GENETIC ENGINEERING AND SOCIETY CENTER

ANNUAL REPORT: 2016-17

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GES CENTER

Shaping the futures of biotechnology by integrating scientific knowledge and public values.

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MISSION STATEMENT

The Genetic Engineering and Society (GES) Center generates knowledge and fosters inclusive dialogue regarding current and future technologies in genetic engineering. We represent diverse disciplines and perspectives and strive to connect with government, industry, and interested publics. Our focus on education, research and engagement enables us to evaluate emerging tools, products, and policies in the growing field of genetic engineering and synthetic biology. The Center serves to improve relationships and learning across disciplines, experts, and stakeholders in order to better inform the future(s) of GE research, development and governance. A multi-disciplinary team of faculty, industry, government, advocacy groups, other NGOS and interested public engage with The Center.

VISION STATEMENT

The Genetic Engineering and Society (GES) Center serves an important function at the nexus of science and technology, the social sciences, and humanities. It brings scholarship, dialogue, and engagement to bear on contentious issues associated with the development, use and deployment of genetically engineered organisms (GEOs) in society. Recognizing the need for broader interactions of academic scholars with citizens, policy makers and other stakeholders, the GES Center strives to serve as a balanced and trusted place for engagement, research, and analysis. This approach brings the skills and activities of academe to bear on the needs of external communities, and in turn, informs scholarly work with the experiences and skills of those communities.

The Center embraces this approach and focuses on translational research and dialogue to bridge academe with other sectors involved in genetic engineering development and governance. The GES Center embodies the University's land grant mission to serve the state, its people, the nation and the world. The GES Center has taken a national and international lead in using research methods and engagement approaches to examine and better understand the technical, ethical, and societal dimensions of genetic engineering and synthetic biology.

At the same time as it reaches out beyond the bounds of the university, the GES Center also looks inward to enhance interdisciplinary teaching and research at NC State where genetic engineering is a focus or can serve as an example to inform broader challenges in inter-disciplinarity or questions at the nexus of technology and society. NC State has a goal to be an international leader in multi-disciplinary and interdisciplinary research, and the work of the GES Center is helping the university reach that goal.

HIGHLIGHTED RESEARCH

A Roadmap to Gene Drives: Systems Approaches to Research and Governance

The science of advanced biotechnology is moving faster than governance considerations and actions. Gene drives are a subset of second-generation genetic engineering technologies that researchers are developing with the aim of moving synthetic gene constructs into wild populations to protect, suppress or eliminate them. Recent legal and policy scholarship has focused on the need for governance to "keep pace" with technological innovation in multiple domains, including biotechnology. However, we currently lack a broad evaluation of the potential ecological, political economy, ethical, and other issues to guide research and development of gene drives. We designed the Roadmap to Gene Drives workshop to fill this gap. Seventy participants engaged in a deliberative format to develop analysis frameworks for ecological, policy, economic and ethical issues and a list of key research and governance needs for the future of gene drives applied to agriculture, conservation, and health.

The program committee has produced and co-edited a special edition of the *Journal of Responsible Innovation* in 2016 to 2017, containing over 10 articles from speakers, participating students and CoPIs, which will be out in late 2017. This work will serve to guide future research, innovation and oversight of gene drive systems.

IGERT- Genetic Engineering and Society: The Case of Transgenic Pests

Recent scientific breakthroughs in genetic engineering raise questions about if and how to develop and use specific products of the technologies. These new technologies demand a new kind of academician to properly contextualize not only their scientific implications but also their social and ethical impacts. The NC State IGERT program is uniquely geared toward offering potential graduate students the opportunity to be among the first of these newly integrated Ph.D. professionals.

Each student receives a Ph.D. degree in an academic graduate program with a minor in Genetic Engineering and Society. The Ph.D. degree programs range from Genetics and Entomology to Communication and Public Administration All students take four core IGERT courses, and the full curriculum for each student is customized. While maintaining depth and rigor, the core courses are designed so that students from all IGERT disciplines will be able to comprehend the material. These courses are designed to make sure that all IGERT students obtain minimum requisite fluency in all aspects of GPM. The courses are offered each year, so that each IGERT cohort has appropriate course availability.

Meanings of Responsible Innovation Across Communities in Biotechnology Project

CCE STEM: Cultivating Cultures of Ethics in STEM

Issues surrounding genetic engineering, biotechnology, and synthetic biology are contentious, especially when applied to food, the environment, and industrial applications for which direct human consent and medical benefits are not present. How researchers, developers and policy-makers communicate about and reflect upon their work is of utmost importance to the fields of bioengineering. This research fills an important niche by encouraging those involved in biotechnology innovation systems to reflect on the ethical dimensions of their work and what it means to innovate responsibly.

This is the second year of the CCE STEM project. In the spring/summer of 2017, we conducted a 3-day focus group training workshop for 10 participating graduate students. Following the training, the students moderated a total of nine focus groups with representatives of academia, industry, government, trade and advocacy NGO stakeholder communities. We developed a survey instrument for pre and post testing of participants' ties to explore meanings of responsible innovation as they relate to stakeholder communities, and core values. The grant paid for a PA research assistant in 2016 and will again in summer 2017. We are using mixed qualitative and quantitative survey methods. The pilot year 2016 was very successful, leading to one publication out (ASEE proceedings journal) and another in draft. We are finding some interesting results and will be the first to publish on responsible innovation and bottom-up meanings in biotech.

Evolutionary Consequences of Invasions of Novel Genotypes and Selfish Genetic Elements

Developing and Testing Novel Gene Drives Aimed at Suppressing Malaria

There has been considerable excitement about using selfish genes (also called gene drives) to alter characteristics of wild mosquito populations so they can no longer transmit diseases such as malaria. The team funded by this grant is doing the genetic engineering of the mosquito while also building a variety of computer simulation models to examine the expected functioning of the gene drives if released from the laboratory. The CRISPR-Cas9 system of gene editing which is being used in this research has properties that are much more complex than described by general media accounts. Our empirical and modeling research aims to carefully examine these properties of CRISPR-Cas9 in mosquitoes so that we can build robust gene drive systems that will offer sustainable, ecologically appropriate suppression of malaria.

Improving Bt Risk Assessment and Management by Genomic Monitoring

Saving Environmentally Friendly GE Crops Through Genomic Fingerprinting

Genetically engineered crops that fight pests based on their production of proteins that initially came from a biocontrol bacterium have decreased insecticide use in corn and cotton. The USDA regards these proteins that only affect targeted pest insects as a "public good" because of their environmental benefits. Unfortunately, misuse of the proteins based on overuse of certain GE crops can result in the target insects evolving resistance. The work conducted based on funding by the USDA will genetically fingerprint samples of the target pests collected from 1997 until 2017 to determine if resistance is evolving and how resistance could be countered by changes in the use of the GE crops.

