	\$292,804	USFWS – White-Nose Syndrome Open Grant	Co-PI
2015-2017	\$21,003	NSF RAPID – Information & Intelligent Systems – Virtual Worlds and Experiential Learning	PI
2016-2017	\$75,000	US START Center – Leadership in Social Networks	PI
2017	\$30,000	Syngenta – Workshop Grant – Math of Agribusiness	Co-I
2016-2017	\$100,000	National Academies Keck Futures Initiative	Co-PI
2015-2017	\$130,000	NSF EAGER – DEB – Machine Learning for Co-Evolutionary Systems	Co-PI
2012-2016	\$1,228,053	Dept. of Homeland Security – CyberSecurity	PI
2014-2016	\$100,000	Dept. of Homeland Security – Next Generation Communications and Interoperability	Project PI
2009-2016	\$275,000	Dept. of Homeland Security – BioSecurity	Project PI
2011-2014	\$3,853,332	NSF EASM – Ocean Sciences – SocioEconomic Systems and Climate Change	Co-PI
2011-2012	\$22,500	UCDPER – Emergency Preparedness	Co-PI
2010-2012	\$384,000	Dept. of Homeland Security – Virtual Worlds and Experiential Education	Project PI
2010-2011	\$99,944	Dept. of Homeland Security – Self-Organizing Surveillance Systems	Project PI
2010	\$22,500	Dept. of Homeland Security – BioSecurity	Co-PI
2009-2012	\$299,886	NSF – DEB – ULTRA-Ex	Co-PI
2009-2011	\$89,318	UCDPER – Emergency Preparedness	PI
2009-2010	\$10,000	USDA CSREES Multi-State Research Fund – Vector-borne Disease Control	Co-I
2008	\$99,990	NIH NAID SBIR – Epidemiological Surveillance	PI
2008	\$5,000	Rutgers Climate and Environmental Change Initiative	PI
2008	\$75,000	Rutgers Academic Excellence Fellowship, Climate and Health Research Initiative	Co-I
2007	\$22,500	Dept. of Homeland Security – BioSecurity	PI
2007	\$22,500	Dept. of Homeland Security – BioSecurity	PI
2006	\$5,000	Tufts Summer Scholars Award – Epidemiology	PI
2003-2004	\$42,000	NIH R01 Supplement - Epidemiology	Co-PI
2003-2004	\$1,500	Tufts Institute of the Environment	Co-I
2003	\$500	MASI Student Travel Award	PI
2003	\$1,500	TIES Student Travel Award	PI

Consultancies

2020 American Civil Liberties Union (ACLU)

2020	The State of Vermont, Department of Education
2018	Ogilvy
2017-present	Humane Society International
2009-present	US Centers for Disease Control
2011-2012	Research Institute for Housing America Trust Fund
2006-2007	New Jersey, Department of Corrections
2004-2009	NIH U19 (Center PI: Gorski) T-cell Mediated Immunity
2004	National Defense University
2004	DARPA

Participation in Research Centers

Center	Position	Description of Role
NIMBioS <i>(National Institute for Mathematical and Biological Synthesis)</i>	Leadership Team	Active participant in working group, organizer of multiple tutorials, mentor for summer research experience for undergraduates, and founding director of the Mathematical Modeling Consulting Center
InForMID <i>(Tufts University Initiative for the Forecasting and Modeling of Infectious Diseases)</i>	Center Co-Director	Researcher and Administrative lead in the area of mathematical modeling of infectious disease epidemiology
CCICADA <i>(US Dept of Homeland Security Command, Control, and Interoperability Center for Advanced Data Analysis)</i>	Project PI	Principle Investigator into data analysis relating to social behavior in virtual/technologically enable environments, bio-security, and bio-inspired algorithms in cyber-security
DIMACS <i>(The Center for Discrete Mathematics and Theoretical Computer Science)</i>	Member	Active participant in working groups, collaborations, and conferences (including acting as organizer for multiple workshops/conferences/tutorials) in all areas of mathematical macrobiology
START <i>(US Dept of Homeland Security Center for the Study of Terrorism and Responses to Terrorism)</i>	Project PI	Principle Investigator working on understanding social behavior and algorithms driving the emergence of extremism and leadership in

Publications (peer reviewed):

* = a student or post-doctoral researcher advised by Fefferman during the research effort reported

Journal Articles:

Published or In Press

68. Lemanski*, N., S. Schwab, D. Fonseca, and N.H. **Fefferman**. (In press) Coordination Among Neighbors Improves the Efficacy of the Zika Control Despite Economic Costs. *PLoS Neglected Tropical Diseases*.
67. Wilson, S., S. Sindi, H. Brooks, M. Hohn, C. Price, A. Radunskaya, N. Williams, and N.H. **Fefferman**. 2020. How Emergent Social Patterns in Allogrooming Combat Parasitic Infections. *Frontiers in Ecology and Evolution*. 8:54.
66. DeNegre*, A., Myers*, K., and N.H. **Fefferman**. 2020. Impact of Strain Competition on Bacterial Resistance in Immunocompromised Populations. *Antibiotics*. 9(3):114
65. Myers*, K., A. Redere*, and N.H. **Fefferman**. 2020. How Resource Limitations and Household Economics May Compromise Efforts to Safeguard Children During Outbreaks. *BMC Public Health*. 20(1):1-14.
64. Suarez*, G., O. Udiani*, B. Allan, C. Price, S. Ryan, E. Lofgren, A. Coman, C. Stone*, L. Gallos*, and N.H. **Fefferman**. 2020. A Generic Arboviral Model Framework for Exploring Trade-offs Between Vector Control and Environmental Concern. *Journal of Theoretical Biology*. 490 (2020) 110161.
63. DeNegre*, A., Myers*, K., and N.H. **Fefferman**. 2020. Impact of Chemoprophylaxis Policy for AIDS-immunocompromised Patients on Emergence of Bacterial Resistance. *PLoS One*. 15(1): e0225861.
62. Gallos*, L., S. Havlin, G. Stanley, and N.H. **Fefferman**. 2019. Propinquity drives the emergence of network structure and density. *Proceedings of the National Academy of Sciences*. 116(41):20360-20365.
61. Stone*, C., S. Schwab*, D. Fonseca, and N.H. **Fefferman**. 2019. Contrasting the Value of Targeted vs. Area-Wide Mosquito Control Scenarios to Limit Arbovirus Transmission for Different Tropical Urban Population Centers. *PLoS Neglected Tropical Diseases*. 13.7: e0007479.
60. Myers*, K., A. DeNegre*, L.K. Gallos*, N. Lemanski*, A. Mayberry, A. Redere*, S. Schwab*, O. Stringham, & N.H. **Fefferman**. 2019. Dynamic Ad Hoc Social Networks in Improvised Intelligence / Counter-Intelligence Exercises: A Department of Homeland Security Red-Team Blue-Team Live-Action Roleplay. *Journal of Homeland Security and Emergency Management*. <https://doi.org/10.1515/jhsem-2018-0027>.
59. Suarez*, G.P., L.K. Gallos, and N.H. **Fefferman**. 2019. A Case Study in Tailoring a Bio-Inspired Cyber-Security Algorithm: designing anomaly detection for multilayer networks. *Journal of Cyber Security and Mobility*. 8(1):113-132.
58. DeNegre*, A., K. Myers*, M. Ndeffo, and N.H. **Fefferman**. 2019. Emergence of Antibiotic Resistance in Immunocompromised Host Populations. *PLoS One* 14 (2), e0212969.
57. Schwab*, S., C. Stone*, D. Fonseca, and N.H. **Fefferman**. 2019. (Meta)population Dynamics Determine Effective Spatial Distributions of Mosquito-Borne Disease Control. *Ecological Applications* 29(3): e01856.
56. Kebir*, A., N.H. **Fefferman**, and S.B. Miled. 2018. A general structured model of a hermaphrodite population. *Journal of Theoretical Biology*. 449:53-59.
55. Lemanski*, N.J. and N.H. **Fefferman**. 2018. Expanding the evolutionary theory of aging: honeybees as a test case for an optimal decision making model of senescence. *American Naturalist*. 191(6):756-766.
54. Schwab*, S., C. Stone*, D. Fonseca, and N.H. **Fefferman**. 2018. The importance of being urgent: the impact of surveillance target and scale on mosquito-borne disease control. *Epidemics*. 23:55-63.

