



2011 Annual Report
National Institute for Mathematical and Biological Synthesis

Reporting Period, September 2010 – August 2011
Submitted to the National Science Foundation, April 2011

Annual Report for Period: 09/2010 - 08/2011**Submitted on:** 04/30/2011**Principal Investigator:** Gross, Louis J.**Award ID:** 0832858**Organization:** U of Tennessee Knoxville**Submitted By:**

Gross, Louis - Principal Investigator

Title:

National Institute for Mathematical and Biological Synthesis (NIMBioS)

Project Participants

Senior Personnel

Name: Gross, Louis**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Louis Gross supervised and coordinated all activities of NIMBioS. This included: hiring NIMBioS staff, coordinating activities of the Associate Directors, organizing meetings of the Advisory Board, communicating with potential participants in NIMBioS activities, communicating the NIMBioS mission to numerous institutions through formal and informal presentations, communicating activities with leaders of other NSF BIO Centers, coordinating the renovations of NIMBioS facilities with University officials, chairing the search committee for six new faculty to be associated with NIMBioS, and communicating regularly with NSF Program Officers regarding NIMBioS plans.

Name: Gavrilets, Sergey**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Dr. Gavrilets is the NIMBioS Associate Director for Scientific Activities and member of the NIMBioS Leadership Team. He leads the assessment of requests for support in conjunction with the rest of the Leadership Team and Board of Advisors. He is also the primary organizer for a NIMBioS working group investigating processes of coalition formation and co-organizer of a planned workshop working toward a formal theory for the evolution of human social complexity.

Name: Lenhart, Suzanne**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Dr. Lenhart is the NIMBioS Associate Director for Outreach, Education, and Diversity and member of the NIMBioS Leadership Team. She oversees all outreach and education activities, supervises the Outreach and Education Coordinator, and works with the Board of Advisor's Committee to Promote Diversity to ensure opportunities at NIMBioS are available to diverse students and researchers. She is an organizer for a NIMBioS working group investigating modeling and management of disease in feral swine within Great Smoky Mountains National Park (GSMNP) and another on use of agent-based models in biology. She also has co-organized NIMBioS investigative workshops evaluating optimal control/optimization questions for individual-based and agent-based models and modeling the life-cycle, stage conversion, and clonal expansion of the parasite *Toxoplasma gondii*.

Name: Hickling, Graham**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Dr. Hickling is the NIMBioS Associate Director for Partner Relations and member of the NIMBioS Leadership Team. He leads contact with industry partners (i.e., ESRI, IBM), government partners (i.e., Great Smoky Mountains National Park), and other supporting organizations. He is also an organizer for a NIMBioS working group investigating modeling and management of disease in feral swine within Great Smoky Mountains National Park (GSMNP) and has been an instructor for the NIMBioS REV program.

Name: Peterson, Cynthia**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Dr. Peterson is the NIMBioS Associate Director for Graduate Education and member of the NIMBioS Leadership Team. She leads evaluation of applicants for NIMBioS graduate research assistantships and oversees administration of the graduate research program. She also coordinates NIMBioS connections to graduate recruitment programs at UTK including an NSF-funded IGERT

and NIH-funded PEER award.

Name: Welsh, Christopher

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Welsh is the NIMBioS Deputy Director and member of the NIMBioS Leadership Team. He oversees the day-to-day operations of NIMBioS, supervises NIMBioS staff, and acts as the point of contact for post-doctoral fellows and short- and long-term visitors.

Name: Beckage, Brian

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Beckage, an associate professor of plant biology at the University of Vermont, was a sabbatical fellow at NIMBioS for the period from Jan-Jul 2010. His focus as a sabbatical fellow was using models to investigate patterns, process, and climate change in savannas. Dr. Beckage worked on five new manuscripts during his sabbatical visit. In addition he helped lead an upper level course in use of hierarchical Bayesian models in ecology, consulted with NIMBioS post-doctoral fellows and working group/workshop participants, and worked collaboratively with NIMBioS staff and short-term visitors.

Name: Krivan, Vlastimil

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Vlastimil Krivan, chair of the Department of Mathematics and Biomathematics, Ceske Budejovice and chair of the Department of Theoretical Ecology, Biology Center, Academy of Sciences of the Czech Republic, was a Sabbatical Fellow at NIMBioS from August 2010 - December 2010. Dr. Krivan reanalyzed patch and diet choice models of optimal foraging theory with respect to evolutionary stability of optimal foraging strategies, reexamined the Gause predator-prey model with refugia, and began developing a text on dynamic models of evolutionary game theory. In addition he started collaborations with NIMBioS visitor and became an active member of the Forest Insects Working Group.

Name: Page, Karen

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Page, Department of Mathematics at University College of London, is currently a Sabbatical Fellow at NIMBioS, having begun in January 2011 (here Jan-Aug 2011). Dr. Page's research looks at mathematical models of noise in cellular signalling networks, especially in the context of signalling by molecules called morphogens.

Name: Stuart, Gary

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Stuart, Biology Department, Indiana State Univ., is scheduled to begin his Sabbatical Fellowship at NIMBioS in August 2011 (Aug - Dec 2011). He will be developing new non-alignment phylogenomic methods for determining relationships at the species, subspecies, and population levels.

Post-doc

Name: Agosto, Folashade

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Agosto is a full-time Post-doctoral Fellow at NIMBioS (fall 2009 - summer 2011). Her research focus is on mathematical analysis of the transmission dynamics of bovine tuberculosis. She is also investigating optimal control of the spread of malaria super-infectivity, optimal vaccination strategies for malaria in an AA-AS-cell population, and optimal control of the effect of media coverage on an epidemic model with treatment. She is a participant in the NIMBioS working group on bovine tuberculosis, co-organizer of the workshop on malaria modeling, mentor for a short-term visitor from Indonesia (Eti Wiraningsih), and teaches a course in Mathematics for Life Sciences (fall 2010, spring 2011).

Name: Akcay, Erol

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Akcay is a full-time Post-doctoral Fellow at NIMBioS (fall 2009 - summer 2011). His research focus is on the evolution of social behavior and the evolutionary ecology of mutualisms. He is the co-PI of the NIMBioS Function and Evolution working group and a participant in the New Soil Black Box Strategies workshop and the Coalitions and Alliances working group. He has conducted seminars at NIMBioS, Cal State San Marcos, Istanbul Tech. Univ., and UC Riverside, and worked with other NIMBioS post-docs in partnership with Great Smoky Mtns National Park. He has established active collaborations with a number of visitors to NIMBioS.

Name: Mao, Yi

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Mao is a full-time Post-doctoral Fellow at NIMBioS (fall 2009 - winter 2011). Her research focus is on multiscale simulations of biomolecular systems, but she is also working on bioluminescence emission control, energy transduction in proteins, drug-resistant behaviors of HIV-1 protease, and directed evolution of peroxidase. She participated in the NIMBioS workshops on optimal control and optimization of individual- and agent-based models and tumor modeling as well as the tutorial in Graph Theory and Biological Networks.

Name: Godsoe, William

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Godsoe is a full-time Post-doctoral Fellow at NIMBioS (fall 2009 - winter 2011). His research focus is on statistical models of organisms' distributions in relation to their environmental requirements. He is collaborating with GSMNP and other NIMBioS post-docs to look at biodiversity issues in the national park, participates in NIMBioS working groups on binary matrices and forest insect dynamics, and has assisted with the Research Experience for Undergraduates program. Dr. Godsoe has been active in establishing research collaborations with visitors to NIMBioS and presenting research results at national conferences.

Name: Bewick, Sharon

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Bewick was a full-time Post-doctoral Fellow at NIMBioS from fall 2009 - spring 2011 and half time from spring 2011 - January 2012. Beginning in spring 2011 she reduced her efforts on the behalf of NIMBioS to enable her to also work as a post-doc with Dr. Paul Armsworth (NIMBioS Senior Collaborator) on insect-plant mutualisms in tropical systems. Her research focus at NIMBioS is on modeling local community responses to climatic change, but she is also investigating models of immune system activation. She is collaborating with GSMNP and other NIMBioS post-docs to look at biodiversity issues in the national park, participates in the NIMBioS working group on modeling forest insect dynamics, and assisted with the Research Experience for Undergraduates program in summer 2010.

Name: Thibert-Plante, Xavier

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Thibert-Plante is a full-time Post-doctoral Fellow at NIMBioS (May 2010 - present) coming to us from McGill University. His research examines the impact of climate change on biodiversity, specifically the evolution of biodiversity and the process of biodiversification in a changing environment (http://nimbios.org/press/thibert-plante_feature). He served as the coordinator of the NIMBioS Post-doctoral Fellows Invited Distinguished Visitor program in 2010-2011, participated in the tutorial on Graph Theory and Biological Networks, and has been active in presenting and publishing his research. In addition he is a mentor for the summer 2011 NIMBioS REU project on effects of essential oils on fungus biocontrol.

Name: Moran, Emily

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Moran is a full-time Post-doctoral Fellow at NIMBioS (September 2010 - present) coming to us from Duke University. Her research investigates the impact of increasing CO₂ on inter-genotype competition and plant-insect interactions in aspen forests in order to develop a modeling framework that could be applied to other forest communities (<http://nimbios.org/press/Moran>). She participated in the working group on modeling forest insect dynamics, worked on adding mathematics exercises to the Biology in a Box program, and has been active in presenting and publishing her research, including presenting at Fisk University, a minority-serving institutional partner with NIMBioS.

Name: Gilman, R. Tucker

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Gilman is a full-time Post-doctoral Fellow at NIMBioS (Sept 2010 - present) coming from University of Wisconsin. His research develops a modeling framework to explore the relationship between coevolution and speciation in order to advance understanding of the two-way relationship between ecological and evolutionary processes (http://nimbios.org/press/gilman_coevolution). He has participated in NIMBioS working groups on Modeling Forest Insect Dynamics and on the Ecology of Niche Variation. He has been active in presenting and publishing his research. In addition he is a mentor for the summer 2011 NIMBioS REU project on energy dynamics and mate selection in birds.

Name: Ingersoll, Tom

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Ingersoll is a full-time Post-doctoral Fellow at NIMBioS (Sept 2010 - present) coming from UC Berkeley. His research develops dispersal and dynamic models for the spread of white nose syndrome in bats (<http://nimbios.org/press/Ingersoll>). He has participated in NIMBioS investigative workshops on Modeling White Nose Syndrome in Bats and on Modeling Wildlife and Virus Zoonoses. In addition he is a mentor for the summer 2011 NIMBioS REU program providing guidance on use of R for biological data analyses.

Name: Jhwueng, Dwueng-Chwuan

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Jhwueng is a full-time Post-doctoral Fellow at NIMBioS (Oct 2010 - present) coming from Indiana University. His research designs new phylogenetic comparative methods for comparative analysis under non-tree-like evolution. He has participated in NIMBioS working groups on Gene Tree/Species Tree Reconciliation and on Species Delimitation. In addition he is a mentor for the summer 2011 NIMBioS REU project examining the effects of energy dynamics on mate selection in birds.

Name: Kanarek, Andrew

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Kanarek will be a full-time Post-doctoral Fellow beginning in August 2011, but he will not have worked 160 hours in the period of this annual report. He comes to NIMBioS from Colorado State Univ. His NIMBioS research will look at the influence of individual trait variation on the dynamics and persistence of small populations.

Name: Gaoue, Orou

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Gaoue will be a full-time Post-doctoral Fellow beginning in June 2011. He comes to NIMBioS from the Institute of Theoretical and Mathematical Ecology at University of Miami. His NIMBioS research will look at integrating new developments in stochastic demography to model the ecological impacts of non-timber forest products harvest.

Name: Chai, Juanjuan

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Chai will be a full-time Post-doctoral Fellow beginning in July 2011. She comes to NIMBioS from the Department of Mathematics at Indiana University. Her NIMBioS research will focus on two problems in phylogenetics, the identifiability of appropriate statistical models and the consistency of maximum parsimony in returning the correct phylogenies.

Name: Ngonghala, Calistus

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Ngonghala will be a full-time Post-doctoral Fellow beginning in June/July 2011. He comes to NIMBioS from the Department of Mathematics at West Virginia Univ. His NIMBioS research will develop a new model with vector demography for investigating malaria transmission dynamics.

Name: Ryan, Daniel

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Ryan is scheduled to begin his post-doctoral fellowship with NIMBioS in August 2011. His research investigates the effects of movement strategies on the population dynamics of multi-trophic ecological communities.

Graduate Student

Undergraduate Student

Name: Richters, Ana

Worked for more than 160 Hours: Yes

Contribution to Project:

Ana is a University of Tennessee undergraduate who works part-time for NIMBioS (fall 2009 - present). She spends most of her NIMBioS time assisting the Program Evaluation Coordinator with maintenance of the NIMBioS participant database. She also assists the Event Coordinator by preparing materials for events and has taken on some responsibilities with compiling requests for support for Board and Leadership Team review. She also assisted with tracking application materials during the NIMBioS-related faculty search in fall 2009/spring 2010.

Name: Thomas, Christal

Worked for more than 160 Hours: Yes

Contribution to Project:

Christal worked part-time for NIMBioS in fall of 2009 providing general administrative support, assisting with maintenance of the NIMBioS participant database, and helping with event management.

Name: Cross, Jay

Worked for more than 160 Hours: No

Contribution to Project:

Mr. Cross assisted the NIMBioS IT staff for several weeks in fall of 2009.

Name: Ford, Ellen

Worked for more than 160 Hours: Yes

Contribution to Project:

Ms. Ford is an undergraduate at the University of Tennessee studying neuroscience. She began work at NIMBioS in February 2011 assisting with maintenance of the NIMBioS participant database, helping process post-doctoral requests for support, compiling information on NIMBioS activities, and working with the NIMBioS Event Coordinator as needed.

Technician, Programmer

Name: Comiskey, Jane

Worked for more than 160 Hours: Yes

Contribution to Project:

Jane is a Senior Analyst for NIMBioS. She developed and maintains the NIMBioS website, provides IT support, provides coding support for scientific activities, and supports web-communications for activity participants.

Name: Fletcher, Robert

Worked for more than 160 Hours: Yes

Contribution to Project:

Rob was a graduate student working part-time for NIMBioS from September 2009-September 2010. His role here was as part of the NIMBioS IT staff handling user problems, researching system upgrades, developing documentation and user support, and working on transferring NESCent user interface software to Linux system.

Name: Tucker, Henry

Worked for more than 160 Hours: Yes

Contribution to Project:

Henry is a Ph.D. candidate in Mathematics at the University of Southern California. He will work with NIMBioS IT staff during summer 2011 on development of a web-based database application to manage information related to activities and participants.

Other Participant**Name:** Peek, Michael**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Mike is the NIMBioS Information Technology (IT) Manager. He provides all IT support, basic hardware and connectivity, software and applications for collaborative services. He oversees the IT staff, which includes a high-performance computing specialist, a senior analyst, and a graduate technician/programmer.

Name: Carr, Eric**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Eric is the NIMBioS high-performance computing (HPC) specialist. He provides support for participant HPC needs as well as IT support. He is the NIMBioS contact for development of an HPC tutorial on plant phylogenetics, and he provides scientific computing support for NIMBioS activities.

Name: Duncan, Sarah**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Sarah was the NIMBioS Outreach and Education Coordinator from January 2009 - August 2010, at which point she was accepted into a doctoral program at Univ. Alabama. Working with the Associate Director for Outreach and Education, she developed and managed the outreach and education activities described under Section II.

Name: Bishop, Pamela**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Pam is the NIMBioS Program Evaluation Coordinator. She has developed evaluation instruments for NIMBioS activities both to support NSF reporting requirements and for internal assessment of the success of activities and ways to improve them. She has also spearheaded the initial development of the NIMBioS participant database and organized information sharing meetings with evaluation staff from other NSF-funded centers.

Name: Crawley, Catherine**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Dr. Crawley is the NIMBioS Communications Coordinator. She is the main point of administrative contact for media, writes press releases on NIMBioS activities, interviews visiting scientists, produces print and video pieces highlighting NIMBioS activities and research, and consults with other staff on strategies to increase awareness of NIMBioS opportunities in the scientific community.

Name: Koosman, Toby**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Toby is the NIMBioS Business Manager. She handles all accounting, inventory, contracting, and personnel procedures and has primary responsibility for all purchasing and financial management of participant support activities. She is the direct supervisor of the Event and Travel Coordinator.

Name: Thomas, Jennifer**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Jennifer is the NIMBioS Event and Travel Coordinator. She is responsible for coordinating logistics of all NIMBioS activities. This includes establishing contracts for lodging and meals, making travel arrangements for activity participants and NIMBioS staff, ensuring all needs are met during activities, and processing travel reimbursement requests from participants.

Name: Rekant, Steve**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Veterinary student participant in REV program (June-July 2010). Steve is a 1st year veterinary student from VA-MD Regional College.

Name: Scott, Janelle

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in REV program (June-July 2010). Janelle is a 2nd-yr veterinary student from Kansas State University.

Name: Drakes, Crystal

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in REV program (June-July 2010). Crystal is a 1st-yr veterinary student from Kansas State University.

Name: Bahorich, Laura

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in the summer 2009 REV program. Laura was a 2nd-yr student from University of Pennsylvania.

Name: Benally, Twyla

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in the summer 2009 REV program. Twyla was a 1st-yr student from Washington State University.

Name: Brown, Julie Paige

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in the summer 2009 REV program. Paige was a 2nd-yr student from University of Tennessee.

Name: DeGroot, Crystal

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in the summer 2009 REV program. Crystal was a 1st-yr student from Michigan State University.

Name: Moran, Kelly

Worked for more than 160 Hours: Yes

Contribution to Project:

Kelly became the NIMBioS Outreach and Education Coordinator in September 2010, having previously managed the Soil Ecology Laboratory at Argonne National Laboratory. Working with the Associate Director for Outreach and Education, she developed and managed the outreach and education activities described under Section II.

Name: Bugman, Alice

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in REV program (June-July 2011). Alice is a veterinary student from the University of Illinois - Urbana-Champaign.

Name: Daniel, Brooke

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in REV program (June-July 2011). Brooke is a veterinary student from the North Carolina State University.

Name: Johnson, Rachel

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in REV program (June-July 2011). Brooke is a veterinary student from the University of Tennessee.

Name: Robl, Nick

Worked for more than 160 Hours: Yes

Contribution to Project:

Veterinary student participant in REV program (June-July 2011). Brooke is a veterinary student from the University of Wisconsin.

Research Experience for Undergraduates

Name: Collins, John

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Freshman

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Chimezie, Ijeoma

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Tennessee State University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Thai, Ngoc

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Truman State University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Bulgar, David

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Oral Roberts University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Geyer, Kelly

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Virginia Tech

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Adhikari, Samrachana

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Mount Holyoke College

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Trask, Jillian

Worked for more than 160 Hours: Yes

Contribution to Project:

High school teacher working with the REU program (June-July 2010).

Years of schooling completed: Pre-College Teacher

Home Institution: Other than Research Site

Home Institution if Other: Bearden High School

Home Institution Highest Degree Granted(in fields supported by NSF): Associate's Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Ojogbo, Ejobagom

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: Fisk University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Lancaster, Evan

Worked for more than 160 Hours: Yes

Contribution to Project:

High school teacher working with the REU program (June-July 2010).

Years of schooling completed: Pre-College Teacher

Home Institution: Other than Research Site

Home Institution if Other: Blackman High School

Home Institution Highest Degree Granted(in fields supported by NSF): Associate's Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Yang, Guang

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Freshman

Home Institution: Other than Research Site

Home Institution if Other: Appalachian State University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Massaro, Tyler

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: SUNY Geneseo

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Spence, Meredith

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: North Carolina State University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Nguyen, Luong

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: Mount Holyoke College

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2010

REU Funding: No Info

Name: Jackson, Ashley

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: North Carolina State University
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2010
REU Funding: No Info

Name: Keleman, Reka

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior
Home Institution: Other than Research Site
Home Institution if Other: Iowa State University
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2010
REU Funding: No Info

Name: Bodiroga, Dubravka

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2010).

Years of schooling completed: Junior
Home Institution: Other than Research Site
Home Institution if Other: Hood College
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2010
REU Funding: No Info

Name: Coon, Kerri

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Sophomore
Home Institution: Other than Research Site
Home Institution if Other: University of Virginia
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2009
REU Funding: REU supplement

Name: Atchley, Taylor

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Junior
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2009
REU Funding: REU supplement

Name: Auker, Cameron

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Sophomore
Home Institution: Other than Research Site
Home Institution if Other: Hampden-Sidney College
Home Institution Highest Degree Granted(in fields supported by NSF): Associate's Degree
Fiscal year(s) REU Participant supported: 2009
REU Funding: REU supplement

Name: Bennett, Crystal

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Sophomore
Home Institution: Other than Research Site
Home Institution if Other: North Carolina A&T University
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2009
REU Funding: REU supplement

Name: Fassino, Steven

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Sophomore
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2009
REU Funding: REU supplement

Name: Ferguson, Revorn

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Junior
Home Institution: Other than Research Site
Home Institution if Other: North Carolina A&T University
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2009
REU Funding: REU supplement

Name: Huang, Wen

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Junior
Home Institution: Other than Research Site
Home Institution if Other: Queen's College CUNY
Home Institution Highest Degree Granted(in fields supported by NSF): Associate's Degree
Fiscal year(s) REU Participant supported: 2009
REU Funding: REU supplement

Name: Khatri, Vishnupriya

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Duke University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2009

REU Funding: REU supplement

Name: Nance, James

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: Emory University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2009

REU Funding: REU supplement

Name: Schiermeyer, Katherine

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in the summer 2009 REU program.

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: East Tennessee State University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2009

REU Funding: REU supplement

Name: Briggs-Dunn, Kimberly

Worked for more than 160 Hours: Yes

Contribution to Project:

High school teacher participant in the summer 2009 REU program.

Years of schooling completed: Pre-College Teacher

Home Institution: Other than Research Site

Home Institution if Other: Clinton High School

Home Institution Highest Degree Granted(in fields supported by NSF): Associate's Degree

Fiscal year(s) REU Participant supported: 2009

REU Funding: REU supplement

Name: Sills, Ginger

Worked for more than 160 Hours: Yes

Contribution to Project:

High school teacher participant in the summer 2009 REU program.

Years of schooling completed: Pre-College Teacher

Home Institution: Other than Research Site

Home Institution if Other: Clinton High School

Home Institution Highest Degree Granted(in fields supported by NSF): Associate's Degree

Fiscal year(s) REU Participant supported: 2009

REU Funding: REU supplement

Name: Blankenship, Tiffany

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: University of Texas - El Paso

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Botesteanu, Dana-Adriana

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Mount Holyoke College

Home Institution Highest Degree Granted(in fields supported by NSF): Bachelor's Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Goglio, Frances

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: University Wisconsin - Madison

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Haycraft, David

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: Howard University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Lee, Lindsay

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Freshman
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2011
REU Funding: REU site award

Name: Noecker, Cecilia

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior
Home Institution: Other than Research Site
Home Institution if Other: St. Olaf College
Home Institution Highest Degree Granted(in fields supported by NSF): Bachelor's Degree
Fiscal year(s) REU Participant supported: 2011
REU Funding: REU site award

Name: Schaefer, Krista

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior
Home Institution: Other than Research Site
Home Institution if Other: Valparaiso University
Home Institution Highest Degree Granted(in fields supported by NSF): Master's Degree
Fiscal year(s) REU Participant supported: 2011
REU Funding: REU site award

Name: Shrestha, Shreejaya

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior
Home Institution: Other than Research Site
Home Institution if Other: Wesleyan College
Home Institution Highest Degree Granted(in fields supported by NSF): Bachelor's Degree
Fiscal year(s) REU Participant supported: 2011
REU Funding: REU site award

Name: Tisdale, Carter

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Sophomore
Home Institution: Other than Research Site
Home Institution if Other: Auburn University
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2011
REU Funding: REU site award

Name: Wisniewski, Christa

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Southeast Missouri State University

Home Institution Highest Degree Granted(in fields supported by NSF): Master's Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Yang, Yang

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Beloit College

Home Institution Highest Degree Granted(in fields supported by NSF): Bachelor's Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Yong, Yicong

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: University of Florida

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Zaccheo, Kelly

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: University of Scranton

Home Institution Highest Degree Granted(in fields supported by NSF): Master's Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Name: Chitrakar, Rojin

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate participant in REU program (June-July 2011).

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Eastern New Mexico Univ.

Home Institution Highest Degree Granted(in fields supported by NSF): Master's Degree

Fiscal year(s) REU Participant supported: 2011

REU Funding: REU site award

Organizational Partners

IBM

IBM is a formal organizational partner with NIMBioS and has pledged the full support of the IBM Deep Computing team and continued collaborations with projects in computational biology. An IBM researcher (Dr. Ravi Rao) is an organizer of the NIMBioS working group on multi-scale analysis of cortical networks.

BioQuest Curriculum Consortium

BioQuest and NIMBioS have collaborated to conduct several workshops at NIMBioS: the NUMB3R5 Count workshop providing data, tools, and curricular materials for teachers and faculty, the SCALE-IT Curriculum Development workshop titled 'Integrating Bioinformatics and Molecular Visualization into the Curriculum' devoted to applying biological problem solving strategies to problems in medicine, epidemiology, forensics, agriculture, and conservation, and the Computational Biology Curriculum Development Tutorial (July 2010, co-sponsored with SCALE-IT and ORNL).