Improving Robustness of a Tactical Model of Aedes/Dengue Dynamics

Building Complex Computer Simulation Models to Help Fight Dengue and Zika Viruses

Dengue is the worst insect-borne virus in the world and Zika is now erupting in more countries. Unfortunately, there are no vaccines to protect people from these viruses, so killing or manipulating the biology of the single mosquito species that transmits these viruses is the goal of many disease prevention programs. A number of research labs are focused on genetically engineering the wild mosquito populations to be sterile or to become incapable of transmitting the viruses. Although it is commonly thought that an engineered mosquito with gene drive will spread throughout a continent and suppress the viruses, the actual situation is more complex. Funds from this grant are being used to conduct ecological experiments that test the rigor of a stochastic, spatially explicit model of the vectoring mosquito. Results from these studies will help to better design engineered mosquitoes and develop more optimal, safe strategies for their release.

Restoring Biotechnology's Moral Fiber? Genetically Modified American Chestnut Trees, Responsible Innovation, and Environmental Justice

Investigating the Case of the Genetically Modified American Chestnut

This project focuses on the research and development of the genetically modified (GM) American chestnut tree, potentially the first GMO to be released in the U.S. that is meant to persist and spread in wild environments. Our research has four core areas: 1) investigating the ways in which scientists associated with this project are practicing responsible innovation; 2) exploring the potential for Native American communities to engage with this technology and its governance, given that the historical range of the American chestnut includes tribal lands; 3) studying the relationship between policy frameworks and NGO narratives about the GM American chestnut; and 4) convening a workshop of stakeholders to strategize and design methods to engage broader publics in the governance of the GM American chestnut.

Citizen Health Innovators

Our goal is to develop engagement channels with innovators, patients, ethicists, and regulators to design adaptive oversight tools that will foster a culture of empowerment and responsibility. We envision building an open and distributed health innovation ecosystem that empowers patients through tailored inventions and is seconded by adaptive regulatory institutions.

This grant supports the Wilson Center and the GES Center in bringing practitioners from community labs and crowd-funding platforms together with regulatory agencies to develop and vet codes of conduct that address liability, ethics, and other governance issues. As new forms of research and discoveries are being made in nontraditional ways, concerns arise about ethics, safety, security, and regulatory guidelines. The deliverables from this project will include up to two convenings, up to two publications in health and science media, and a final report summarizing the major findings and a research agenda.

Anticipating the Biosafety - Biosecurity Challenges of the DIYbio Community

DIYbio

Researchers will explore the rapidly expanding DIYbio community by visiting 20 individual labs in the United States and abroad in order to qualify the state of DIYbio in terms of capabilities, trends, and needs in relation to biosafety and biosecurity. We plan to explore the broader biosecurity concerns in relation to potential threats, current relationships with biosecurity professionals and identify trends/needs of the community. The project will also establish a biosafety/biosecurity fellowship program. All DIY labs face the same tension: how to operate an open access biolab for a broad set of users encouraged to experiment widely, while simultaneously maintaining strict controls on what they do. By embedding biosafety experts within the DIYbio communities over the course of a year, the Open Philanthropy Biosafety–Biosecurity Fellows will learn first-hand how DIY labs operate and will use this knowledge to codify a universal set of biosafety and biosecurity practices that can be adopted by the growing number of DIY labs.

Assessing Public Perceptions of Gene Drives for Invasive Species and Pest Control

Public Perceptions of Foods Produced With Gene Drive Technology

Researchers will conduct focus group discussions with citizens/grocery shoppers, as well as a largescale survey of the US general public. The aim of the work is to both get an idea of how consumers will respond to foods produced using gene drives (especially in terms of their willingness to pay for these foods), as well as to understand citizen preferences for how risks of the technology are assessed. So far there is no published empirical research on either of these questions. This project grew directly out of the 2015 NSF-sponsored workshop, "A Roadmap to Gene Drives," and will support the doctoral research of economics PhD student Mike Jones, who came to NCSU as part of the NSF-funded IGERT program in GES.

The History Project: Archive of Agricultural Genetic Engineering & Society (AAGES)

Collecting and Archiving a History of Genetic Engineering and Society

Together with the NC State Libraries Special Collections and Department of History, GES is creating a video archive of oral histories to document for posterity the memories and papers of the pioneers of genetic engineering. In this process we are interviewing individuals from the first generation of researchers and regulators, many of whom are still actively working in their fields.

The History Project continues to be the sole effort to create a public archive of oral histories with important figures in the first generation of genetic engineers, regulators, and their critics. To date, we have conducted 17 interview with 19 subjects and will be hosting a public event to roll out the archive in Sept. 2017.

GES Center affiliated faculty published 108 papers in 2016-17.

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Corin, E., **Jones, M. G.**, Andre, T., & Childers, G., (*in press*). Characteristics of Lifelong Science Learners: An Investigation of STEM Hobbyists. *International Journal of Science Education.*

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Childers, G. & **Jones, M. G.** *(in press*). Learning from a distance: High school students' perceptions of virtual presence, motivation, and science identity during a remote microscopy investigation. *International Journal of Science Education.*

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Tunlaya-Anukit, S., et al, **Sederoff, R.R**. A proteomic based quantitative analysis of the relationship between monolignol biosynthetic protein abundance and lignin content using transgenic Populus trichocarpa. In *Recent Advances in Polyphenols Research. In Press.*

MEDIA APPEARANCES

GES Faculty are frequently called upon by high profile media organizations, such as The New York Times and NPR to discuss and give context to stories and research around biotechnology.