53. Beckage, B., L. Gross, S. Metcalf, E. Carr, K. Lacasse, J. Winter, P. Howe, N. **Fefferman**, A. Zia, and T. Franck. 2018. Integrating human behavior and risk perception into a climate model. *Nature Climate Change*. 8:79–84.
52. Maslo, B., O. Stringham, A. Bevan, A. Brumbaugh, C. Sanders, M. Hall, and N.H. **Fefferman**. 2017. High Survival of Some Infected Bat Populations Veils a Persistent Extinction Risk from White-nose Syndrome. *Ecosphere*. 8(12):e02001.10.1002/ecs2.2001.
51. Stone*, C.M., S.R. Schwab*, D.M. Fonseca, N.H. **Fefferman**. 2017. Human movement, cooperation, and the effectiveness of coordinated vector control strategies. *Journal of the Royal Society Interface*. 14(133):20170336.
50. Lemanski*, N.J. and N.H. **Fefferman**. 2017. Coordination Between the Sexes Constrains the Optimization of Reproductive Timing in Honey Bee Colonies *Nature Scientific Reports*. 7:2740.
49. Egizi, A., N.H. **Fefferman**, and R. Jordan. 2017. Relative Risk of Infection with Ehrlichiosis Agents and Lyme Disease in an Area Where Both Vectors are Sympatric. *Emerging Infectious Diseases*. 23(6):939-945.
48. Greenbaum*, G. and N.H. **Fefferman**. 2017. Application of network methods for understanding evolutionary dynamics in discrete habitat. *Molecular Ecology*. DOI: 10.1111/mec.14059
47. Maslo, B., R. Valentin, K Leu, K Kerwin, A Bevan, G.C. Hamilton, N.H. **Fefferman**, and D.M. Fonseca. 2017. ChiroSurveillance: The Use of Native Bats to Detect Invasive Agricultural Pests. *PLoS One*. 12(3), e0173321.
46. Robinson*, O.J., O.P. Jensen, M.M. Provost, S. Huang, N.H. **Fefferman**, A. Kebir and J.L. Lockwood. 2017. Evaluating the vulnerability of sex-changing fish to harvest: A game-theoretic approach. *ICES Journal of Marine Science*. 74(3):652-659.
45. Gallos*, L., M. Korczynski*, and N.H. **Fefferman**. 2017. Anomaly Detection Through Information Sharing Under Different Topologies. *EURASIP Journal on Information Security*. 2017:5. DOI:10.1186/s13635-017-0056-5.
44. Maslo, B., S. Gignoux-Wolfsohn, and N.H. **Fefferman**. 2017. Success of Wildlife Disease Treatment Depends on Host Immune Response. *Frontiers in Ecology and Evolution*. 5(28).
43. Lofgren*, E., A. Egizi, and N.H. **Fefferman**. 2016. Patients as Patches: Ecology and Epidemiology in Healthcare Environments. *Infection Control and Hospital Epidemiology*. 37(12):1507-1512.
42. Korczynski*, M., A. Hamieh*, J. H. Huh, H. Holm, S. R. Rajagopalan, and N. H. **Fefferman**. 2016. Hive Oversight for Network Intrusion Early Warning Using DIAMoND: A Bee-Inspired Method for Fully Distributed Cyber Defense. *IEEE Communications Magazine* 54(6):60-67.
41. Gallos*, L. and N.H. **Fefferman**. 2015. Simple and efficient self-healing strategy for damaged complex networks. *Physical Reviews E*. 92(5):052806.
40. Kebir*, A., N.H. **Fefferman**, S. Ben Miled. 2015. Understanding hermaphrodite species through game theory. *Journal of Mathematical Biology*. 71(6-7):1505-1524.
39. Gallos*, L., and N.H. **Fefferman**. 2015. The Effect of Disease-Induced Mortality on Structural Network Properties. *PLoS One*. DOI: 10.1371/journal.pone.0136704
37. Burkhalter*, J.C., N.H. **Fefferman**, and J.L. Lockwood. 2015. The impact of personality on the success of prospecting behavior in changing landscapes. *Current Zoology*. 61:557-568.
36. Robinson*, O., J. Lockwood, O. Stringham*, and N.H. **Fefferman**. 2015. A Novel Tool for Making Policy Recommendations Based on PVA:Helping Theory Become Practice. *Conservation Letters*. 8(3):190-198.

35. **Fefferman**, N.H. and E.N. Naumova. 2015. Dangers of vaccine refusal near the herd immunity threshold: a modelling study. *Lancet Infectious Diseases*. S1473-3099(15)70130-1
34. Maslo, B. and N.H. **Fefferman**. 2015. A Case Study of Bats and White-Nose Syndrome Demonstrating How to Model Population Viability with Evolutionary Effects. *Conservation Biology*. 29(4):1176-1185. DOI: 10.1111/cobi.12485.
33. Parham, P E. J. Waldock, G.K. Christophides, D. Hemming, F. Agosto, K. J. Evans, N.H. **Fefferman**, H. Gaff, A. Gumel, S. LaDeau, S. Lenhart, R.E. Mickens, E. Naumova, R. Ostfeld, P. Ready, M. Thomas, J. Velasco-Hernandez, E. Michael. 2015. Climate, Environmental, and Socioeconomic Change – Weighing up the Balance in Vector-Borne Disease Transmission. *Philosophical Transactions of the Royal Society B*. 370.1665 (2015): 20130551.
32. Egizi, A., N.H. **Fefferman**, and D. M. Fonseca. 2015. Evidence that implicit assumptions of “no evolution” of disease vectors in changing environments can be violated on a rapid timescale. *Philosophical Transactions of the Royal Society B*. 370.1665 (2015): 20140136.
31. Greening*, B., N. Pinter-Wollman, and N.H. **Fefferman**. 2015. Higher-Order Analysis of Information Sharing and Knowledge Capacity in Animal Social Groups *Current Zoology*. 61(1): 114–127.
30. Gallos*, L. and N.H. **Fefferman**. 2014. Revealing effective classifiers through network comparison. *Europhysics Letters*. 108(3): 38001.
29. Lofgren*, E.T., R.W. Moehring, D.J. Anderson, D.J. Weber, and N.H. **Fefferman**. 2014. A Mathematical Model to Evaluate the Routine Use of Fecal Microbiota Transplantation to Prevent Incident and Recurrent *Clostridium difficile* Infection. *Infection Control and Hospital Epidemiology*. 35(1):18-27.
28. Greening*, B. and N.H. **Fefferman**. 2014. Evolutionary Significance of the Role of Family Units in a Broader Social System. *Nature Scientific Reports*. 4: 3608
27. Seiler, M.J., Collins, A.J., and N.H. **Fefferman**. 2013. Strategic Mortgage Default in the Context of a Social Network: An Epidemiological Approach. *Journal of Real Estate Research* 35(4).
26. Robinson*, O.J., N.H. **Fefferman**, and J.L. Lockwood. 2013. How to effectively manage invasive predators to protect their native prey. *Biological Conservation* 165: 146-153.
25. **Fefferman**, N.H., and L.M. Romero. 2013. Can physiological stress alter population persistence? A model with conservation implications. *Conservation Physiology*. 1(1): cot012. doi: 10.1093/conphys/cot012
24. Moorthy, M., D. Castronovo, A. Abraham, S. Bhattacharyya, S. Gradus, J. Gorski, Y.N. Naumov, N.H. **Fefferman**, and E.N. Naumova. 2012. Deviations in influenza seasonality: odd coincidence or obscure consequence? *Clinical Microbiology and Infection*. 18(10):955-962.
23. Hock*, K. and N.H. **Fefferman**. 2012. Social organization patterns can lower disease risk without associated disease avoidance or immunity. *Ecological Complexity*. 12:34–42.
22. Hock*, K. and N.H. **Fefferman**. 2011. Violating Social Norms when Choosing Friends: How Rule-Breakers Affect Social Networks. *PLoS One*. 2011; 6(10): e26652
21. Hock*, K. and N.H. **Fefferman**. 2011. Extending the role of social networks to study social organization and interaction structure of animal groups. *Annales Zoologici Fennici*. 48(6):365-370.
20. Kafai, Y.B. and N.H. **Fefferman**. 2010. Virtual Epidemics as Learning Laboratories in Virtual Worlds. *Journal of Virtual Worlds Research*. 3(2):2-15.