Great Smoky Mountains National Park

GSMNP is a formal organizational partner with NIMBioS. GSMNP staff have collaborated with NIMBioS to develop outreach and education programs and as participants in NIMBioS working groups. Presentations on opportunities for GSMNP/NIMBioS collaboration have been given at the GSMNP's annual science conferences. NIMBioS and GSMNP staff are also working together on research on biodiversity issues and beginning discussions of large-scale monitoring issues.

California State University San Marcos Foundation

NIMBioS staff are working with CSUSM faculty and staff to increase underrepresented individuals in science careers, with particular connections through the NIH-funded MARC Phase II award at CSUSM. NIMBioS and CSUSM have signed a formal partnership agreement, and NIMBioS scientists have visited and presented at CSUSM.

Environmental Systems Research Institute, Inc.

ESRI is a formal organizational partner with NIMBioS prepared to provide expertise in enhancing the connection between mathematical models, computational simulation, and GIS visualization and analysis in application to biological problems.

Fisk University

NIMBioS staff are working with Fisk University faculty and staff to increase underrepresented individuals in science careers. Fisk students and faculty have participated in the NIMBioS REU program, the undergraduate research conference, and as short-term visitors. NIMBioS and Fisk have signed a formal partnership agreement, and NIMBioS researchers have visited and presented at Fisk.

IPlant Collaborative

IPlant is an NSF Center with which NIMBioS is collaborating on outreach and education projects including co-sponsoring a session at the 2009 National Assoc. of Biology Teachers Meeting. Along with the other NSF BIO Centers, we are sharing information on projects and potential research collaborations. IPlant co-sponsored a tutorial on use of high performance computing in phylogenetics, which was held at NIMBioS.

Nat. Ctr for Ecological Analysis and Syn

NIMBioS communicates with NESCent, NEON, NCEAS, and IPlant to talk about possible avenues of collaboration between the institutions and centers. An education and outreach meeting was held at NESCent, and NIMBioS organized a meeting of program evaluation staff from the various centers in April 2010. NIMBioS staff attended an Education and Outreach meeting held at NCEAS in September 2010. The BIO Center Directors have discussed potential collaborations on research and communication.

Nat. Evolutionary Synthesis Center

NIMBioS communicates with NESCent, NEON, NCEAS, and IPlant to talk about possible avenues of collaboration between the institutions and centers, and the Bio Center Directors are in regular discussions regarding potential collaborations on research and communication. NESCent hosted an education and outreach meeting and post-doctoral symposium attended by NIMBioS staff and post-docs. NIMBioS

organized a meeting of program evaluation staff from the various centers in April 2010, and NIMBioS and NESCent cooperated on a joint session at the SIAM annual meeting in 2010. NIMBioS and NESCent are also collaborating on activities and sessions at SACNAS in 2011. Also in 2011, NIMBioS will host a joint Investigative Workshop with NESCent working toward a formal theory for the evolution of human social complexity.

National Ecological Observatory Network, Inc

NIMBioS initiated communication between NESCent, NEON, NCEAS, and IPlant to talk about possible avenues of collaboration between the institutions and centers in February. An education and outreach meeting was held at NESCent for a more in-depth discussion. The Directors of these Centers are in communication to share resources and encourage new collaborations. NIMBioS hosted a NEON DSECC meeting in February 2010, and a NEON representative attended the NIMBioS-organized center program evaluation meeting in April 2010.

National Institute for Computational Sci

NICS staff collaborated with NIMBioS in development of the HPC Tutorial held in March 2009 and have consulted with NIMBioS staff on high-performance computing needs and possible future tutorials. Time on the KRAKEN super-computer operated by NICS was provided during the Tutorial and arrangements are in place for use of KRAKEN as appropriate for activities based at NIMBioS. NICS co-sponsored the NIMBioS tutorial on HPC for Phylogenetics in October 2010.

North Carolina Agricultural & Technical State University

NIMBioS staff are working with NC A&T faculty and staff to increase underrepresented individuals in science careers. NC A&T faculty are participating in activities at NIMBioS, and NC A&T students have participated in the NIMBioS REU program and undergraduate research conference.

Scalable Computing and Leading Edge Inno

Scalable Computing and Leading Edge Innovative Technologies (SCALE-IT) is an Integrative Graduate Education and Research Training (IGERT) program funded by the National Science Foundation. It is an interdisciplinary graduate fellowship program at the University of Tennessee designed to train scientists to apply appropriate computing tools to solve quantitative problems at all scales of biology (from atom to ecosystems). NIMBioS and SCALE-IT have co-sponsored Curriculum Development workshops including two in 2009 devoted to applying biological problem solving strategies to problems in medicine, epidemiology, forensics, agriculture, and conservation and one on computational biology in July 2010. NIMBioS and SCALE-IT also co-sponsored a series of speakers on computational biology challenges over the Spring 2009 term at UTK.

Mathematical Biosciences Institute (MBI)

MBI and NIMBioS are collaborating on a project, PUMP (also sponsored by the Society for Mathematical Biology and SIAM) to survey undergrad and graduate programs in mathematical biology around the US. The leadership teams of NIMBioS and MBI are in regular contact regarding potential collaborations, and an MBI representative attended the NIMBioS-organized center program evaluation meeting in April 2010. NIMBioS will cosponsor a summer graduate workshop jointly with MBI and CAMBAM in July 2011.

Program for Excellence and Equity in Res

Program for Excellence and Equity in Research (PEER) is an NIH-funded graduate student support program at UTK. NIMBioS faculty and staff have collaborated in development of this 'program of excellence' designed to increase numbers of under-represented minority Ph.D.s in science, technology, engineering, and mathematics (STEM) fields. PEER has an emphasis on quantitative biology. NIMBioS regularly provides space for PEER meetings, and PEER is an official co-sponsor of the NIMBioS Multi-cell Multi-scale Modeling Tutorial held in May 2011.

USDA-APHIS-WS-National Wildlife Research Center

USDA is a formal organizational partner with NIMBioS. USDA-APHIS personnel initiated the NIMBioS Bovine Tuberculosis Workshop (July 2009) and are regular participants in other scientific activities (i.e., Feral Hog / Pseudorabies and Bovine Tb Working Groups).?? NIMBioS contributed to Foreign Animal Disease outbreak training for USDA staff, and NIMBioS and APHIS staff have worked on plans for Working Groups on Cattle Tick fever and Wildlife Tuberculosis.

Howard Hughes Medical Institute

HHMI, through its HHMI Professor Program, sponsored the efforts of BioQuest and Dr. Claudia Neuhauser to lead the NIMBioS co-sponsored 'Curriculum Development Workshop: Integrating Bioinformatics and Molecular Visualization into the Curriculum' in June 2009. HHMI

support provided funding for attendance by faculty at this Workshop, for which NIMBioS provided facilities and staff support. NIMBioS, BioQuest, and HHMI co-sponsored the NUMB3R5 Count workshop on quantitative biology in May 2009.

University of Texas - El Paso

UTEP and NIMBioS have signed a formal partnership agreement to enhance the participation of under-represented minorities in STEM disciplines. These efforts are underway through the NIH-funded MARC Phase II award at UTEP and the Bioinformatics MS program at UTEP. NIMBioS staff and post-docs have visited UTEP to discuss research in mathematical biology, and UTEP faculty and students have attended NIMBioS activities, including the REU program and working group and investigative workshops.

Amer. Assoc for Advancement of Science

NIMBioS is involved in the AAAS-led and NSF-funded Conference on Transforming Undergraduate Education in Biology: Mobilizing the Community for Change. NIMBioS organized a group of UTK undergraduate math and biology students to consider questions posed by AAAS for this Conference.

Project Kaleidoscope

Project Kaleidoscope (PKAL) coordinated with NIMBioS on a Webinar on undergraduate education for life science students led by the NIMBioS Director, Louis Gross. The founder of PKAL, Jeanne Narum, visited NIMBioS to gather information on innovative ways to transform undergraduate education and presented a seminar at NIMBioS.

Oak Ridge National Laboratory

A number of ORNL scientists are NIMBioS senior personnel or collaborators. NIMBioS has co-sponsored a summer program in biophysics with ORNL, and ORNL scientists have participated on a career panel for the undergraduate research program and as mentors for the NIMBioS REU program.

Society For Mathematical Biology

NIMBioS and the University of Tennessee will host the Society of Mathematical Biology's (SMB) annual meeting in 2012.

American Institute of Biological Sciences

NIMBioS Director Lou Gross is on the American Institute of Biological Sciences (AIBS) Board of Directors. NIMBioS has cooperated with the AIBS to communicate opportunities and discuss co-sponsoring an outreach and education symposium. NIMBioS staff have presented at AIBS meetings.

NSF Mathematical Sciences Institutes

NIMBioS Director and Associate Directors communicate regularly with their counterparts at the various math institutes to develop ideas for collaborative activities. NIMBioS has joined with the other math institutes in the joint initiative on Climate Change and Sustainability. www.mathinstitutes.org/climate-initiative NIMBioS regularly hosts a reception with the other math institutes at the annual Join Math Meeting. Also, NIMBioS is collaborating on organizing workshops and short courses with these institutes at SACNAS (2010, 2011).

Howard University

NIMBioS has signed a formal partnership with Howard University, a minority-serving institution, to increase the representation of underrepresented minorities in the STEM disciplines. Howard Univ. students have attended the Undergraduate Research Conference, and a Howard faculty member delivered the keynote address at the 2010 conference. Howard faculty and students have participated in NIMBioS activities, and NIMBioS staff and post-docs have visited Howard to discuss research in mathematical biology.

Tennessee State University

NIMBioS has entered into discussions with Tennessee State University, a minority-serving institution, to develop a partnership designed to increase the representation of underrepresented minorities in the STEM disciplines. Tennessee State faculty and students have participated in NIMBioS activities.

National Center for Medical Intelligence

NIMBioS and NCMI conducted a series of workshops, supported through a supplement to the cooperative agreement for NIMBioS, to review and develop NCMI analytic priorities and capabilities on infectious disease risk. Two 1-day workshops were conducted in Washington, D.C.

in October 2010. The October workshops were followed by a workshop at NIMBioS in January 2011 that brought together infectious disease modeling experts to consider how quantitative methods could improve understanding of baseline infectious disease risks, quantitative approaches to situational awareness on pandemic events, rapid response modeling, and approaches to contextualize biological events in terms of economic, political, and social impacts. Additional workshops are planned to further investigate/demonstrate the application of infectious disease modeling to expand the forecasting quality of the disease risk assessments of NCMI, an agency within the U.S. Department of Defense (DOD).

USDA-APHIS -Veterinary Services

NIMBioS and USDA APHIS Vet. Services have entered into a Memorandum of Understanding regarding use of USDA-controlled data useful to the Bovine Tb working group.

TDEC Natural Heritage Program

NIMBioS has entered into a Data Use Agreement with the Natural Heritage Program of the Tennessee Department of Environment and Conservation. The purpose of the agreement is to facilitate access to data useful in modeling the spread of white-nose syndrome in bats.

University of the Virgin Islands

NIMBioS staff are working with University of the Virgin Islands faculty and staff to increase underrepresented individuals in science careers. Faculty and students from the Virgin Islands have participated in NIMBioS activities.

Joint Institute Computational Sci (JICS)

JICS is a joint institute between the University of Tennessee and Oak Ridge National Laboratory. JICS staff collaborated with NIMBioS staff to conduct the HPC tutorial Training the Trainers (March 2009). Cooperative activities were carried out with Jim Ferguson and JICS during the REU programs.

Teragrid XD Remote Visualization (RDAV)

NIMBioS is collaborating with RDAV to conduct a tutorial on HPC application of R and other codes for biological research.

Other Collaborators or Contacts

Other Collaborators or Contacts

NIMBioS is collaborating with a large number of scientists from many fields. The text below identifies individuals, their affiliations, and how they have interacted with NIMBioS.

NIMBioS BOARD OF ADVISORS

NIMBioS has an external advisory board that works with the Leadership Team to evaluate requests for support, encourage collaborative research at the interface of mathematics and biology and assist in developing methods to increase the diversity of participants in NIMBioS activities. Current and past Board members and their institutions (and dates of service) are:

Susan Holmes ? Stanford University (2008-present; Chair 2010-present)
 Cheryl Briggs ? University of California at Santa Barbara (2008-2010)
 Carlos Castillo-Chavez ? Arizona State University (2008-present)
 Iain Couzin ? Princeton University (2008-present)
 Bard Ermentrout ? University of Pittsburgh (2010-present)
 Lisa Fauci ? Tulane University (2008-present)
 James Glazier ? Indiana University (2008-present)
 Gregory Goins ? North Carolina A & T State University (2008-present)
 Alan Hastings ? University of California at Davis (2008-present; Chair 2008-2010)
 Christine Heitsch ? Georgia Institute of Technology (2008-present)
 Fern Hunt ? National Institute of Standards and Technology (2010-present)
 Peter Hudson ? Pennsylvania State University (2008-2010)
 Trachette Jackson ? University of Michigan (2008-present)
 Overtoun Jenda ? Auburn University (2008-2010)

John Jungck ? Beloit College (2008-present)
 Matthew Keeling ? University of Warwick (2008-present)
 Nancy Kopell ? Boston University (2008-2010)
 Donna Koslowsky ? Michigan State University (2008-2010)
 David Krakauer ? Santa Fe Institute (2008-2010)
 Jonathan Mattingly ? Duke University (2008-present)
 George Middendorf ? Howard University (2008-present)
 Kiona Ogle ? Arizona State University (2010-present)
 Lisa Sattenspiel ? University of Missouri (2010-present)
 Ynte Schukken ? Cornell University (2010-present)
 Gary Smith ? University of Pennsylvania (2008-2010)
 DeWitt Sumners ? Florida State University (2008-present)
 John Tyson ? Virginia Polytechnic Institute and State University (2008-2010)
 Mariel Vazquez ? San Francisco State University (2008-present)
 Leor Weinberger ? University of California at San Diego (2010-present)

SENIOR PERSONNEL

The below individuals have been actively involved in NIMBioS activities:

Armsworth, Paul -- Assistant Professor, Department of Ecology and Evolutionary Biology. He is one of the new faculty hired at UT in affiliation with NIMBioS. Dr. Armsworth has served as an advisor to the REU/REV program and consults with NIMBioS regularly regarding future activities. He is co-organizer of a working group on extensions of optimal control for ecological systems.

Berry, Mike ? Prof. and Assoc. Head, Dept. of Electrical Engineering and Computer Science. Dr. Berry was a co-organizer for the NIMBioS HPC Tutorial, a member of the NIMBioS faculty search committee, and provides advice on HPC opportunities.

Day, Judy ? Assistant Professor, Department of Mathematics and Department of Electrical Engineering and Computer Science. Dr. Day is one of the new faculty hired in affiliation with NIMBioS, expanding expertise in modeling at the below-organism level. She is a mentor for the NIMBioS REU program.

Ganusov, Vitaly -- Assistant Professor, UT Department of Microbiology. He is one of the new faculty hired at UT in affiliation with NIMBioS, expanding expertise in immunology. He has submitted workshop requests for support, is hosting a short-term visitor looking at T-cell differentiation during chronic bacterial infection (summer 2011), and serves as a mentor for the REU/REV program.

Gilchrist, Mike -- Asst. Prof., Univ. Tennessee Department of Ecology & Evolutionary Biology. Dr. Gilchrist is one of the organizers and instructors for the NIMBioS REU and REV program, developed a working group request for support, and co-organized a tutorial on HPC applications.

Joo, Jaewook -- Assistant Professor, UT Department of Physics and Astronomy. Dr. Joo is one of the new faculty hired at UT in affiliation with NIMBioS, expanding expertise in biophysics. He is an advisor to the REU/REV program and a co-organizer of the workshop on modeling *Toxoplasma gondii*.

Lanzas, Cristina ? Assistant Professor of Epidemiology, Dept. of Comparative Medicine, Veterinary College, University of Tennessee. Dr. Lanzas is one of the new faculty hired in affiliation with NIMBioS, expanding expertise in epidemiology/infectious disease modeling. She is a mentor for the NIMBioS REU/REV program and developed a workshop request for support.

Odoi, Agricola ? Asst. Prof., Univ. Tennessee Comparative Medicine, Veterinary College. Dr. Odoi provides expertise in epidemiology, participates in the Modeling Disease in Feral Swine working group, co-organized a NIMBioS Investigative Workshop on Modeling Transmission of Bovine Tuberculosis and the subsequent working group on Bovine Tb, was a member of the NIMBioS faculty search committee, mentors NIMBioS post-docs, and is one of the instructors for the NIMBioS REV program.

O'Meara, Brian -- Assistant Professor, Department of Ecology and Evolutionary Biology. Dr. O'Meara organized a tutorial on use of High-performance Computing in Phylogenetics and is a participant in two NIMBioS working groups related to phylogenetic modeling. He is one of the new faculty hired at UT in affiliation with NIMBioS and mentors NIMBioS post-docs.

Simberloff, Dan -- Gore Hunger Prof of Environmental Science, Univ. Tennessee Department of Ecology & Evolutionary Biology. Dr.

Simberloff participated in the NIMBioS Working Group examining biological problems using binary matrices and is a mentor for NIMBioS post-doctoral fellow William Godsoe.

Ubeda de Torres, Francisco -- Asst. Prof., Univ. Tennessee Department of Ecology & Evolutionary Biology. Dr. Ubeda co-organized the NIMBioS Working Group on intragenomic conflict in 2009.

UT AND ORNL SENIOR COLLABORATORS

The below individuals have participated as noted in NIMBioS activities and are part of a pool of possible post-doctoral mentors as well as providing a variety of local expertise in fields related to NIMBioS working groups:

Aime'e Classen, Assistant Professor, UT Department of Ecology and Evolutionary Biology. Dr. Classen's research focuses on how biotic and abiotic factors interact to shape ecosystem structure and function. She mentors NIMBioS post-docs.

Charles Collins, Associate Professor, UT Department of Mathematics. Dr. Collins's research focuses on numerical analysis and scientific computing with applications to continuum mechanics and other areas. He mentors NIMBioS post-doc Yi Mao.

Shigetoshi Eda, Research Associate Professor, UT Department of Forestry, Wildlife, & Fisheries. Dr. Eda has been an advisor for the NIMBioS REU/REV program and is co-organizer of the NIMBioS workshop on modeling John's Disease.

Ben Fitzpatrick, Assistant Professor, UT Department of Ecology and Evolutionary Biology. Dr. Fitzpatrick conducts research in population genetics, conservation biology, and vertebrate biology. He is a mentor for NIMBioS post-docs.

James Fordyce, Associate Professor, UT Department of Ecology and Evolutionary Biology. Dr. Fordyce mentors NIMBioS post-doc Erol Akcay.

Hong Guo, Associate Professor, UT Department of Biochemistry & Cellular and Molecular Biology. Dr. Guo mentors NIMBioS post-doc Yi Mao.

Kimberly Gwinn, Assoc. Professor, UT Entomology and Plant Pathology Department. Dr. Gwinn is one of the mentors for the NIMBioS REU program.

Thomas Hallam, Emeritus Professor, UT Departments of Ecology and Evolutionary Biology and Mathematics. Dr. Hallam has co-organized the NIMBioS Investigative Workshop on Modeling White-nose Syndrome in Bats (June 2009), coordinated additional meetings on White-nose Syndrome, and is a mentor for NIMBioS post-doc Tom Ingersoll.

Jian Huang, Associate Professor, UT Department of Electrical Engineering & Computer Science and Associate Director of the NSF Teragrid XD Remote Vis (RDAV) Center. Dr. Huang co-organized the NIMBioS tutorial Migration from the Desktop: HPC application of R and other codes for biological research.

Michael Langston, Professor, UT Department of Electrical Engineering & Computer Science. Dr. Langston was a co-organizer of the NIMBioS HPC Tutorial (March 2009).

Gary McCracken, Professor, UT Department of Ecology and Evolutionary Biology. Dr. McCracken has co-organized the NIMBioS Investigative Workshop on Modeling White-nose Syndrome in Bats (June 2009), coordinated additional meetings on White-nose Syndrome, and is a mentor for NIMBioS post-doc Tom Ingersoll.

Vasileios Maroulas, Assistant Professor, UT Department of Mathematics. Dr. Maroulas mentors NIMBioS post-docs, serves as a mentor for the NIMBioS REU/REV program, and is co-organizer of the workshop on mathematical modeling of intracellular movements.

Andreas Nebenfuhr, Associate Professor, UT Department of Biochemistry, Cellular, and Molecular Biology. Dr. Nebenfuhr is a mentor for the 2011 NIMBioS REU/REV program.

John New, Professor, UT Department of Comparative Medicine, Veterinary College. Dr. New has been involved in the NIMBioS faculty search procedures, a member of the search committee, and provides advice and support in development of the NIMBioS REV program.

Vladimir Protopopescu, Senior Research Staff, ORNL Computer Science & Mathematics Division. Dr. Protopopescu's research focuses on mathematical modeling of complex systems. He is a mentor for the 2011 NIMBioS REU/REV program.

Susan Riechert, Distinguished Service Professor, UT Department of Ecology & Evolutionary Biology. Dr. Riechert is assisting with NIMBioS outreach efforts with emphasis on the Biology in a Box program.

Nate Sanders, Associate Professor, UT Department of Ecology & Evolutionary Biology. Dr. Sanders mentors NIMBioS post-docs and is an advisor for the REU/REV program.

Chunlei Su, Assistant Professor, UT Department of Microbiology. Dr. Su's research focuses on population genetics and regulation of virulence in *Toxoplasma*. He co-organized the NIMBioS workshop on modeling *Toxoplasma gondii* and the subsequent working group evolving from that workshop.

Steven Wise, Assistant Professor, UT Department of Mathematics. Dr. Wise is an instructor for the NIMBioS REU and REV programs, discussed NIMBioS in a presentation at the SHANKS conference in May 2009, mentors NIMBioS post-docs, and organized the NIMBioS workshop on solid tumor modeling.

Jie Xiong, Dr. Xiong co-organized the NIMBioSa tutorial on use of stochastic differential equations in ecology and the NIMBioS working group on agent-based models of biological systems.

Xiaopeng Zhao, Assistant Professor, UT Department of Mechanical, Aerospace, and Biomedical Engineering. Dr. Zhao co-organized the NIMBioS workshop on modeling *Toxoplasma gondii* and the subsequent working group evolving from that workshop.

ADDITIONAL COLLABORATORS

Edward and Linda Allen (Department of Mathematics and Statistics, Texas Tech University), along with Jie Xiong (Dept. Mathematics, Univ. Tennessee), co-organized the NIMBioS tutorial on Stochastic Modeling in Biology. (March 2011)

Noelia Barrios (Department of Ecology and Evolutionary Biology graduate student) and Marco Martinez (Department of Mathematics graduate student) planned and conducted the NIMBioS-sponsored tutorial on use of R for life sciences in spring 2009.

Michael Bevers, USDA Forest Service. Dr. Bevers co-organized the NIMBioS tutorial on optimal control and optimization for biologists and has been a participant in NIMBioS workshops and working groups, including the working group on agent based models for biology. (December 2009)

Margaret Cozzens (Center for Discrete Mathematics & Theoretical Computer Science, Rutgers University), Jo Ellis-Monaghan (Dept. Mathematics, Saint Michael's College), and Gregg Hartvigsen (Dept. Biology, SUNY Geneseo), along with NIMBioS Board member John Jungck (Dept. Biology, Beloit College) led the NIMBioS tutorial on graph theory and biological networks. (August 2010)

Kathy DeWein and Gale Stanley, high school teachers, facilitated introduction of the Biology in a Box program in a number of high schools. (2009-2011).

Dr. Jim Ferguson (Director for Education, Outreach and Training, National Institute for Computational Studies, Univ. Tennessee/ORNL), Dr. Christian Halloy (Research Leader, JICS UT/ORNL), Dr. Kwai Wong (Research Scientist, Joint Institute for Computational Science at UT/ORNL), Michael McLennan (Senior Research Scientist, Purdue University), Tabitha Samuel (Electrical Engineering & Computer Science, University of Tennessee), John Eblen (Electrical Engineering & Computer Science, University of Tennessee), Dr. Scott Duke Sylvester (Post-doctoral Fellow, Department of Biology, Emory University), Gary Rogers (Department of Computer Science, University of Tennessee), and Stan Tomov (Research Scientist, Computer Science Department, University of Tennessee) were co-instructors for the NIMBioS tutorial designed to 'train the trainers' in use of high-performance computing for biologists. (March 2009)

Sheldon McKay (iPlant); Alexis Stamatakis (Computer & Communication Sciences, Tech. Univ. of Munich); Dan Stanzione (Adv. Computing Ctr/iPlant, Texas); Robert Thomson (Center for Population Biology, UC Davis); James Wilgenbusch (Scientific Computing, Florida State Univ.), along with Eric Carr (NIMBioS), Jim Ferguson (NICS UTK/ORNL); Susan Holmes (NIMBioS Board member and Professor, Stanford); Brian O'Meara (Ecology & Evolutionary Biology, Univ. Tennessee) co-planned and instructed the NIMBioS tutorial on High Performance Computing for Phylogenetics. (October 2010)

Tamah Fridman, Joint Institute for Computational Sciences, ORNL, planned and organized a Summer School in Biophysics: Physics and Computational Challenges in Biology and initiated discussions on NIMBioS involvement in the program. (summer 2009 and 2010)

John Lounsbury, Professor, Department of Psychology, University of Tennessee consulted with NIMBioS staff on program assessment and evaluation procedures.