Jennifer Kuzma quoted in Science magazine article by Elizabeth Pennisi, "U.S. Academies gives cautious go-ahead to gene drive" June 8, 2016	link
Fred Gould and John Godwin profiled in Pacific Standard article by Alison Hawkes, "Re-coding for Conservation" about the island mice gene drive project with Island Conservation. July 8, 2016	link
Todd Kuiken quoted in MIT Technology Review article by Antonio Regalado "Why Kickstarter's Glowing Plant Left Backers in the Dark." July 15, 2016	link
Fred Gould interviewed by Ernie Hood in Radio In Vivo program "GMOs." July 27, 2016	link
Jennifer Kuzma quoted in PBS Nova Next Now article by Brooke Borel "Editing Out Pesticides", August 3, 2016.	link
GES faculty & students meeting with Japanese journalists. August 5, 2016.	link
Jennifer Kuzma quoted and research cited in The Boston Globe article by Doug Hill "Staying Ahead of Technology's Curves" August 21, 2016	link
Jennifer Kuzma quoted in Wired magazine article by Matt Simon "Genes Might Be Helping the Tasmanian Devil Fight Off Face Cancer" August 30, 2016.	link
Todd Kuiken quoted in MIT Technology Review article by Emily Mullin "The Light Fails to Glow on DIY Biology." September 15, 2016	link
Jennifer Kuzma interviewed on Future Biotech Policy, WCOM 103.5 FM, Chapel Hill and Carrboro Radio In Vivo /. September 21, 2016.	link
Jennifer Kuzma interviewed by Dan Charles on NPR's All Things Considered story on "As a GMO Pillar Wobbles, Biotech Companies Promise New Insect-Killing Genes." September 22, 2016.	link
Article about Zack Brown research in CEnREP "New research by CEnREP faculty reports that mixed-use neighborhoods may lead to less happy residents." October 10, 2016	link
Fred Gould quoted in Science article by Kelly Servick "Brazil will release billions of lab-grown mosquitoes to combat infectious disease. Will it work?" October 13, 2016	link
Jennifer Kuzma guest on Science Friday (Public Radio International, Airs on NPR) with Ira Flatow, October 14, 2016.	link

Jennifer Kuzma quoted in PRI story by Julia Franz "Scientists develop a hornless Holstein using 'gene editing.' Are you ready to eat it?" Oct 20, 2016.	link
Fred Gould profile in WBUR On Point interview with Tom Ashbrook "A Deep Dig on GMO and Crop Yields." November 2, 2016.	link
Jennifer Kuzma quoted in Associated Press Story by Seth Borenstein "Risk experts: Candidates not focusing on biggest threats" November 2, 2016.	link
Todd Kuiken quoted in MIT Technology Review article by Emily Mullin "Obama Advisers Urge Action Against CRISPR Bioterror Threat." November 17, 2016	link
Todd Kuiken quoted in BuzzFeed article by Stephanie M. Lee "DNA Biohackers Are Giving the FDA A Headache With Glow-In-The-Dark Booze" December 6, 2016	link
Jennifer Kuzma quoted in Wine Enthusiast magazine by Brooke Borel "Can Science Save our Favorite Wines?" December 8, 2016.	link
Jennifer Kuzma mentioned in New York Times article by Stephanie Strom "National Biotechnology Panel Faces New Conflict of Interest Questions" December 27, 2016.	link
Jennifer Kuzma interviewed and quoted in NBC News, 11 Surprising Predictions for 2017 From Some of The Biggest Names in Science, December 29, 2016	link
Fred Gould quoted in Huffington Post article by Carey Gillam "New Research Shows Failings of GMO Insect Resistance, Corn Crop in Jeopardy." January 6, 2017	link
Jennifer Kuzma research highlighted in NCSU press release, Bioscience Technology, Phys.org, Science Daily, etc. "New Tool Can Help Policymakers Prioritize Information Needs for Synthetic Biology Tech." January 17, 2017.	link
Jennifer Kuzma quoted in Nature magazine, "Gene-Edited Animals Face U.S. Regulatory Crackdown." January 19, 2017.	link
Todd Kuiken quoted in Science article by Kelly Servick "Proposed U.S. biotech rules raise industry hopes and anxieties." January 27, 2017	link
Podcast- Talking Biotech with Kevin Folta & Fred Gould: Fred Gould chair of National Academies of Science review of biotech crops, reaffirms GMO safety and sustainability. Jan 30, 2017.	link
Todd Kuiken quoted in Gizmodo article by Kristen V. Brown "Germany Is Threatening Biohackers with Prison" February 9, 2017	link
Jennifer Kuzma quoted in National Press Briefing on Gene Editing, AAAS Annual Meeting, Feb 16, 2017.	link

Fred Gould referenced in Fayetteville State University press release "Fayetteville State University Biological Sciences Receives National Science Foundation Grant to Study Plants and Parasites in the Context of Global Warming." February 21, 2017	link
Jennifer Kuzma interviewed on Australian Broadcasting Company (ABC) Call for open discussion on governance of gene editing technologies. The Science Show, February 25, 2017.	link
Fred Gould quoted in Mother Jones article by Tom Philpott, "Just One Small Problem with This Major Report on GMO Safety." March 5, 2017.	link
Todd Kuiken quoted in NPR All Things Considered story by Rob Stein "Scientists Closer to Creating a Fully Synthetic Yeast Genome." March 9, 201 7	link
Todd Kuiken quoted in Futurism article by Patrick Caughill "Scientists Are Close to Creating a Fully Synthetic Genome." March 12, 201 7	link
Jennifer Kuzma quoted in MIT Tech Review, Rewriting Life by Emily Mullin "5 Biotech Products U.S. Regulators Aren't Ready For." March 17, 2017	link
Interviewed for the CBC (Canadian Broadcast Corporation) radio story with Bob McDonald "Are we prepared for our gene altered future?" March 25, 2017.	link
Research featured in PLoS Blog by Aaron Dy "Can a new model help governance keep up with synthetic biology?" March 27, 2017	link
Fred Gould quoted in UNC-TV Nova Next article by Veronique Greenwood "How Mosquito Nets Can Shape the Evolution of Behavior." March 29, 2017	link
Letter to Nature Biotechnology 35, 302-304, "Elevating the conversation about GE crops." Response to criticisms of GE crop study in The Chronicle of Higher Education. April 11, 2017	link
Fred Gould interviewed by Wendy Zuckerman in Science Vs podcast "GMO… OMG? Safe or freakish frankenfood?" April 13, 2017	link
Todd Kuiken quoted in The Atlantic article by Sarah Zhang "Whatever Happened to the Glowing Plant Kickstarter?" April 20, 2017	link
Fred Gould referenced in National Corngrowers Association blog "Tune in! CommonGround Volunteer Talks GMOs with Bill Nye" April 21, 2017	link
Fred Gould featured in Netflix series *Bill Nye Saves the World*, S1E4 – "More Food, Less Hype," discussing GMO crop safety. April 21, 2017.	link
Jennifer Kuzma quoted in Slate magazine article by Brooke Borel "The U.S. Regulations for Biotechnology Are Woefully Out of Date." April 21, 2017.	link

Fred Gould quoted by Belinda Martineau in Biotech Salon article "Scientific Uncertainty and Professional Ethics as Related to GMOs.' April 22, 2017	link
GES Faculty meeting with European agro journalists (approx. 15). April 27, 2017.	
Photo of Fred Gould from Netflix series "Bill Nye Saves the World" in ExtraNewsFeed blog by Alfonso KC "Bill Nye's New Netflix Show Is Right About Pretty Much Everything…Except GMOs." May 1, 2017	link
Todd Kuiken quoted in Slate article by Molly Olmstead "The Fuzzy Regulations Surrounding DIY Synthetic Biology" May 4, 2017	link
Fred Gould quoted by Nick Wilson in Mountain Express blog article "Facts, fears and the future of food: Asheville talks about genetic engineering." May 17, 2017.	link
Fred Gould quoted by Belinda Martineau in Biotech Salon article "What Did Monsanto's Robb Fraley Really Learn from Bill Nye?" May 31, 2017.	link