19. Hock*, K., K.L. Ng, and N.H. **Fefferman**. 2010. Systems approach to studying animal sociality: individual position versus group organization in dynamic social network models. *PLoS One*. 5(12): e15789.
18. **Fefferman**, N.H. and E.N. Naumova. 2010. Innovation in Observation: A Vision for Early Outbreak Detection. *Emerging Health Threats*. 3:e6. doi: 10.3134/ehjt.10.006
17. Lofgren*, E.T., J.B. Wenger, N.H. **Fefferman**, D. Bina, S Gradus, S. Bhattacharyya, Y.N. Naumov, J. Gorski, E.N. Naumova. 2010. Disproportional Effects in Populations of Concern for Pandemic Influenza: Insights from Seasonal Epidemics in Wisconsin, 1967-2004. *Influenza and Other Respiratory Diseases*. 4:205-212.
16. Phan, L., N.H. **Fefferman**, D. Hui, and D. Brugge. 2010. Impact of Street Crime on Boston Chinatown. *Local Environment*. 15(5):481-491.
15. Reed, J.M., N.H. **Fefferman**, and R.C. Averil-Murray. 2009. Vital Rate Sensitivity Analysis and Management Implications for Desert Tortoise. *Biological Conservation*. 14(12): 2813-3222.
14. Wilson-Rich, N., Spivak, M., **Fefferman**, N.H., Starks, P.T. 2009. Genetic, Individual, and Group Facilitation of Disease Resistance in Insect Societies. *Annual Reviews of Entomology*. 54:405-23.
13. **Fefferman**. N.H. 2008. Biological Experimentation *in silico*. *Annales Zoologici Fennici*, 45: 367-368.
12. Lofgren*, E., M. Senese*, J. Rogers* and N.H. **Fefferman**. 2008. Pandemic Preparedness Strategies for School Systems: Is Closure Really the Only Way? *Annales Zoologici Fennici*, 45: 449-458.
11. **Fefferman**, N.H. and K.L. Ng*. 2007. How Disease Models on Static Graphs Fail to Approximate Epidemics in Shifting Social Networks. *Physical Review E*. 76:031919. (*This article was selected for reprinting by the Virtual Journal of Biological Physics Research 2007*)
10. Lofgren*, E. and N.H. **Fefferman**. 2007. The Untapped Potential of Virtual Game Worlds to Shed Light on Real World Epidemics. *The Lancet Infectious Diseases*. 7:625–629. (*article content was the cover of the journal*)
9. Lofgren*, E., N.H. **Fefferman**, Y.N. Naumov, J. Gorski and E.N. Naumova. 2007. Influenza Seasonality: Underlying Causes and Modeling Theories. *Journal of Virology*, 81(11):5429-5436.
8. Lofgren*, E., N.H. **Fefferman**, M. Doshi and E.N. Naumova. 2007. Assessing Seasonal Variation in Multisource Surveillance Data: Annual Harmonic Regression. *Lecture Notes in Computer Science*. BioSurveillance 2007. eds D. Zeng et al. 4506:114-123.
7. **Fefferman**, N.H. and K.L Ng*. 2007. The role of individual choice in the evolution of social complexity. *Annales Zoologici Fennici*, 44:58-69.
6. **Fefferman**, N.H., J.F.A. Traniello, R.B. Rosengaus and D.V. Calleri. 2007. Disease Prevention and Resistance in Social Insects: Modeling the Survival Consequences of Immunity, Hygienic Behavior and Colony Organization. *Behavioral Ecology and Sociobiology*, 61:565-577.
5. Starks, P.T.B. and N.H. **Fefferman**. 2006. Polistes Nest Founding Behavior: a Model for the Selective Maintenance of Alternative Behavioral Phenotypes. *Annales Zoologici Fennici*, 43:456-467.
4. **Fefferman**, N.H., and E.N. Naumova. 2006. Combinatorial Decomposition of an Outbreak Signature. *Mathematical Biosciences*, 202(2):269-287.
3. **Fefferman**, N.H. and J.M. Reed. 2006. A Vital Rate Sensitivity Analysis that is Valid for Non-Stable Age Distributions and for Short-Term Planning. *The Journal of Wildlife Management*, 70(3):649-656.

2. **Fefferman**, N.H., and P.T.B. Starks. 2006. A Modeling Approach to Swarming in Honey Bees. *Insectes Sociaux*, 53(1):37-45.
1. **Fefferman**, N.H., E.A. O'Neil, and E.N. Naumova. 2005. Confidentiality vs Confidence: The aggravation of aggregation as a remedy in public health. *Journal of Public Health Policy*, 26(4):430-449.

Under Review:

10. **Fefferman**, N.H., E.T. Lofgren, N. Li, P. Blue, D.J. Weber, and A.A. Yakubu. Fear, Access, and the Real-Time Estimation of Etiological Parameters for Outbreaks of Novel Pathogens. (Under Review)
9. **Fefferman**, N.H. and O. Udiani. Workforce Training, Deployment, Protection, and Management in the Wake of a Pandemic. (Under Review).
8. Lofgren, E. K. Lum, A. Horowitz, B. Madubonwu, K. Myers, and N. H. **Fefferman**. The Epidemiological Implications of Jails for Community, Corrections Officer, and Incarcerated Population Risks from COVID-19. (Under Review).
7. Feinberg, F., A. Patania, B. McShane, B. Falk, D. Larremore, E. Feit, J. Helveston, M. Small, M. Braun, N. **Fefferman**, and E. Bruch. A Framework for Studying Choices in Networks. (Under Review)
6. Beckage, B., K. Lacasse, J.M. Winter, N.H. **Fefferman**, F.M. Hoffman, L.J. Gross, S.S. Metcalf, T. Franck, E. Carr, A. Zia, and A. Kinzig. The Earth has humans, so why don't our climate models? (Under Review)
5. Udiani*, O., K. Lacasse, A. Zia, L. Gallos*, P. Zhong*, B. Beckage, E. Carr, T. Franck, L. Gross, F. Hoffman, P. Howe, A. Kinzig, S. Metcalf, J. Winter, and N.H. **Fefferman**. Recruitment and Mobilization for Social Movements: implications from network modeling. (Under Review)
4. Udiani*, O., and N.H. **Fefferman**. Could the Need for Rest Provide a Pathway for the Evolution of Division of Labor in Social Species? (Under Review)
3. Gignoux-Wolfsohn, S.A., Pinsky, M.L., Kerwin, K., Herzog, C., Hall, M., Bennett, A.B., **Fefferman**, N.H. and Maslo, B., Genomic signatures of evolutionary rescue in bats surviving white-nose syndrome. (Under Review)
2. Udiani*, O. and N.H. **Fefferman**. Has disease risk shaped the evolution of social complexity in insect societies? (Under Review)
1. Siewe*, N., B. Greening*, and N.H. **Fefferman**. The Potential Role of Asymptomatic Infection in Outbreaks of Emerging Pathogens (Under Review)

Book Chapters:

Published or In Press

10. **Fefferman**, N.H. When to Turn to Nature-Inspired Solutions for Cyber Systems. 2019. in Nature-Inspired Security and Resilience. eds. Eltoweissy, Elalfy, Fulp, and Mazurczyk. pp 29-50. The Institution of Engineering and Technology, London, UK.
9. Price, C.R. and N.H. **Fefferman**. 2019. A Preliminary Exploration of the Professional Support Networks the EDGE Program Creates. in A Celebration of the EDGE Program's Impact on the Mathematics Community and Beyond (pp. 317-325). Springer, Cham.
8. Brooks. H.Z., M.E. Hohn, C. Price, A.E. Radunskaya, S.S. Sindi, N.D. Williams, S.N. Wilson, N.H. **Fefferman**. 2018. Mathematical Analysis of the Impact of Social Structure on Ectoparasite Load in Allogrooming Populations. in Understanding Complex Biological Systems with Mathematics eds. A. Radunskaya, R. Segal, B. Shtylla. Association for Women in Mathematics Series, vol 14. pp 47-61. Springer