Claudia Neuhauser (University of Minnesota- Rochester), Ethel Stanley, Sue Risseuw, and John Jungck (all of BioQuest) collaborated with NIMBioS in planning and carrying out the NUMB3R5 Count Workshop (May 2009) and the BioQuest collaborators also co-sponsored the SCALE-IT Curriculum Development Workshops (Integrating Bioinformatics and Molecular Visualization in the Curriculum (June 2009) and Computational Biology (July 2010)).

Premal Shah, Univ. Tennessee Department of Ecology and Evolutionary Biology provided computer and audiovisual support for NIMBioS seminars.

Julio Belamonte, Randy Heiland, Mitja Hmeljak, and Maciej Swat (all Biocomplexity Institute, Univ. Indiana) and NIMBioS Board member James Glazier are co-instructors for the NIMBioS tutorial on multi-cell, multi-scale modeling. (Planned for May 2011)

Amy Szczepanski, Education, Outreach, and Training Coordinator, NSF Teragrid XD Remote Vis (RDAV) Center. Amy co-organized the NIMBioS tutorial Migration from the Desktop: HPC application of R and other codes for biological research along with Eric Carr (NIMBioS), Michael Gilchrist (Dept. Ecology & Evolutionary Biology, Univ. Tennessee), and Jian Huang (RDAV and Dept. Electrical Engineering and Computer Science, Univ. Tennessee). (Planned for May 2011)

ADDITIONAL STAFF (not supported off direct NSF funds)

Ms. Chandra Eskridge, Executive and Business Assistant for NIMBioS. Chandra provides support for the NIMBioS Director and Deputy Director as well as working with other business staff on travel and reimbursement issues.

GRADUATE RESEARCH ASSISTANTS

NIMBioS has supported the following graduate research assistants (GRAs):

Spring 2009:

Erin Bodine, Department of Mathematics;
Rachel Leander, Department of Mathematics ? Biology in a Box;
Marco Martinez, Dept. of Mathematics ? R Tutorial for Life Sciences

2009/2010 academic year:

Erin Bodine, Department of Mathematics;
Ivan Juric, Ecology and Evolutionary Biology;
Rachel Leander, Department of Mathematics ? Biology in a Box;
Premal Shah, Ecology and Evolutionary Biology.

2010/2011 academic year:

Yuzhuo Chu, Dept. Biochemistry, Cellular and Molecular Biology;
Bolye Gomero, Dept. Mathematics
Mauricio Gonzalez-Forero, Dept. Ecology and Evolutionary Biology;
Premal Shah, Dept. Ecology and Evolutionary Biology;
Henian Xia, Dept. Mechanical, Aerospace, and Biomedical Engineering.

2011/2012 academic year (beginning August 2011):

Yuzhuo Chu, Dept. Biochemistry, Cellular and Molecular Biology;
Mauricio Gonzalez-Forero, Dept. Ecology and Evolutionary Biology;
John Martin, Electrical Engineering & Computer Science;
Adam Sullivan, Dept. Mechanical, Aerospace, & Biomedical Engineering;
Ashutosh Wadhwa, Dept. of Forestry, Wildlife, & Fisheries.

SHORT-TERM VISITORS

The following individuals have visited (or will visit prior to August 31, 2011) NIMBioS for collaborative research efforts:

Rene Salinas, Asst. Professor, Appalachian State Univ. Collaborated with Dr. Suzanne Lenhart and Dr. Frank van Manen on Using Dynamic Model Feedback for Optimization of Individual-based Models (2009) and with NIMBioS scientific staff on visualizations/modeling related to the feral hogs working group (2010).

Renee Fister, Dept. Mathematics, Murray State Univ.; Elsa Schaefer, Dept. Mathematics, Marymount Univ.; Holly Gaff, Virginia Modeling, Analysis and Simulation Center, Old Dominion Univ.; Rachael Miller, Dept. Mathematics, Univ. Tennessee. These researchers met with Dr. Suzanne Lenhart at NIMBioS to collaborate on disease modeling. (May 2009)

Maria Leite, Department of Mathematics, University of Oklahoma; Zhilan Feng, Department of Mathematics Purdue University; Jorge Velasco-Hernandez, Programa de Matemáticas Aplicadas y Computación Instituto Mexicano del Petróleo.
Project Title: Coupling within- and between-host dynamics in HIV
These researchers met to work on Coupling Within- and Between-Host Dynamics in HIV and on Models for the Characterization and Prediction of Outbreaks of Dengue Fever Based on Spatially Explicit Information. (July 2009)

Ilki Kim, Dept. Physics, North Carolina A&T University.
Dr. Kim visited NIMBioS to meet with UT and ORNL collaborators with the goal of gaining information to help build a research program in biophysics at NC A&T.
(August 2009)

Clare Devaux, Marie Curie Fellow, Imperial College, London.
Project Title: Spatial ecological model of sympatric speciation of palm trees
Clare Devaux is collaborating with Sergey Gavrilets (Univ. Tennessee) to develop and test ecological and neutral models of speciation that can describe the emergence of two sympatric species of palms trees endemic to Lord Howe Island. (October 2009)

Eti Wiraningsih, Mathematics Dept., Universitas Gadjah Mada, Indonesia.
Project Title: Competing species model with an infectious disease and time delay
Ms. Wiraningsih visited NIMBioS with support from the Directorate General for Higher Education of Republic of Indonesia. While here she collaborated with Dr. Suzanne Lenhart, Dr. Fola Agosto, and others to develop an optimal control in SEIR model for rabies between dogs and humans with vaccination effect. (November 2009 - February 2010)

Jean Michel Tchuente, Dept. Mathematics and Statistics, Univ. of Guelph, Canada.
Project Title: Optimal Vaccination Strategies for Malaria in an AA-AS Population
Jean Michel Tchuente is collaborating with Suzanne Lenhart (Univ. Tennessee) and Folashade Agosto (NIMBioS) to formulate a deterministic model for malaria transmission in individuals with dominant homozygous gene (AA-cell) and individuals with sickle-cell trait (AS-cell), in order to theoretically assess the benefit of the control strategies on the transmission dynamics of malaria in individuals with AA-cell against individuals with AS-cell natural resistance. (December 2009)

Brian Beckage, Dept. Plant Biology, Univ. of Vermont.
Project Title: Using models to investigate patterns, process, and climate change in savannas
Brian Beckage's research focuses on dynamics of forests, including disturbance and dynamics in savanna communities, climate change and ecological communities, tree invasions, and forest diversity. (December 2009)

Jason Miller, Dept. Mathematics and Computer Science, Truman State Univ.
Project Title: Training in multi-scale modeling for research and teaching
Jason Miller is training in mathematical and computational modeling for the purpose of advancing personal research and teaching in an undergraduate program in mathematical biology. The training objective is to acquire skills in multiscale modeling of biological phenomena with direction from professional modelers at NIMBioS. (December 2009)

Ellen Simms, Dept. Integrative Biology, Univ. of California, Berkeley.
Project Title: Modeling nodulation dynamics of legumes

Ellen Simms is collaborating with Erol Akçaya (NIMBioS) modeling nodulation dynamics of legumes. (January 2010)

Jason Hoeksema, Dept. Biology, Univ. Mississippi; Sarah Richardson, Environmental Sciences Program, DePaul Univ.; Ellen Simms, Dept. Integrative Biology, UC Berkeley; Antonio Golubski, Dept. Ecology & Evolutionary Biology, Univ. of Toronto; and Miro Kummel, Dept. Environmental Science, Colorado College. (James Umbanhower, Dept. Biology, Univ. of North Carolina, Chapel Hill was part of this group but was ill and unable to travel to NIMBioS).

Project Title: Production economics of mutualism: Rhizobial bail-outs to the domatia bubble

These individuals met with Dr. Erol Akçaya (NIMBioS post-doc) to develop a general framework for using economic theory to model how mutualisms evolve and how they create and respond to ecological change. (February 2010)

Judith Canner, Biomathematics Program, North Carolina State Univ.

Project Title: The effects of climate change on ant population dynamics and ant-plant mutualisms

To understand the factors controlling the seasonal abundance of ants, Judith Canner is collaborating with Sharon Bewick (NIMBioS) and Katie Stuble (Univ. of Tennessee) to develop a stage-structured model of colony dynamics. The goal is to understand how temperature, which alters the developmental and mortality rates of eggs, larvae and pupae, can influence the seasonal abundance of workers in the colony and, ultimately, colony survival. (March 2010)

Jeremy Van Cleve, Santa Fe Institute.

Project Title: Exploring two-tier models of social behavior in structured populations

Jeremy Van Cleve is collaborating with Erol Akçaya (NIMBioS) to explore two-tier models of social behavior in structured populations. (March 2010)

Emily Moran, Dept. Biological Sciences, Duke University.

Dr. Moran visited NIMBioS to develop a collaboration network on use of individual-based and population models to investigate plant genotype-specific responses to environmental changes. (April 2010)

Kerrie Anne Loyd, Warnell School of Forestry and Natural Resources, Univ. Georgia.

Project Title: A stochastic modeling approach to feral cat management and prey take

Ms. Loyd visited NIMBioS to collaborate with Dr. Louis Gross and Jane Comiskey from NIMBioS as well as Dr. Paul Armsworth (Univ. Tennessee, NIMBioS Sr. Personnel) and Dr. Yetta Jager (Environmental Sciences Division, ORNL, NIMBioS Sr. Collaborator) on development of improved stochastic models for feral cat management. Her models examine the effect of alternative feral cat management options on cat populations and prey take and predation on a focal species over a 10-year period. (May 10-14, 2010)

Scott Duke-Sylvester, Dept. Biology, Univ. Louisiana ? Lafayette and Chris Ellingwood, Botany Dept., Univ. Vermont.

Project Title: Spatial modeling of Everglades plant community response to natural and anthropogenic disturbance.

Dr. Duke-Sylvester and Dr. Ellingwood visited NIMBioS to collaborate with NIMBioS Sabbatical Fellow Dr. Brian Beckage, NIMBioS Director Lou Gross, and NIMBioS scientific staff Jane Comiskey and Eric Carr on a project to model Everglades plant community dynamics. The model projects potential changes to Everglades plant communities in response to altered patterns of fire and hydrology. The model is being used to evaluate the impact of climate change and alternative hydrologic scenarios on the distribution of plant communities in the Everglades. (May 10-14, 2010)

Sanjukta Hota, Fisk Univ.

Project Title: HIV research discussion and partnership visit.

Sanjukta Hota is collaborating with Suzanne Lenhart (NIMBioS/UTK) and Hem Raj Joshi (Xavier Univ.) to develop a mathematical epidemic model of HIV with inclusion of controls through educational information and treatment. The goal is to develop an optimal strategy that minimizes the number of infected and the cost of implementing the controls. (May 17-21, 2010)

Dong Chen and Marguerite Madden, University of Georgia

Geospatial modeling of feral swine distribution in Great Smoky Mtns National Park

Drs. Chen and Madden visited NIMBioS to work with Suzanne Lenhart, Chuck Collins, and Eric Carr on feral swine modeling.

William J. Platt, Louisiana State Univ.

Project Title: Models for savanna dynamics based on differential flammability of trees.

Bill Platt is collaborating with Brian Beckage (NIMBioS Sabbatical Visitor) and Louis Gross (NIMBioS) to develop a stochastic model for vegetation-fire feedbacks in savannas as well as a general conceptual model for fire that incorporates short- and long-term feedbacks involving vegetation at local, regional, and global scales. These models will be developed to provide new insights into the role of fire in maintaining grasslands and savannas. (June 21-25, 2010)

Sadie Ryan, National Center for Ecological Analysis and Synthesis; Michael Tildesley, Centre for Infection, Immunity and Evolution, Univ. of Edinburgh;

Project Title: Using GIS to inform spatial epidemic models of disease transmission among US farms.

Sadie Ryan and Michael Tildesley are collaborating on research to investigate the geographical resolution required to accurately predict future epidemics of foot-and-mouth disease in the USA, and to create model frameworks that can be adapted to other livestock diseases such as Bovine tuberculosis and Brucellosis. (June 28 - July 2, 2010)

Redwan Al Faori, Univ. of Arkansas; Luis Cabrales Arriaga, Texas Tech Univ.; M. Letitia Holden Hubbard, Duke Univ.

Al Faori, Arriaga and Hubbard attended the 2010 Summer School in Biophysics at the Univ. of Tennessee/Oak Ridge National Laboratory, of which NIMBioS was a co-sponsor. (July 7-10, 2010)

Michael Bode, Univ. of Melbourne; Gareth Lennox, Univ. of Sheffield; Carl Toews, Duquesne Univ.

Project Title: Optimal design of spatial and spatio-temporal management strategies for terrestrial biodiversity conservation and fisheries management.

This collaborative group of early career mathematical biologists visited NIMBioS to work with Dr. Paul Armsworth, Univ. of Tennessee; focusing on terrestrial biodiversity conservation and fisheries management. The group is developing and applying constrained optimization techniques to inform the design of management strategies. (July 4-27, 2010).

Richard Hall, Odum School of Ecology, Univ. Georgia; John Lambrinos, Dept. Horticulture, Oregon State Univ.; Gregory Schrott, Archbold Biological Station; and Hiroyuki Yokomizo, National Institute for Environmental Studies, Japan.

This collaborative group is synthesizing ecological theory, computational modeling and empirical data to understand how habitat fragmentation interacts with local biotic resistance to drive invasion patterns. The simulation model uses a dataset from pampas grass (*Cortaderia jubata*) as an invasive in California. The results of this study, and the code generated for the model, will have broad applicability for the understanding and management of invasions into human-altered landscapes. (July 12-23, 2010)

Yoram Louzoun, Dept. Mathematics, Bar Ilan Univ., Israel.

Project Title: Optimal viral immune surveillance evasion strategies.

Yoram Louzoun is collaborating with Vitaly Ganusov (Dept. of Microbiology, Univ. of Tennessee) to develop an optimization framework to compute the number of expected epitopes in different viral proteins and to conduct a bioinformatic analysis of the epitope density in different proteins that correlates with the optimization analysis. (July 22 - August 17, 2010)

Dr. Ross Cressman (Dept. of Mathematics, Wilfrid Laurier Univ.

Project Title: Habitat selection and multi-species population games.

Ross Cressman's project is part of ongoing collaborative research on evolutionary game theory with NIMBioS Sabbatical Fellow Vlastimil Krivan. This research examines how game-theoretic results can extend to cases when time scales can be separated. The primary goal of the project is to generalize heuristic single-species solution concepts such as the Ideal Free Distribution to multi-species models with a long-term goal to develop a more general conceptual approach for multi-species games. (September 27 - October 2, 2010)

Urban Friberg, Dept. of Animal Ecology, Uppsala Univ.; Bill Rice, Dept. of Ecology, Evolution and Marine Biology, UC Santa Barbara.

Project Title: Homosexuality driven by genetic conflicts between sex chromosomes Friberg and Rice are collaborating with Sergey Gavrillets (NIMBioS/UTK) on a project to develop a mathematical model that describes the evolutionary dynamics of a genomic conflict that potentially can drive the evolution of homosexuality. (September 29 - October 3, 2010).

Mohammad Yahdi, Dept. of Mathematics & Computer Science, Ursinus College.

Project Title: Mathematical modeling, analysis, and optimal control of Vancomycin-Resistant Enterococci (VRE).

Mohammad Yahdi is collaborating with Suzanne Lenhart (NIMBioS/UTK) to analyze the dynamic underlying the emergence in hospitals of VRE and to determine strategies for optimal control of its spread without the risk involved in clinical testing. (October 3 - October 9, 2010)

Ryan Chisholm, Smithsonian Tropical Research Institute.

Project Title: Integrating niche structure into neutral models of community ecology.

Ryan Chisholm is collaborating with NIMBioS postdocs Erol Akçaya, Sharon Bewick and Will Godsoe to investigate neutral theory models and niche structure in community ecology. (Oct. 22-31, 2010)

Jeanne Narum, Project Kaleidoscope.

Project Title: Gathering stories about transformative collaborations that transform undergraduate STEM.

Jeanne Narum visited NIMBioS to gather stories about what works in transforming the undergraduate STEM learning environment and to

translate them into a series of essays that suggest major areas to be addressed over the next decade. (Oct. 25-26, 2010)

Dave McCandlish, Dept. of Biology, Duke Univ.

Project Title: Evolutionary flexibility of HIV surface proteins.

Dave McCandlish is collaborating with Sergey Gavrilets (NIMBioS/UTK) to reconstruct virus exploration of neutral networks corresponding to protein function using publicly available sequence data. (Oct. 25-30, 2010)

Philip Ryan, Div. of Mathematics and Computer Science, Truman State Univ.

Project Title: Training in agent-based modeling Philip Ryan is visiting NIMBioS for training in agent-based modeling. In his research, he applies agent-based models (ABMs) to mathematical ecology and physiology problems. His research goal is to develop an ABM which analyzes diabetes self-management strategies, especially with type II diabetes, based on the oral glucose tolerance test. (Nov. 1-12, 2010).

Peter Turchin, Dept. of Ecology and Evolutionary Biology, Dept. of Mathematics, Univ. of Connecticut.

Project Title: Evolution of social complexity: models of multilevel-selection and intergroup conflict.

Peter Turchin is collaborating with Sergey Gavrilets (NIMBioS/UTK) and David Anderson (Dept. of Anthropology, UTK) to use agent-based models in investigating the development of complex hierarchies in response to selection imposed by intergroup conflict. (Nov. 15-19, 2010)

Robert Holt, Dept. of Biology, Univ. of Florida.

Project Title: Linking mathematical models of ecological processes across organizational and temporal scales.

Robert Holt is collaborating with NIMBioS Sabbatical Fellow Vlastimil Krivan to investigate how labile behaviors alter ecological responses to resource pulses and shifting landscapes. (Nov. 28-29, 2010)

Mark Kirkpatrick, Section of Integrative Biology, University of Texas, Austin

Dr. Kirkpatrick was invited as a NIMBioS Post-doctoral Fellows Distinguished Visitor. He presented a seminar on chromosome evolution under local adaptation and sexual conflict and met with NIMBioS post-docs. (January 11-12, 2011)

Phil Crowley, University of Kentucky.

Dr. Crowley visited NIMBioS to collaborate with Drs. Suzanne Lenhart and Lou Gross on decision-making by plants and animals.

Istvan Karsai, Biological Sciences, East Tennessee State Univ.) and Jonathan Shik, Zoology, Univ. of Oklahoma)

Project Title: Effects of climate change on ant colony dynamics: overwintering success.

Istvan Karsai and Jonathan Shik are collaborating with Sharon Bewick (NIMBioS), Nate Sanders (Univ. of Tennessee), and Katharine Stuble (Univ. of Tennessee) to construct models that consider implications of individual behavior and physiology on the outcome of colony level overwintering survival. (Jan. 18-22, 2011)

Urmi Ghosh-Dastidar, Mathematics, New York City College of Technology, CUNY.

Project Title: Study and analysis of aquatic pathogenic transmission.

Urmi Ghosh-Dastidar is collaborating with Suzanne Lenhart (NIMBioS) to review and analyze the spread of waterborne pathogens that occur in multiple pathways (ie, cholera). (Feb. 14-16, 2011)

Peter Hammerstein, Institute for Theoretical Biology, Humboldt University, Berlin

Dr. Hammerstein was invited as a NIMBioS Post-doctoral Fellows Distinguished Visitor. He presented a seminar on manipulative strategies and their evolution and met with NIMBioS post-docs. (March 7-8, 2011)

Rene Salinas, Department of Mathematical Sciences, Appalachian State University

Dr. Salinas visited NIMBioS to collaborate with Suzanne Lenhart, Eric Carr, and Graham Hickling on modeling the dynamics and spread of feral hogs in the southeastern U.S. (February 28-March 3, 2011)

Mark McPeck, Distinguished Professor of Biological Sciences, Dartmouth College

Dr. McPeck was invited as a NIMBioS Post-doctoral Fellows Distinguished Visitor. He presented a seminar on climate change and community assembly and met with NIMBioS post-docs. (March 7-8, 2011)

Dr. Fred Adler, Departments of Mathematics and Biology, University of Utah

Dr. Adler was invited as a NIMBioS Post-doctoral Fellows Distinguished Visitor. He presented a seminar on game theoretics and conflict and met with NIMBioS post-docs. (March 20-23, 2011)

Ryan Chisholm, Smithsonian Tropical Research Institute.

Project Title: Analyzing biodiversity patterns in theoretical community models with variable niche structure Ryan Chisholm is collaborating with NIMBioS postdocs Erol Akçaya, Sharon Bewick and Will Godsoe to investigate biodiversity patterns in community ecology. (Apr. 2-10, 2011).

Juanjuan Chai, Department of Mathematics, University of Indiana

Juanjuan visited NIMBioS to discuss possible collaboration with NIMBioS post-docs and UT faculty. (April 4-5, 2011)

Kevin Flores, Arizona State Univ.

Project Title: An individual-based model for the evolution of eusociality via maternal manipulation.

Kevin Flores is collaborating with NIMBioS GRA Mauricio Gonzalez-Forero to develop an individual-based model for the evolution of eusociality via maternal manipulation. (April 11-15, 2011)

Daniel Maxin, Valparaiso Univ.; Ludek Berec, Biology Centre ASCR, Institute of Entomology, Ceske Budejovice, Czech Republic.

Project Title: Applying two-sex population models to epidemiological problems.

Maxin and Berec are collaborating on a project to apply two-sex population models to epidemiological problems. (April 9-16, 2011)

Peter Kim, Department of Mathematics, University of Utah

Dr. Kim visited NIMBioS to collaborate with Sharon Bewick and Vitaly Ganusov about detecting change in the immune system. (April 26-30, 2011)

Mae Woods, University College London

Mae Woods will visit NIMBioS to collaborate with Dr. Karen Page on modeling collective cell migration of neural crest cells in *Xenopus laevis*. She is also attending the Multi-cell Multi-scale Modeling tutorial. (planned for May 14-22, 2011)

Hem Joshi, Xavier University, and Sanjukta Hota, Fisk University

These researchers will visit NIMBioS to work with Suzanne Lenhart on developing an optimal control model investigating the effect of education on HIV control. (planned for May 2011)

Lindsey Holmstrom, Department of Epidemiology at UC Davis; Joe Corn, Veterinary Medicine at Univ. Georgia; Marguerite Madden, Department of Geography, Univ. Georgia; and Rene Salinas, Dept. Mathematical Sciences, Appalachian State Univ.

These researchers will meet at NIMBioS to work with Suzanne Lenhart, Chuck Collins, Graham Hickling, and Eric Carr to discuss feral swine models. This group is connected to the Feral Swine working group. (planned for May 2011)

Irina Nikitina, Central Tuberculosis Research Institute, Russia

Irina will visit NIMBioS to work with Dr. Vitaly Ganusov and others on modeling T-cell differentiation during chronic bacterial infection. (planned for summer 2011)

POST-DOCTORAL FELLOWS

NIMBioS has ten Post-doctoral Fellows as of April 2011 (Folashade Augusto, Erol Akçay, Sharon Bewick, Tucker Gilman, William Godsoe, Tom Ingersoll, Tony Jhwueng, Yi Mao, Emily Moran, and Xavier Thibert-Plante). Six more have accepted positions but have not yet started at NIMBioS, and the decision for one other is pending. Five of the possible seven new post-docs are expected to start within the period of this annual report:

Juanjuan Chai (Department of Mathematics, Indiana University) starts in June 2011.

Orou Gaoue (Dept. Biology, University of Miami) starts in June 2011.

Andrew Kanarek (Dept. Biology, Colorado State University) starts in August 2011.

Calistus Ngonghala (Department of Mathematics, West Virginia University) starts in June/July 2011.

Daniel Ryan (Dept. Mathematics, University of Miami) starts in August 2011.

Note: Shade Shatters (School of Life Sciences, Arizona State University and Applied Economics Dept., University of Vigo, Spain) was

scheduled to start in July 2010 as noted in the previous annual report. Family circumstances resulted in him deciding not to become a NIMBioS post-doc after all.