CORE FACULTY PRESENTATIONS: 70

Faculty	Date	Lecture/Presentation
Zack Brown	8/2/2016	Plenary Session "Food and Environment," AAEA Annual Meeting (Boston, MA)
Jason Delborne	8/22/2016	"Public attitudes, perceptions, and engagement in the field of genetic modification," Regulatory Affairs for Crop Protection (guest lecture). NC State University. August 22, 2016.
Zack Brown	8/29/2016	NSF-SESYNC Workshop on "Living with Resistance" (Annapolis, MD)
Todd Kuiken	9/6/2016	Presentation "Biosecurity in a world without walls" - FBI Weapons of Mass Destruction Coordinators Training, Washington, D.C. September 9, 2016
Jason Delborne	9/15/2016	"Mapping gene drive governance," Conference on Advancing Science for Policy through Interdisciplinary Research on Regulation, organized by University of California, Berkeley's Center for Science, Technology, Medicine and Society. Berkeley, CA. September 15, 2016.
Fred Gould	9/16/2016	"Environmental effects of GE crops" - Turkish visitors to CALS
Todd Kuiken	9/18/2016	Judge at aGEM 2016 Competition & Workshop by Mindfuel. University of Calgary, Calgary, Alberta. September 17-18, 2016
Zack Brown	9/20/2016	The Economics of Genetically Engineered Crops. CALS Global Leadership Academy presentation for Turkish visitors. September 20, 2016.
Jason Delborne	9/21/2016	"GMOs, public perception, and opportunities for public engagement," Agricultural Biotechnology Training Program for Turkish delegation, coordinated by the College of Agriculture and Life Sciences (CALS) Global Academy and the Genetic Engineering and Society Center. NC State University. September 21, 2016.
Jennifer Kuzma	9/23/2016	"GEOs and U.S. Governance," Agricultural Biotechnology Training Program for Turkish delegation, coordinated by the College of Agriculture and Life Sciences (CALS) Global Academy and the Genetic Engineering and Society Center. NC State University. September 23, 2016.

Fred Gould	9/26/2016	Organizer and Discussion leader - Symposium: "What Constitutes Responsible Field Release of Transgenic Insects?" International Congress of Entomology. Orlando FL
Jason Delborne	9/26/2016	"Diverse approaches for public engagement," Symposium: What Constitutes Responsible Field Release of Transgenic Insects? International Congress of Entomology. Orlando, FL. September 26, 2016.
Jennifer Kuzma	9/26/2016	"Anticipatory governance of gene drives." International Congress of Entomology. Orlando, FL. September 26, 2016.
Fred Gould	9/27/2016	"Entomological Solutions to World Problems" Grand Challenges Entomology Leadership Summit held at ICE Orlando, FL
Jennifer Kuzma	9/27/2016	"Innovation in Governance." North Carolina Agricultural Biotechnology Summit, September 27, 2016.
Jason Delborne	9/28/2016	"Gene drives on the horizon," Science and Society, University of Ottawa. Ontario, Canada. September 28, 2016.
Fred Gould	9/30/2016	Keynote Address "Will genetically engineered pests protect health, biodiversity, and crop production?" International Congress of Entomology. Orlando FL.
Todd Kuiken	10/5/2016	Presentation "Perspectives from Inside/Outside the Convention on Biological Diversity's Engagement Process" OECD Workshop, NC State. October 5, 2016
Jennifer Kuzma	10/6/2016	"Governance for Engineered Pests in Historical and Systems Contexts" Keynote for OECD Workshop on Environmental Release of Engineered Pests: Building an International Governance Framework, Raleigh, NC October 6, 2016.
Jennifer Kuzma	10/10/2016	"Gene Editing and Emerging Issues." AGree Initiative, Meridian Institute, Washington, DC. October 10, 2016.
Fred Gould	10/12/2016	Dean's Big Ideas Forum–Report on "Genetic Engineering Research at NCSU."
Jason Delborne	10/12/2016	"Research, Advocacy, and Engagement: Exploring the Roles of Experts in Democracy," keynote address to the 2016 Research-to-Policy Conference: Pathways to Successful Engagement in Agricultural, Natural Resources and Food Issues, hosted by University of California Cooperative Extension (UCCE) at the University of California, Davis. October 12, 2016.

Jennifer Kuzma	10/14/2016	Roundtable participant. Emerging Gene Editing Technologies in Agriculture. Agree Transforming Food and Ag Policy, Convening Series, Meridian Institute., Washington DC October 14 2016
Todd Kuiken	10/18/2016	Presentation "Synthetic Biology and Biodiversity: Are international governance systems keeping pace?" – European Commission, Brussels, Belgium. October 18, 2016
Jennifer Kuzma	10/21/2016	"Hubris or Humility in the Regulatory Assessment of Gene Drives?" Gene Editing: Life and Law Beyond the Human, SUNY-Buffalo, NSF-funded workshop, Oct. 21-22, 2016.
Todd Kuiken	10/21/2016	Presentation "Vigilante Environmentalism: How New Genomic Technologies Could Change How We Manage, Value, And Govern Ecosystems." Gene Editing: Life and Law Beyond the Human, SUNY-Buffalo, NSF-funded workshop, Oct. 21-22, 2016.
Fred Gould	10/27/2016	AACCI annual meeting Savannah, GA "Future of Food Sustainability and Safety" "Report on findings of NASEM study"
Fred Gould	11/2/2016	Nuts and bolts of gene drive in mosquitoes WHO Geneva, Switzerland (via Skype)
Jason Delborne	11/11/2016	"Governing emerging biotechnologies: Expertise, democracy, and public engagement." Between Certainty and Experimentation, Department of Geography seminar series. University of North Carolina – Chapel Hill. November 11, 2016.
Jason Delborne	11/12/2016	"Perspectives from recent proceedings of the National Academy of Sciences and its June 2016 report, Gene Drives on the Horizon," Leadership Summit on Synthetic Biology Stakeholder and Community Engagement for Public Health, Conservation, and Food and Agriculture. Co-sponsored by the Wilson Center and the Keystone Policy Center. Washington, D.C. July 12, 2016.
Fred Gould	11/16/2016	"GE Crops: Activities of GES Center and NASEM" NC Biotech Center, RTP, NC
Fred Gould	11/16/2016	"Are GMOs safe to eat?" Interra International, LLC, Chapel Hill, NC
Jason Delborne	11/16/2016	"Engagement as governance." Making the World Engineerable: Science, Practice, and Policy. National Academies of Sciences, Engineering, and Medicine. Washington, DC. November 16, 2016.