7. Williams, N.D., H.Z. Brooks, M.E. Hohn, C. R. Price, A.E. Radunskaya, S.S. Sindi, S.N. Wilson, and N. H. **Fefferman**. 2018. How Disease Risks Can Impact the Evolution of Social Behaviors and Emergent Population Organization. *in* Understanding Complex Biological Systems with Mathematics eds. A. Radunskaya, R. Segal, B. Shtylla. Association for Women in Mathematics Series, vol 14. pp 31-46. Springer
6. Korczynski*, M., A. Hamieh*, J.H. Huh, H. Holm, S. R. Rajagopalan, and N.H. **Fefferman**. 2017. DIAMoND: Distributed Intrusion/Anomaly Monitoring for Nonparametric Detection (invited extended version). *in* Security, Privacy and Reliability in Computer Communications and Networks. eds. K. Sha, A Striegel, and M Song. River Publishers Series in Communications. River Publishers.
5. **Fefferman**, N.H. and L.M. Fefferman. 2011. Mathematical Macrobiology: An Unexploited Opportunity in High School Education. *in* Biomath in the Schools. eds. M.B. Cozzens, and F.S. Roberts. DIMACS Series in Discrete Mathematics and Theoretical Computer Science. Vol 76. American Mathematical Society.
4. Jagai, J., N.H. **Fefferman** and E.N. Naumova. 2011. Waterborne Disease Surveillance. *in* Encyclopedia of Environmental Health. eds. J. Nriagu, S. Kcew, T. Kawamoto, J. Patz, and D. Rennie. Elsevier Science. 1st edition
3. Ji, S., W.A. Chaovalitwongse, N.H. **Fefferman**, W. Yoo, and J.E. Perez-Ortin. 2009. Mechanism-based Clustering of Genome-wide RNA Levels: Roles of Transcription and Transcript-Degradation Rates. *in* Clustering Challenges in Biological Networks. eds. S. Butenko, P.M. Pardalos, and W.A. Chaovalitwongse. World Scientific Publishing Company.
2. **Fefferman**, N.H. and J.F.A. Traniello. 2008. Social Insects as Models in Epidemiology: Establishing the Foundation for an Interdisciplinary Approach to Disease and Sociality. *in* Organization of Insect Societies: From Genome to Sociocomplexity eds J. Gadau and J. Fewell. Harvard University Press
1. MacLeod, N., N. Ortiz, N.H. **Fefferman**, W. Clyde, C. Schultze, and J. MacLean. 2000. Phenotypic Response of Foraminifera to episodes of global environmental change. *in* Biotic Response to Global Change. eds S.J. Culver and P. Rawson. Cambridge University Press

Edited Volumes:

1. **Fefferman**, N.H. (Ed.) (2008) *Annales Zoologici Fennici* 45(5)

Peer Reviewed Contributed Conference Papers:

8. Suarez*, G.P., L.K. Gallos, and N.H. **Fefferman**. 2018. A Case Study in Tailoring a Bio-Inspired Cyber-Security Algorithm: designing anomaly detection for multilayer networks. *2018 IEEE Security and Privacy Workshops (SPW)*. IEEE, 2018.
7. Fields, D. A., Kafai, Y. B., Giang, M. T., **Fefferman**, N., & Wong, J. 2017. Plagues and people: Mass community participation in a virtual epidemic within a tween online world. *Proceedings of the 12th International Conference on the Foundations of Digital Games*. DOI: 10.1145/3102071.3102108
6. Kafai, Y. B., Fields, D. A., Giang, M. T., **Fefferman**, N., Sun, J., Kunka, D., & Wong, J. 2017. Designing for massive engagement in a tween community: Participation, prevention, and philanthropy in a virtual epidemic. *In Interaction Design & Children Conference*. New York: ACM, 365-370. ISBN: 978-1-4503-4921-5
5. Fields, D. A., Kafai, Y. B., Giang, M. T., **Fefferman**, N., & Wong, J. 2017. The Dragon Swooping Cough: Mass community participation in a virtual epidemic within a tween online world. *In* B. Smith, M. Borge, E. Mercier & K. Y. Lim (Eds.) *Proceedings of the 12th International Conference*

on *Computer Supported Collaborative Learning*, Volume 2 (pp. 865-866). Philadelphia, PA: International Society of the Learning Sciences.

4. Fields, D. A., Kafai, Y. B., Sun, J., **Fefferman**, N., Ellis, E., DeVane, B., Giang, M. T., & Wong, J. 2016. The great dragon swooping cough: Stories about learning designs in promoting participation and engagement with a virtual epidemic. In Barany, A., Slater, S., & C. Steinkuehler (Eds.), *Proceedings of the Games + Learning + Society (GLS) 12.0 Conference* (pp. 419-424). Pittsburgh, PA: ETC Press.
3. Verma, S., A. Hamieh*, J. H. Huh, H. Holm, S. R. Rajagopalan, M. Korczynski*, and N. H. **Fefferman**. 2016. Stopping Amplified DNS DDoS Attacks Through Query Rate Sharing Between DNS Resolvers, to appear in the International Conference on Availability, Reliability and Security (ARES). (Note: this is the proceeding of a conference, not a journal, but is equivalent to journal publication for the field of computer science, however in keeping with the conventions of Biology, Fefferman is last author as PI on the sponsoring grant that funded the research.)
2. Korczynski*, M., A. Hamieh*, J.H. Huh, H. Holm, S. R. Rajagopalan, and N.H. **Fefferman**. 2015. DIAMoND: Distributed Intrusion/Anomaly Monitoring for Nonparametric Detection. *CCCN 2015: 24th International Conference on Computer Communications and Networks, IEEE, 2015*. (Note: this is the proceeding of a conference, not a journal, but is equivalent to journal publication for the field of computer science, however in keeping with the conventions of Biology, Fefferman is last author as PI on the sponsoring grant that funded the research.)
1. **Fefferman**, N.H., J. Jagai, and E.N. Naumova. 2004. Two - Stage Wavelet Analysis Assessment of Dependencies in Time Series of Disease Incidence. *Proceedings of the 2004 Conference of the International Environmetrics Society*

Research Mentoring

(bold = current)

Undergraduate Researchers:

Shyretha Brown, Danika Chari, Kaige Chen, Ian Clark, Liz Davis, Anne Eaton, Taylor Eisenstein, Brandon Grandison, Derek Hansen, David Haycraft, John Huffman, Ana Kilgore, John Kim, Edward Lee, Somair Malik, Andrew McConvey, Jeffrey Mandell, Zain Paracha, Luke Postle, Lauren Prince, Asya Pritsker, Cathy Reis, Jeremiah Rogers, Bolanle Salaam, Nicole Scholtz, Margaret Senese, Joshua Smith, Andrew Sohn, Kim Stanek, Johanna Tam, Colleen Thiersch, Elena Tsvetkova, Barton Willage, Immanuel Williams, Nakeya Williams, Barry Walker, Hannah Yin, Yi Ming Yu, Yongqing Yuan, Stefanie Yuen, James Xue, Bobby Zandstra

Graduate Researchers:

(Committee Member, or Advisor for work on funded research projects – not primary dissertation advisor; * = special case)

Kevin Aagard, Emma Bell, Carissa Bleker, Curtis Burkhalter, Jordan Bush, Huilan Chang, Erick Chastain, Fnu Eric Ngang Che, **Brittany Coppinger**, Ashley Crump, Kathryn Fair, Alison Golinski, **Stephen Grady**, Gili Greenbaum, Candice JeanLouis, **Hwayoung Jung**, Ariel Kruger, Di Li, Eric Lofgren*, Nicholas Lorusso, Adam Marszalek, Benjamin McClendon, Anthony Ogbuka, Paul Raff, Orin Robinson, Margarete Romero, Rajat Roy, Liliana Salvador, **Shelby Scott**, Tinevimbo Shiri, Brittany Stephenson, Alex Thorn, Rafael Valentine, Alex Villiard, Orion Weldon