SABBATICAL FELLOWS

NIMBioS has supported three Sabbatical Fellows in residence and has one scheduled to begin in August 2011:

Dr. Brian Beckage, Assistant Professor, Department of Plant Biology, University of Vermont, was in residence Jan-Jul 2010. Dr. Beckage's research focused on using models to investigate patterns, process, and climate change in savannas. (January ? July 2010)

Dr. Vlastimil Krivan, Chair, Department of Theoretical Ecology, Biology Center, Academy of Sciences of the Czech Republic was in residence Aug 2010-Dec 2010. Dr. Krivan studied links between animal behavior, population dynamics, and evolutionary processes that preserve biodiversity by combining game theoretical methods to describe animal behavior with differential equations describing population dynamics. (August ? December 2010)

Dr. Karen Page, Department of Mathematics, University College London, is currently in residence at NIMBioS. Her research focus is mathematical models of noise in cellular signaling networks. (January ? August 2011)

Dr. Gary Stuart, Biology Department, Indiana State University, is scheduled to begin at NIMBioS in August 2011. Dr. Stuart's research emphasis is development of new non-alignment phylogenomic methods for determining relationships at the species, subspecies, and population levels. (August ? December 2011)

Activities and Findings

Research and Education Activities:

Year 1:

From September 1, 2008 ? August 31, 2009, 437 participants (404 different people--37% male; 62% female) attended NIMBioS sponsored events. In Year 1 NIMBioS hosted 7 Working Group meetings, 2 Investigative Workshops, 1 Tutorial, 8 Short-term Visitors, and more than 15 Outreach and Education activities. Participants came from 15 countries, including 41 different states in the U.S., as well as the District of Columbia and Puerto Rico. A total of 165 different institutions were represented, including colleges or universities (87%), federal government institutions (8%), state government institutions (.5%) private businesses (.5%), non-profit organizations (4%), and high schools (.5%). Participants from these institutions were college/university faculty (51%), undergraduate students (5%), graduate students (21%), government employees (8%), postdoctoral researchers, (6%), private business employees (.5%), college/university staff (5%), non-profit employees (4%), college/university administrators (1%), and high school faculty/staff (5%). Around 5% of participants indicated being of Hispanic/Latino ethnicity. The majority of participants reported their race as white (54%), although Asian (6%), black/African American (4%), Native Hawaiian/Pacific Islander (.2%), and American Indian/Alaska Native (1%) races were also represented (33% of participants chose not to report their race, and 35% chose not to report ethnicity).

Year 2:

From September 1, 2009 ? August 31, 2010, 791 participants (635 different people--58% male; 42% female) attended NIMBioS sponsored events. In Year 2 NIMBioS hosted 13 Working Group meetings, 4 Investigative Workshops, 3 Tutorials, 37 Short-term Visitors, 2 Sabbatical Fellows, and more than 15 Outreach and Education activities. Participants came from 30 countries, including 42 different states in the U.S., as well as the District of Columbia and Puerto Rico. A total of 274 different institutions were represented, including colleges or universities (88%), federal government institutions (6%), county government institutions (.6%) private businesses (2%), non-profit organizations (2%), high schools (1%), middle schools (1%), and elementary schools (.1%). Participants from these institutions were college/university faculty (48%), undergraduate students (15%), graduate students (10%), government employees (5%), postdoctoral researchers, (12%), private business employees (2%), college/university staff (3%), non-profit employees (1%), college/university administrators (1%), and K-12 faculty/staff (3%). Around 6% of participants indicated being of Hispanic/Latino ethnicity. The majority of participants reported their race as white (65%), although Asian (10%), black/African American (5%), and American Indian/Alaska Native (1%) races were also represented (16% of participants chose not to report their race, and 18% chose not to report ethnicity).

Year 3:

From September 1, 2010 ? April 30, 2011, 567 participants (500 different people--62% male; 38% female) attended NIMBioS sponsored events. In Year 3 so far, NIMBioS has hosted 12 Working Group meetings, 4 Investigative Workshops, 2 Tutorials, 20 Short-term Visitors, 2 Sabbatical Fellows, and more than 21 Outreach and Education activities. Participants came from 20 countries, including 42 different states in the U.S., as well as the District of Columbia and Puerto Rico. A total of 262 different institutions were represented, including colleges or universities (89%), federal government institutions (6%), private businesses (2%), non-profit organizations (2%), and high schools (1%). Participants from these institutions were college/university faculty (46%), undergraduate students (16%), graduate students (11%), government employees (6%), postdoctoral researchers, (14%), private business employees (1%), college/university staff (3%), non-profit employees (2%), college/university administrators (.4%), and high school faculty/staff (1%). Around 6% of participants indicated being of Hispanic/Latino ethnicity. The majority of participants reported their race as white (68%), although Asian (10%), black/African American (4%), Native Hawaiian/Pacific Islander (.4%), and American Indian/Alaska Native (2%) races were also represented (13% of participants chose not to report their race, and 14% chose not to report ethnicity). By the end of August 2011, NIMBioS will have hosted 17 Working Group meetings, 9 Investigative Workshops, 4 Tutorials, 26 Short-term Visitors, 3 Sabbatical Fellows, and more than 25 Outreach and Education activities during Year 3.

OVERALL SUMMARY (cumulative)

From September 1, 2008 ? April 30, 2011, 1,795 participants (1,230 different people--60% male; 40% female) attended NIMBioS sponsored events. Since its inception, NIMBioS has hosted 32 Working Group meetings, 10 Investigative Workshops, 6 Tutorials, 65 Short-term Visitors, 3 Sabbatical Fellows, and approximately 75 Outreach and Education activities. Participants came from 36 countries, including 49 different states in the U.S., as well as the District of Columbia and Puerto Rico. A total of 464 different institutions were represented, including colleges or universities (88%), federal government institutions (6%), state government institutions (.1%), county government institutions (.3%), private businesses (2%), non-profit organizations (2%), high schools (.5%), middle schools (.4%), and elementary schools (.06%). Participants from these institutions were college/university faculty (48%), undergraduate students (13%), graduate students (13%), government employees (6%), postdoctoral researchers, (11%), private business employees (1%), college/university staff (3%), non-profit employees (2%), college/university administrators (1%), and K-12 faculty/staff (2%). Around 6% of participants indicated being of Hispanic/Latino ethnicity. The majority of participants reported their race as white (63%), although Asian (10%), black/African American (5%), Native Hawaiian/Pacific Islander (.1%), and American Indian/Alaska Native (1%) races were also represented (19% of participants chose not to report their race, and 21% chose not to report ethnicity). By the end of Year 3 (August 2011) NIMBioS will have hosted 37 Working Group meetings, 15 Investigative Workshops, 8 Tutorials, 72 Short-term Visitors, 4 Sabbatical Fellows, and more than 80 Outreach and Education activities.

Major Research and Educational Activities

Year 1 Reporting Period (September 2008 ? August 2009)

Year 1: Advisory Board Meetings, 1 on-site and 1 virtual. These meetings were held to refine NIMBioS procedures and goals and to evaluate requests for support, including for working groups, workshops, sabbatical visitors, and post-doctoral fellows. (See attachment for Board minutes).

Working Group on Coalitions and Alliances

http://www.nimbios.org/workinggroups/WG_Coalitions.html

Organizers: Sergey Gavrilets, Department of Mathematics and Ecology & Evolutionary Biology, University of Tennessee, Knoxville; Frans B. M. de Waal, Psychology Department, Emory University

The goal of this working group is to bring together empiricists and theorists to identify the most promising ways for building a testable quantitative theory of coalition formation. 11 participants

Dates: April 2009 (11 participants)

Working Group on Intragenomic Conflict

http://www.nimbios.org/workinggroups/WG_genomic_conflict.html

Organizers: Francisco Ubeda de Torres, Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville; Andy Gardner, Ashworth Laboratories, Edinburgh, UK; Jon Wilkins, Santa Fe Institute, Santa Fe, NM

This working group brings together biologists working on intragenomic conflict and mathematicians interested in evolutionary theory. The questions to be answered by the working group are related to the differences and commonalities between conflicting genes and what types of models work best for modeling intragenomic conflict.

Date: April 2009 (15 participants)

Working Group on Feral Swine / Pseudo-rabies in Great Smoky Mountains National Park

http://www.nimbios.org/workinggroups/WG_PRV.html

Organizers: Graham Hickling, Department of Forestry, Wildlife and Fisheries, Institute of Agriculture, University of Tennessee, Knoxville, and Director, Center for Wildlife Health; Suzanne Lenhart, Mathematics Department, University of Tennessee, Knoxville; Leslie Real, Biology Department, Emory University

This working group focuses on the problem of managing pseudo-rabies virus and other disease agents among feral swine within Great Smoky Mountains National Park.

Dates: April 2009 (15 participants)

Working Group on Use of Binary Matrices in Biology

http://www.nimbios.org/workinggroups/WG_binary_matrices.html

Organizers: Edward F. Connor, Department of Biology, San Francisco State University; Joshua Ladau, Gladstone Institutes, San Francisco

The Binary Matrices working group focuses on null model tests of binary data. The goal of the Binary Matrices Working group is to bring together biologists, statisticians, and mathematicians to address ways to improve quantitative inference from binary data in biology.

Dates: May 2009 (10 participants)

Working Group for Synthesizing and Predicting Infectious Disease while Accounting for Endogenous Risk (SPIDER)

http://www.nimbios.org/workinggroups/WG_spider.html

Organizers: Eli Fenichel, Arizona State University, School of Life Sciences; Carlos Castillo-Chavez, Arizona State University, Department of Mathematics and Statistics; Peter Daszak, Consortium for Conservation Medicine, New York, NY; Rick Horan, Michigan State University, Department of Agricultural, Food, and Resource Economics; Charles Perrings Arizona State University, School of Life Sciences

The SPIDER working group comprises disease ecologists, economists, and mathematicians working to develop predictive models both to forecast the risks associated with emerging infectious diseases in humans, livestock, wildlife, and plants, and to assist in the development of risk management strategies.

Date: June 2009 (14 participants)

Working Group for Integrating Functional and Evolutionary Dynamics at Multiple Scales

http://www.nimbios.org/workinggroups/WG_Funct_Ev_Dynamics.html

Organizers: Erol Akcay and Joan Roughgarden, Department of Biology, Stanford University

This working group models the dynamics of biological systems at the functional and evolutionary levels and works toward integrating the two in a unified framework.

Dates: June 2009 (11 participants)

Working Group on Population and Community Ecology Consequences of Intraspecific Niche Variation

http://www.nimbios.org/workinggroups/WG_niche_variation.html

Organizers: Daniel Bolnick, Section of Integrative Biology, University of Texas at Austin; Volker Rudolf, Department of Ecology & Evolutionary Biology, Rice University; Kevin McCann, Department of Integrative Biology, University of Guelph, Guelph, Ontario, Canada

The working group uses mathematical models to determine whether, and how, niche variation alters the dynamics of classical models of single-species, predator-prey, and community interactions. It comprises biologists and mathematicians familiar with 1) empirical patterns of niche variation; 2) theoretical quantitative genetics, population genetics, foraging theory, and neural networks; and 3) mathematical models of population, predator-prey, and food web dynamics.

Date: July 2009 (15 participants)

Investigative Workshop for Modeling White Nose Syndrome in Bats at the Individual and Colony Levels: Epizootiology and Management

http://www.nimbios.org/workshops/WS_Bats.html

Organizers: Thomas G. Hallam and Gary F. McCracken, Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville

The purpose of this meeting was to develop modeling directions to help assist in the understanding of the temporal and spatial scales, the pathology, and the physiology of bats during WNS stress and ultimately to lead to managed control of the disease.

Date: June-July 2009 (35 participants)

Investigative Workshop on Modeling the Impact of Cattle Movements on Transmission Dynamics of Bovine Tuberculosis

http://www.nimbios.org/workshops/WS_BovineTB.html

Organizers: Colleen Webb, Department of Biology, Colorado State University, Fort Collins; Agricola Odoi, Department of Comparative Medicine, University of Tennessee, Knoxville

Experts from across the globe met to discuss cutting-edge approaches to model bovine TB transmission in the United States, with the goal of developing a model that would help inform policy on TB control strategies.

Date: July 2009 (38 participants)

Year 2 Reporting Period (September 2009 ? August 2010)

Year 2: Advisory Board Meetings, 1 on-site and 1 virtual. These meetings were held to refine NIMBioS procedures and goals and to evaluate requests for support, including for working groups, workshops, sabbatical visitors, and post-doctoral fellows. (See attachment for Board minutes).

Investigative Workshop on New Strategies for the Black Box: Identifying Mathematical Tools for Elucidating Plant-Soil Interactions

http://www.nimbios.org/workshops/WS_blackbox.html

Organizers: Alison E. Bennett (Department of Entomology, University of Wisconsin); James Umbanhowar (Department of Biology, University of North Carolina)

The purpose of this workshop was to build a comprehensive picture of plant-soil interactions that can then inform basic science as well as applied science, including restoration, conservation, and global change. Theoretical frameworks for expanding our knowledge and driving the future of plant-soil interactions were identified.

Date: October 2009 (33 participants)

Investigative Workshop on Optimal Control and Optimization for Individual-based and Agent-based Models

http://www.nimbios.org/workshops/WS_OptimalControl.html

Organizers: Filippo Castiglione, Institute for Computing Applications, Rome; Volker Grimm, UFZ Center for Environmental Research, Leipzig; Reinhard Laubenbacher, Virginia Bioinformatics Institute; Suzanne Lenhart, University of Tennessee, Knoxville

This workshop brought together researchers working in agent-based models, optimal control, and optimization to discuss the possible development of control theoretic approaches for agent-based models, beginning with the ones mentioned above.

Date: December 2009 (43 participants)

Working Group for Synthesizing and Predicting Infectious Disease while Accounting for Endogenous Risk (SPIDER), 2nd meeting (see Year 1 for description)

Date: November 2009 (11 participants)

Working Group on Use of Binary Matrices in Biology, 2nd meeting (see Year 1 for description)

Dates: December 2009 (11 participants); May 2010 (10 participants)

Working Group on Feral Swine / Pseudo-rabies in Great Smoky Mountains National Park, 2nd meeting (see Year 1 for description)

Dates: January 2010 (15 participants)

Working Group on Darwinian Morphometrics: Cross-Topology Registration of Shape

http://www.nimbios.org/workinggroups/WG_ct_registration.html

Organizers: Patrick A. Carter, School of Biological Sciences, Washington State University; Richard Gomulkiewicz, Department of Mathematics and School of Biological Sciences, Washington State University; David Houle, Department of Biological Science, Florida State University; J. Stephen Marron, Department of Statistics and Operations Research, University of North Carolina, Chapel Hill

This group aims to develop a much deeper understanding of the biological processes that underlie differences in form, by the novel approach of integrating biological hypotheses directly into the geometric operation of registration and the resulting statistical analysis. The group's activities synthesize the development of appropriate hypotheses with methods of registration not previously considered by evolutionary biologists, such as point distribution models, voxel based space warps, and medial models, to produce logical and systematic methods of analysis.

Date: January 2010 (16 participants)

Working Group on Modeling Bovine Tuberculosis

http://www.nimbios.org/workinggroups/WG_BovineTB

Organizers: Colleen Webb, Colorado State University, Department of Biology and Department of Mathematics and Agrícola Odoi, University of Tennessee, Department of Comparative Medicine

This group of experts in network and simulation modeling, bovine TB and control and eradication strategies addresses questions regarding the sources and spread of bovine TB in areas with high local prevalence and at the national scale and how understanding the sources and spread of bovine TB can be used to inform control and eradication strategies.

Date: February 2010 (13 participants)

Working Group on Synthesizing Predictive Modeling of Forest Insect Dynamics Across Spatial and Temporal scales

http://www.nimbios.org/workinggroups/WG_insects

Organizers: Mario Pineda-Krch and Mark Lewis, Centre for Mathematical Biology, Department of Mathematical and Statistical Sciences, University of Alberta, Canada and Andrew Liebhold, Northern Research Station, USDA Forest Service

The aim of the working group is to synthesize cutting edge predictive modeling approaches using several case studies based on historical outbreak data. The group consists of leading researchers engaged in developing an understanding of the complex ecological, evolutionary, and environmental processes governing the dynamics of forest insect pest.

Date: February 2010 (14 participants)

Working Group on Coalitions and Alliances, 2nd meeting

(see Year 1 for description)

Date: February 2010 (11 participants)

Working Group for Integrating Functional and Evolutionary Dynamics at Multiple Scales, 2nd meeting (see Year 1 for description)

Date: March 2010 (8 participants)

Working Group on Food Web Dynamics and Stoichiometric Constraints in Meta-Ecosystems

http://www.nimbios.org/workinggroups/WG_FoodWebs

Organizers: Mathew Leibold, Section of Integrative Biology, University of Texas at Austin; Robert W. Sterner, Dept. Ecology Evolution and Behavior, University of Minnesota; Francois Massol, CEMAGREF, Aix en Provence, France; Chris Klausmeier, Kellogg Biological Station, Michigan State University

This working group addresses important questions at the community/ecosystem interface and works toward synthesizing the two theoretical approaches to food web/ecosystem dynamics, i.e., ecological stoichiometry and meta-community/ecosystem theory.

Date: April 2010 (9 participants)

Working Group on Multi-Scale Analysis of Cortical Networks

http://www.nimbios.org/workinggroups/WG_CorticalNetworks

Organizers: A. Ravishankar Rao, IBM Research and Ehud Kaplan, Mt. Sinai School of Medicine

This group composed of researchers with a wide range of backgrounds, ranging from mathematical physics to computer science to neuroscience will use statistical network theory as a unifying mathematical model to analyze neuroscientific data across multiple levels of abstraction, ranging from single neuron to whole brain.

Date: May 2010 (8 participants)

Investigative Workshop on Modeling *Toxoplasma gondii*

http://www.nimbios.org/workshops/WS_Toxoplasma.html

Organizers: Xiaopeng Zhao, Biomedical Engineering Dept., University of Tennessee, Knoxville; Chunlei Su, Department of Microbiology, University of Tennessee, Knoxville; Jitender P. Dubey, Laboratory of Parasitic Diseases, United States Department of Agriculture; Michel Langlais, Institut Mathematiques de Bordeaux, Universite Victor Segalen Bordeaux; Suzanne Lenhart, Department of Mathematics, University of Tennessee, Knoxville; Jaewook Joo, Department of Physics and Astronomy, University of Tennessee, Knoxville

This workshop explored mathematical tools and problems in describing the life cycle, stage conversion, and clonal expansion of *T. gondii* by bringing together expertise in parasitic diseases, epidemiology, population genetics, disease modeling, network dynamics, evolutionary dynamics, and nonlinear analysis.

Date: May 2010 (38 participants)

Investigative Workshop on Modeling the Sustainability of Coral Reef Ecosystem Services Under Multiple Interacting Stressors

http://www.nimbios.org/workshops/WS_coralreef.html

Organizers: Susan Harrell Yee, U.S. EPA, Gulf Ecology Division and Jerald S. Ault, University of Miami, Rosenstiel School of Marine & Atmospheric Science

This workshop evaluated the potential for development of a comprehensive coral reef systems model that links multiple interacting environmental stressors (e.g., water quality, exploitation, episodic events, climate changes, and vessel groundings) to the state and dynamics of reef ecosystems stretching from coastal bays to coral reefs.

Date: July 2010 (33 participants)

Working Group on Population and Community Ecology Consequences of Intraspecific Niche Variation, 2nd meeting (see Year 1 for description)

Date: June 2010 (15 participants)

Working Group on Feral Swine / Pseudo-rabies in Great Smoky Mountains National Park, 3rd meeting, (see Year 1 for description)

Date: August 2010 (9 participants)

Year 3 Reporting Period (September 2010 ? August 2011)
(Year 3 to date September 2010 ? April 2011)

Year 3: Advisory Board Meetings, 1 on-site (Oct 2010) and 3 virtual (one in Jan 2011 and two in Apr 2011). These meetings were held to refine NIMBioS procedures and goals and to evaluate requests for support, including working groups, workshops, sabbatical visitors, and post-doctoral fellows. The January 2011 meeting was in response to a Board recommendation from the October meeting that led to an extra call for post-doctoral fellow applicants targeted toward students in mathematics (some thought our March deadline came too late relative to other post-doctoral opportunities sought by many mathematics graduates). The spring meeting was split into two separate virtual meetings with one meeting devoted to discussion/evaluation of post-doctoral fellow requests and one devoted to working group/workshop requests. This was done per Board suggestion to save time and allow members to focus on specific types of requests. (See attachment for summary of the fall Board meeting).

Working Group for Integrating Functional and Evolutionary Dynamics at Multiple Scales, 3rd meeting (see Year 1 for description)

Date: September 2010 (11 participants)

Working Group on Coalitions and Alliances, 3rd meeting (see Year 1 for description)

Date: November 2010 (9 participants)

Investigative Workshop on Modeling Wildlife and Virus Zoonoses

http://www.nimbios.org/workshops/WS_zoonoses.html

Organizers: Colleen B. Jonsson, Department of Microbiology, Center for Predictive Medicine, University of Louisville, Louisville, Kentucky; Linda J. S. Allen, Department of Mathematics and Statistics, Texas Tech University, Lubbock, Texas; Pauline van den Driessche, Department of Mathematics and Statistics, University of Victoria

The focus of this workshop was to define, discuss, and develop approaches to collaboratively address critical gaps that remain in mathematical modeling of the ecology and natural history of zoonotic viruses, how they are maintained in their reservoirs, the processes and mechanisms that lead to transmission, host switching, and molecular events that lead to transfer and adaptation to a new host and post-transfer adaptation.

Date: November 2010 (43 participants)

Working Group on Use of Binary Matrices in Biology, 4th meeting (see Year 1 for description)

Date: December 2010 (6 participants)

Working Group on Population and Community Ecology Consequences of Intraspecific Niche Variation, 3rd meeting (see Year 1 for description)

Date: February 2011 (14 participants)

Working Group on Darwinian Morphometrics: Cross-Topology Registration of Shape, 2nd meeting (see Year 2 for description)

Date: January 2011 (11 participants)

Working Group on Modeling Bovine Tuberculosis, 2nd meeting (see Year 2 for description),

Date: January-February 2011 (13 participants)

Working Group on Synthesizing Predictive Modeling of Forest Insect Dynamics Across Spatial and Temporal Scales, 2nd meeting (see Year 2 for description)

Dates: October 2010 (15 participants)

Working Group on Food Web Dynamics and Stoichiometric Constraints in Meta-Ecosystems, 2nd meeting (see Year 2 for description)

Date: January 2011 (8 participants)

Working Group on Species Delimitation

http://nimbios.org/workinggroups/WG_species_delimitation

Organizers: David Weisrock, Department of Biology, University of Kentucky and Ruriko Yoshida, Department of Statistics, University of Kentucky

The primary objective of this working group is to bring together new and established researchers in mathematics, biology and statistics in order to discuss challenges in a growing field that applies gene trees reconstructed from DNA sequence data to delimiting species.

Date: December 2010 (12 participants)

Working Group on Gene Tree and Species Tree Reconciliation

http://nimbios.org/workinggroups/WG_genetree_reconciliation

Organizers: Gordon Burleigh, Department of Biology, University of Florida; Oliver Eulenstein, Department of Computer Science, Iowa State University; David Liberles, Department of Molecular Biology, University of Wyoming

This group aims to define and characterize the statistical, algorithmic and computational problems associated with gene tree/species tree reconciliation and to apply solutions to these problems to infer patterns and processes of gene duplication and loss from large-scale comparative genomic data sets.

Date: December 2010 (12 participants)

National Center for Medical Intelligence (NCMI) and NIMBioS: Infectious Disease Modeling Workshops

http://www.nimbios.org/workshops/WS_Disease_Modeling

NIMBioS and NCMI conducted a series of workshops, supported through a supplement to the cooperative agreement for NIMBioS, to review and develop NCMI analytic priorities and capabilities on infectious disease risk. Two 1-day workshops were conducted in Washington, D.C. in October 2010 with the first day focusing on identifying the types of intelligence products most and least useful to support force health protection, humanitarian assistance, disaster relief, and stability operations facing COCOM commanders. Participants on the 2nd day worked to identify medical intelligence customers, characterize their needs, and assess major overlaps and gaps in requirements and reporting. The October workshops were followed up by a workshop at NIMBioS in January 2011 that brought together infectious disease modeling experts to consider how quantitative methods could improve understanding of baseline infectious disease risks, quantitative approaches to situational awareness on pandemic events, rapid response modeling, and approaches to contextualize biological events in terms of economic, political, and social impacts. Additional workshops are planned to further investigate/demonstrate the application of infectious disease modeling to expand the forecasting quality of the disease risk assessments of NCMI, an agency within the U.S. Department of Defense (DOD). The workshops assess mathematical and computational modeling approaches with potential to meet DOD requirements.

Date: October 18, 2010 (16 participants), October 19, 2010 (16 participants, some overlap with Oct. 18 group), January 2011 (12 participants)

Investigative Workshop on Solid Tumor Modeling

http://www.nimbios.org/workshops/WS_tumor_modeling.html

Organizers: Vittorio Cristini, University of Texas, School of Information and Health Sciences, Houston; John Lowengrub, Mathematics Department, University of California, Irvine; Kasia Rejniak, Moffitt Cancer Center, Integrated Mathematical Oncology; Steven M. Wise, Mathematics Department, University of Tennessee, Knoxville

The goals of this workshop were to discuss current achievements and challenges in modeling solid tumors in the human body and to identify areas in modeling, computing, laboratory experimentation, and clinical diagnosis that should be pursued to improve our understanding of tumor development and ultimately treatment.

Date: January 2011 (38 participants)

Investigative Workshop on Synchronous Activity in Biological Systems

http://www.nimbios.org/workshops/WS_synchrony.html

The goals of this workshop were to provide insights into how ideas about the study of synchrony in one field can provide novel insights into questions of synchrony in another field, to identify gaps in the theory of synchrony from a biological perspective, and to identify where progress can be made.

Date: April 2011 (34 participants)

Working Group on Optimal Control for Agent-based Models

http://nimbios.org/workinggroups/WG_ABMs

Organizers: Gary An, University of Chicago Pritzker School of Medicine; Reinhard Laubenbacher, Virginia Bioinformatics Institute; Suzanne Lenhart, Department of Mathematics, University of Tennessee; Jie Xiong, Department of Mathematics, University of Tennessee

Building on a NIMBioS Investigative Workshop held in December 2010, this working group will explore mathematical and control/optimization frameworks and tools for agent-based/individual-based models.