Todd Kuiken	11/16/2016	Presentation "Challenges to Governance of Gene Drive Research and Development", American Society of Tropical Medicine and Hygiene 65th annual meeting, Atlanta, GA. November 16, 2016.
Jason Delborne	11/17/2016	"Incorporating public engagement throughout phased testing [of gene drives]," American Society for Tropical Medicine and Hygiene. Atlanta, GA. November 17, 2016.
Fred Gould	11/20/2016	"Report on the NASEM study of GE Crops" Harvard Kennedy School, Cambridge, MA
Jennifer Kuzma	11/28/2016	Governance of Genetically Engineered Organisms: A Social Science Perspective. Seminar for Agbiome company, Raleigh, NC, Nov 28, 2016.
Fred Gould	11/29/2016	Brigham Young University Radio Show –GE Crops Report.
Zachary Brown	12/1/2016	Report to OECD CRP Governing Body Open Forum Session on Gene Editing on GES-CSIRO October workshop on "Environmental Release of Engineered Pests". Paris, France
Fred Gould	12/2/2016	"Can genes drive safely" Keck Faculty symposium, NCSU
Jason Delborne	12/2/2016	"Public engagement and emerging biotechnologies: Opportunities and challenges for response-able science." Centro de Estudos Sociais, University of Coimbra. Coimbra, Portugal. December 2, 2016.
Fred Gould	12/5/2016	"GMO Science & Uncertainty" Environmental Law Institute workshop on "Communicating Uncertainty in Science, Law, and Journalism". Wash. DC.
Jennifer Kuzma	12/6/2016	GMOs and Pesticides in a Governance Policy Context. 68th Crop Protection School Annual Meeting Of NC Crop Protection Association. Dec 6, 2016.
Todd Kuiken	12/6/2016	Panel: The Future of Biohacking. Future Today Summit. 92nd Street Y, New York, NY, December 6, 2016
Fred Gould	12/7/2016	"GE Crops Report Study Process" Forum of Society Leaders on Genetically Engineered Crops: Experiences and Prospects. NASEM Wash, DC
Fred Gould	12/8/2016	Presentation "Living in a Genetically Engineered World" OLLI, McKimmon Center, Raleigh, NC
Fred Gould	12/13/2016	"The biological basis of gene drive technologies: Beyond the hype" Society for Risk Analysis, San Diego, CA. December 13, 2016

Jason Delborne	12/13/2016	"Reflections from the National Academies of Sciences committee on non-human gene drives and responsible conduct," Society for Risk Analysis. San Diego, CA. December 13, 2016.
Jennifer Kuzma	12/13/2016	"Systems thinking for risk governance of gene drives: A deliberative workshop." Society for Risk Analysis conf. San Diego, CA. Dec 12-14, 2016.
Todd Kuiken	12/13/2016	Presentation "CRISPR and Gene Drives without Walls: Myths and realities about the democratization of genetic technologies", Society for Risk Analysis. San Diego, CA. December 13, 2016.
Fred Gould	1/26/2017	Seminar - Rethinking Regulation ""Rethinking Regulation of GE Crops". Kenan Institute for Ethics, Duke University, Durham NC
Jennifer Kuzma	1/26/2017	Seminar - Rethinking Regulation ""Oversight of Genetic Engineering: Evaluating the past to inform the future". Kenan Institute for Ethics, Duke University, Durham NC
Jennifer Kuzma	2/3/2017	Plenary Session: "From Genetic Engineering to Gene Editing: U.S. Governance Perspective." University of Tokyo & Kyoto University. February 3, 2017 (delivered remotely, translation by Dr. Makiko Matsuo)
Fred Gould	2/13/2017	Keynote Address Gordon Research Conference on Plant-Herbivore Interactions. Ventura, California.
Jennifer Kuzma	2/17/2017	"Governance for Genetic Engineering to Control Disease Vectors in the Wild." American Association for the Advancement of Science Annual Meeting. Boston, MA. February 17, 2017.
Jennifer Kuzma	3/3/2017	Seminar for UNC-CH Center for Genomics and Society investigators and trainees, Gene Drives, Governance and Ethics, March 3, 2017.
Jennifer Kuzma	3/9/2017	"CRISPR, Gene drives, Governance and Ethics" Center for Genomics, UNC-Chapel Hill. March 9, 2017.
Jennifer Kuzma	3/10/2017	Plenary Session: "The Social and Policy Systems Surrounding Emerging Biotechnologies, Microbes and the Environment" MEDx-IBIEM Joint Symposium: Frontiers in Microbiome Dynamics and Engineering, Duke University, March 10, 2017
Todd Kuiken	3/15/2017	Presentation "Synthetic Biology: Where it is and where it may go?" United Nations Food and Agriculture Organization, Rome, Italy. March 15, 2017.

Fred Gould	4/7/2017	Introduction—Art's work in the age of biotechnology: determining our genetic futures—NCSU workshop.
Fred Gould	4/11/2017	Elevating the discussion of genetically engineered crops. Hopkins Lecture. Kansas State Univ.
Jennifer Kuzma	4/21/2017	Plenary Session: "Proofreading Gene Edited Animals: Risk Governance Systems." Editing Nature Summit. Yale University. April 20-21, 2017
Jennifer Kuzma	4/27/2017	Plenary Session: "The Societal Dimensions of Gene Editing." University-Industry Consortium. Baltimore, MD. April 27, 2017.
Jennifer Kuzma	4/28/2017	Invited participant for Resolve, Dupont Roundtable on Gene editing and Governance, Washington, DC, April 28, 2017.
Jennifer Kuzma	5/18/2017	"Lessons for Hyperloop One from the Biotechnology World." ASU Governance on Emerging Technologies, 5th Annual Conference. Phoenix, AZ. May 17-19, 2017.
Jennifer Kuzma	5/18/2017	Plenary: "International Governance of Gene Drives." ASU Governance on Emerging Technologies, 5th Annual Conf. Phoenix, AZ. May 17-19, 2017
Fred Gould	5/30/2017	Future tiered approaches to regulation of new crop varieties. CropLife conference on Future of Plant Breeding Oversight in Canada—Ottawa
Fred Gould	6/5/2017	Keynote Address: Environmental effects of GM crops: Findings of a National Academies of Sciences, Engineering and Medicine (US-NASEM) report. 14th International Symposium on the Biosafety of Genetically Modified Organisms. Guadalajara, Mexico.
Todd Kuiken	6/22/2017	Judge at Biodesign Challenge Summit 2017. School of Visual Arts, New York, NY. June 22, 2017
Jennifer Kuzma	6/25/2017	"Ethics and responsible innovation in biotechnology communities: A pedagogy of engaged scholarship." American Society of Engineering Education. Annual Meeting. June 25 - 28, 2017, Columbus, OH.