(primary research advisor to)

Jessica Beck, **Kelly Buch**, Ashley DeNegre, **Jeff DeSalu**, Brad Greening, Natalie Lemanski, **Agnesa Redere**, Samantha Schwab, **Anna Sisk** (co-advised), Oliver Stringham, Karen Wylie

Post-Doctoral Researchers:

Dr. Erick Chastain, Dr. Lazaros Gallos, Dr. Manuel Garcia-Quisimondo, Dr. Ali Hamieh, Dr. Karlo Hock, Dr. Cindy Hui, **Dr. Jing Jiao**, Dr. Amira Kebir, Dr. Maciej Korczynski, Dr. Natalie Lemanski, Dr. Kellen Myers, Dr. Kah Loon Ng, Dr. Chris Stone, Dr. Nourridine Siewe (co-advised by Prof. S. Lenhart), Dr. Gonzalo Suarez, **Dr. Oyita Udiani**, Dr. Peng Zhong

Courses Developed and Taught (all courses developed from scratch)

- Advanced Mathematical Ecology II (MAT/EEB 682 – University of Tennessee, Knoxville) Spring 2017 and 2019
- Evolution, Disease, and Medicine (ENR110 – Rutgers University / EEB 310 – UT, Knoxville) Fall each year 2009 – 2014, Spring 2018 and 2020
- Conversational Bio-Mathematical Modeling (ENR 428 – Rutgers University/ EEB 475 – UT, Knoxville) Spring 2011 – 2014, 2020
- Problems in Ecology: Academic Pedagogy (ENR 601 – Rutgers University) Fall 2015
- (*Co-Developed and Taught*) Ethics & Professional Development in Ecology and Evolution (ENR 602 01 – Rutgers University) Spring 2013-2016 (exception – sabbatical Fall 2014-Spring 2015)
- Introduction to Modeling Ecology, Evolution, and Epidemiology (ENR 604 – Rutgers University) Spring each year 2010 – 2016 (exception – sabbatical Fall 2014-Spring 2015)
- Introduction to Epidemiological Modeling (ENR 603 – Rutgers University) Fall each year 2009 – 2012
- Elements of Data Analysis and Epidemiology (CMPH 343 – Tufts University School of Medicine) Spring 2006

Professional Memberships

Association for Women in Mathematics (AWM)
Association for Women in Science (AWIS)
Complex Systems Society (CSS)
Institute of Electrical and Electronics Engineers (IEEE)
International Union for the Study of Social Insects (IUSSI)
Society for Industrial and Applied Mathematics (SIAM)
Society for Mathematical Biology (SMB)

Invited Presentations

*upcoming

2020

Public Interview: “Nina Fefferman,” You Made it Weird podcast

Public Lecture: “The Role of Applied Math in Real-time Pandemic Response: How Basic Disease Models Work,” NIMBioS Webinar Series, Knoxville, TN

Public Interview: “Math + Virus + Us,” Here We Are podcast and YouTube video.

2019

Public Lecture: “Vaccine Acceptance and Epidemic Risks,” Infinite Futures Event Series, Museum of Science and Industry, Chicago, IL.

“When to Turn to Biology for Inspiration in Systems Design,” DIMACS 30th Anniversary Conference, New Brunswick, NJ.

“Patients as patches: Ecological challenges from the epidemiology of healthcare environments,” ESA 2019, Louisville, KY.

“Math and Disease,” Possibilities in Postsecondary Education and Science (PIPES), UTK, Knoxville, TN.

Keynote Address: “Evolving Efficient Solutions: How simple natural systems solve the most complicated problems,” MBI Capstone Conference 2019, Columbus, OH (virtual)

Plenary Talk: “How AIDS prevalence impacts the emergence of antibiotic resistance in bacterial infections,” SIAM BMM 2019, Richmond, VA.

Public Lecture: “Math and Disease,” Stand Up Science, Farragut, TN.

“Biosurveillance and Homeland Security,” Princeton University, NJ.

“Understanding Social Communication Systems with Homology Theory,” Complex Systems Seminar, University of Michigan, Ann Arbor, MI.

“Going Against the Grain,” Women Empowered in STEM (WeSTEM) 2019, Champaign, IL.

“You’re Worth It: Job Negotiations,” Women Empowered in STEM (WeSTEM) 2019, Champaign, IL.

2018

“Math: A Critical, Treacherous Bridge Between Scientific Disciplines,” American Geophysical Union (AGU 2018), Washington DC.

“The Evolution of Social Complexity as Multi-Scale Feedback Control on Networks,” Systems Theory Lunch Colloquium, Harvard Medical School, Boston, MA.

“Saving Bats from Fungal Diseases with Linear Algebra,” Claremont Center for Mathematical Sciences Colloquium, Claremont, CA.

Plenary Talk: “Evolving Efficient Solutions: How simple natural systems solve the most complicated problems,” NIMBioS Undergraduate Research Conference 2018, Knoxville, TN.

Plenary Talk: “Linking Local Decisions with Global Outcomes in Networks: Case Studies in Behavior and Population Health” SIAM Life Sciences 2018, Minneapolis, MN.

“The mathematical biology of networks: from disease outbreaks to cyber-attacks,” TN Governor’s School, University of Tennessee, Knoxville, TN.

“Trans-disciplinary adventures in the mathematical biology of networks: from disease outbreaks to cyber attacks,” DIMACS REU, Rutgers University, Piscataway, NJ.

Public Webinar: “Social and Biological Networks: The Evolution of Social Systems,” US National Academies of Sciences, Engineering, and Medicine: Math Frontiers Webinar Series

2017

“Self-Diagnosing Networks,” Data Institute San Francisco Conference (DSCO17), San Francisco, CA.

Keynote: “Evolving Efficient Solutions: How simple natural systems solve the most complicated problems,” Workshop on Bio-Inspired Security, Trust Assurance, and Resilience (BioSTAR 2017), San Jose, CA.

“Wildlife Disease Management Outcomes May Depend on the Mechanism of Host Immune Response,” Distinguished Lecture Series in Immunology and Infectious Diseases, Center for Emerging & Re-emerging Infectious Diseases, School of Medicine, University of Washington, Pullman, WA.

2016

- “Evolving Healthy Populations,” International Symposium on Biomathematics and Ecology Education and Research 2016, Charlseton, SC.
- “Individuals, Societies, and Climate: Modeling motivations to change,” Oak Ridge National Laboratory Workshop on Human Activity at Scale in Earth System Models, Oak Ridge, TN.
- “Network Models in Epidemiology,” US-Canadian Institutes Epidemiology Summer School: Mathematical Modeling of Infectious Disease Spread, MBI, Columbus, OH.
- “The Invasion Ecology of Diseases in a Human Environment,” Arthur M. Sackler Colloquia of the National Academy of Sciences, Coupled Human and Environmental Systems, Washington DC.
- “Global Feedback Control on Centrality in Self-Organizing Systems”, Mathematical Biosciences Institute Workshop on the Control and Observability of Network Dynamics, MBI, Columbus, OH.
- “Zika Control: More Complicated than Hoped?” Next Einstein Forum, Dakar, Senegal.

2015

- “Linear Algebraic Tools in Conservation Ecology,” Simon A. Levin Mathematical, Computational and Modeling Sciences Center Seminar, Tempe, AZ.
- “Applications of Homology Theory to Animal Communication Systems,” Mathematics and Statistics Colloquium, Arizona State Univ., Tempe, AZ.
- “Trade-offs Between Collaboration and Infection Risk: Can ‘social distancing’ improve colony function?” Conference on Complex Systems 2015, Tempe, AZ.
- “The Benefits of Ongoing Dynamics in Self-Organizing Social Systems,” Conference on Collective Dynamics and Evolving Networks, Bath, UK.
- Plenary Talk:** Exploiting the Complexity of Identity to Infiltrate Clandestine Groups – Lessons from a LARP, CyDentity Conference, CCICADA, New Brunswick, NJ.
- “Incorporating Evolutionary Rescue into Population Viability Models,” Mathematics of Planet Earth: Workshop on Management of Natural Resources, Washington D.C.
- “Distributed Detection Algorithms for Real-Time Maritime CyberSecurity,” Joint CCICADA & AMU Conference on Maritime CyberSecurity, New Brunswick, NJ.
- “The Definition of Communication: One way biology and math people accidentally talk past each other and what we might be able to do to fix it,” Annual Meeting, Society for Integrative and Comparative Biology, West Palm Beach, FL.