Dates: April 2011 (11 participants)

Working Group on Synthesizing Predictive Modeling of Forest Insect Dynamics Across Spatial and Temporal Scales, 3rd meeting (see Year 2 for description)

Dates: April 2011 (10 participants)

Planned research/educational activities, May 1 ? Sept. 1, 2011:

Working Group on Multi-scale Modeling of the Life Cycle of *Toxoplasma gondii*

http://www.nimbios.org/workshops/WS_Toxoplasma.html

Organizers: Zhilian Feng, Department of Mathematics, Purdue University; Dana Mordue, Department of Microbiology and Immunology, New York Medical College; Chunlei Su, Department of Microbiology, University of Tennessee; Xiaopeng Zhao, Department of Biomedical Engineering, University of Tennessee

Building on a NIIMBioS Investigative Workshop held in May 2010, this working group aims to develop a mathematical framework to understand within-host infection dynamics; to explore new mathematical models to investigate the characteristics of the complex transmission pathways of *T. gondii*; and to integrate within-host and between-host models to understand the influences of various properties of the parasites on their genetic diversities and bio-geographic patterns.

Dates: May 2011

Working Group for Synthesizing and Predicting Infectious Disease while Accounting for Endogenous Risk (SPIDER), 3rd meeting, (see Year 1 for description)

Date: May 2011

Working Group on Multi-Scale Analysis of Cortical Networks, 2nd meeting, (see Year 2 for description)

Date: May 2011

Working Group on Feral Swine / Pseudo-rabies in Great Smoky Mountains National Park, 4th meeting, (see Year 1 for description)

Date: August 2011

Working Group on Gene Tree and Species Tree Reconciliation, 2nd meeting, (see Year 3 for description)

Date: August 2011

Investigative Workshop on Individual-based Ecology of Microbes

http://nimbios.org/workshops/WS_IB_microbe_ecology

Organizers: Ferdi L. Hellweger, Civil & Environmental Engineering, Northeastern University; Jan-Ulrich Kreft, Centre for Systems Biology, University of Birmingham; Caroline Plugge, Microbial Physiology, Wageningen University; Andre Levchenko, Biomedical Engineering, Johns Hopkins Univ.

The goal of this workshop is to bring together researchers interested in applying individual observational and/or modeling techniques to study microbial ecology.

Date: June 2011

Investigative Workshop on Malaria Modeling and Control

http://www.nimbios.org/workshops/WS_malaria_modeling.html

Organizers: Miranda I. Teboh-Ewungkem, Department of Mathematics, Lafayette College; Folashade Agosto, NIMBioS; Frederick Baliraine, Univ. California, San Francisco, Dept. of Medicine, Division of Infectious Diseases, San Francisco General Hospital

This workshop will bring together experts in the mathematics and biology of malaria dynamics to discuss cutting-edge approaches to modeling malaria transmission and control.

Date: June 2011

Investigative Workshop on Modeling Johne's Disease

http://www.nimbios.org/workshops/WS_JohnesDisease.html

Organizers: Shigetoshi Eda, Center for Wildlife Health, Univ. of Tennessee Knoxville; Ynte H. Schukken, Dept. Population Medicine and Diagnostic Sciences, Cornell Univ.; Ian A. Gardner, Dept. Medicine and Epidemiology, Univ. of California Davis; John P. Bannantine, Agricultural Research Service, US Department of Agriculture

This workshop will invite scientists in mathematics, biostatistics, epidemiology, veterinary medicine, immunology, molecular biology, and genetics, to facilitate multi-disciplinary collaborations for better understanding of the epidemiology and immunology of Johne's disease.

Date: July 2011

Investigative Workshop on Mathematical Models of Metabolism and Body Weight Regulation

http://www.nimbios.org/workshops/WS_metabolism.html

Organizers: Kevin D. Hall, National Institute of Diabetes & Digestive & Kidney Diseases and National Institutes of Health; Steven B. Heymsfield, Merck & Co., Inc.; Diana M. Thomas, Mathematical Sciences, Montclair State University

The workshop will provide background on the physiology of human body weight regulation, highlight some of the recent progress applying such methods to modeling human metabolism, food intake, and body composition, and will pose open mathematical modeling problems originating from metabolism and body weight regulation research.

Date: July 2011

Investigative Workshop on Modeling Renal Hemodynamics
http://www.nimbios.org/workshops/WS_renal_hemodynamics.html

Organizers: Anita Layton, Department of Mathematics, Duke University and Leon Moore, Department of Physiology & Biophysics, SUNY Health Sciences Center

A goal of this workshop is to initiate the process of integrating key data and concepts into multi-scale mathematical models of the renal vasculature and hemodynamic controls, which, in the long term, can be used to study the development of hypertension, diabetes, and other progressive renal diseases.

Date: August 2011

National Center for Medical Intelligence (NCMI) and NIMBioS: Infectious Disease Modeling Workshop (see Year 3 for description)

Date: August 2011 (projected)

Findings:

Activities at NIMBioS have led to 65 publications on research ranging across many areas of applied mathematics, epidemiology, evolution, ecology and conservation biology. These publications involved 136 researchers and appeared in 50 different journals. Of these publications, 15 appeared in high impact factor journals, including American Naturalist, Ecology, Ecological Applications, Evolution, Genetics, PLOS Biology, Proceedings of the National Academy of Sciences, Science, and Trends in Ecology and Evolution. The publications focus on applications of mathematical models and approaches to a variety of topics of great current interest including emerging disease of a common North American bat species, adaptive human behavior in response to epidemics, effects of intra-specific trait variation in ecological interactions, and the dynamics of coalition and alliance formation in primates.

Training and Development:

Major Opportunities for Training, Development, and Mentoring (through April 30, 2011)

PUMP (Panel on Undergraduate Math Biology)

Held at MBI (Mathematical Biosciences Institute), this activity is organized by MBI, SIAM, and SMB. S. Duncan attended an initial meeting and a follow up conference call, which has led to a collaborative wiki for the panel. The goal is to produce a report that will serve as a resource for individuals and institutions developing initiatives in quantitative biology for undergraduate students.

Vision and Change in Undergraduate Biology Education

Year 1: L. Gross participated in the AAAS Vision and Change Committee on Undergraduate Biology Education. A student mini-conversation was held at NIMBioS in April 2009 with 11 participants to determine which issues the students find most pressing, and how to best use student input for the Vision and Change Steering Committee for Educational Reform reports.

Year 2: S. Duncan submitted a report on the discussion to AAAS along with student nominations to attend the AAAS Visions and Change Conference, July 2010. Two students from UTK were nominated by NIMBioS to attend. Louis Gross also attended the conference in Washington, D.C.

Year 3: Gross was co-author and member of the Steering Committee for publication, Vision and Change Final Report ? A Call to Action.

R Seminar

The R Seminar for statistical computing was co-sponsored by NIMBioS and the University of Tennessee's Department of Ecology and Evolutionary Biology. The purpose of the seminar was to help students learn to use the R statistics package in biological research. The format of the seminar was one hour a week for six weeks.

Date: January 2009 (20 participants)

Curriculum Development Workshop: Integrating Bioinformatics and Molecular Visualization into the Undergraduate Biology Curriculum
 NIMBioS, SCALE-IT, and BioQuest co-sponsored an Undergraduate Biology Curriculum Workshop called Integrating Bioinformatics and Molecular Visualization into the Undergraduate Biology Curriculum for faculty on bioinformatics and visualization, which are rapidly developing research approaches throughout the biological, physical, and mathematical sciences curriculum. The emphasis was on creating teaching units that apply biological problem solving strategies to real problems in medicine, epidemiology, forensics, agriculture, and conservation.

Date: June 2009 (18 participants)

Mathematica Technical Seminar

NIMBioS hosted Wolfram Research for two technical seminars on use of Mathematica 7 in the sciences. These focused on applications of

Mathematica for teaching and research.
Date: September 2009

Tutorial: High-Performance Computing
Training the Trainers: High-Performance Computing Tutorial for Computational Science Professionals Collaborating with Biologists. This NIMBioS High Performance Computing (HPC) Tutorial focused on disseminating the tools necessary for organizations and individuals to leverage computational resources for research at the interface of biological/computational/mathematical research.
Date: March 2009 (33 participants)

Tutorial: Optimal Control and Optimization for Biologists
Organizers: Suzanne Lenhart, University of Tennessee, Department of Mathematics and Michael Bevers, USDA Forest Service, Fort Collins, Colorado
The tutorial introduced selected topics in optimal control and optimization with an emphasis on biological applications and will include lectures and interactive computer lab sessions.
Date: July 2009 (37 participants)

Tutorial: Computational Biology Curriculum Development
This tutorial, co-sponsored by NIMBioS and other partners, focused on helping graduate students and faculty develop curriculum resources and teaching approaches that reflect modern biological problem solving as well as engaging students with the use of emerging computational tools and data.
Date: July 2010 (21 participants)

Tutorial: Graph Theory and Biological Networks
This tutorial was designed to teach participants how graph theory can inform their understanding of many common biological patterns that are graphs.
Date: August 2010 (35 participants)

Tutorial: High Performance Computing for Phylogenetics
This tutorial focused on how to use TeraGrid, the CIPRES Portal, the iPlant Discovery environment, university clusters, and other typically free HPC resources for phylogenetic analysis
Date: October 2011 (31 participants)

Teacher Collaboration Program
This program provides links between teachers, scientists, and educators with interest in mathematical biology. Math or biology/science teachers interested in making connections between the fields are encouraged to participate. NIMBioS matches participants from different communities in a bi-directional partnership to enhance the cross-disciplinary approach to mathematics and biology. The program currently has 26 participants.

Research Experiences for Undergraduates and Veterinary Students (REU/REV)
Veterinary students and undergraduates majoring in math, biology, and related fields lived on campus and worked in teams with UT professors on interdisciplinary research projects for eight weeks. Each research project had a math mentor and a biology or vet mentor.
Year 1 ? June-July 2009 - 10 undergraduates, 4 veterinary students, 2 high school teachers
Year 2 ? June-July 2010 - 14 undergraduates, 3 veterinary students, 2 high school teachers

Tutorial: Stochastic Modeling in Biology
This tutorial was designed to introduce selected topics in stochastic models with an emphasis on biological applications.
Date: March 2011 (35 participants)

Planned training/development opportunities, May 1 ? Sept. 1, 2011:

Research Experiences for Undergraduates and Veterinary Students
The participants will include 15 undergraduates, 4 veterinary students and 1 high school teacher
Dates: May-July 2011

Tutorial: Migration from the Desktop: HPC Application of R and Other Codes for Biological Applications
The goal of this workshop is to introduce participants to the skills, strategies, and techniques necessary for them to make the jump from desktop computing to HPC environments.

Date: May 2011

Tutorial: Multi-Cell, Multi-Scale Modeling

This tutorial will introduce and teach a novel approach to multi-cell multi-scale modeling using free software that allows researchers to build, test and run sophisticated multi-cell, multi-scale models of tissues and organs without low-level coding. They will also learn a suite of tools that provide for subcell modeling.

Date: May 2011

Joint MBI-CAMBAM-NIMBioS Summer Graduate Workshop

Workshop for graduate students on mathematical ecology and evolution.

Date: July 2011

Outreach Activities:

Outreach and Education are a significant component of NIMBioS activities. These activities cover a broad audience from elementary school (Kids U, Biology in a Box (K-12)), middle school (Girls in Science, SHADES, Gadget Girls: Adventures in STEM), high school (teacher collaboration and math/biology curriculum programs, Junior Science and Humanities Symposium), and undergraduates (undergraduate math/biology majors conference, Mu Alpha Theta annual meeting, visits to MSI partners, summer REU program) to graduate students and general science population (summer graduate school with MBI, summer REV program, seminars, presentations). Various institutional partner visits were made, including visits to the Mathematical Biosciences Institute, the All Taxa Biodiversity Inventory project and the Science Symposium at Great Smoky Mountains National Park, Fisk Univ., Howard Univ., Univ. of Texas-El Paso, California State Univ.-San Marcos, NC AT&T and Tennessee State for partnering with minority-serving institutions. The section below describes NIMBioS outreach and education activities completed through April 30, 2011.

Minority-Serving Institution Partner Visits

Visits were arranged for NIMBioS researchers to visit our minority-serving institution partners: California State University-San Marcos (S. Lenhart, November 2010); Fisk University (F. Agosto, S. Lenhart, K. Moran, December 2010; E. Moran, April 2011); Howard University (W. Godsoe, March 2011); and University of Texas-El Paso (Y. Mao, April 2011). L. Gross visited University of the Virgin Islands, St. Thomas (Jan 2011). Also a visit was made to Tennessee State to discuss developing a partnership (S. Lenhart, February 2010) and members of Tennessee State mathematics faculty met with NIMBioS staff.

Joint Math Meetings

Co-sponsored with NSF Mathematics Institutes, the Joint Mathematics Meetings are held in Washington, D.C., for the purpose of advancing mathematical achievement, encouraging research, and to provide the communication necessary to progress in the field.

Year 1: NIMBioS and the Mathematics Institutes sponsored an open-house with presentations on opportunities available through these NSF-funded Institutes. (January 2009)

Year 2: NIMBioS and the Mathematics Institutes again sponsored an open-house with presentations on opportunities available through these NSF-funded Institutes. (January 2010)

Year 3: NIMBioS again co-sponsored an open-house with the Mathematics Institutes. Also, S. Lenhart presented on NIMBioS activities during an education session organized by the Society for Industrial and Applied Mathematics. (January 2011)

Earthfest 2009, Knoxville, TN and Earth Day 2009, Oak Ridge, TN

NIMBioS representatives handed out flyers and talked to the public attending these events.

Webinar: Mathematics and Life Science Education: Promoting Interdisciplinarity

L. Gross led this Webinar, which explored the possibilities of a multi-pronged approach to integrate quantitative ideas throughout the biology curriculum. Co-sponsored with Project Kaleidoscope (PKAL).

Date: April 2009 (28 participants)

NUMB3R5 Count Workshop

This workshop was for faculty interested in addressing the gap between mathematics and its application in biological problem solving. To support the observation, experimentation and modeling of data, the Numb3r5 Count workshop provided an introduction to data, tools, and curricular materials for use with undergraduates. Cosponsored by NIMBioS, BioQuest and HHMI.

Date: May 2009 (17 participants)

Computational Biology Seminar Series

Co-Sponsored by the Scalable Computing and Leading Edge Innovative Technologies (SCALE-IT) graduate fellowship program, NIMBioS, Department of Biochemistry, Cellular, & Molecular Biology and Graduate School of Genome Science and Technology (GST), there were a total of 11 seminars presented by researchers in computational biology over the spring term 2009.

Kids U at the University of Tennessee

S. Duncan and S. Lenhart led a week-long summer course for 4-8th grade students called Biology by Numbers! Students learned about scientific inquiry, conducted their own group research project, and analyzed data using graphs and measures of central tendency.

Date: June 2009

Great Smoky Mountains National Park (GSMNP) Outreach

Year 1: The Smoky Mountains Science Teacher Institute at Tremont - S. Duncan and S. Lenhart led a session introducing NIMBioS and taught a module created by NIMBioS to examine biodiversity and illustrate a quantitative biological lesson for students. (June 2009 - 35 participants)

Girls in Science Biodiversity Session at Tremont ? S. Duncan and S. Lenhart lead a session to introduce NIMBioS, promote girls in science, and illustrate quantitative biology with a salamander diversity module. (June 2009 -25 participants)

Year 2: NIMBioS lead quantitative biology sessions for the Girls in Science week at Tremont (June 2010 ? 20 participants) and for the Smoky Mountains Science Teacher Institute at Tremont (June 2010 ? 20 participants). GSMNP Science Colloquium - K. Moran and J. Trask gave a presentation about NIMBioS (April 2011)

Mu Alpha Theta

NIMBioS contributed to the 2009 Mu Alpha Theta National Convention in Knoxville by providing speakers and facilitating campus tours for students. Mu Alpha Theta is the national high school mathematics honor society.

Date: July 2009

Undergraduate Research Conference at the Interface Between Biology and Mathematics

Year 1: Faculty and Minority Serving Institution partners and high school teachers were invited to see the research of these undergraduates. The conference included student talks and posters, a guest plenary speaker, and a meeting of NSF UBM PIs. The conference also featured a panel to take questions about research and careers in math biology. Nearly 200 undergraduates and faculty from more than 40 academic institutions in North America participated in the conference. There were 40 undergraduate research talks and 35 student posters (October 2009)

Year 2: Undergraduate students engaged in research in biology and mathematics, their faculty mentors, Minority Serving Institution partners and high school teachers were invited. The conference included student talks and posters, a guest plenary speaker, and a career panel to take questions about research and careers in math biology. One hundred twenty-nine undergraduates and faculty from more than 30 academic institutions in North America were in attendance. There were 22 undergraduate research talks and 36 posters. (November 2010)

Tennessee Academy of Sciences

S. Duncan and S. Lenhart presented NIMBioS at a booth at the Tennessee Academy of Sciences meeting at the University of Tennessee, Knoxville.

Date: October 2009

NIMBioS Multidisciplinary Job Candidate Seminars

Job candidate seminars were co-hosted by various departments at the University of Tennessee including Biochemistry, Cellular and Microbiology, College of Veterinary Medicine, Ecology and Evolutionary Biology, Electrical Engineering and Computer Science, Forestry, Wildlife, and Fisheries, Mathematics, and Microbiology.

Year 1: There were a total of 14 job candidate presentations for faculty positions associated with the NIMBioS search with attendance of 30-50 people at each seminar.

Year 2: There were a total of six job candidate presentations for faculty positions associated with the NIMBioS search with attendance of 30-50 people at each seminar.

NIMBioS Interdisciplinary Seminars

The NIMBioS Interdisciplinary Seminar Series is held on alternating Tuesdays during the fall and spring semesters. On Tuesdays when no formal seminar is scheduled, NIMBioS hosts an Afternoon Tea for NIMBioS staff, visitors, faculty, and post-docs as well as faculty and students from across the UT community. The teas provide an opportunity for informal collaboration, discussion and networking.

Dates: Fall 2009 and Spring 2010 ? 11 presentations

Dates: Fall 2010 and Spring 2011 ? 16 presentations

Biology in a Box

Biology in a Box is a fun and challenging way for entire schools to enhance their life sciences curriculum at all grade levels and to encourage student interest in STEM (science, technology, engineering, and mathematics) disciplines. The program employs a hands-on, inquiry-based

approach to teach the wonders of the living world, as well as introducing the scientific methods and math skills we use to understand that world. Each Biology in a Box set consists of ten boxes each representing a different thematic unit.

Year 1: S. Duncan, R. Leander and S. Lenhart partnered with Biology in a Box at the University of Tennessee to add math exercises to the boxes. Workshops to teach how to use the boxes were prepared by S. Riechert and facilitated by G. Stanley and K. DeWein at Elizabethton High School, Elizabethton, TN (6/2009); Walter Hill School, Rutherford Co, TN (8/2009); and McMinn County School System, Athens, TN (8/2009)

Year 2: S. Duncan taught a Biology in a Box session with 80 participants at an annual regional Girl Scout meeting in Knoxville, TN (September 2009). Informational presentations about Biology in a Box were given by S. Riechert at the University of Tennessee's Outreach Conference and also UT's Howard Baker Center (January 2010) and by G. Stanley at the National Science Teachers Association Annual Meeting (March 2010). Workshops to teach how to use the boxes were prepared by S. Riechert and facilitated by G. Stanley and K. DeWein at Vance Middle School, Bristol, TN (January 2010); Meigs Middle School, Meigs County, TN (January 2010); Monroe County School System, TN (February 2010); Henry County Schools EW Grove School, Paris, TN (February 2010); Crossville Cumberland County Schools, TN (March 2010); Warren County School System, TN (May 2010). Biology in a Box Summer Workshop for Teachers at NIMBioS ? 20 local teachers and 6 out of state teachers explored the new mathematical exercises added to the Biology in a Box units by NIMBioS in this interactive workshop (June 2010).

Year 3: K. Moran, S. Lenhart, E. Moran and A. Hare (UTK undergraduate volunteer) worked on math exercises to enhance the activities in Box 9: Forestry. A paper by S. Riechert, R. Leander and S. Lenhart on the squirrel caching game from one of the boxes was featured on the cover of the April 2011 issue of American Biology Teacher. Workshops were presented to national and regional audiences as well as to teachers from schools systems requesting information. S. Riechert, K. Moran and S. Lenhart presented a workshop at the National Science Teachers Association regional conference in Nashville, TN (December 2011). The workshop covered the teaching of STEM discipline with Biology in a Box utilizing the sound communication theme of the new Biomimicry unit, which coincided with the conference theme of Southern Sounds of Science. G. Stanley and K. DeWein presented at a workshop reviewing the inquiry theme to explore important biological concepts at the National Science Teachers Association National Meeting in San Francisco, CA (March 2011). S. Riechert presented a similar workshop at the UTeach Institute's national meeting at the University of Texas, Austin (May 2010) and (May 2011 scheduled). K. DeWein exhibited information on Biology in a Box and other NIMBioS education programs at the TN Environmental Conference (March 2011). Informational presentations were given at George Mason University (G. Stanley, S. Lenhart, August 2010). In-service workshops were completed at the following Tennessee school systems by teams of two of the project facilitators (i.e., former K DeWein and current teachers G Stanley & H. Howard, Project Director S. Riechert and Production Manager JR Jones). Sets were given at these workshops to school systems lacking them and upgrades made to school systems already participating in the project: Rhea County (January 2010), Cumberland County (February 2010), Cumberland County (March 2010), Warren County (May 2010), McNairy County (July 2010), Pickett County (August 2010), Knox County (August 2010), Sumner County (October 2010), Washington County (November 2010), Tipton County (November 2010) and Tennessee School for the Deaf (February 2010 and March 2010).

Coordinators for Education, Outreach and Communication (CEOC)

Year 1: In February and April 2009, C. Crawley and S. Duncan organized conference call meetings between NEScent, NEON, NCEAS, iPlant, NEON, and MBI to talk about possible avenues of collaboration between the institutions and centers.

Year 2: In October 2009, C. Crawley and S. Duncan attended the first annual Coordinators for Education, Outreach and Communication collaborative meeting with the NSF biology centers including NCEAS, NEScent, iPlant, EOL, BioSync, AIBS and NEON. This meeting focused on sharing resources and knowledge in education, outreach and communication. The first annual meeting was held at NEScent. Duncan and Crawley participated in follow up conference calls in January, March and April 2010. Year 3: In September 2010, C. Crawley and K. Moran attended the second annual Coordinators for Education, Outreach and Communication collaborative meeting with the NSF Biology Centers at NCEAS. In future, coordinators of education and outreach and coordinators of communication plan to meet separately and in conjunction with other relevant meetings. In October 2011, the coordinators of education and outreach will meet prior to or post the National American Biology Teacher meetings.

Tennessee Junior Science and Humanities Symposium

NIMBioS hosted visiting high school Junior Science Symposium students for an introductory session to NIMBioS and a quantitative biodiversity module created by NIMBioS.

Date: February 2010 (33 participants including students and teachers)

Date: February 2011 (24 participants and this time NIMBioS presented materials and talked to students and teachers about its mission at a booth during an open-house for an additional 36 participants)

Evaluation Meeting for Biology Research and Education Centers

P. Baird organized and attended a collaborative evaluation meeting held at NIMBioS for NSF biology-related research and education centers whose purpose was to learn from each of the other centers about evaluation best practices and plan for future evaluation initiatives.

Date: April 2010

NIMBioS/UBM Award

NIMBioS provided financial support to help eight undergraduate students attend the Beyond BIO2010 Celebration and Opportunities Conference, May 21-22, 2010, at the National Academy of Sciences in Washington D.C. The NIMBioS/UBM Award covers transportation to and from the conference for ten undergraduate students currently participating in the NSF UBM programs across the United States.

Society of Industrial and Applied Mathematics (SIAM) Conference on Life Sciences

S. Lenhart organized and spoke in a mini-symposium at the conference along with speakers from MBI and NEScent.

Date: July 2010

Webinar: Math, Computing, Undergraduate Ecology Education and Large Datasets: An Example from a Citizen Science Program, sponsored by NIMBioS and the Ecological Society of America (ESA), was held at NIMBioS. W. Godsoe and L. Gross presented. The webinar focused on math and computational education for ecology undergrads and illustrated how a large field dataset can be used to motivate hypothesis formulation and assessment by undergraduates. Date: September 2010 (42 participants)

'Advancing Hispanics/Chicanos & Native Americans in Science' (SACNAS) Annual Conference

NIMBioS collaborated on a session for the 2010 fall SACNAS Annual Conference with SCALE-IT and PEER.S. Lenhart spoke in this session. In addition, Lenhart spoke in the Modern Math Workshop sponsored by the NSF Math Institutes.

Date: September 2010

SHADES (Sharing Adventures in Engineering and Science)

NIMBioS helped inspire sixth and seventh grade girls about careers in math, science and engineering at this annual workshop organized by the Greater Knoxville Math/Science Coalition. K. Moran led the students through a hands-on soil science activity, then students calculated the fraction of earth's land area that is arable farmland, demonstrating its scarcity. J. Trask led an activity called 'Fun with Triangles' that involved creating 3-D shapes from triangles. Thirty-eight local students participated as well as community members and teachers.