AFFILIATED FACULTY PRESENTATIONS AND LECTURES: 52

Affiliated Faculty	Lecture/Presentation
Alun Lloyd	After the Honeymoon, the Divorce: Unexpected Outcomes of Disease Control Strategies. SIAM Dynamical Systems conference. Snowbird, UT. June 2017.
Alun Lloyd	Modeling gene drives, from concept, through trials and to the field: The importance of biological complexities. Lorentz Center Workshop on Regulating Gene Drive. University of Leiden, Netherlands. March 2017.
Alun Lloyd	Genetic Control Strategies for Vector-Borne Diseases. Main Speaker, ANZIAM Mathematical Biology Special Interest Group workshop, University of Adelaide, Australia. February 2017.
Alun Lloyd	Model Guided Design of Experiments and Data Collection. MBI Workshop on Population Models in the 21st Century, The Ohio State University, Columbus, OH. November 2016.
Alun Lloyd	Genetic Control Strategies for Vector-Borne Diseases. Operations Research Program seminar, NC State. October 2016.
Alun Lloyd	Control of Dengue by Combined Strategies. International Congress of Entomology, Orlando, FL. September 2016.
Alun Lloyd	Control of Dengue by Combined Strategies. Society for Mathematical Biology Annual Meeting, University of Nottingham, UK. Contributed talk. July 2016.
M. Gail Jones	Corin E., Jones, M. G., Andre, T., & Childers, G. (April 2017). Free-Choice STEM Learning: American Adults' Influences, Choices, and Motivations Compared by Age and Gender. American Educational Research Association, San Antonio, TX.
M. Gail Jones	Ennes, M., Jones, M. G., Chesnutt, K., & Englehardt, H. (April 2017). Educator Self-Efficacy in Informal Science Centers. American Educational Research Association, San Antonio, TX.
M. Gail Jones	Childers, G., Jones, M. G., Chesnutt, K., Corin, E. & Andre, T. (April 2017). STEM Career Choices and Science Leisure-Learning Interests. National Association of Research in Science Teaching, San Antonio, TX.
M. Gail Jones	Corin, E., Jones, M. G., Andre, T., & Childers, G. (April 2017). Gender and Age Cohort Differences in Motivations, Participation Choices in Free Choice STEM-learning Activities. National Association of Research in Science Teaching, San Antonio, TX.

M. Gail Jones	Ennes, M., Jones, M. G., Chesnutt, K., & Englehardt, H. (April 2017). Perceived levels of self-efficacy in informal science educators. National Association of Research in Science Teaching, San Antonio, TX.
M. Gail Jones	Hite, R., Jones, M. G., Childers, G., Ennes, M., Chesnutt, K., Pereyra, M., & Cayton, E. (April 2017). Relating Cognitive Development to Perceptions of Virtual Presence in 3-D, Haptic-Enabled, Virtual Reality Science Instruction. Paper presentation for the National Association for Research in Science Teaching (NARST)
M. Gail Jones	Hite, R., Jones, M. G., Childers, G., Ennes, M., Chesnutt, K., Pereyra, M., & Cayton, E. (April 2017). Classifying Learning Activities in 3-D, Haptic-Enabled, Virtual Reality Science Instruction through Students' Questioning. Poster presentation for the American Educational Research Association (AERA) Conference, San Antonio, TX.
M. Gail Jones	Hite, R., Jones, M. G., Childers, G., Ennes, M., Chesnutt, K., Pereyra, M., & Cayton, E. (April 2017). Cognitive Development and Virtual Presence in 3-D, Haptic-Enabled, Virtual Reality Science Instruction. Paper presentation for the American Educational Research Association (AERA) Conference, San Antonio, TX.
M. Gail Jones	Jones, M. G., Cayton, E., Chesnutt, K., Ennes, M., & Hite, R. (April 2017). Electrifying Ideas for Teaching Energy. Workshop presented at the National Science Teachers Conference, Los Angeles, CA.
M. Gail Jones	Hite, R., Jones, M. G., Ennes, M., Chesnutt, K., Cayton, E., & Childers, G. (April 2017). Cracking the Case: Integrating Biology and Engineering in Case Studies. Workshop presented at the National Science Teachers Conference, Los Angeles, CA.
M. Gail Jones	Chesnutt, K., Jones, M. G., Cayton E., Ennes, M., & Hite, R. (April 2017). Packing Your Scale Backpack: Research-Based Science Resources for Learning About Size and Scale. Workshop presented at the National Science Teachers Conference, Los Angeles, CA.
M. Gail Jones	Hite, R., Jones, M. G., Childers, G., Ennes, M., Chesnutt, K., Pereyra, M., Cayton, E., & Stanley, R. (2017, January). The Utility of 3-D, Haptic-Enabled, Virtual Reality for Learning Complex Biological Systems: Students' Understanding of the Human Heart. Research paper presented for the Association for Science Teacher Education (ASTE) National Conference, Des Moines, IA.
M. Gail Jones	Jones, M. G., Hite, R., Sounder, A. (2017, January). Virtual Reality STEAM Changes Student Outcomes. Paper presented at the Future of Education Technology Conference, Orlando, FL.
M. Gail Jones	Girard, R., Lytle, E., Hollard, J., & Jones, M. G. (2017, February). Immerse Students in STEAM Using Virtual Reality. Paper presented at the TCEA Convention, Austin, TX.

M. Gail Jones	Hite, R., Jones, M. G., & Childers, G., (2016, October). A Proposed Research Agenda for 3-D, Haptic-enabled, Virtual Reality Technology in 6-12 Science Instruction. Paper presentation for the South West Chapter of the Association for Science Teacher Education (ASTE) Regional Conference, Tyler, TX.
M. Gail Jones	Ennes, M., Jones, M. G., Burns, K., Covel, J., Johnson, D., Lannoye-Hall, C. (2016, September). Improving Educator Self-Efficacy in Teaching Science Concepts. Presented at Association of Zoos and Aquariums Annual Conference, San Diego, CA.
M. Gail Jones	Pereyra, M., & Jones M. (2016, September). I Latin American and Caribbean Open Science Forum, CILAC 2016, Montevideo, Uruguay.
M. Gail Jones	Gardner, G. E., Jones, M. G., & Ramos, M. (July 2016). Cognition at the extremes: Undergraduate biology students' concepts of extreme spatial scales. Paper presented at the annual meeting of the Society for the Advancement of Biology Education Research (SABER), Minneapolis, MN.
M. Gail Jones	Jones, G., Cayton, E., Chesnutt, K., Ennes, M., & Justice, N., (2016, October). The Power School: Electrifying Ideas for Teaching Energy. NC Science Teachers Association Annual Meeting. Greensboro, NC.
M. Gail Jones	Chesnutt, K., Jones, M.G., Cayton, E., Ennes, M., & Huff, P. (2016, October). Packing your scale backpack: Resources for enhancing out-of-school learning of size and scale. NC Science Teachers Association Annual Meeting. Greensboro, NC.
M. Gail Jones	Ennes, M., Jones, M. G., Chesnutt, K. (2016, September). Improving Informal Educator Self-Efficacy in Teaching Science Concepts. Presented at Environmental Educators of North Carolina Conference. Black Mountain, NC.
Marce Lorenzen	Lorenzen, M.D. (2017). Use of genomic and transcriptomic resources for development of species- specific transgenes. 26th IWGO Conference, Beijing, China
Marce Lorenzen	Lorenzen, M.D. (2017). Basic steps for developing genetic technologies in a non-model organism. International Plant & Animal Genome Conference, San Diego, CA
Marce Lorenzen	Lorenzen, M.D. (2016). Trials and tribulations associated with transforming non-model organisms. XXV International Congress of Entomology, Orlando, FL
Marce Lorenzen	Lorenzen, M.D. (2016). Progress towards genome-wide insertional mutagenesis of the western corn rootworm. Bayer CropScience Seminar, Morisville, NC
Marce Lorenzen	Chu, F. and Lorenzen, M.D. (2016). Development of transgenic helper/donor Diabrotica virgifera virgifera strains for genome-wide mutagenesis. Monsanto Corn Academic Summit, St. Louis, MO

Max Scott	Second Research Coordination Meeting (RCM) on the FAO/IAEA Co-ordinated Research Project "Comparing Rearing Efficiency and Competitiveness of Sterile Male Strains Produced by Genetic, Transgenic or Symbiont-based Technologies" in Panama City, Panama from 27-31 March, 2017. Presentation: "Transgenic sexing strains: evaluation of the influence of genetic background in Drosophila and new Lucilia cuprina gene promoters for driving tTA expression".
Max Scott	ICE 2016, XXV International Congress of Entomology, Orlando, FL, USA, September 25-30 on Development and evaluation of male-only strains of the New World screwworm
Max Scott	Project Directors' meeting for the Biotechnology Risk Assessment Grants (BRAG) Program (May 23, 2017), Riverdale, MD. Poster presentation: "Development and evaluation of safeguards for conditional suppressive gene drives for spotted wing Drosophila and the New World screwworm ".
Max Scott	"The sixth annual meeting of the American college of wound healing and tissue repair", Chicago, IL, December 1-3, 2016 on Next Gen Maggot Therapy 2.0
Max Scott	2016 Annual Meeting of WERA 1021, Orlando, FL, September 29, 2016 on Male-only strains, Cas9 strains and gene drive in SWD
Max Scott	Department of Entomology, The University of Georgia, Athens, GA., February 27, 2017. Talk on "Genetically modified insect strains for genetic control of pests"
R.M Berry-James	Berry-James, R. M. Invited Discussant. NASPAA Accreditation Site Visitor Training, 2017 Annual Conference Saluting the Public Service: a Bold & Noble Profession, Atlanta, GA: March 17-21, 2017.
R.M Berry-James	Berry-James, R. M. Moderator/Discussant. Responsible Innovation: New Directions in Public Service on track Human Resources, Leadership and Public Management, 2017 Annual Conference Saluting the Public Service: a Bold & Noble Profession, Atlanta, GA: March 17-21, 2017.
R.M Berry-James	Berry-James, R. M. Moderator/Presenter. Teaching Cultural Competence in Public Administration: Lessons Learned from Problem Based Approaches. Paper presented on track Program Evaluation: Enhancing Credibility and Building Ownership of Lessons Learned, 2017 Annual Conference Saluting the Public Service: a Bold & Noble Profession, Atlanta, GA: March 17-21, 2017.
R.M Berry-James	Berry-James, R. M. NASPAA Accreditation Site Visitor Training. Presented workshop training at the 2017 COMPA 46th Annual Conference on Emerging Strategies Leading to a More Inclusive and Diverse Society, Atlanta, GA: March 17, 2017.

R.M Berry-James	Berry-James, R. M. (Invited Moderator). Luncheon Plenary on Perspectives on Social Equity in a Mythical Post Racial Society training at the 2017 COMPA 46th Annual Conference on Emerging Strategies Leading to a More Inclusive and Diverse Society, Atlanta, GA: March 16, 2017
R.M Berry-James	Berry-James, R. M. (Invited Guest). Academic Speaker for Public Service Week, Old Dominion University, Department of Public Administration, School of Public Service, October 24, 2016
R.M Berry-James	Berry-James, R. M. (Invited Keynote). Responsible Innovation in Food Biotechnology: Exploring Cultural Perceptions and Engaging Public Trust. North Carolina Central University, College of Behavioral and Social Science 10th Anniversary, September 28, 2016.
R.M Berry-James	Berry-James, R. M. (with C. Maher, E. Williams, & G. Marshall). The Skills and Resources Needed to be Effective MPA and PhD Directors. 2016 NASPAA Annual Conference, Columbus, Ohio: October 20-21, 2016.
R.M Berry-James	Berry-James, R. M. (Invited Facilitator). Accreditation Readiness Consulting. 2016 NASPAA Advisory Services Pilot Training Incubator, Columbus, Ohio: October 19, 2016.
Veljko Dubljević	"Psychopharmacological Enhancement: Ethical and Policy Issues", Davidson College, USA, 25.10.2016
Veljko Dubljević	Paediatric neuroenhancement, best interest and autonomy: A case of normative reversal" paper presented at the "Pediatric neuroenhancement" Research Week, University of Osnabrück, Germany, 09.03.2016.
Veljko Dubljević	"Illuminating the Black Box of Moral Intuition", Moral Attitudes and Decision-making (MAD) Lab, Kennan Institute of Ethics, Duke University, Durham, USA, 08.12.2016.