2014

- “BioInspired Anomaly Detection: Social Insects and Network Security,” Dept. of Homeland Security Science and Technology HSARPA CyberSecurity Division Research and Development Showcase and Technical Workshop, Washington D.C.
- “n-TANGLE: a new method for comparing networks across scales” Workshop on Advances in Discrete Networks, Dept. of Mathematics, Univ. of Pittsburgh, Pittsburgh, PA.
- Keynote Address:** “Virtual Worlds Helping Public Health Preparedness,” New Jersey Health Care Quality Institute Annual Meeting, Trenton, NJ.
- “A Mathematician’s Role in Fighting Ebola,” Saint Ann’s School, Brooklyn, NY.
- “Provable Boundaries on Disease Outbreaks in Self-Organizing Social Networks,” The Duke University Mathematical Biology Colloquium, Durham, NC.
- Keynote Address:** “Designing your own role: Women in STEM,” Tufts University Graduate Student Luncheon for Women in Science, Medford, MA.
- “Division of Labor as an Adaptation to Combat Disease Risks?” The Seventh International Symposium on Biomathematics and Ecology: Education and Research (BEER), Claremont, CA.

“How dynamic networks affect disease transmission,” The BioCircuits Institute, UCSD, San Diego, CA.

“The Evolution of Social Complexity,” Plant Biology Dept. Seminar, Univ. of Vermont, Burlington, VT.

“Provable Boundaries on Disease Outbreaks in Self-Organizing Social Networks,” Math Dept. Seminar, Univ. of Tennessee at Knoxville, TN.

“Mathematics, Optimization, and the Evolution and Behavior of Social Insects,” Math Dept. Junior Colloquium, Univ. of Tennessee at Knoxville, TN.

“The Life of a Mathematical Researcher,” Saint Ann’s School, Brooklyn, NY.

“Mathematics, Optimization, and the Evolution and Behavior of Social Insects,” Social Insect Research Group Seminar, School of Life Sciences, Arizona State Univ., AZ.

“N-tangle: A Network Comparison Method,” Workshop on Animal Social Networks, NIMBioS, TN 2013

“Evolutionary pressures, Infectious Diseases, and Self-Organizing Social Systems,” Evolutionary Studies Seminar, Co-Sponsored by the Collective Dynamics of Complex Systems Research Group, the Undergraduate Math Club, Upsilon Pi Epsilon, and Pi Mu Epsilon, SUNY Binghamton, NY.

“BioInspired Anomaly Detection,” DHS CyberSecurity PI Meeting, Arlington, VA.

“Mathematics, Evolutionary Biology, Epidemiology, and National Security”, Saint Ann’s School, Brooklyn, NY.

“Evolution of Reproductive Timing and Social Organization in Honey Bees,” Scientific Learning Forum at FMC, Ewing, NJ.

“Crowd Sourcing WoW: A Case Study in Improving Pandemic Preparedness,” Annual George M. Sideris Biology Conference, LIU, Brooklyn, NY.

2012

Public Lecture: “Math, Complexity, and Social Groups: Using math to understand the nature of society,” Campus Life Enrichment Committee (CLEC) Lecture, Georgia Southern Univ., GA.

“How and Why Static Approximations Can Fail to Give Adequate Insight into Processes on Dynamic Networks,” Math Dept. Colloquium, Georgia Southern Univ., GA.

“Theoretical Worlds: An Exploration of Models and Model Systems,” Tufts Univ, Dept. of Civil and Environmental Engineering Seminar Series, Medford, MA.

“Help, my avatar is sick!” Panel Talk, SXSW, Austin, TX.

“WISE – Women, Ignore Silly Expectations!” 2012 WISE Conference, Texas A&M, TX.

2011

“The Evolution of Social Complexity,” CUNY Initiative for the Theoretical Sciences Workshop on A Unified Theory of Evolution, CUNY, NY.

“Balancing Workforce Productivity Against Disease Risks for Environmental and Infectious Epidemics,” Math Dept. Seminar, Univ. of Ghana, Legon, Ghana.

“Selective Pressures from Disease on Social Behavior in Hosts,” DIMACS/MBI US - African BioMathematics Initiative: Workshop on Genetics and Disease Control, Elmina, Ghana.

Plenary Address: “The Future of Technology and Knowledge,” Next-Generation Communications Interoperability Workshop, Chicago, IL.

“Virtual Worlds and Real Epidemics - Insights from WoW's Corrupted Blood Plague,” E-Virtuoses International Conference on Serious Games, Valenciennes, France.

Plenary Address: “Disease Robustness and Evolutionary Selective Pressures on Social Organization in Eusocial Insects,” Mathematical Biosciences Institute Workshop on Insect Self-Organization and Swarming, Ohio State Univ., OH.

“Hakkar’s Corrupted Blood Plague: How an Outbreak in WoW is Helping Epidemiologists Create Better Disease Models,” Game Developer’s Conference 2011, San Francisco, CA

“Exploring the Role of Behavior in Infectious Disease Dynamics: Mathematical Insights from World of Warcraft and other Virtual Worlds,” DIMACS/CCICADA Student Workshop on Where the Mathematical and Computational Sciences Meet Society, Rutgers University, NJ

“Multi-Dimensional Data and the Influence of Human Behavior in Biosurveillance for Infectious Disease Outbreaks,” Global Biosurveillance Conference: Enabling Science and Technology – 2nd Meeting in the Biological Threat Non-Proliferation Conference Series, Santa Fe, NM

2010

“Distributed Algorithms for Collective Visualization of Data,” Visualanalytics Workshop 2010, Imperial College London, UK

“The Importance of Behavioral Dynamics on Disease Burden,” Southern African Wildlife College, South Africa

“The Impact of Stress on Populations,” DIMACS Advanced Study Institute on Conservation Biology, Limpopo, South Africa

“Social Behavior in Virtual Worlds,” Panel Discussant – InPlay 2010, Toronto, Canada

“Self-Organizing Networks, Social Complexity, and Disease Dynamics,” Rensselaer Polytechnic Institute, NY

“Playing with Plague: Exploring Disease Dynamics from Within,” 2010 AAAS Annual Meeting, San Diego, CA

“Epidemiological Pressures on the Evolution of Social Complexity,” Mathematical Methods in Systems Biology, Tel Aviv, Israel

2009

“Information Theoretic Tool for Biosurveillance,” CCICADA Kickoff Meeting, Rutgers Univ., NJ

“Perspectives, Challenges, and Creativity in Understanding Behavioral Epidemiology,” Workshop on Behavioral Epidemiology, Rutgers Univ., NJ

“Evolutionary Implications of Epidemics on Social Behavior,” Evolutionary Genetics and Genomics at Rutgers, Rutgers Univ., NJ

Panel participant and Speaker on Popular Culture and Science, Sheffield Documentary Film Festival '09, Sheffield, United Kingdom

Keynote Address: “Epidemiological Insights from Virtual Worlds,” Life Science Dialogue Heidelberg, - Inaugural Conference, Germany

“Social Stability and Success: A new concept in self-organizing systems and preferential attachment,” Office of Naval Research Workshop on Complex Systems, Institute for Pure and Applied Mathematics, Los Angeles, CA

“The Impact of Household Capital Models on Targeted Epidemiological Control Strategies for Diseases with Age-Based Etiologies,” Makerere Univ., Kampala, Uganda

Keynote Address: “Hakkar's Corrupted Blood Plague: How an Outbreak in World of Warcraft is Helping Epidemiologists Create Better Disease Models,” Games for Health – Virtual Worlds, Boston, MA

“Network Representations and the Evolution of Social Complexity,” Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, NJ