Date: October 2010

Gadget Girls: Adventures in STEM

NIMBioS organized several sessions in applied math for a day-long event encouraging interest in science, technology, engineering and mathematics for middle school girls from throughout the Appalachian region. The event was hosted by UT College of Arts and Sciences Academic Outreach and the Southern Appalachians Girl Scout Council Approximately 150 girls and seven chaperones participated.

Date: April 2011

Soil Biology Teacher Workshop

NIMBioS presented a short session promoting the unity of science and math within this workshop on April 15, 2010, sponsored by the UTK Biosystems Engineering and Soil Science Department for high school teachers in biology and environmental science. K. Moran presented a module on modeling of predator-prey interactions that included calculating and graphing fluctuations in a model predator-prey system over time, and also introduced participants to free modeling software available on the web called Netlogo.

Planned Outreach Activities, May 1 - Sept. 1, 2011:

Great Smoky Mountains National Park

NIMBioS will lead quantitative biology sessions for the Girls in Science week at Tremont (June 2011) and for the Smoky Mountains Science Teacher Institute (June 2011).

Soil Biology Teacher Workshop

NIMBioS will present a module on quantifying biodiversity to teachers in another installment of this workshop series (June 2011).

NIMBioS PRESENTATIONS:

Formal talk to University of Tennessee, Math Dept faculty, 28 Aug 2008, S. Lenhart

Discussion with colleagues at the VI International Conference on Ticks and Tick-borne Pathogens, Buenos Aires, Argentina, 24 Sep 2008, G. Hickling

Formal talk to Oak Ridge National Laboratory, Biology and Environmental Sciences Division, 2 Oct 2008, L. Gross, G. Hickling

Formal talk on NIMBioS at AIBS Board of Directors Meeting, 13 Oct 2008, L. Gross

Formal presentations on NIMBioS to Agencies in DC area (NIH, NSF, OSTP and USDA), 14 Oct 2008, L. Gross

Informal presentation to high school teachers at UT Math Contest, 14 Oct 2008, S. Lenhart

Informal presentation to Biomedical Science and Technology Center at Oak Ridge National Laboratory, 16 Oct 2008, S. Lenhart

Formal talk to Univ. Tennessee Deans Council, 17 Oct 2008, L. Gross

Formal talk to Univ. Tennessee Arts and Sciences Department Heads, Oct 2008, L. Gross

Formal talk on NIMBioS at Natural Areas National Meeting, 17 Oct 2008, L. Gross

Informal talk at the 11th International Conference on Lyme Borreliosis and Other Tick-borne Diseases, Irvine CA., 20 Oct 2008, G. Hickling

Formal talk on NIMBioS to UT Board of Trustees, 23 Oct 2008, L. Gross

Formal talk on NIMBioS at NSF UT IGERT Programs kick-off, 23 Oct 2008, L. Gross

Informal presentation at AMS sectional meeting at the University of Alabama at Huntsville, 26 Oct 2008, S. Lenhart

Informal talk with the Wildlife Diseases Working Group, The Wildlife Society 15th Annual Conference, Miami FL., 10 Nov 2008, G. Hickling

Formal talk on NIMBioS at California State University at San Marcos (CSUSM), MARC II, 13 Nov 2008, L. Gross

Formal Talk on NIMBioS to faculty from CSUSM and Palomar and MiraCosta Community Colleges, 13 Nov 2008, L. Gross

Formal talk to CSUSM undergraduates including discussion of NIMBioS, 13 Nov 2008, L. Gross

Formal talk at TIMBER Conference at Appalachian State University , 15 Nov 2008, S. Lenhart

Informal discussions at Biology Summit (NAS) - AAAS - Washington DC, 3-4 Dec 2008, L. Gross

Informal discussions with NRC Board on Life Sciences - Washington DC, 4-5 Dec 2008, L. Gross

Formal talk at NIH-MIDAS Network meeting, Monterrey CA, 5 Dec 2008, S. Lenhart

Presentation: Adaptive radiation: contrasting recent theory and data. U. of Paris, Orsay-Sud, France. Included discussion of NIMBioS with researchers & students in ecology & evolution, 8 Dec 2008, S. Gavilets

Presentation: Dynamics of coalition formation and the egalitarian revolution. U. of Strasburg, France. Included discussion of NIMBioS with researchers & students in biology, 9 Dec 2008, S. Gavilets

Formal talk at Math Institutes Reception of the Joint Math Meetings, Washington DC, 5 Jan 2009, S. Lenhart

Informal presentation at BIO-SIGMAA business meeting (math-biology special interest group of MAA), Joint Math Meetings, Washington DC, 6 Jan 2009, S. Lenhart

Informal discussions at iPlant Collaborative Workshop on Cyberinfrastructure for Plant Science - Arizona, 8 Jan 2009, L. Gross

Formal talk at Belmont University - Nashville, 20 Jan 2009, L. Gross

Informal discussion of NIMBioS opportunities with participants at the Regional Conference to Assess Research and Extension Needs in Integrated Pest Management to Reduce the Incidence of Tick-Borne Diseases in the Southern United States. CDC Atlanta., 20-21 Jan 2009, G. Hickling

Presentations and discussions introducing NIMBioS and exploring partnership with North Carolina A&T University, 26-27 Jan 2009, S.

Duncan, S. Lenhart, C. Peterson

Talk to East Tennessee Public Health Forum on NIMBioS and implications for epidemiology and public health, 5 Feb 2009, L. Gross

Meeting with GSMNP Education Staff, Feb 10 2009, S. Duncan, G. Hickling, S. Lenhart

AAAS Meetings: discuss mini symposium on Biological questions addressed by multiscale mathematical methods; attend symposium on Math in entry-level biology ? Chicago, 12-15 Feb 2009, L. Gross

Presentation: NIMBioS informational talk at Tennessee Governor's Academy, Knoxville (honors high school), 19 Feb 2009, S. Lenhart

Presentation: NIMBioS informational talk at Virginia Tech, Blacksburg, 20 Feb 2009, S. Lenhart

HHMI program advising: link Math and Biology for undergrads ? Wilkes College, Wilkes Barre, PA, 22-24 Feb 2009, L. Gross

Presentation: Dynamics of ecological speciation: case studies and mathematical models' U. of Fribourg, Switzerland. Included discussion of NIMBioS with researchers & students in ecology & evolution, 24 Feb 2009, Sergey Gavrilets

Presentation: New Opportunities for Graduate Education at UTK. At retreat for BCMB and GST programs coupled with recruiting of new graduate students. 6 Mar 2009, C. Peterson

Presentation: NIMBioS informational talk at MAA Southeastern Section Meeting, Belmont Univ., Nashville, TN, 14 Mar 2009, S. Lenhart

Poster presentation on NIMBioS at Biomedical Science and Engineering Conference at Oak Ridge National Laboratory, 18 Mar 2009, S. Lenhart

Presentation to the 2009 Great Smoky Mountains National Park Science Colloquium, Gatlinburg. Introducing NIMBioS, The National Institute for Mathematical and Biological Synthesis, in partnership with Great Smoky Mountains National Park. 20 Mar 2009, G. Hickling, S. Lenhart

Wildlife and Rabies Symposium, Univ. of Tennessee Institute of Agriculture, Knoxville, TN. Rabies and wildlife: An introduction, April 2009, G. Hickling

Discussion with chair of Biology Department at Florida Institute of Technology, Melbourne, FL, 16 Apr 2009, S. Lenhart

NIMBioS informational welcome to Coalitions and Alliances working group, 16 Apr 2009, L. Gross

University of Tennessee, Knoxville - Undergraduate Mathematics Day - 'What's math got to do with it? Drugs, sex and rock and roll - connections between math and biology at NIMBioS', 18 Apr 2009, L. Gross

NIMBioS informational welcome to Intragenomic Conflict working group, 20 Apr 2009, C. Welsh

NIMBioS informational welcome to Feral Swine/Pseudorabies working group, 26 Apr 2009, C. Welsh

La Selva Biological Field Station, Costa Rica- 'Ecological complexity and Public Policy', 'Quantitative Approaching to Assessing Patterns of Change in Forests', 27-28 Apr 2009, L. Gross

USDA-APHIS Wildlife Seminar for Emergency Animal Disease Preparedness, Athens, GA, Managing endemic wildlife disease: bovine TB in New Zealand as a case, May 2009, G. Hickling

Research presentations at Complex Trait Community Annual Meeting, Manchester, UK, Characterizing the gut microbiome in relation to host intestinal mRNA in collaborative cross progenitors and Extracting and validating gene-phenotype association networks using the ontological discovery environment, May 2009, M. Langston et. al.

Washington University, St. Louis - 'Space and Control in Natural Systems', 'Mathematics and Life Science Education: Promoting Interdisciplinarity', 4 May 2009, L. Gross

University of Texas, El Paso, TX - 'Mathematics and Life Science Education: Promoting Interdisciplinarity', 11 May 2009, L. Gross

Vanderbilt Shanks Conference, 18 May 2009, Steve Wise

Presentation to Workshop for Emergency Response to Disease at the Wildlife/Livestock Interface, Georgia Center for Continuing Education, University of Georgia, 12-14 May 2009, G. Hickling

NIMBioS informational welcome to Binary Matrices in Biology working group, 26 May 2009, L. Gross

NIMBioS informational welcome to NUMB3R5 Count workshop, 29 May 2009, L. Gross

Washington State University, Pullman, WA - Pacific Northwest Conference on Comprehensive Mathematical Modeling in the Natural and Engineering Sciences Organized in the Spirit of L. A. Segel - 'Space and control in Natural Systems', 3 Jun 2009, L. Gross

Formal talk at the Chinese Society for Math Biology and Society for Math Biology Joint Meeting - China, 15-17 Jun 2009, L. Gross

International Symposium: Origin of Species, 150 years later, Kristineberg, Sweden, Dynamics of adaptive radiation, June 2009, S. Gavrilets

Invited talk at Congress of the European Academy of Allergology and Clinical Immunology, Warsaw, Poland, High-throughput computation can help identify key molecular response networks in allergic disease, June 2009, M. Langston

TeraGrid 09, Arlington, VA, Generating exact solutions to difficult combinatorial problems on extremely large graphs using out-of-core techniques, June 2009, M. Langston et. al.

NIMBioS informational talk at Institute for Mathematics and its Applications, Univ. of Minnesota, June 12, 2009, S. Lenhart

Invited international talk for Mathematical Modeling and Analysis of Ecological Systems Symposium at the First Joint Meeting of the Society for Mathematical Biology and the Chinese Society for Mathematical Biology, Hangzhou, China, Space, control and population biology? June 14-17, 2009, L. Gross

Invited international talk at Xi'an Jiaotong University, Xi'an, China, Multiscale modeling, space and control of natural systems, June 19, 2009, L. Gross

Interview on WBIR Channel 10 News, Knoxville, TN, Tick-borne disease, July 2009, G. Hickling

Imperial College London, UK, Dynamics of adaptive radiation, July 2009, S. Gavrilets

15th International Congress of Speleology, Kerrville, Texas, White-Nose Syndrome in hibernating bats: Are these affected bats the next 'canary in the mine?' July 2009, T. H. Kunz, D. S. Blehert, P. M. Cryan, J. H. Coleman, A. Hicks, M. D. Tuttle

Invited talk at DOE EPSCoR Program Review Workshop, Brookhaven National Laboratory, Upton, NY, Scalable computational methods for the analysis of high-throughput biological data, July 2009, M. Langston

University of California at Davis Workshop on Graduate Education at the Interface of Biology and Mathematics, Davis, CA, Some lessons from 30 years of interdisciplinary graduate education, July 8, 2009, L. Gross

AAAS/NSF Vision and Change: Undergraduate Biology Education for the 21st Century, Washington DC. Serve on Steering Committee and co-chaired sessions on Concepts and Skills for all Biology Students, July 14-17, 2009, L. Gross

Invited talk at Mu Alpha Theta National Convention, Knoxville, The power of optimal control, July 21, 2009, S. Lenhart

Mu Alpha Theta Annual Conference, Knoxville, TN, What's math got to do with it? Connections between math and biology at NIMBioS, July 23, 2009, L. Gross

NIMBioS informational talk at Society of Mathematical Biology Meeting, Vancouver, Canada, July 27, 2009, S. Lenhart

NIMBioS informational talk at ORNL Brown Bag lunch for summer student researchers, July 30, 2009, C. Peterson.

CODIGEOSIM Workshop on Geosimulation and Mathematical Modeling for Zoonotic Disease, York Univ., Toronto, Persistence and spread

of the agent of Lyme disease in low-density, emerging blacklegged tick populations, Aug. 2009, G. Hickling

Ecological Society of America, Albuquerque, Dynamics of adaptive radiation, August, 2009, S. Gavrilets

Invited talks at Ecological Society of America Annual Meeting Albuquerque, NM.

Symposium on Undergraduate Ecological Education, Undergraduate Biology Education: Bio2010 Revisited and Workshop on Big Models in Ecology, Introductory Presentation, The good, the bad, the ugly are all possible outcomes, August 4-8, 2009, L. Gross

Invited workshop at Radford University, Radford, VA, Mathematics and life science education: Promoting interdisciplinarity, August 24, 2009, L. Gross

Invited plenary talk, Young Investigators Workshop, Mathematical Biosciences Institute, Optimal control of two models of rabies in raccoons, Aug. 25, 2009, S. Lenhart

Workshop on Metapopulations, La Foully, Switzerland, Dynamics of adaptive radiation, Sept. 2009, S. Gavrilets

Invited community colloquium, York University, Toronto, Canada, The power of optimal control, Sept. 10, 2009, S. Lenhart

University of Tennessee Pre-Football Game Showcase Talk, Knoxville, Computational ecology: Environmental problem-solving for the 21st century, Sept. 12, 2009, L. Gross

Invited distinguished lecture, Middle Tennessee State University, The power of applied math, Sept. 17, 2009, S. Lenhart

Epi-Group presentation, Univ. of Tennessee Institute of Agriculture, Knoxville, TN, The ecology of tick-borne disease in Tennessee, Oct. 2009, G. Hickling

Department of Biology, University of Idaho, Moscow, Dynamics of adaptive radiation, Oct. 2009, S. Gavrilets

Department of Anthropology, State University of Washington, Pullman, Cycling in the complexity of early societies, Oct. 2009, S. Gavrilets

OSC2 DIVERSITAS Conference, Cape Town South Africa, The parallels of emerging infectious diseases and biological invasions: the biology behind an economic risk model, Oct. 2009, C. Jerde, P. Daszak, D. Finnoff, D. Lodge, K. Smith

Phi Zeta Research Symposium, Michigan State University's College of Veterinary Medicine, Spatial epidemiology of campylobacteriosis in East Tennessee., Oct. 2009, C. DeGroot

Invited keynote address for Second International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems, Integrating into the future: NIMBioS and the math/biology interface, Oct 9, 2009, L. Gross

NIMBioS presentation to SACNAS Board, Oct. 14-17, 2009, C. Peterson.

Conference opening talk for NIMBioS Undergraduate Research Conference at the Interface Between Biology and Mathematics, What's math got to do with it? Connections between math and biology at NIMBioS, Oct. 23, 2009, L. Gross

National Academy Board on Life Sciences, Washington DC, Multiscale modeling, space and control of natural systems, Oct. 27, 2009, L. Gross

Talk to Directors, National Institutes of Food and Agriculture, USDA, Washington, DC, 'NIMBioS: Synergies with agricultural sciences, Oct. 28, 2009, L. Gross

International Workshop: 150 Years after Darwin: From Molecular Evolution to Language, Palma de Mallorca, Spain, Dynamics of adaptive radiation, Nov. 2009, S. Gavrilets

Invited talk, RTI International Fellows Symposium, Research Triangle Park, NC, The interface of mathematics, biology and computing: Successes and a look to the future, Nov. 3, 2009, L. Gross

Seminar at the Univ. of Vermont, Structural studies on a pair of circulatory proteins: Cofactors or cohorts in crime? Nov. 13, 2009, C. Peterson

Invited workshop, National Association of Biology Teachers Annual Conference, Denver, CO, Computational thinking in biology for all students, Nov. 13, 2009, L. Gross

Centripitals Lecture, Univ. of Tennessee, Knoxville, Fostering interdisciplinarity in research and education: NIMBioS and beyond, Nov. 18, 2009, L. Gross

Seminar at Maryville College, Maryville, TN, A pair of circulatory proteins: Cofactors or cohorts in crime? Nov. 20, 2009, C. Peterson

Invited talk at International Workshop on Parameterized Complexity and Approximation Algorithms, Schloss Dagstuhl, Germany, Parameterized algorithms for string correction problems, Dec. 2009, M. Langston et. al.

Research talk, NIMBioS Investigative Workshop: Optimal Control and Optimization for Individual-based and Agent-based Models, Adapting optimal control from a simple aggregated model to an individual-based model, Dec. 1, 2009, L. Gross

Outreach seminar (NIMBioS: A New National Institute to Foster Mathematical and Biological Linkages) and a research seminar (The games of nature: New approaches to evolutionary game theory) at Cal State Univ. San Marcos, Dec. 1, 2009, E. Akcay

Research Presentation at Georgia State Univ., An unexpected role for metals in regulating the activity of a serine protease inhibitor, PAI-1, Dec. 16, 2009, C. Peterson

Research seminar (The games of nature: New approaches to evolutionary game theory, Dec. 19, 2009) and a public lecture (Social evolution theory, Dec. 21, 2009), Istanbul Technical University, Istanbul, Turkey, E. Akcay

Invited talk and Invited Paper Session of MAA Environmental Mathematics Activity Group - Joint Meeting of the American Math Society and Mathematics Association of America, 'Environmental Modeling and Big Projects: Lessons from Everglades Restoration Planning,' San Francisco, CA, Jan. 15, 2010, L. Gross

Systems Approaches in Immunology, Santa Fe, New Mexico, Growth detection: A mechanism for immune system decision-making, Jan. 2010, S. Bewick

NIMBioS informational talk at MAA session on Enrichment Activities for Math Majors, Joint Math Meetings, San Francisco, Jan. 13, 2010, S. Lenhart

Research seminar, UC Riverside, Cooperation in animals, plants and bacteria: Why the 'how' is important, Jan. 14, 2010, E. Akcay

Invited talk, Farragut High School Science Academy, Knoxville, Computational ecology: Environmental problem-solving for the 21st century, Jan. 26, 2010, L. Gross

Introductory talk at Duke University, Feb 2010, S. Lenhart

Introduction to 'Moving Across Scales: Mathematics for Investigating Biological Hierarchies' Symposium Organizer and Moderator, American Association for the Advancement of Science Annual Meeting, San Diego, CA, Feb 21, 2010, L. Gross

'What's math got to do with it? Connections between math and biology at NIMBioS,' Tennessee Governor's Academy, Knoxville, TN, Feb 24, 2010, L. Gross

2nd Berlin Bat Meeting: Bat Biology and Infectious Diseases, Germany, Impact of White-Nose Syndrome on ecosystem services provided by insectivorous bats, Feb. 2010, T. Kunz, W. Frick, J. Pollock, R. Scott Reynolds

Vanderbilt University, Darwin's Day, Dynamics of adaptive radiation, Feb 2010, S. Gavrilets

Informal presentation, Dept. of Homeland Security, Washington, DC, Moving NIMBioS forward: Collaborations with sponsoring agency partners, Feb. 2, 2010, L. Gross

Outreach and research presentations at Middle Tennessee State Univ., Opportunities for WISE women at the University of Tennessee (Feb. 3) and New insights for an old couple: Regulation of a protease and its inhibitor (Feb. 4), 2010, C. Peterson

National Academy of Sciences Workshop on Computational Thinking for Everyone, Remote Presentation to Workshop in Washington, DC, Computational thinking, models and data: Comments from thirty years of effort at the math/biology interface, presented via web, Feb. 4, 2010, L. Gross

Invited seminar, Fisk University, The power of optimal control: from controlling rabies to CPR, Feb. 11, 2010, S. Lenhart

Invited talk and workshop, Univ. of Nevada Las Vegas UBM Program, Mathematics and life science education: Promoting interdisciplinarity, and Space and control in natural systems, Feb. 12, 2010, L. Gross

EEB seminar, North Carolina State University, How do we test for coevolution in nature, Feb. 16, 2010, W. Godsoe

NIMBioS informational welcome to Forest Insects Working Group, Feb 22, 2010, C. Welsh

Washington University, St Louis, Dynamics of ecological speciation, March 2010, S. Gavrillets

Southeastern Sectional Meeting, Lexington, KY, The Cahn-Hilliard-Hele-Shaw equations: Applications in biological growth, March 2010, S. Wise

Invited talk at Institute of Biological Engineering Annual Conference, Cambridge, MA, Scalable high performance algorithms and implementations, with application to the analysis of high-throughput biological data, March 2010, M. Langston

Research presentations at UT-ORNL-KBRIN Bioinformatics Summit, Cadiz, KY, Graph algorithms for machine learning: A case-control study based on prostate cancer populations and high throughput transcriptomic data; Inferring gene coexpression networks for low dose ionizing radiation using graph theoretical algorithms and systems genetics; and Serendipitous discoveries in microarray analysis, March 2010, M. Langston

Ecology and Evolution of Infectious Disease P.I. Meeting, Atlantic City, NJ, Blacklegged tick phenology and behavior: Implications for Lyme disease in southern states, March 2010, G. Hickling

Invited seminar, University of Kentucky, Optimal control of harvesting models, March 2, 2010, S. Lenhart

Invited talks, Arizona State Univ., Tempe, AZ, Mathematics and life science education: Promoting interdisciplinarity, Space and control in natural systems, Trees as engineers: Lessons from some mathematical models in plant biology, and Computational thinking, models and data: Comments from thirty years of effort at the math/biology interface, March 4-5, 2010, L. Gross

Langston et. al. EEB seminar, Louisiana State University, I can't define the niche but I know it when I see it, March 15, 2010, W. Godsoe

NIMBioS informational talk. National Science Teachers Association Annual Meeting. March 19, 2010, S. Duncan

Presentation at Rhodes College, Building a biological camera: 3D snapshots of a pair of regulatory proteins, March 29, 2010, C. Peterson

International HIV Dynamics & Evolution Conference, Monterey, CA, Quantifying factors determining the rate of CTL escape and reversion during acute and chronic phases of HIV infection, April 2010, V. Ganusov

Informal presentation, UTK Undergraduate Mathematics Conference, NIMBioS: Opportunities for graduate students, April 10, 2010, L. Gross

Research seminar, UC Berkeley, The evolution of games and how to play them, April 22, 2010, E. Akcay

UTK Mathematics Department Junior Colloquium, What's math got to do with it? Connections between math and biology at NIMBioS, April 22, 2010, L. Gross

Invited talk, Beyond Bio2010 Symposium, Washington, DC, Getting ahead in math bio ed: Toward a national plan for undergraduate quantitative life science education, May 22, 2010, L. Gross

Keynote talk, HHMI Conference on Mathematics and Biology Education, Univ. of Delaware, Wilmington, Mathematics and life science education: Promoting interdisciplinarity, June 10, 2010, L. Gross

Informational talks, Society of Industrial and Applied Mathematics annual meeting, July 2010, S. Lenhart

Invited talks, I can't define the niche but I know it when I see it: using probability theory to understand species distributions, Louisiana State University, March 2010; Universite de Montreal, North Carolina State University, Duke University, Nov 2010; Western Kentucky University, Dec 2010; Kennesaw State University, Jan 2011; University of Hawaii at Manoa, Virginia Commonwealth University, Feb 2011; Howard University, March 2011, W. Godsoe

HIV dynamics and evolution annual meeting, Monterey, CA, April, 2010, V. Ganusov

Kin selection, behavioral dynamics, and group optimality, Research presentation, Evolution Society Meeting, Portland, OR, June 2010, E. Akcay

The consequences of phenotypic plasticity on ecological speciation, Research talk, Evolution 2010, Portland, Oregon, June 2010, X. Thibert-Plante and AP Hendry

A statistical justification for using distribution models to infer changes in environmental requirements, Society for the Study of Evolution, June 2010, W. Godsoe

Greater Everglades Ecosystem Restoration Meeting - Fort Meyers, FL, 'Florida Panther Recovery: Evidence, Models and Implications for Public Policy, July 15, 2010, L. Gross

Invited Mini-Symposium talk, Society for Mathematical Biology Annual Meeting, Rio de Janeiro, Brazil, 'Getting Ahead in Math Bio Ed: a National Plan for Undergraduate Quantitative Life Science Education in the US, July 28, 2010, L. Gross

Invited talk, Optimal control of the spread of malaria super-infectivity (preliminary report), Mini-symposium on Applications of Control in Biology, SIAM Annual Meeting, Pittsburgh, PA, July 2010, F. Augusto
Research seminar, NESCent, Duke University. July 20, 2010, Y. Mao

Invited Organized Oral Session talk, Ecological Society of America Annual Meeting, Pittsburgh, PA, 'Linking Mathematical and Computational Science with Ecology Education,' Aug 3, 2010, L. Gross

NIMBioS informational welcome to Graph Theory and Biological Networks Tutorial, Aug 16, 2010, C. Welsh

Invited talk - Department of Homeland Security Annual Chemical and Biological Division Performers Conference - Washington, DC - 'New Opportunities for Modeling and Analysis of Animal Infectious Disease Concerns and NIMBioS' - Aug. 18, 2010
Formal talk, Biocomplexity Institute, Indiana University, Aug 2010, Y. Mao

Do unmeasured biotic interactions bias species distribution models? Ecological Society of America, Aug 2010, W. Godsoe and LJ Harmon

Understanding biodiversity through distance measures and multidimensional plots. Mathfest Pittsburgh PA, Aug 2010, W. Godsoe and S. Adhikari

Informational talk at James Mason University, Aug 2010, S. Lenhart

Invited panelist and moderator, Evolutionary Dynamics in Cancer, sponsored by the James S. McDonnell Foundation, Almagro, Spain, Sept 1-4, 2010, L. Gross

Invited talk and faculty workshop, Departments of Mathematics and Biology, James Madison University, Harrisonburg, VA, 'Space and Control in Natural Systems' and Interdisciplinary Education at the Math/Biology Interface,' Sept 27, 2010, L. Gross

Math, computing, undergraduate ecology and large datasets, Ecological Society of America Ecology and Education Summit, Sept 2010, W. Godsoe and L. Gross

Informational talk, Introduction to Scientific Computing undergraduate course, University of Tennessee, Sept 2010, J. Day

Biodiversity in the Great Smoky Mountains National Park: Past and present measurements, Meeting of the Oklahoma Academy of Sciences,

Sept 2010, W. Godsoe et. al.