GES MINOR COURSES

Course	Description	Faculty
GES 508	Emerging Technologies and Society	Jason Delborne
GES 591	Systems Thinking and Modeling	Zack Brown & Alun Lloyd
GES 591-002	GES Colloquium	Fred Gould
HON 296-006	Living in a Genetically Engineered World	Fred Gould

ADDITIONAL GES FACULTY COURSES

Spring 2017

PA 598-798	Science and Technology Policy	Jennifer Kuzma
PA 835	Readings and Research	Jennifer Kuzma

Fall 2016

PA 835	Readings and Research	Jennifer Kuzma
PA 798	Research Methods and Design	Jennifer Kuzma
NR571	Current Issues in Natural Resource Policy	Jason Delborne

CORE FACULTY SERVICE ACTIVITIES

Faculty	Date	Service
Jennifer Kuzma	2016	Review panel for Genome Canada's Life Sciences Research Projects
Jennifer Kuzma	2017	NCSU CHASS SAS Distinguished Professor of Communication and Rhetoric search committee
Jennifer Kuzma	2013-	NCSU National Science Foundation IGERT Genetic Pest Management Faculty Executive Committee
Jennifer Kuzma	2013-	NCSU GES Center Executive Committee
Jennifer Kuzma	2013-17	Program Committee, Annual Conference on Governance of Emerging Technologies: Policy, Ethics and Law, Arizona State University
Jennifer Kuzma	2014-17	Activity Development Team Activity Development Team. NSF Multi-site Public Engagement with Science-Synthetic Biology (MSPES)
Jennifer Kuzma	2014-17	Secretary and Council Member of Society for Risk Analysis
Jennifer Kuzma	2015-	NCSU Chancellor's Budget Advisory Committee
Jennifer Kuzma	2015-17	Council for Agricultural Science and Technology (CAST) Taskforce on Gene Editing and Report Author
Jennifer Kuzma	2016-	U.S. National Academies NAS Committee on Future Biotechnology Products
Jennifer Kuzma	2016-	World Economic Forum Global Futures Council on Technology, Values, and Policy
Jennifer Kuzma	2016-	NCSU Plant Sciences Initiative Workgroup on Education and Society
Jennifer Kuzma	2016-17	NCSU Senate Subcommittee on Academic Policy
Jennifer Kuzma	2016-17	NCSU Standing Committee on Records and Registration (Senate liaison)
Jennifer Kuzma	2016-18	NCSU University Faculty Senate
Fred Gould	2014-	National Research Council, member of Board on Agriculture and Natural Resources 2014-Present

Fred Gould	2014-	National Academy of Sciences, National Research Council. Chair of Committee on Genetically Engineered Crops: Experiences and Prospects.
Jason Delborne	2005-	Mentoring Program, Society for Social Studies of Science (4S). Initiated program as elected 4S Student Representative in 2005. Subsequently volunteer mentor.
Jason Delborne	2013-	Executive Committee, Genetic Engineering and Society Center (NCSU)
Jason Delborne	2013-	Executive Committee, IGERT Fellowship program in Genetic Engineering and Society (NCSU)
Jason Delborne	2013-	Co-Director, Genetic Engineering and Society Minor Program (NCSU)
Jason Delborne	2013-	Teaching Peer Review Committee, Dept. of Forestry and Environmental Resources (NCSU)
Jason Delborne	2014-	Editorial Board (charter member), Engaging Science, Technology, and Society. Society for Social Studies of Science's open-access journal [estsjournal.org].
Jason Delborne	2014-	Faculty Facilitator and Mentor, "Policy, Science, Technology and Society (POSTS) Scholars Program," funded by the National Science Foundation to "increase diversity in science and technology studies and science policy fields," coordinated through Arizona State University's center for Nanotechnology in Society. Program includes campus mentoring during the academic year and three weeks of summer workshops in Washington, D.C.
Jason Delborne	2014-	Science, Technology, and Society Advisory Committee (NCSU)
Jason Delborne	2015-	Leadership in Public Science Committee, Chancellor's Faculty Excellence Program. (NCSU)
Jason Delborne	2015-	Editorial Board, Science Communication
Jason Delborne	2015-	University Standing Committee on Evaluation of Teaching, NCSU
Jason Delborne	2015-16	National Academies of Science, Engineering and Medicine, Ad-Hoc Committee on Gene Drive Research in Non-Human Organisms: Recommendations for Responsible Conduct.
Jason Delborne	2016-17	Post-Tenure Review Committee, Dept. of Forestry and Environmental Resources (NCSU)

Todd Kuiken	10/2016	Expert Testimony, European Commission DG Environment – Synthetic Biology
Todd Kuiken	current	Member - United Nations Convention on Biological Diversity Ad Hoc Technical Expert Group on Synthetic Biology
Todd Kuiken	current	Member – MIT-Broad Foundry Biosecurity and Biosafety Committee
Todd Kuiken	current	Member –TU Delft's PRISMA Project Advisory Board
Todd Kuiken	current	Founding Member - iGEM Biosafety/Security Committee
Todd Kuiken	current	Co-Chairperson - iGEM Human Practices Committee
Todd Kuiken	current	Guest Lecturer – Georgetown University, George Mason University
Zack Brown	2016	Chair, Organizing Committee, OECD-funded workshop on Environmental Release of Engineered Pests: Building an International Governance Framework (Fall 2016)

FINANCIALS

The GES Center has been quite successful with grant acquisition this year (see below) and has been able to extend its funding for at least two additional years through writing staff salaries into budgets of these grants and return of some F&A to the center.

However, we do not have solid funding for 5 years at the current level of activity (it is possible we could extend 5 years with current funds with minimal level activity with 1 staff member instead of 3, but that is not the goal).

As such, the GES Center is actively pursuing several grants, both large and small, that will sustain our operations after our initial funding grants expire in 2018. We have submitted numerous additional grants this year that are pending review. We are also working directly with corporate and foundation officers from University Development to establish new funding relationships with large foundations. We are submitting additional ideas to foundations that have open calls for proposals and cultivating new foundation relationships. One challenge to fundraising is that GES Center does not accept funding from corporate or strong advocacy NGO sources.

GES AFFILIATED FACULTY: 39

RESEARCH LEADERS

Jennifer Kuzma
Fred Gould
Todd Kuiken
Jason Delborne
Zachary Brown

AFFILIATED FACULTY & VISITING SCHOLARS

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Rodolphe Barrangou
Chase Beisel
Jade Berry-James
David Berube
Andrew Binder
Matthew Booker
Hannah Burrack
Eric Davis
Veljko Dubljevic
Rob Dunn
Keith Edmisten
John Godwin
Jean Goodwin
Kevin Gross
Nick Haddad
Nora Haenn
Joe Herkert
Jane Hoppin
Gail Jones
William Kimler
William Kinsella
Alun Lloyd
Marce Lorenzen
James Mahaffey
Marian McCord
Bob Patterson
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Heike Sederoff
Ronald Sederoff
Momoko Suda
Wally Thurman

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