- “Mathematical Optimization, Evolutionary Sociobiology, and Eusocial Insects,” Conference on The Power of Analysis, Princeton Univ., NJ
- “Mathematical Insights into Behavioral Epidemiology,” Univ. of Texas Health Science Center, Houston, TX
- “Basics of Mathematical Modeling,” Mosquito Modeling Made Easy Day, Center for Vector Biology, Rutgers Univ., NJ
- “Mathematical and Computational Methods in Epidemiology and BioSurveillance,” Jackson State University, MS
- “Mathematics, Optimization, and the Evolution and Behavior of Social Insects,” UNC, Chapel Hill, Applied Math, NC
- “Network models in Epidemiology and Sociobiology: Introduction, Overview, and Recent Advances,” Mathematical Sciences, RPI, NY

2008

- “Social Behavior and the Dynamics of Corrupted Blood,” Rice University/Games for Health, Houston, TX
- “Possible Selective Mechanisms for the Evolution of Disease-defensive Social Organizations,” Ecology and Evolution Seminar, Boston Univ., MA
- “Behavioral Epidemiology in Virtual Worlds: Exploiting the virtual experience,” Advanced Technology Applications for Combat Casualty Care 08; Telemedicine and Advanced Technologies Research Center Medical Simulation & Training Technology
- “Recent Advances in the What, How and When of Network Models in Infectious Disease Epidemiology,” SIAM 2008, CA
- “World of Warcraft Corrupted Blood Disease: Epidemiological Observations and Findings,” Games for Health, Baltimore, MD
- “Computational Ecology: The Evolution of Sociality,” Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, NJ
- Plenary Talk:** “Self-organizing social behavior and disease-defensive organizational strategies in social species,” Complexity 2008, Univ. Illinois Urbana, IL
- “From the Individual to the Population: Modeling the many levels of evolutionary fitness in social species,” Dept. of Ecology and Evolution and Natural Resources, Rutgers Univ., NJ
- “Individual Decisions, Group Efficiency,” ExxonMobil, Clinton, N.J.

2007

- Public Lecture:** “Virtual Games, Real Epidemics: Can We Learn Real-Life Lessons in BioDefense from Online Games?” Biosecurity, Biotechnology and Global Health Seminar Series, Program on Science and Global Security, Princeton Univ., NJ
- “Disease on Networks: Can Static Representations Capture the Full Complexity of a Dynamic Process?” NDSSL Seminar Series, Virginia Bioinformatics Institute, Virginia Tech, VA
- Public Lecture:** “Real People, Virtual Worlds: Watching a Plague Unfold,” Institute for Mathematical Sciences, National Univ. of Singapore
- “The Continued Mystery of Regular, Old, Annual Flu,” Workshop on Mathematical models for the Study of the Infection Dynamics of Emergent and Re-emergent Diseases in Humans, Institute for Mathematical Sciences, National Univ. of Singapore
- “Epidemics and the Evolution of Social Complexity,” Program in Ecology and Evolution Seminar Series, Rutgers Univ., NJ
- “Playing Games at School: Parents, Public Schools, and Children's Health,” DIMACS Workshop on Game Theory in Epidemiology and Ecology, Rutgers Univ., NJ

- “Analyzing Entropy in Biosurveillance,” U.S. Dept. of Homeland Security research briefing, Washington D.C.
- “Fantastic Problems in Mathematical Ecology,” DIMACS Bio-Math Connection Field Testers Workshop, Rutgers Univ., NJ
- “Does Securing Infrastructure Against Workforce-Depletion Depend on Whether the Risk is Environmental or Infectious?” DIMACS Workshop on Mathematical Modeling of Infectious Diseases in Africa, Univ. of Stellenbosch, South Africa
- “Social interaction and disease dynamics,” Workshop on Analysis of Time Series Data in Epidemiology, Tufts Univ. School of Medicine, Boston, MA
- “The Behaviors of Individuals and Populations,” Working Group on Spatio-Temporal and Network Modeling of Diseases, ICMS, Edinburgh, Scotland
- “The Evolution of Complexity in Already Social Groups,” Dept. of Ecology and Evolutionary Biology, Princeton Univ., NJ
- “Disease as a Selective Pressure and the Evolution of Social Complexity,” Applied Biomathematics, Stony Brook, NY
- “Vital Rate Sensitivity Analysis: A new method for population viability analysis - Two examples of its use,” Applied Biomathematics, Stony Brook, NY
- “Disease as a Selective Pressure and the Evolution of Social Complexity,” Morin Lab, Dept. of Ecology, Evolution and Natural Resources, Rutgers Univ., NJ

2006

- “The Role of Individual Choice in the Evolution of Social Complexity and its Implications Towards the Emergence of Zoonotic Infections,” DIMACS Computational and Mathematical Epidemiology Seminar, Rutgers Univ., NJ
- “Preparing Societal Infrastructure Against Disease-Related Workforce Depletion,” DIMACS Workshop on Facing the Challenge of Infectious Diseases in Africa, University of the Witwatersrand, South Africa
- “Fantastic Problems in Mathematical Ecology,” DIMACS Bio-Math Connect Institute for High School Teachers, Denver, CO
- “Societal Bio-defense - How Can we Accomplish Safety, Stability and Efficiency?” SIAM Annual Meeting, Boston, MA
- “When females should stop supporting lazy males: mathematics and honey bees?” DIMACS REU Seminar Series, Rutgers Univ., NJ
- “Selected Problems in Epidemiology.” DIMACS Tutorial on Data Mining and Epidemiology, NJ
- “How Would Termites Prepare for Pandemic Bird Flu and What Should We Learn From Them?” Joint Dept. of Entomology and Center for Infectious Disease Dynamics Seminar, Penn State Univ., PA
- “Different Scales of BioDefense - Can societies be both safe and efficient?” DIMACS Computational and Mathematical Epidemiology Seminar, Rutgers Univ., NJ

2005

- “Termites in the Nation’s Service,” DIMACS Computational and Mathematical Epidemiology Seminar, Rutgers Univ., NJ
- “Applications of Self-Organizing Systems to Epidemiology.” DIMACS Mixer Series, Rutgers Univ., NJ
- “Disease Signatures: A New Combinatorial Method for Epidemiology,” DIMACS Computational and Mathematical Epidemiology Seminar, Rutgers Univ., NJ
- “Fantastic Problems in Mathematical Ecology,” DIMACS Bio-Math Connect Institute for High School Teachers, Rutgers Univ., NJ

“How Complex Systems Can Simplify a Complex Problem: What Epidemiologists Can Learn From Insects,” Institute for Advanced Study, Center for Systems Biology Seminar Series, NJ

2004

“Incorporating Behavior and Social Structure into Pathogen Defense Strategies. Conference on Innate Immunity for Biodefense,” National Defense University's Center for Technology and National Security Policy (CTNSP) & the Department of Defense, Washington D.C.

Keynote Address: “Social Insects, Immunocompetence and Epidemiology: A Model System for Systems Modelers,” Vanderbilt Medical School, Dept. of Microbiology and Immunology Annual Retreat, TN

“Disease and Immunocompetence in Group-Living Animals: Implications for Human Epidemiology,” DARPA/DSO Workshop on Endogenous Defense, VA

Contributed Presentations

2008. “An Interdisciplinary Framework for Defining and Distinguishing Security Desiderata for Personally Sensitive Information,” DIMACS/DyDAN Workshop on Internet Privacy: Facilitating Seamless Data Movement with Appropriate Controls

2006. “A Vital Rate Sensitivity Analysis (VRSA) for Non-stable Age Distributions and Short-term Planning,” North American Ornithological Conference

2004. “A Mathematical Analysis of Reproductive Fission,” North American Section of the International Union for the Study of Social Insects (with published abstract)

2004. “Two-stage Wavelet Analysis Assessment of Dependencies in Time Series of Disease Incidence,” The 2004 Conference of the International Environmetrics Society (with published abstract)

2004. “Mathematical Modeling of Behavior and Ecology in Social Insects: Social mechanisms of pathogen control in termite colonies,” Departmental Research Seminar, Tufts Univ.

2003. “Modeling Waterborne Infectious Outbreaks: When, where and how bad will they be?” The 2003 Conference of the International Environmetrics Society (with published abstract)

2003. “Modeling Disease Resistance through Social Interactions in Termites,” The 2nd Conference on the Mathematics and Algorithms of Social Insects (with published abstract)

Service (external to Home Institution)

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| <i>Ongoing</i> | Referee of papers for <i>American Naturalist</i> , <i>Annales Zoologici Fennici</i> , <i>Behavioral Ecology and Sociobiology</i> , <i>Biological Conservation</i> , <i>BMC Evolutionary Biology</i> , <i>Bulletin for Mathematical Biology</i> , <i>Canadian Biosystems Engineering</i> , <i>Conservation Letters</i> , <i>IMA Journal of Applied Mathematics</i> , <i>Journal of Biological Dynamics</i> , <i>Journal of Infectious Diseases</i> , <i>Journal of Insect Science</i> , <i>Journal of Nonlinear Dynamics</i> , <i>Mathematical Biosciences</i> , <i>Journal of Medical Internet Research</i> , <i>Journal of the Royal Society Interface</i> , <i>Malaria Journal</i> , <i>Nature</i> , <i>Nature Scientific Reports</i> , <i>Parasites and Vectors</i> , <i>PeerJ</i> , <i>Physical Reviews X</i> , <i>PLoS Computational Biology</i> , <i>PLoSOne</i> , <i>PloS Medicine</i> , <i>PNAS</i> , <i>Vaccine</i> , <i>Vector-Borne and Zoonotic Diseases</i> |
| 2020 | Deputy Editor <i>PLOS Computational Biology</i> |
| 2019-2021 | Director of Development, Enhancing Diversity in Graduate Education (EDGE) Foundation |
| 2019 | Guest Editor <i>PLOS Computational Biology</i> |
| 2019 | Co-Organizer SIAM Network Science Annual Meeting (NS 19) |
| 2018 | NSF ad hoc proposal reviewer |

2018 Burroughs Wellcome Fund grant proposal reviewer

2018 Co-Organizer IEEE Symposium on Security and Privacy, entitled: 3rd Workshop on Bio-inspired Security, Trust, Assurance and Resilience (BioSTAR 2018)

2017-cont. Member of the Leadership Team of the National Institute for Mathematical and Biological Synthesis

2017 Co-Organizer NIMBioS Workshop on Applying Optimization Techniques to Agricultural Problems

2017 ARO grant proposal reviewer

2016 Co-Organizer MBI (the Mathematical Biosciences Institute at Ohio State) Workshop on Generalized Network Structures and Dynamics

2016 Co-Organizer MBI (the Mathematical Biosciences Institute at Ohio State) Emphasis Semester on Dynamics of Biologically Inspired Networks

2014 ARO grant proposal reviewer

2013- 2016 Member of Scientific Advisory Board for MBI (the Mathematical Biosciences Institute at Ohio State)

2013 NIH grant proposal reviewer

2013-2016 Co-Organizer NIMBioS Working Group on Climate Change and Vector-borne Diseases

2013-2019 Invited Participant Joint NIMBioS-SESYNC Working Group on Human Risk Perception and Climate Change

2012 Invited Grant Proposal Reviewer for the United States – Israel Binational Science Foundation

2012 US Environmental Protection Agency FIFRA Scientific Advisory Panel (SAP) on Pollinator Risk Assessment Framework

2011 Invited Participant - External Expert Review Panel for Bioscience Research and Development at Los Alamos National Laboratory

2011 Program Committee Member, The Third International UKVAC Workshop on Visual Analytics (VAW 2011)

2011 NSF grant proposal reviewer

2011 Co-Organizer DIMACS/MBI US - African BioMathematics Initiative: Advanced Study Institute and Workshop on Genetics and Disease Control

2010 Organizer of the DIMACS Mini-Workshop on ‘Emergent Properties of Dynamic Biological Networks’

2010 Lecturer at DIMACS/MBI US - African BioMathematics Initiative: Workshop and Advanced Study Institute on Conservation Biology

2010 Organizer of the DIMACS Mini-Workshop on ‘Game-theoretic Approaches to Medical Prognosis’

2010 NSF grant reviewer/panel participant

2010 Invited International Reviewer for Centre of Excellence Grants for the Australian Research Council

2010 Co-Organizer of the DIMACS Workshop on Modeling and Mitigation of the Impacts of Extreme Weather Events to Human Health Risks

2009 Co-Organizer DIMACS Workshop on Economic Epidemiology, Makerere Univ., Kampala, Uganda

2009 NSF grant reviewer/panel participant

2009 Co-Organizer/ Program Co-Chair Workshop on Economic Epidemiology, Makerere Univ., Kampala, Uganda

2009 Co-Organizer Mosquito Modeling Made Easy Day at the N.J. Center for Vector Biology

2008-2010 Member Chief Editorial Committee for the DIMACS Book Series

2008-2010 Member Editorial Board of DIMACS Educational Modules Series

- 2008 Invited organizer SIAM mini-symposium on Network Models of Infectious Disease
- 2008 Ran the Reconnect Program on Biosurveillance at DIMACS – a week long short course for teaching faculty at liberal arts institutions on an advanced topic to expand their own and their students research opportunities
- 2007 Mentor to two teams of researchers for Department of Homeland Security funded Research Experience for those at Minority Serving Institutions
- 2006-2016 Advisory/Editorial Board Member for the journal *Annales Zoologici Fennici*
- 2004 Subject Matter Expert on Innate Immunity and Biodefense, National Defense University
- 2004 Research Consultant, DARPA (via Strategic Analysis, INC.)
- 2003 Developed algorithm for Managing Endangered Species Habitat in Hawaii - MESH software package (Reed, J.M., N.H. Fefferman, C.S. Elphick, and M. Silbernagle. 2004)
- 2000-2002 Technical Editor (Cryptography) to MacMillan Press
- 1999 Invited Reviewer of AES submission to the National Institute of Standards and Technology, later published as The Twofish Encryption Algorithm, Schneier, et al, 1999, John Wiley & Sons Inc.

Service (internal to Home Institution)

- 2020 Advisor to the COVID-19 Re-Imagining Fall Task Force
- 2019-cont. Head of Graduate Admissions, Program in Ecology and Evolutionary Biology
- 2019 Research Mentor for the NIMBioS Summer Research Experiences (SRE) for Undergraduates
- 2019 Co-Organizer Tutorial on Networks at NIMBioS
- 2018 Serve on departmental Promotion and Tenure Committee for Prof. O'Meara
- 2018-cont. Serve on Faculty Mentoring Committee for Prof. Kivlin
- 2017-cont. Served as Departmental Coordinator for University Future Faculty Program
- 2017 Research Mentor for the NIMBioS Summer Research Experiences (SRE) for Undergraduates
- 2017 Lecturer for Joint 2017 MBI-NIMBioS-CAMBAM Summer Graduate Program
- 2016-2017 University of Tennessee, Knoxville Department of Ecology and Evolutionary Biology Search Committee Member and Diversity Advocate (Ecosystem Ecology Search)
- 2016-2017 University of Tennessee, Knoxville Department of Mathematics Search Committee Member (Mathematical Biology Search)
- 2016-cont. University of Tennessee, Knoxville Program in Ecology and Evolutionary Biology Graduate Affairs Committee Member
- 2015-2016 Rutgers University Biological Sciences Area Committee Member
- 2014 Rutgers University EENR Department Wildlife Biology Faculty Search Committee Member
- 2010 Co-Mentor to a team of researchers for Department of Homeland Security funded Research Experience for those at Minority Serving Institutions
- 2009-2010 Organizer of the EENR seminar series
- 2009 Organizer of the DIMACS Workshop on Behavioral Epidemiology
- 2009-2010 Member E&E Executive Committee
- 2008-2012 Member of EENR Curriculum Committee
- 2008-2010 Member Chief Editorial Committee for the DIMACS Book Series
- 2008-2010 Member Editorial Board of DIMACS Educational Modules Series
- 2007-2009 Member of the Rutgers University Advisory Board to the Office for the Promotion of Women in Science, Engineering and Mathematics

2006-2015 Research Advisor for Rutgers Univ. DIMACS REU
2005-2007 Co-organizer DIMACS seminar series Mathematical and Computational Epidemiology