Informational talks at the SACNAS annual meeting, Anaheim, CA, Sept 2010, S. Lenhart

Accounting for seasonal effects with additive mixed models for counts of bat activity, Research presentation, North American Society for Bat Research annual meeting, Denver, CO, Oct 2010, T. Ingersoll et. al.

Invited speaker, Mathematics Department Invited Lecture Series in Mathematical Biology, Duke University, Durham, NC, 'Space and Control in Natural Systems,' Nov 5, 2010, L. Gross

Steering committee member and panel moderator, Workshop on The Role of Animal Agriculture in a Sustainable 21st Century Global Food System, Board on Agriculture and Natural Resources, National Academy of Sciences, Washington, DC, Nov 9-10, 2010, L. Gross

Opening Speaker, steering committee member and panel discussant, Workshop on Mathematical Challenges for Sustainability, Center for Discrete Mathematics and Theoretical Computer Science, Rutgers University, Rutgers, NJ, 'Comments on the Mathematics of Sustainability Science,' Nov 15, 2010, L. Gross

A student-generated collaborative approach to developing new evaluator competencies, roundtable presentation at the American Evaluation Association Annual Conference, San Antonio, TX, Nov 2010, P. Bishop

My first year as an internal evaluator: What I didn't know that I didn't know, roundtable presentation at the American Evaluation Association Annual Conference, San Antonio, TX, Nov 2010, P. Bishop

Invited talk, Evolution of motivations and behavioral responses: Integrating the proximate and ultimate causes of behavior, University of Paris VI -- Symposium on game theory and evolution, Nov 2010, E. Akcay

Research presentation for the EECS Junior Seminar, University of Tennessee, Nov 2010, J. Day

Hybridization, species collapse, and other strange stories, NIMBioS Interdisciplinary Seminar, Nov 2010, R. Gilman

Biodiversity in the Great Smoky Mountains National Park: Past and present measurements. NIMBioS Undergraduate Research Conference, Nov 2010, W. Godsoe et. al.

Informational talks Cal. State University San Marcos, Nov 2010, S. Lenhart

Invited talk, Mathematical modeling and optimal control of transmission of avian influenza, Fisk University, Nashville, TN, Dec 1, 2010, F. Augusto

NIMBioS informational welcome to Species Delimitation Working Group, Dec 2, 2010, C. Welsh

Participant, Planning meeting for the National Research Council Standing Committee on the Use of Emerging Science for Environmental Health Decisions, Washington, DC, Dec 13, 2010, L. Gross

Mathematical analysis of the transmission dynamics of bovine tuberculosis model, The 7th International Conference on Differential Equations and Dynamical Systems, University of South Florida, Tampa, FL, Dec 15-18, 2010, F. Augusto

NIMBioS informational welcome to Gene Tree/Species Tree Reconciliation Working Group, Dec 16, 2010, C. Welsh

Evolution of cooperation in animals, plants and bacteria: Why the 'how' is important, UC Riverside Department of Biology Lunch Seminar, Dec 2010, E. Akcay

Eusociality through maternal manipulation, Biocomplexity XI: The evolution of cooperation, Indiana University, Bloomington, IN, Dec 2010, M. Gonzalez-Forero

Community genetics and global change: effects of tree genotype and atmospheric pollutants on population and community dynamics, Research presentation, Oak Ridge National Laboratory, Dec 2010, E. Moran

A Mechanistic Approach to Modeling Ant Communities Under Warming Regimes, Ecological Society America, Pittsburgh, PA; University of Utah Mathematical Biology Seminar, Salt Lake City, UT; Centre for Mathematical Biology at the University of Alberta, Edmonton, AB; 7th International Conference on Differential Equations and Dynamical Systems, Tampa FL; SAMAB, Gatlinburg, TN; 2010, Bewick SA et. al.

Growth Detection: A Novel Role for CD4+ T-cells, SIAM, Pittsburgh, PA, 2010, Bewick SA, Yang R, Ganusov V.

Invited talk, Optimal control of the spread of malaria super-infectivity (preliminary report), AMS Special Session on Structured Models in Ecology, Evolution, and Epidemiology: Periodicity, Extinction, and Chaos, Joint Math Meeting, New Orleans, LA, Jan 7, 2011, F. Augusto

Invited speaker and faculty workshop leader, Departments of Mathematics and Biology, University of the Virgin Islands, St. Thomas, 'What's math got to do with it? Connections between math and biology' and 'Building Quantitative Concepts and Skills for Life Science Students,' Jan 18-19, 2011, L. Gross

Informational talks at the Joint Math Meetings, New Orleans, Jan. 2011, S. Lenhart

Modeling phylogenetic comparative methods with hybridization, NIMBioS Interdisciplinary Seminar, Jan 25, 2011, T. Jhwueng

Invited speaker, Symposium on Systems Biology: Definitions and Implementations, Vanderbilt, University, Nashville, TN, 'Multi-scale Modeling of Ecological Systems: Systems Biology in Application to Natural Resource Management,' Feb 21, 2011, L. Gross

Using program theory to communicate evaluation plans with stakeholders, paper presented at the Southeastern Evaluation Association Annual Conference, Tallahassee, FL, Feb 2011, P. Bishop

Job talk, Control strategies in malaria transmission models, Interdisciplinary Arts & Sciences, University of Washington, Tacoma, Feb 15, 2011 and Department of Mathematics Austin Peay State University, Feb 18, 2011, F. Augusto

Zero inflated count models for imperfectly detected invasions: implications for White Nose Syndrome surveillance, Research presentation, Southeastern Bat Diversity Network, Louisville, KY, Feb 2011, T. Ingersoll

Community genetics and global change: effects of tree genotype and atmospheric pollutants on population and community dynamics, NIMBioS Interdisciplinary Seminar, Feb 2011, E. Moran

Invited speaker, Conference on Computational and Systems Biology, University of Florida, Gainesville, FL, 'Trees as Engineers: Lessons from Some Mathematical Models in Plant Ecology,' March 18, 2011, L. Gross

Keynote talk, University of Tennessee Undergraduate Honor's Symposium, Knoxville, TN, 'Living in an interdisciplinary world: coping skills to be successful,' March 26, 2011, L. Gross

Participant, National Science Board Task Force on Unsolicited Mid-scale Research, Denver, CO, March 31, 2011, L. Gross

Informational talk, Information Science at the Interface of Mathematics and Biology: The Example of NIMBioS, Environmental Information Science undergraduate course at Univ. of Tennessee, Knoxville, March 2011, C. Crawley

Seminars, Some problems in phylogenetic comparative methods, Institute of Statistics, National Kaohsiung University, Taiwan; Department of Statistics, National Cheng-Kung University; Department Mathematical Science, National Cheng-Chi University; Department of Statistics, National Taipei University; Department of Applied Mathematics, National Chung-Hsing University; Department of Applied Mathematics, National Pingtung University of Education, March 2011, T. Jhwueng

Math Biology Seminar, Department of Mathematics, Georgia Institute of Technology, March 2011, Y. Mao

The games organisms play: how proximate mechanisms can facilitate the evolution of cooperation, Research presentation, NC State University Raleigh, April 2011, E. Akcay

Invited Speaker, Oak Ridge Institute for Continued Learning, Oak Ridge, TN, 'NIMBioS: a National Institute fostering Research and Education at the Interface of Mathematics and Biology,' April 8, 2011, L. Gross

Moderator and panelist, Workshop on Glioma Ecosystem Opportunities, James S. McDonnell Foundation, La Jolla, CA, April 14-16, 2011, L. Gross

Modern methods of estimating biodiversity from presence-absence surveys, San Francisco State University, Colloquium in Ecology, Evolution, and Conservation, 25 April 2011, Dorazio RM, Gotelli NJ, Ellison AM

Hierarchical Bayesian modeling and ecology: two global-change case studies, Research presentation, Fisk University, April 2011, E. Moran

Invited talk, Physics of immunity: Complexity approach, Dresden, Germany, April 2011, V. Ganusov

Journal Publications

Akçay E, Van Cleve J, Feldman MW, Roughgarden J, "A theory for the evolution of other-regard integrating proximate and ultimate perspectives", PNAS, p. 19061, vol. 106, (2009). Published,

Duenez-Guzman EA, Mavarez J, Vose MD, Gavrillets S, "Case studies and mathematical models of ecological speciation: Butterflies in a jungle", Evolution, p. 2611, vol. 63, (2009). Published,

Fitzpatrick BM, Fordyce JA, Gavrillets S, "Pattern, process, and geographic modes of speciation", Journal of Evolutionary Biology, p. 2342, vol. 22, (2009). Published,

Reichard JD, Kunz TH, "White-Nose Syndrome inflicts lasting injuries to the wings of little brown myotis (*Myotis lucifugus*)", Acta Chiropterologica, p. 457, vol. 11, (2009). Published,

Rice WR, Gavrillets S, "Sexually antagonistic chromosomal cuckoos", Biology Letters, p. 686, vol. 5, (2009). Published,

Sadedin S, Hollander J, Panova M, Johannesson K, Gavrillets S, "Case studies and mathematical models of ecological speciation: Ecotype formation in a Swedish snail", Molecular Ecology, p. 4006, vol. 18, (2009). Published,

Yahara K, Fukuyo M, Sasaki A, Kobayashi I, "Evolutionary maintenance of selfish homing endonuclease genes in the absence of horizontal transfer", PNAS, p. 18861, vol. 106, (2009). Published,

Akçay, E, "The evolution of payoff matrices", Proc. of the Royal Society B., p. , vol. , (2010). Published,

Collins C, Fister KR, Williams M, "Optimal control of a cancer cell model with delay", Mathematical Modeling of Natural Phenomena, p. , vol. , (2010). Published,

Fenichel EP, Horan RD, Hickling GJ, "Bioeconomic management of invasive vector-borne diseases", Biological Invasions, p. , vol. , (2010). Published,

Frick WF, Reynolds DS, Kunz TH, "Influence of climate and reproductive timing on demography of little brown myotis (*Myotis lucifugus*)", Journal of Animal Ecology, p. 128, vol. 79, (2010). Published,

Godsoe W, "Regional variation exaggerates ecological divergence in niche models", Systematic Biology, p. 298, vol. 59, (2010). Published,

Godsoe W, "I can't define the niche but I know it when I see it: A formal link between statistical theory and the ecological niche", Oikos, p. 53, vol. 119, (2010). Published,

Miller NR, Schaefer E, Gaff H, Fister KR, Lenhart S, "Modeling optimal intervention strategies for cholera", Bulletin of Mathematical Biology, p. , vol. , (2010). Published,

Riechert SE, Post BK, "From skeletons to bridges and other STEM enrichment exercises for high school biology", American Biology Teacher, p. 20, vol. 72, (2010). Published,

Roughgarden J, Akçay E, "Do we need a sexual selection 2.0?", Animal Behaviour, p. e1, vol. 79(3), (2010). Published,

Roughgarden J, Akçay E, "Final response: sexual selection needs an alternative", Animal Behaviour, p. e18, vol. 79(3), (2010). Published,

- Wise SM, "Unconditionally stable finite difference, nonlinear multigrid simulation of the Cahn-Hilliard-Hele-Shaw system of equations", *J. Sci. Comput.*, p. , vol. , (2010). Published,
- Travis CB, Gross LJ, Johnson BA, "Tracking the gender pay gap: A case study", *Psychology of Women Quarterly*, p. 410, vol. 33, (2009). Published,
- Beckage B, Platt WJ, Gross LJ, "Vegetation, fire, and feedbacks: A disturbance-mediated model of savannas", *The American Naturalist*, p. 805, vol. 174, (2009). Published,
- Gavrilets S, Losos JB, "Adaptive radiation: Contrasting theory with data.", *Science*, p. 732, vol. 323, (2009). Published,
- Brock WA; Kinzig AP; Perrings C, "Modeling the economics of biodiversity and environmental heterogeneity", *Environmental and Resource Economics*, p. 43, vol. 46, (2010). Published,
- Duncan SI; Bishop P; Lenhart S, "Case studies and mathematical models of ecological speciation", *Life Sciences Education*, p. 311, vol. 9, (2010). Published,
- Fenichel EP; Horan RD; Hickling GJ, "Management of infectious wildlife diseases: Bridging conventional and bioeconomic approaches", *Ecological Applications*, p. 903, vol. 20, (2010). Published,
- Frick WF; Pollock JF; Hicks AC; Langwig KE; Reynolds DS; Turner GG; Butchkoski CM Kuns TH, "An emerging disease causes regional population collapse of a common north american bat species", *Science*, p. 679, vol. 329, (2010). Published,
- Hallam TG; McCracken GF, "Management of the panzootic white-nose syndrome through culling of bats", *Conservation Biology*, p. 189, vol. 25, (2010). Published,
- Fujitani Y; Kawai J; Kobayashi I, "Random-walk mechanism in the genetic recombination", In *Advances in Computational Biology (series: Advances in Experimental Medicine and Biology)*, p. 275, vol. 680, (2010). Published,
- Furuta Y; Abe K; Kobayashi I, "Genome comparison and context analysis reveals putative mobile forms of restriction-modification systems and related rearrangements", *Nucleic Acids Research*, p. 2428, vol. 38, (2010). Published,
- Giraud T; Gladioux P; Gavrilets S, "Linking the emergence of fungal plant diseases with ecological speciation", *Trends in Ecology and Evolution*, p. 387, vol. 25, (2010). Published,
- Godsoe W; Yoder JB; Smith CI; Drummond CS; Pellmyr O, "Absence of population-level-phenotype matching in an obligate pollination mutualism", *Journal of Evolutionary Biology*, p. 2739, vol. 23, (2010). Published,
- Gonzalez-Parra PA; Lee S; Velazquez L; Castillo-Chavez C, "A note on the use of optimal control on a discrete time model of influenza dynamics", *Mathematical Biosciences and Engineering*, p. 2004, vol. 72, (2010). Published,
- Gotelli NJ; Dorazio RM; Ellison AM; Grossman GD, "Detecting temporal trends in species assemblages with bootstrapping procedures and hierarchical models", *Philosophical Transactions of the Royal Society of London, Series B*, p. 3621, vol. 365, (2010). Published,
- Horan RD; Fenichel EP; Wolf CA; Gramig BM, "Managing infectious animal disease systems", *Annual Review of Resource Economics*, p. 101, vol. 2, (2010). Published,
- Khan F; Furuta Y; Kawai M; Kaminska K; Ishikawa K; Bujnicki J; Kobayashi I, "A putative mobile genetic element carrying a novel Type IIF restriction-modification system", *Nucleic Acids Research*, p. 3019, vol. 38, (2010). Published,
- Krivan V, "Evolutionary stability of optimal foraging: Partial preferences in the diet and patch models", *Journal of Theoretical Ecology*, p. 486, vol. 267, (2010). Published,

- Lennox GD; Dallimer M; Armsworth PR, "Landowners' ability to leverage in negotiations over habitat conservation", *Theoretical Ecology*, p. , vol. , (2010). Published,
- Meyer K; Kirkpatrick M, "Better estimates of genetic covariance matrices by "bending" using penalized maximum likelihood", *Genetics*, p. 1097, vol. 109, (2010). Published,
- Perrings C; Burgiel S; Lonsdale WM; Mooney H; Williamson M, "International cooperation in the solution to trade-related invasive species risks.", *Annals of the New York Academy of Sciences*, p. 198, vol. 1195, (2010). Published,
- Perrings C, "The exotic effects of capital accumulation", *Proceedings of the National Academy of Sciences*, p. 12063, vol. 107, (2010). Published,
- Shah P; Gilchrist MA, "Effect of correlated tRNAs on translation errors and the evolution of codon usage bias", *PLoS Genetics*, p. e1001128, vol. 6, (2010). Published,
- Slocum MG; Beckage B; Platt WJ; Orzell SL; Taylor W, "Effect of climate on wildfire size: A cross-scale analysis", *Ecosystems*, p. 828, vol. 13, (2010). Published,
- Smith R; Okano JT; Kahn JS; Bodine EN; Blower S, "Evolutionary dynamics of complex networks of HIV drug-resistant strains: The case of San Francisco", *Science*, p. 697, vol. 327, (2010). Published,
- Tang G; Beckage B, "Projecting the distribution of forests in New England in response to climate change", *Diversity and Distributions*, p. 144, vol. 16, (2010). Published,
- Thilbert-Plante X; Hendry AP, "The consequences of phenotypic plasticity for ecological speciation", *Journal of Evolutionary Biology*, p. 326, vol. 24, (2010). Published,
- Thilbert-Plante X; Hendry AP, "When can ecological speciation be detected with neutral loci?", *Molecular Ecology*, p. 2301, vol. 19, (2010). Published,
- Ubeda F; Gardner F, "A model for genomic imprinting in the social brain juveniles", *Evolution*, p. 2587, vol. 64, (2010). Published,
- Yoder JB et. al., "Ecological opportunity and the origin of adaptive radiations", *Journal of Evolutionary Biology*, p. , vol. , (2010). Published,
- Bolnick DI; Amarasekare P; Araujo M; Burger R; Jiang Y; Levine J; Novak M; Rudolf V; Schreiber S; Urvan M; Vasseur D, "Why intraspecific trait variation matters in ecology", *Trends in Ecology and Evolution*, p. 183, vol. 26, (2011). Published,
- Fenichel EP; Castillo-Chavez C; Ceddia MG; Chowell G; Gonzalez-Parra PA; Hickling G; Holloway G; Horan R; Morin B; Perrings C; Springborn M; Velazquez L; Villalobos C, "Adaptive human behavior in epidemiological models", *Proceedings of the National Academy of Sciences*, p. , vol. , (2011). Published,
- Mao Y, "Dynamics studies of luciferase using elastic network model: how the sequence distribution of luciferase determines its color", *Protein Engineering & Design Selection*, p. 341, vol. 24, (2011). Published,
- Mesterton-Gibbons M; Gavrillets S; Gravner J; Akcay E, "Models of coalition or alliance formation", *Theoretical Biology*, p. 187, vol. 274, (2011). Published,
- Riechert SE; Leander RN; Lenhart SM, "A role-playing exercise that demonstrates the process of evolution by natural selection: Caching squirrels in a world of pilferers", *The American Biology Teacher*, p. 208, vol. 73, (2011). Published,
- Schreiber S; Burger R; Bolnick D, "The community effects of phenotypic and genetic variation within a predator population", *Ecology*, p. , vol. , (2011). Accepted,

Yong J, "A deterministic linear quadratic time-inconsistent optimal control problem", *Mathematical Control & Related Fields*, p. 83, vol. 1, (2011). Published,

Ceddia MG; Bartlett M; De Lucia C; Perrings C, "On the regulation of spatial externalities: coexistence between GM and conventional crops in the EU and the 'newcomer principle'", *The Australian Journal of Agriculture and Resource Economics*, p. 126, vol. 55, (2011). Published,

Sadedin S; Hollander J; Panova M; Johnnsson K; Gavrilets S, "Case studies and mathematical models of ecological speciation. 3. Ecotype formation in a Swedish snail", *Molecular Ecology*, p. 4006, vol. 18, (2009). Published,

Books or Other One-time Publications

Gavrilets S, Vose A, "Dynamic patterns of adaptive radiation: evolution of mating preferences", (2009). chapter, Published
Editor(s): In Butlin, RK, J Bridle, and D Schluter
Collection: Speciation and Patterns of Diversity
Bibliography: Cambridge University Press, pp. 102-126

Miller Neilan R, Lenhart S, "Introduction to optimal control with an application in disease modeling", (2010). chapter, Accepted
Collection: Modeling Paradigms and Analysis of Disease Transmission Models
Bibliography: American Mathematical Society, DIMACS

Ding W, Lenhart S, "Introduction to optimal control for discrete time models with an application to disease modeling", (2010). chapter, Accepted
Collection: In: Modeling Paradigms and Analysis of Disease Transmission Models
Bibliography: American Mathematical Society, DIMACS Volume

Bodine E, Lenhart S, Gross L, "Mathematics for the Life Sciences", (2010). Book, in progress
Bibliography: Text in draft form

Duenez-Guzman EA, Vose A, Vose M, Gavrilets S, "Simulating population genetics on the XT5", (2009). Conference Proceeding, Published
Collection: Proc. of the Compute the Future Cray Users Group Conference, Atlanta
Bibliography: Conference Proceeding

Post BK, Riechert SE, "Bridging the gap: Biology and engineering in the high school curriculum", (2009). Conference Proceeding, Published
Collection: Proc. Of ASEE SE Conference, Marietta, Georgia
Bibliography: Conference Proceeding

Abu-Khzam FN, Fernau H, Langston MA, Lee-Cultura S, Stege U, "A fixed-parameter algorithm for string-to-string correction", (2010). Conference Proceedings, Published
Collection: Proc. of Computing: the Australasian Theory Symposium, Brisbane, Australia
Bibliography: Conference Proceeding

Bodine EN, "Dissertation: Optimal Control of Species Conservation Strategies", (2010). Thesis, Published
Bibliography: University of Tennessee, Knoxville

Dorazio RM, Gotelli NJ, Ellison AM., "Modern methods of estimating biodiversity from presence-absence surveys.", (2011). Book, Published
Editor(s): O. Grillo (ed.)
Collection: Biodiversity / Book 4
Bibliography: InTech, ISBN 978-953-307-1427-1.

Gonzalez-Parra P, Velazquez L, Villalobos MC, Castillo-Chavez C, "Optimal control applied to a discrete influenza model.", (2010). Book, Published
Editor(s): Franco Angeli Edition
Collection: Proceedings Book of the XXXVI International Operation Research Applied to Health Services
Bibliography: Book ISBN 13: 9788856825954

Web/Internet Site

URL(s):

<http://www.NIMBioS.org>
<http://www.nimbios.org/wordpress/>

Description:

NIMBioS Website

URL: <http://www.nimbios.org>

The NIMBioS website, [nimbios.org](http://www.nimbios.org), became operational October 1, 2008. Visitor traffic is monitored by Google Analytics. For the period October 1, 2008 through April 21, 2011, NIMBioS.org received 106,874 visits and 336,123 page views from 52,273 unique visitors, spending an average of 3.13 minutes on site and viewing an average of 3.15 pages per visit.

For the year ending April 21, 2011, unique visitors increased 79%, site visits increased 68%, and pageviews increased 52% compared to the previous year.

Fifty-three percent of visitors viewed a single page; 16 percent viewed more than 4 pages. Visits have originated from 7,099 cities in 167 countries/territories, using 89 languages. More than 50 percent of visits are identifiable as originating from colleges or universities. Direct traffic has accounted for 32 percent of visits, search engines 39 percent, and referring sites 29 percent. The site currently has 364 html pages and 240 pdf documents. Pages with the highest visitor traffic include the front page, personnel pages, calendar/announcements, education page, and pages describing research opportunities for postdoctoral fellows, undergraduates, working groups, and workshops.

NIMBioS Blog

URL: <http://www.nimbios.org/wordpress/>

The NIMBioS blog is produced by NIMBioS. With several new posts every week, the blog showcases news and commentary generated by NIMBioS staff and partners. Begun in August 2011, the blog had 40 posts (as of April 26, 2011)

Other Specific Products

Product Type:

Proposals

Product Description:

Kunz TH, Sorenson MD. 2010-2013. Assessing population genetic structure and gene flow in the little brown myotis, *Myotis lucifugus*. Morris Animal Foundation. \$196,759. Pending.

Sharing Information:

Public has open access to any results/findings stemming from proposals.

Product Type:

Proposals

Product Description:

Kunz TH, Sorenson MD, Hallam TG, McCracken GF, Barton HA, Reeder DM. 2010-2013. Collaborative Research: White-nose syndrome?an emerging infectious diseases of North American hibernating bats. National Science Foundation. \$855,995. Pending.

Sharing Information:

Public has open access to any results/findings stemming from proposals.

Product Type:

Proposals

Product Description:

Pannkuk EL, Risch T, Benjamin E, Gilmore D, Huss M. 2010. Lipid analysis of Arkansas bat integument, fungal fatty acid metabolism, and control of white-nose syndrome in Arkansas. Arkansas State Wildlife Grants. \$42,790. Pending.

Sharing Information:

Public has open access to any results/findings stemming from proposals.

Product Type:

Proposals

Product Description:

Pannkuk EL, Risch T, Savary B, Gilmore D, Huss M. 2009. Fungal digestion of chiropteran integument. National Speleological Society. \$5,800. Accepted.

Sharing Information:

Public has open access to any results/findings stemming from proposals.

Product Type:

Meetings

Product Description:

Tridane A, Pasour V. March 2010. Mathematical modeling in life sciences: Control and optimization, 34th SIAM Southeastern-Atlantic Section Conference, North Carolina State University.

Sharing Information:

Conferences are open to interested participants.

Product Type:

Teaching aids

Product Description:

Martinez M. 2010. R for biologists: An introductory guide.

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

March 19, 2010. Toxoplasmosis (Length: 3:01; 2,741 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

February 23, 2010. Interview with Dr. Katie A. Portacci (Length: 2:42; 149 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

November 11, 2009. Interview with Dr. Gary An (Length: 3:25; 254 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

November 11, 2009. Interview with Dr. Alan Hastings (Length: 2:11; 220 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

November 11, 2009. Interview with Dr. Karen Garrett (Length: 3:03; 100 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

November 5, 2009. BioSongs Project 2009 (Length: 2:59; 249 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

September 1, 2009. Modeling the Bear Population in Appalachia (Length: 4:01; 573 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

July 27, 2009. Interview with Dr. Sebastian Schreiber (Length: 2:48; 503 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

July 27, 2009. Interview with Dr. Gail Wolkowicz (Length: 2:34; 440 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

June 15, 2009. Biology By Numbers! (Length: 1:25; 156 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

June 10, 2009. Interview with Dr. Joan Roughgarden (Length: 2:16; 1,558 views as of 4/20/11).

Sharing Information:

All videos are available online through nimbios.org.

Product Type:

Audio or video products

Product Description:

June 7, 2009. Interview with Dr. Peter Daszak (Length: 2:57; 410 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2010. The NIMBioS nexus: Creating interdisciplinary connections to solve biological problems. Higher Ground, The Online Magazine of the Univ. of Tennessee College of Arts & Sciences

Sharing Information:

Available to the public on the University of Tennessee's website.

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Examining human behavior and the threat of disease. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Searching for solutions to evolutionary puzzles. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. The value of variation: Ecologists consider causes and consequences. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Can ants, and the plants that rely on them, take the heat? NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Scientist ties distribution modeling to ecological theory. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Mathematic models help formulate strategies for controlling infectious disease. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2010. Darwinian morphometrics and the problem of shape. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2010. Species distribution models can exaggerate differences in environmental requirements. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2010. A mad itch: Controlling pseudo-rabies in feral swine. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Trees facilitate wildfires as a way to protect their habitat. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. The evolution of social behavior: Cooperation and conflict. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Multiscale simulations reveal protein form and function. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Plotting herds to eradicate bovine tuberculosis. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009 Unraveling the mystery of white-nose syndrome. NIMBioS Online

Sharing Information:

Available at nimbios.org

Product Type:

Feature Articles

Product Description:

Crawley, C. 2009. Tackling a math problem for ecology. NIMBioS Online.

Sharing Information:

Available at nimbios.org

Product Type:

Proposal

Product Description:

Webb, CT, Wennegren, U, Tildesley, M. 2010. Spread of Animal Disease within US Livestock: Improving Decisions and Interventions. Department of Homeland Security. \$556,137. Accepted.

Sharing Information:

Public has open access to any results/findings stemming from proposals.

Product Type:

Meetings

Product Description:

Fenichel E. et. al. June 2010. Special Session: Economics of epidemics and infectious disease. World Congress for Environmental and Resource Economics, Montreal.

Sharing Information:

Conferences are open to interested participants.

Product Type:

Meetings

Product Description:

Vasseur D, Lankau R, Hughes R, Hairston N, Tinker T, Schreiber S, Claessen D, Bolnick D, Novak M. August 2011. The Ecological Consequences of Intraspecific Variation, symposium at Ecological Society of America, Austin Texas

Sharing Information:

Conferences are open to interested participants.

Product Type:

Teaching aids

Product Description:

S. Duncan, S. Lenhart and K. Moran, with additional help from E. Moran, A. Happ (UTK undergraduate) and R. Leander (UTK graduate student, now postdoc at MBI), added math exercises to nine units from Biology in a Box: (1) Fossils; (2) Of Skulls and Teeth; (3) Fur, Feathers, Scales and Insulation; (4) Simple Measures; (5) It's In Your Genes; (6) Animal Kingdom; (7) Backyard Naturalist; (8) Everything Varies; (9) Forestry

Sharing Information:

Biology in a Box is provided to school systems per their request. Information on Biology in a Box units and exercises are available via the NIMBioS.org website and the Biology in a Box website at <http://eeb.bio.utk.edu/biologyinbox/>

Product Type:

Teaching aids

Product Description:

S. Duncan and S. Lenhart created a module entitled "Measuring Biodiversity" for the Great Smoky Mountains National Park Girls in Science Week (revised by K. Moran), and another titled "Measuring Biodiversity II: Large Datasets" for the Smoky Mountains Science Teacher Institute at Tremont. Date: 2010

Sharing Information:

These aids were used at the Great Smoky Mountains National Park Girls in Science Week and the Smoky Mountains Science Teacher Institute at Tremont. They are also available at nimbios.org

Product Type:

Teaching aids

Product Description:

K. Moran created a module entitled "Modeling Predator-Prey Relationships in Soil" for a Soil Biology Teacher Workshop

Sharing Information:

This aid was used in Soil Biology Teacher Workshop and it is also available at nimbios.org

Product Type:

Teaching aids

Product Description:

K. Moran created a module entitled "Measuring a Forest" for Gadget Girls: Adventures in STEM

Sharing Information:

Used at Gadget Girls: Adventures in STEM and available at nimbios.org

Product Type:

Audio or video products

Product Description:

May 18, 2010. What to do about feral cats? (Length: 2:23, 240 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

May 24, 2010. The evolution of proteins (Length: 1:12, 197 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

June 12, 2010. Ants and climate change (Length: 2:23, 275 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

June 25, 2010. Transmission dynamics of infectious disease (Length: 1:53, 249 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

August 30, 2010. Relationship between a species' niche and its distribution (Length: 3:51, 211 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

September 10, 2010. Preserving nature on land and sea (Length: 6:23, 113 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

November 11, 2010. The scientific study of history (Length: 1:29, 265 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

February 26, 2011. Science for the People, RB Morris (Length: 5:16, 265 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

March 2, 2011. Sexual Selection, Jay Clark (Length: 5:16, 270 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

Audio or video products

Product Description:

April 15, 2011. NIMBioS Welcomes Timothy Sellers (Length: 2:09, 26 views as of 4/20/11)

Sharing Information:

Available at nimbios.org

Product Type:

NIMBioS Blog

Product Description:

NIMBioS Blog

URL: <http://www.nimbios.org/wordpress/>

The NIMBioS blog is produced by NIMBioS. With several new posts every week, the blog showcases news and commentary generated by NIMBioS staff and partners. Begun in August 2011, the blog had 40 posts (as of April 26, 2011)

Sharing Information:

Available to anyone with internet access.

Product Type:

Talking Science blog

Product Description:

?Biology by Numbers? TalkingScience org

URL: <http://www.talkingscience.org/category/biology-by-numbers/>

?Biology by Numbers? is a blog created for TalkingScience, a project of Science Friday Initiative, the nonprofit partner of the radio program Science Friday broadcast on NPR. Begun in March 2011, the blog is updated on a monthly basis.

Sharing Information:

Available to anyone who has internet access.

Contributions

Contributions within Discipline:

Contributions within Discipline:

NIMBioS is inherently an interdisciplinary institute with cross-cutting activities that involve mainly biology and mathematics, with connections to many other disciplines. A primary goal of NIMBioS is to address key biological questions using appropriate mathematical methods. During our first two full years of operation, NIMBioS fostered interactions in several different areas of both math and biology, involving a broad array of researchers from many disciplinary backgrounds including behavioral biologists, ecologists, evolutionary biologists, anthropologists, geneticists, psychologists, bioinformaticians, veterinarians, epidemiologists, physicians and wildlife biologists. Mathematicians and statisticians from many sub-disciplines of these fields participated, as well as computational scientists with particular expertise in high performance computing. NIMBioS has been supportive of research efforts that have led to more than 60 publications and 175 presentations across a vast array of different areas of science and education.

Contributions to Other Disciplines:

Contributions to Other Disciplines:

An objective of NIMBioS is to bring together individuals from numerous disciplines to collaborate on new research projects, consider new areas which might benefit from contact with various fields of math and biology and foster communication between disciplines. A few examples from activities held over the first two years of operation include: individuals with mainly separate backgrounds in biology or mathematics attended a Tutorial to provide them with the conceptual foundations and skills to utilize optimal control approaches in a variety of areas applicable to the life sciences; a continuing working group on binary matrices brought together food web ecologists, network biologists, and conservation biologists with statisticians who have expertise in applying emerging statistical methods to field data; a Workshop on Bovine Tuberculosis brought together mathematical modelers, veterinarians, geographers and epidemiologists to consider methods to utilize USDA data to estimate potential likelihoods and impacts of this disease in the US, which led to formation of a NIMBioS Working Group on this disease; NIMBioS sponsored the first gathering of mathematical modelers and epidemiologists to consider models for the spread of white-nosed syndrome in bats across the US; a Tutorial on Stochastic Modeling in Biology provided mathematical background on many applications of these models to a large group of biologists; a Working Group on Species Delimitation brought together new and established researchers in mathematics, biology, and statistics in order to discuss challenges in a growing field that applies gene trees reconstructed from DNA sequence data to delimiting species; and an Investigative Workshop on Mathematical Modeling of Wildlife and Virus Zoonoses brought together wildlife biologists, pathologists, modelers, and epidemiologists to consider mathematical modeling of the ecology of zoonotic viruses, how they are maintained in their reservoirs, the processes and mechanisms that lead to transmission, host switching, and molecular events that lead to transfer and adaptation to a new host and post-transfer adaptation. These activities often included participation by NIMBioS Postdoctoral Fellows and visiting researchers. By the end of Year 3 (August 2011), it is projected that since its inception NIMBioS will have hosted 37 Working Group meetings, 15 Investigative Workshops, 8 Tutorials, 72 Short-term Visitors, 4 Sabbatical Fellows, and more than 80 Outreach and Education activities.

Contributions to Human Resource Development:

Contributions to Human Resource Development:

Numerous outreach activities were held, focused on providing information on how mathematics contributes to biology to various audiences. This included: two of the largest gatherings of undergraduates carrying out research at the interface of mathematics and biology which included participation by many undergraduates involved in NSF UBM (Undergraduate Biology Major) programs at many institutions; a summer program providing research experiences for an interacting group of undergraduates from biology and mathematics, high school science teachers and graduate students in veterinary medicine; collaboration with high school teachers to bring the Biology in a Box program, now with mathematics curricular components, into K-12 classrooms; and numerous talks to undergraduate and graduate student audiences about what NIMBioS is and how the interface between math and biology is important in developing new techniques for significant societal problems as well as investigating basic biology. NIMBioS has initiated four Institutional Partnerships with Minority Serving Institutions, with various NIMBioS faculty and researchers giving talks at these institutions and students and faculty from these institutions participating in numerous NIMBioS activities. A total of ten graduate students have been supported through NIMBioS cost-share arrangements to collaborate on activities and expand their own expertise - these students were pursuing degrees in diverse fields including mathematics, ecology and evolutionary biology, biochemistry and molecular biology, computer science and bioengineering. Ten postdoctoral fellows were supported to carry out research that was approved by the NIMBioS Advisory Board on biological questions at several different levels, ranging from protein structure

to global-scale analysis of species distribution patterns. NIMBioS has supported short-term visits by over 60 researchers to collaborate across diverse institutions for intense brief periods of time on a large array of topics and to encourage development of new collaborations with NIMBioS postdoctoral fellows.

Contributions to Resources for Research and Education:

Contributions to Resources for Research and Education:

The project compiled a guide to the statistical package R for life scientists, which is posted on the NIMBioS web site. The project supported the development of a new text on mathematics for life scientists designed for an entry-level course sequence, which has gone through several drafts and has been used for more than two years by more than 600 students who evaluated and classroom-tested it. The project is also supporting the development of quantitative components of the Biology-in-a-Box set of activities so that these materials and the boxes may be utilized in both biology and mathematics classrooms in elementary, middle and high schools. The project brought on-line a computer cluster for use by participants in NIMBioS activities. NIMBioS has developed an extensive collection of web-based material on research activities and numerous interviews with visiting and resident scientists, and also operates feeds to various social media outlets. NIMBioS distributes a bi-monthly electronic newsletter to more than 2,600 individuals and has developed more than forty press releases on research and education efforts at NIMBioS.

Contributions Beyond Science and Engineering:

Contributions Beyond Science and Engineering:

Several Working Groups at NIMBioS are focused on issues with near-term relevance to resource managers and policy makers, including: the Working Group on Feral Swine/Pseudo-rabies in Great Smoky Mountains National Park, which is addressing issues of management of a wild population arising from concerns about the potential for disease spread from the wild population to domestic livestock; the Working Group on Synthesizing and Predicting Infectious Disease while Accounting for Endogenous Risk (SPIDER), which is merging human behavioral and infectious disease models to improve understanding of disease risk and to build better predictive models; and the Working Group on Bovine Tuberculosis dealing with the sources and spread of bovine TB in areas with high local prevalence and at the national scale and how understanding the sources and spread of bovine TB can be used to inform control and eradication strategies. All of these activities are intended to be used to inform public policy decisions by Federal and State officials. NIMBioS initiated a collaboration with the National Center for Medical Intelligence to gather a group of disease modelers to suggest potentially important new initiatives for managing infectious disease in the armed forces. An Investigative Workshop on White-Nose Syndrome in Bats considered modeling protocols for determining the potential spread and impact of this fungal disease, which is affecting bat populations in many US states, and is a major project of one of the NIMBioS postdoctoral fellows. The Workshop informed a study published in a cover article in Science magazine (Frick WF, Pollock JF, Hicks AC, Langwig KE, Reynolds DS, Turner GG, Butchkoski CM, Kunz TH. 2010. An emerging disease causes regional population collapse of a common North American bat species. *Science* 329(5992):679-82). NIMBioS initiated a Songwriter-in-Residence program, in conjunction with the James R. Cox Professorship Fund at UT, to support visits by touring musicians during which they interact with NIMBioS researchers and develop songs about biology and the lives of researchers. Part of this effort includes a collaboration with WUOT-FM, a National Public radio affiliated station based at UT to record and broadcast songs and interviews with these songwriters.

Conference Proceedings

Rogers, GL;Perkins, AD;Phillips, CA;Eblen, JD;Abu-Khzam, FN;Langston, MA, Using Out-of-Core Techniques to Produce Exact Solutions to the Maximum Clique Problem on Extremely Large Graphs, "MAY 10-OCT 13, 2009", 2009 IEEE/ACS INTERNATIONAL CONFERENCE ON COMPUTER SYSTEMS AND APPLICATIONS, VOLS 1 AND 2, : 374-381 2009

Special Requirements

Special reporting requirements:

This Special Reporting Requirements section includes:

1. Benchmarks for diversity of participants and organizers at NIMBioS activities
2. Expected expenditure of remaining funds for NIMBioS

BENCHMARKS FOR DIVERSITY OF PARTICIPANTS AND ORGANIZERS AT NIMBIOS ACTIVITIES

As per the suggestion of the Site Review carried out at NIMBioS in June 2010, the NIMBioS Leadership Team has consulted with the

NIMBioS Advisory Board in response to the recommendation by the Site Review that we establish a variety of benchmarks for our programs. The Site Review particularly recommended that benchmarks be developed on participation in Working Groups and Investigative Workshops relative to gender and under-represented groups, on geographical diversity of participants, and on the breadth of topic coverage for our activities.

As we did not have guidance from other similar NSF Centers or Institutes on establishment of such benchmarks, we proceeded first to analyze data on these aspects of our programs, and then to develop benchmarks which we believe to be feasible and to foster our efforts to respond to the recommendations made by the Site Review and our Advisory Board.

We have chosen these benchmarks to be evaluated across the breadth of our types of activities, rather than applied to constrain any single activity. From discussions with the Site Review team, we believe that the intent of their recommendations was in no way to establish any type of 'quotas' for particular activities but to encourage broadening our activities and participants across the range of our programs. In the below therefore, we have noted benchmarks by our major research-support activities (Working Groups and Investigative Workshops) as well as providing metrics across our entire range of activities. These benchmarks are given below. A table of metrics that characterize our activities to date relative to these benchmarks is presented in Section A-2 of the attachment to this report.

Benchmarks for diversity in participants at NIMBioS activities:

1. Gender: Across all Working Groups and Investigative Workshops, the proportion of female participants will be at least 30%.
2. Geographic - International participation: Across all Working Groups and Investigative Workshops, at least 10% of participants will be from outside the USA.
3. Under-represented groups (overall): Across all NIMBioS activities, we will increase the percent of participants from under-represented groups by approximately 10% per year. [$F(t+1) = 1.1 F(t)$ where $F(t)$ is the proportion of total participants from underrepresented groups in Year t , and $F(t+1)$ is the proportion of total participants from underrepresented groups in Year $(t+1)$]
4. Underrepresented groups (Working Groups and Investigative Workshops): Comparably to the overall goal for all activities, we aim to increase the proportion of participants from under-represented groups in Working Groups and Investigative Workshops by 10% per year.
5. Local participants: To avoid overrepresentation of the University of Tennessee community in activities, we will limit participation by UT/ORNL faculty/staff to approximately 15% of the total participants in Working Groups and Investigative Workshops.

Benchmarks for diversity in activity organizers:

1. Gender: Across all Working Groups and Investigative Workshops, approximately 30% of the organizers will be female.
2. Local: No more than 25% of Working Group/Investigative Workshop organizers will be UT faculty/staff.
3. Underrepresented groups: We will encourage researchers from underrepresented groups to be organizers/co-organizers of requests for support, but no specific goal is set because of the small number of organizers.

Number of requests for support:

1. We will strive to maintain the number of requests for support submitted to NIMBioS at or above current levels. We have determined that we already receive roughly the same number of requests per year as NESCent (National Evolutionary Synthesis Center), a successful NSF-funded center established in 2004, suggesting that current levels are about what can be expected. In addition, these levels provide an adequate pool without overburdening our Advisory Board.

Metrics for activities to date

The table of metrics for activities through April 2011 provided in Section A-2 of the attachment to this report indicates NIMBioS is close to meeting the above benchmarks.

Participant gender diversity: Gender diversity of Working Groups was of concern to the Site Review team based on numbers through May 2010, with Year 1 at 19% women and Year 2 at 22%. To date in Year 3 28% of Working Group participants have been female, reflecting efforts by the NIMBioS Leadership Team to encourage greater participation. Gender diversity of Investigative Workshop participants and participants in activities overall has remained steady at near 40% female.

International participants: The proportion of international participants in NIMBioS Working Groups and Investigative Workshops has

consistently been above 10% (near 20%) in spite of the higher costs associated with international travel. Over all activities through April 2011, which includes a number of more local educational activities, 11% of participants have been from outside the United States. In Year 1 participants came from 15 countries and 41 states. In Year 2 NIMBioS had participants from 30 countries and 42 states, and as of April 2011, Year 3 participants have come from 20 countries and 42 states (Note: 5 large Investigative Workshops will take place in summer 2011, and the number of countries and states represented for the year will go up considerably). Since inception NIMBioS participants have come from 36 countries and 49 states, highlighting our efforts for geographic diversity.

Participants from underrepresented groups (URG): The NIMBioS Leadership Team continues to stress the importance of including members of underrepresented groups in activities, particularly to potential organizers of activities. NIMBioS relies on people self-identifying their race/ethnicity, and proportions presented are out of all participants, not just those who self-identified. Unfortunately not all members of underrepresented groups self-identify. The proportion of participants from URGs increased from Year 1 to Year 2 with near 10% of total Working Group and Investigative Workshop participants from URGs in Year 2. To-date Year 3 proportions have dropped off for Working Groups/Investigative Workshops but have remained above 11% for all activities combined (Note: There are a number of Working Group/Investigative Workshop events planned for May-Aug of Year 3 that are not reflected in these numbers).

Local participants: The proportion of local participants in Working Groups has remained at approximately 15% all three years. Working Groups generally have 12-15 members, so most groups have fewer than two local faculty/post-docs. Investigative Workshops initially had just over 20% local participants, partly because last minute cancellations were filled with local applicants rather than incurring the high cost of last minute travel expenses for non-locals, but the proportion of locals was reduced to 15% for Year 3. Over all activities, local participation has been 14% so far in Year 3.

Organizer gender diversity: The proportion of women organizers for Investigative Workshops increased from 25% in Year 1 to 36% in Year 3 to date. The proportions are not as high for Working Groups with Years 2 and 3 at 13% female. Over all events from inception to April 2010, 24% of organizers/instructors have been female.

Local organizers: The proportions of local organizers of Working Groups and Investigative Workshops were 28% and 75% in Year 1, reflecting the fact that a majority of the initial NIMBioS activities at startup had organizers associated with the NIMBioS or the University of Tennessee. Since then NIMBioS has reached out to a broader community and advertised opportunities more, significantly increasing the number of external organizers.

The proportion of local organizers dropped to 22% and 36% for Working Groups and Investigative Workshops in Year 2, and to-date in Year 3 local organizers have made up only 16% of Working Group organizers, 9% of those for Investigative Workshops, and 24% of those for all activities combined.

Number and breadth of activities: In Year 3 NIMBioS received 10 Working Group requests for support, 13 for Investigative Workshops, and 48 for post-doctoral fellowships. The number of Working Group requests was consistent with those received in Year 2 while Investigative Workshop and post-doctoral fellowship requests increased. It is expected that supporting more Investigative Workshops in Years 2 and 3 will result in more Working Group requests in subsequent years. See Benchmarks attachment (Section A-2) for a figure showing the subject areas of NIMBioS Working Groups and

Investigative Workshops by year. On a qualitative basis it is evident that the breadth of activities supported has increased from Year 1 to Year 3, particularly with the inclusion of activities related to physiology and immunology and cellular systems in Year 3, areas not represented in Years 1 or 2.

EXPECTED EXPENDITURE OF REMAINING FUNDS FOR NIMBIOS

This section reports on the status of NIMBioS expenditures to date, expenditures expected to occur prior to the end of the current year of support (ending August 31, 2011), and planned use of remaining funds over the project time period.

The total award to UTK for the first three years of operation of NIMBioS is \$9,000,000, of which approximately \$2,200,000 is for participant support and \$6,800,000 is for direct charges and associated F&A charges.

As of the end of March 2011, our estimate is that a total of \$4,100,000 of direct charges and F&A have been made, and \$1,100,000 of

participant support charges have been made. There are a large number of NIMBioS activities that will be held prior to the end of our third year of support. We estimate that as of August 31, 2011 we will have expended a total of \$5,200,000 of the direct and F&A funds and \$1,900,000 of the participant support funding. Thus, we project that as of August 31, 2011, there will be approximately \$1,600,000 of direct and F&A charges remaining uncommitted and \$300,000 of participant support funding remaining. Of the \$1,600,000 of direct and F&A charges remaining, approximately \$1,100,000 is for direct charges.

Note that the above figures do not include the supplement for a total of \$186,000 which was added to the base funding of the cooperative agreement. For this supplement funding, we project that there will be approximately \$110,000 remaining as of August 31, 2011.

Plans for expenditure of remaining funds:

For the remaining direct funds, essentially the entire amount arises from a smaller number of postdoctoral fellows supported in the initial 3 years than had been budgeted for, a smaller number of sabbatical visitors, and the start of activities late in the middle of our first year, thus leading to a lower total for staff salaries than had been budgeted. We are moving to a much larger facility that has space for significantly more postdoctoral fellows and visitors as well as the capacity to have concurrent activities that have been problematic to hold in our present space. We have space in our new facilities for 15 postdoctoral fellows rather than the 10-11 for which we have budgeted for the fourth and fifth project years. We thus intend to increase the number of postdoctoral fellows by approximately 5 per year for the fourth and fifth years of our operation, which will utilize approximately \$1,100,000 of the remaining direct and F&A funds.

We plan to utilize the remaining \$500,000 of direct and F&A funds to support (salary funds as well as basic staff and administrative support) six of the postdoctoral fellows for a year beyond the original expiration dates of the cooperative agreement (e.g. through August 2014). This is to ensure that we will have funding to support a group of postdoctoral fellows we plan to have arrive at NIMBioS during 2012.

For the remaining supplement funding, we plan to utilize a portion of it (approximately \$25,000) to support the efforts of postdoctoral researchers at other institutions collaborating on disease modeling and to hold two additional workshops (at a cost of approximately \$40,000 each; one at NIMBioS and one in Washington) to meet the goals of this joint project with NCMI.

Change in Objectives or Scope: None

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported: