

THE NATIONAL CENTER FOR SCIENCE AND CIVIC ENGAGEMENT

**WASHINGTON SYMPOSIUM  
AND SENCER-ISE NATIONAL  
MEETING**

SEPTEMBER 27-29, 2015

**#SENCERWISE15**

# TABLE OF CONTENTS

Directions to Washington Symposium and SENCER-ISE National Meeting Venues

Capitol Complex Map

Welcome

About The National Center for Science and Civic Engagement

Sunday, September 27 Agenda

Monday, September 28 Agenda

Tuesday, September 29 Agenda

Biosketches of Symposium Speakers and Staff

Invited Poster Abstracts

Presenter and Staff Contact Information

# DIRECTIONS TO CAPITOL HILL

## SEPTEMBER 29: CAPITOL HILL POSTER SESSION

12:00 p.m. – 2:00 p.m.

Capitol Visitor Center

Congressional Meeting Room North

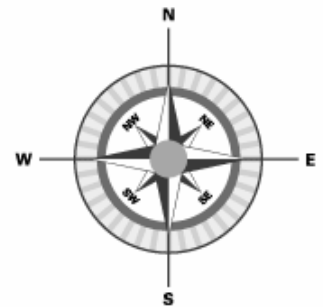
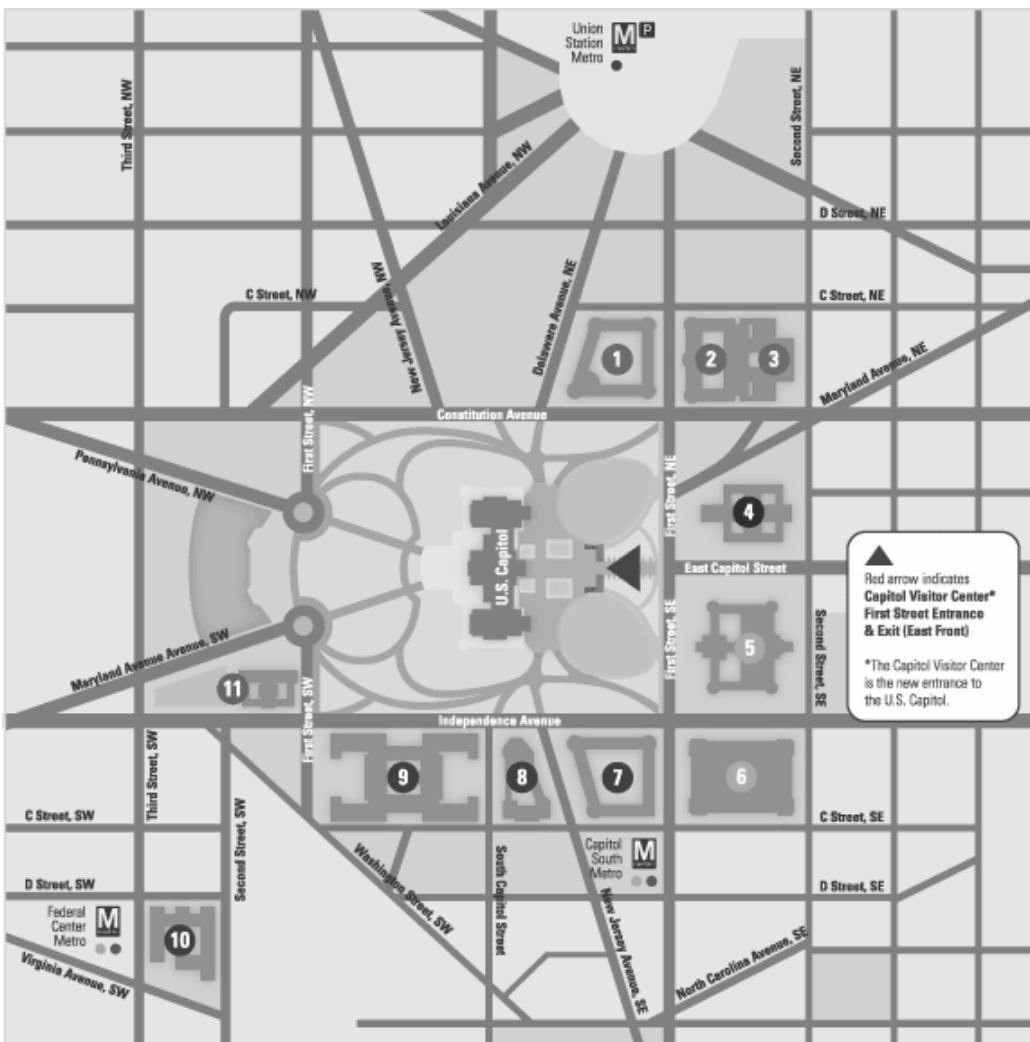
Metro: Capitol South station, Orange and Blue lines

The Capitol Visitor Center will be straight ahead and on the left as you exit the Capitol South Metro Station.

Entrances are located on First Street.

Please arrive at the Congressional Meeting Room North between **11:00 a.m. - 11:45 a.m.** to set up your poster, and allow 10-15 minutes to go through security at the building entrance. NCSCE staff will provide pins and clips for poster hanging. The session and reception will conclude at 2:00 p.m.

## CAPITOL COMPLEX MAP



### Areas of Interest

- 1 Russell Senate Office Building
- 2 Dirksen Senate Office Building
- 3 Hart Senate Office Building
- 4 U.S. Supreme Court
- 5 Jefferson Building, Library of Congress
- 6 Madison Building, Library of Congress
- 7 Cannon House Office Building
- 8 Longworth House Office Building
- 9 Rayburn House Office Building
- 10 Ford House Office Building
- 11 U.S. Botanic Garden & the National Garden

## **WELCOME**

Welcome to the 2015 National Center for Science and Civic Engagement Washington Symposium and SENCER-ISE National Meeting. This annual meeting provides NCSCE with the opportunity to recognize the excellent work being done on college campuses around the United States to improve science, technology, engineering, and mathematics education by linking course content to real world applications. This year, we also have a particular opportunity to recognize the work of SENCER's informal science education community, and to highlight the partnerships between informal and formal educational institutions.

We thank our distinguished plenary speakers and colleagues who are offering presentations and posters. We wish to especially acknowledge Tom Wood, our host at the George Mason University, and the Honorable Bonnie Watson Coleman, member of Congress, our host and sponsor for our Capitol Hill program.

We invite you to learn more about participants' campus work by reading the poster abstracts included in this program, exploring more information online at [www.sencer.net](http://www.sencer.net), and talking with any member of the NCSCE staff during or following the Symposium.

### **THE NATIONAL CENTER FOR SCIENCE AND CIVIC ENGAGEMENT**

The National Center for Science and Civic Engagement offers programs, services, and resources to colleges, universities, schools, and community organizations designed to make STEM education real, relevant, rigorous, and responsible, and support student success and achievement. We invite you to join us in our work.

What improvements in teaching practices and curriculum design will inspire, motivate, and sustain intellectual excellence among our students? How can formal (K-12 and college education) and informal education be integrated in ways that advance the interests of traditionally underserved and underrepresented students? How can students learn from engaging with the great civic challenges of our time? How can new ways of learning improve the human condition?

These questions shape the work and priorities of the National Center for Science and Civic Engagement. Why? Because, as a nation, we can ill afford to lose the benefits that accrue when students achieve high levels of competence in a variety of critical, 21st century skills, especially those developed and nurtured through study in the STEM fields.

Our Center's programs emphasize attention to students not just as candidates for college degrees, but as citizens who contribute to the essential work of creating, applying, and disseminating knowledge — the knowledge we need to make our democracy.

## **SENCER - INFORMAL SCIENCE EDUCATION**

SENCER-ISE places the work of the National Center for Science and Civic Engagement at the forefront of educational practice in that it supports and evaluates cross-sector partnerships between higher education and informal science education institutions.

SENCER-ISE's goals are to create durable institutional partnerships between the sectors and to emphasize the importance of informal science educational institutions and activities as credible sources of high quality, life-long learning on matters of science, public policy, personal well being, and public welfare. Funded by the National Science Foundation and The Noyce Foundation, SENCER-ISE

- Supports ten Civic Engagement Partnerships,
- Encourages intra- and inter-partnership communication through in-person and online meetings and through postings on the project website,
- Provides infrastructure support and consultation to the partnerships on evaluation practices and operational matters, and
- Disseminates to the wider educational community the results of partnership activities and resource materials related to evaluation outcomes, best practices for sustaining partnerships, and more.

Overall, SENCER-ISE creates networks in which awardees can learn from each other, engage in common reflective activities, and create models of collaboration. Beneficiaries include higher education faculty, informal science education professionals, students, and the general public.

## SUNDAY, SEPTEMBER 27

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*George Mason University, Arlington Campus  
3351 North Fairfax Drive, Founders Hall  
Arlington, VA 22201*

**2:00 P.M. – 3:00 P.M.**

**CHECK-IN**

Staff will be in the lobby of Founders Hall. At check-in, you will receive your nametag and program materials.

**3:00 P.M. – 3:15 P.M.**

**WELCOME TO THE 2015 NCSCE WASHINGTON SYMPOSIUM  
AND SENCER-ISE NATIONAL MEETING**

*Wm. David Burns  
National Center for Science and Civic Engagement*

David will provide an overview of the themes and goals for the 2015 Washington Symposium and SENCER-ISE National Meeting program.

**3:15 P.M. – 3:30 P.M.**

**CONSERVATION IN PRACTICE AT GEORGE MASON UNIVERSITY**

*Tom Wood  
George Mason University*

Tom Wood, Professor of Conservation Studies at George Mason University and a co-director of the Chesapeake Bay SENCER Center for Innovation, will provide an overview of initiatives that reflect the commitment of George Mason University to conservation efforts in the region.

**3:30 P.M. – 4:00 P.M.**

**PLENARY PRESENTATION: SENCER SYNERGIES WITH INFORMAL LEARNING**

*David Ucko  
National Center for Science and Civic Engagement*

Through their focus on issues of broad public consequence and their emphasis on civic engagement, SENCER courses share many attributes with informal education. In particular, this presentation will highlight some of these shared attributes, including relevance, interdisciplinary content, learner focus, and evaluation, and the different ways they are foregrounded in both formal and informal contexts. The session will provide an overview of the ten Higher Education- Informal Science Education institutional partnerships created by the NSF- and Noyce Foundation-funded SENCER-ISE project, which were designed to advance both understanding and collaboration between these two sectors of the science education community. It will conclude by identifying potential projects and strategies for further enhancing the public impact of collaborations between formal and informal educators.

**4:00 P.M. – 4:30 P.M.**

**THE NANOSCALE INFORMAL SCIENCE EDUCATION NETWORK –  
FOSTERING COLLABORATIONS BETWEEN UNIVERSITIES AND SCIENCE MUSEUMS TO ENGAGE  
THE PUBLIC IN LEARNING ABOUT NANOTECHNOLOGY**

Larry Bell  
*Museum of Science, Boston*

Paul Martin  
*Science Museum of Minnesota*

The NISE Net was funded by NSF in 2005 to create a network of both university research organizations and informal science education organizations that would raise the capacity of both kinds of organizations to raise public awareness, understanding, and engagement with nanoscale science engineering and technology. Ten years later, at the end of project funding, there are nearly 600 organizations actively involved—about 200 university groups, 350 museums and other kinds of ISE organizations, and a variety of others, reaching nearly 11 million visitors per year. In this presentation, the Principal Investigators of the NISE Net project will outline some of the ways that universities and museums have worked together in the Network and identify some of the increased capacities that developed among the various tiers of partners within the Network infrastructure.

**4:30 P.M. – 4:45 P.M.**

**BREAK**

**4:45 P.M. – 5:15 P.M.**

**HUMANITIES AND STEM: BRIDGING THE IMAGINARY DIVIDE**

Rita Kranidis  
*Montgomery College*

Eliza Reilly  
*National Center for Science and Civic Engagement*

Gillian Backus  
*Northern Virginia Community College*

The national prioritization of STEM education as a driver of economic and technological development has generated an awareness among educators of the limits of traditional STEM disciplinary training in helping students situate their knowledge in relation to culture and history, and in using it responsibly in a complex civic and social context. This session will provide an overview of the longstanding arguments for, and benefits of, integrating science and humanities content in the college curriculum and will offer current examples of innovative approaches to the inter- and transdisciplinary curricula that students need in the 21st century.

**5:15 P.M. – 5:30 P.M.**

**TOMORROW'S PROGRAM — A LOOK AHEAD**

Wm. David Burns  
*National Center for Science and Civic Engagement*

David Burns will close the day's program with brief reflections on what we have learned so far, followed by a description of the themes for Monday's program and how they relate to the work of SENCER and the National Center.

**5:30 P.M. – 6:30 P.M.**

**RECEPTION**

We invite participants to use this time to learn about the work of other attendees. Hors d'oeuvres will be provided and a cash bar will be available.

## MONDAY, SEPTEMBER 28

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*George Mason University, Arlington Campus  
3351 North Fairfax Drive, Founders Hall  
Arlington, VA 22201*

**9:00 A.M. – 9:45 A.M. CHECK-IN AND BREAKFAST**

Founders Hall Multipurpose Room

**9:45 A.M. – 10:00 A.M. WELCOME AND GOALS FOR THE DAY**

Ellen Mappen  
*National Center for Science and Civic Engagement*

Ellen Mappen, NCSCE's Project Director for Informal Science Partnership Programs, will outline the themes and goals for today's panels and presentations.

**10:00 A.M. – 11:00 A.M. PLENARY PRESENTATION: THE NATIONAL PARK SERVICE AND THE NATION'S LEARNING LANDSCAPE**

Julia Washburn  
*National Park Service*

Julia Washburn, Associate Director for Interpretation, Education and Volunteers for the National Park Service, will highlight the role of the National Park Service as part of the nation's learning landscape, especially regarding scientific and historical literacy. Washburn will give examples of how our nation's National Parks serve as places for inspiration, recreation, conservation, and learning, as well as places of healing and reconciliation. She will highlight some of the challenges that the parks face today, and some of the strategies the NPS has identified to achieve relevance in its second century.

**11:00 A.M. – 12:00 P.M. PANEL PRESENTATION: GROWING PARTNERSHIPS: BEST PRACTICES FOR SUCCESS**

Brett Branco  
*Brooklyn College*

Hank Gruner  
*Connecticut Science Center*

Amy Tuininga  
*Montclair State University*

Melissa Strongman  
*Lindsay Wildlife Experience*

Steve Bachofer  
*Saint Mary's College of California*

Rachel O'Neill  
*University of Connecticut*

Karen Tingley  
*Wildlife Conservation Society*

Partnerships between formal and informal science educators offer many benefits to both types of institutions: access to high quality research, training for educating lay audiences, and connection to the community. All of these are important outcomes for federal granting agencies. But despite the obvious benefits, there are many logistical challenges to realizing these goals. This panel will share collective partnership experiences and strategies aimed at overcoming these challenges. These include practices such as meeting regularly, remaining flexible, working with reciprocity, promoting partnership successes to administrators, and maintaining a willingness to explore multiple, new collaborative opportunities. The panel will also address audience questions about overcoming obstacles and growing partnerships. An outcome of this panel will be a proposed set of new best practices for growing formal/informal science partnerships.



**12:00 P.M. – 1:00 P.M.**

**LUNCH**

**1:00 P.M. – 2:00 P.M.**

**KEYNOTE ADDRESS: “CREATING THE ‘COMMONS’: IMPLICATIONS FOR LEARNING AND IMPACT”**

Marsha Semmel

*National Center for Science and Civic Engagement*

Today, more than ever, the potential exists for us to create a vibrant, lifelong learning ecosystem that can leverage digital tools and diverse venues to provide robust pathways for learning and community engagement for our various publics. This presentation will look at the notion of “commons creating,” what futurist Bob Johansen deems the most important leadership skill for our times, and explore its implications and relevance for organizations dedicated to supporting learners of any age.

**2:00 P.M. – 2:30 P.M.**

**PUBLIC LANDS, COMMON GROUND:  
IMMERSING STUDENTS IN CRITICAL DIALOG ABOUT RESOURCE STEWARDSHIP**

Alix D. Dowling Fink

*Longwood University*

The archway under which visitors pass to enter Yellowstone National Park from the north is inscribed with a simple but significant statement: “For the betterment and enjoyment of the people.” Our public lands represent a substantial commitment to the national ideals of shared resources, inclusive access, and preservation for future generations. Like a neighborhood playground on a grand scale, they offer recreational opportunities that are the main attraction for many visitors. However, as with a playground, these lands function within a broader context and play diverse roles in their respective communities, and thus their stewardship requires critical dialog, complex decision-making, and collaborative compromise. For those reasons and so many others, our public lands – large, small, wild, urban – also serve as classrooms, unique spaces that facilitate transformational learning experiences. For more than 10 years, Longwood University has used public lands as expansive teaching and learning environments, where students from across disciplines ask and seek to understand questions about stewardship issues. Through a transdisciplinary approach facilitated by formal and informal educators, students work not only as young scholars, but more importantly, as citizens invested in civil deliberation and civic discourse.

**2:30 P.M. – 3:00 P.M.**

**FACILITATING INFORMAL STEM OUTREACH: GAINS AND CHALLENGES**

Rachel R. Busiek

Jennifer A. da Rosa

Sarah S. Durkin

Rachel E. Hetlyn

*United States Naval Academy*

The United States Naval Academy's STEM Center for Education and Outreach (STEM Center) uses undergraduate facilitators to promote hands-on, experienced-based, and project-based learning (PBL) methodology for K-16 educators and students nationwide. Midshipman 1/C Rachel Busiek, a STEM Center student facilitator, will present the accomplishments and gains made by STEM Center undergraduate volunteers that facilitate STEM events, including accomplishments and challenges, observed community impact, and program assessment in the context of civic life, ethics, and national security. In addition, Midshipman Busiek will reflect on personal lessons learned from teaching in an informal setting and explore her motivation for joining the STEM pipeline, to be an active STEM outreach event facilitator, and to choose a STEM-focused service academy for her undergraduate study.

**3:00 P.M. – 3:30 P.M.**

**THINKING GREEN: IMPROVING STUDENT LEARNING AND ENVIRONMENTAL AWARENESS**

Eugene Galperin

*East Stroudsburg University*

This presentation will trace the redesign of a course in college algebra that enhanced student learning of mathematical techniques while promoting the students' appreciation of the societal value of mathematics. The redesign also increased student understanding of environmental economics while deepening their environmental awareness. The course is restructured in such a way that students are increasingly motivated to take up research projects and are better technically prepared to complete such projects. The presentation discusses techniques and methods for structuring assignments, setting up prerequisites, providing immediate and encouraging feedback, creating custom-made problems, and integrating problems from multiple textbooks and other sources within a single assignment.

**3:30 P.M. – 3:45 P.M.**

**BREAK**

**3:45 P.M. – 4:15 P.M.**

**ENGAGING STUDENTS AND CITIZEN SCIENTISTS ON FOREST HEALTH IN CENTRAL NEW JERSEY**

Nellie Tsipoura

*New Jersey Audubon*

Jay Kelly

*Raritan Valley Community College*

Raritan Valley Community College and NJ Audubon received funding from the SENCER-ISE program in 2013 to develop a partnership to engage students and citizen scientists on issues of forest health in central New Jersey. Tsipoura and Kelly will present the preliminary results of this project. These results include the successful integration of forest ecology, management and communication curricula into existing Ecology and Environmental Field Study courses, student involvement in the training of citizen scientists to conduct forest bird surveys and rapid assessment of invasive plant species and deer herbivory, intensive studies of forest bird and plant communities by student interns and citizen scientists, and outreach to local officials to improve forest health. Presenters will also share examples of the curricular modules and pathways used; results of the student-citizen forest assessment training and research, assessment of student and citizen learning, as well as interest and engagement on forest health; and successful changes made to public policy and perception.

4:15 P.M. – 4:45 P.M.

**THE FLORIDALEARNS STEM SCHOLARS PROGRAM – INFORMAL SCIENCE EDUCATION  
AS A CATALYST FOR ENGAGING GIFTED AND TALENTED STUDENTS IN  
FLORIDA’S SMALL AND RURAL DISTRICTS**

Lisa Shin

John Varady

*Heartland Educational Consortium*

The FloridaLearns STEM Scholars program is creating a replicable model that will increase the knowledge of students in STEM content areas, create opportunities for authentic STEM research experiences, promote student leadership development, and provide multiple measures of support to encourage student pursuit of STEM postsecondary education and career goals. The program is being implemented by the Heartland Educational Consortium, one of three educational consortia in the state providing educational resources and support to teachers and students in small and rural school districts. Attendees will learn how program staff have begun to SENCERize the program’s Informal Science Education opportunities (STEM Forums) by integrating civic engagement into existing lessons and structures, thereby allowing students to take the lessons beyond the classroom and back to their home communities. Participants will be offered a structured framework for implementing this K-12 model within their own regional high school to college feeder pattern.

## **TUESDAY, SEPTEMBER 29**

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*Capitol Visitor Center, Congressional Meeting Room North*

*United States Capitol*

*Washington, DC 20515*

7:30 A.M. – 11:00 A.M.

**SENCER-ISE PARTNERS MEETING - BY INVITATION ONLY**

*This meeting will take place in the Wilson Room of the Holiday Inn Arlington.*

11:00 A.M. – 12:00 P.M.

**POSTER SET-UP**

*Staff will be on hand at the Congressional Meeting Room North to help with poster set-up beginning at 11:00 a.m.*

12:00 P.M. – 2:00 P.M.

**POSTER SESSION AND LUNCHEON RECEPTION**

1:30 P.M.

**HAWAII AS A MODEL SENCER STATE**

***Hawaii’s Work to Become the First SENCER Model State***

Robert Franco

*Kapiolani Community College*

Hokulani Aikau

Denise Konan

*University of Hawaii at Mānoa*

**Remarks**

Wm. David Burns

*National Center for Science and Civic Engagement*

2:00 P.M.

**SYMPOSIUM ADJOURNS**

## SYMPOSIUM SPEAKERS AND STAFF

### **Hökūlani K. Aikau**

**Associate Professor of Native Hawaiian and Indigenous Politics**

***University of Hawai'i at Mānoa***

Hökūlani K. Aikau (Kānaka ʻŌiwi) is an associate professor of Native Hawaiian and Indigenous Politics in the Department of Political Science at the University of Hawai'i at Mānoa. She currently serves as Director of the General Education Office at UHM. Aikau is a transdisciplinary scholar who received her doctorate in American Studies from the University of Minnesota, a master's degree in sociology from the University of Memphis, and a bachelor's of science degree in sociology and women's studies from the University of Utah. She has received fellowships from the Ford Foundation and the MacArthur Foundation, and research grants from the UH Mānoa Sea Grant Program and SENCER. She has published two books: *A Chosen People, a Promised Land: Mormonism and Race in Hawai'i* (University of Minnesota Press, 2012) and *Feminist Waves, Feminist Generational Cultures: Life Stories from Three Generations in the Academy, 1968-1998* (co-edited with Karla Erickson and Jennifer L. Pierce, University of Minnesota Press, 2007). Her next full length monograph, *Piko: Restoring People, Places and Practices*, is an ethnography of a wetland restoration project on in He'ei'a, O'ahu. She has published articles in *American Quarterly*, *American Indian Studies*, *Arena Journal*, and *Alternatives: Global, Local, Political*. "Forces of Mobility and Mobilization: Indigenous Peoples Confront Globalization" (co-authored with Jeff Corntassel) appears in the SAGE Handbook of Globalization (Sage Publications, forthcoming). Aikau assumed the role of associate editor of *American Quarterly* in Fall 2014.

### **Steve Bachofer**

**Professor of Chemistry**

***Saint Mary's College of California***

In collaboration with Lindsay Wildlife Experience, Steve and other Saint Mary's faculty provide civic engagement in the biology, computer science, environmental science and geology curriculum. Through the SENCER-ISE grant, students and faculty create tangible product materials to benefit Lindsay and the general public. In this project students recorded spectral data on lead pollution and its deleterious effects on wildlife, in addition to preparing some educational annotated slideshows for Lindsay.

Steve, who holds a doctorate in chemistry from Brown University, pursues both laboratory chemical research and pedagogical studies. Through his SENCER work he has received several grants for instrumentation including the field portable XRF. He has published two research articles on XRF methodology as a pedagogical tool and two book chapters on successful civic engagement projects. Steve serves as a SENCER Center for Innovation co-director, a SENCER model course developer with Phylis Martinelli, and is an enthusiastic advocate for integrating civic engagement throughout the curriculum as a catalyst for deep learning student engagement, and active citizenship.

**Gillian Backus****Professor of Biology*****Northern Virginia Community College***

Gillian Backus is a professor of biology at Northern Virginia Community College, Loudoun Campus where she teaches *Anatomy and Physiology* and *Introductory Biology*. As a member of a Faculty Learning Community, Gillian and several colleagues have developed a two-credit honors independent study that merges science and art, essentially turning STEM into *STEAM*. The course has run for two successful iterations and shows promise as a model of the integration of STEM and humanities content. Gillian earned her Ph.D. in toxicology from the University of North Carolina-Chapel Hill and was a Science and Technology Policy Fellow at the National Academies of Science (Washington, DC). Her fellowship placement at the Koshland Science Museum introduced her to the principles and practices of informal science education. Before taking her position at NOVA, Gillian worked for the US EPA in Washington, DC, evaluating chemical risk assessment. She is a graduate of Mount Holyoke College with a biology major and French minor.

**Larry Bell****Senior Vice President, Strategic Initiatives*****Museum of Science, Boston***

Larry has worked at the Museum of Science in various roles since 1971. He led the Museum in a long-range plan employing constructivist learning experiences to provide visitors with practice in science thinking skills. He is interested in advancing public engagement with the societal implications of science and technology, activities that engage the public in dialogue and deliberation about socio-scientific issues, and how research in the science of science communication can improve informal education practices. He is currently PI for two NISF-funded project, the NISE Net and Multi-Site Public Engagement with Science-Synthetic Biology.

**Brett Branco****Assistant Professor of Earth and Environmental Sciences*****Brooklyn College - CUNY***

Brett Branco is a marine scientist who thrives on bringing his passion for science into the classroom. He uses Brooklyn as a natural laboratory to teach earth and environmental sciences to urban students who view cities and themselves as disconnected from the natural world. Brett has established a local research program through the college's Aquatic Research and Environmental Assessment Center that explores drivers of water quality in the lakes and estuaries around New York City including Prospect Park Lake and Jamaica Bay. These collaborative projects with New York City agencies and the National Park Service provide students with opportunities to engage in real world issues in their own neighborhoods and demonstrate the capacity of science to inform managers and the general public about possible solutions. He serves on the Steering Committee for Brooklyn College's Urban Sustainability Program and is a founding member of the Science and Resilience Institute at Jamaica Bay.

**David Burns*****Executive Director******National Center for Science and Civic Engagement***

Wm. David Burns is the executive director of the National Center for Science and Civic Engagement, co-founder and principal investigator of SENCER, publisher of *Science Education and Civic Engagement - An International Journal*, and professor of general studies at Harrisburg University of Science and Technology. He also serves as principal investigator for the National Center's Great Lakes Stewardship Through Education Network (GLISTEN) project, Science and Civic Engagement: Western Network (SCEWestNet), SENCER-ISE, an initiative to connect formal science education at the college level with informal science educators (museums, aquaria, science journalists, etc.), and Engaging Mathematics, an initiative which applies the SENCER method to college-level mathematics courses, with the goal of using civic issues to make math more relevant to students.

Prior to establishing the National Center, David served as senior policy director for the Association of American Colleges and Universities (AAC&U). During his nine years with AAC&U, he established the Center for Disease Control and Prevention-sponsored Program for Health and Higher Education and created the Summer Symposia dedicated to exploring the power that students have to improve the health of colleges and communities. For 23 years, David was a member of the administration of Rutgers, the State University of New Jersey. David is the principal author and editor of the book, *Learning for Our Common Health*, and, among other publications, the article, "Knowledge to Make Our Democracy." In 2008, the American Society for Cell Biology honored David and SENCER co-founder Karen Kashmanian Oates with the Bruce Alberts Award for Excellence in Science Education. David's undergraduate and graduate work (at Rutgers) was in political science with a concentration on political theory. He was a Woodrow Wilson National Fellow.

**Rachel Busiek*****Midshipman 1st Class******United States Naval Academy***

Rachel Busiek, Midshipman 1st Class, is studying mechanical engineering as a senior at the United States Naval Academy (USNA). She currently serves as the president of the Midshipmen Science Technology Engineering Mathematics (M-STEM) Extracurricular Activities (ECA). Working closely with the USNA faculty and staff of the STEM Center of Education and Outreach, she oversees and coordinates the 30 M-STEM company representatives and assists with acquisition of volunteers for a multitude of STEM outreach events. With over 500 hours of STEM volunteer service in her three years since joining the U.S. Naval Academy, Rachel has experience facilitating informal STEM outreach to students and teachers of all ages all across the nation in a variety of STEM subjects.

**Hailey Chenevert*****Manager, Informal Science Education Partnership Programs******National Center for Science and Civic Engagement***

Hailey works primarily with the SENCER-ISE (Science Education for New Civic Engagements and Responsibilities- Informal Science Education) initiative. In this capacity, she serves as part of the project leadership team, takes part in the review and distribution of partnership awards, liaisons with project advisors, consultants, and evaluators, and supports developing partnerships. Hailey brings experience in the informal education field from previous work with the Smithsonian Center for Folklife and Cultural Heritage. While at the Smithsonian, she worked with over 25 universities, the USDA, and the Association of Public and Land-grant Universities to create *Campus and Community: Public and Land-grant Universities and the USDA at 150*, a program for the 2012 Smithsonian Folklife Festival. Hailey holds a degree from Michigan State University, as well as a specialization in museum studies.

**Jennifer da Rosa****Instructor of Practical Applications for STEM*****United States Naval Academy***

Jennifer da Rosa is an instructor of practical applications for STEM at the United States Naval Academy. She has an M.S. in geoscience from Texas A&M University and is an Ed.D. student in curriculum, teaching, learning, and leadership at Northeastern University. Her research interests include conceptual change and learning theory, impacts of informal STEM education, teacher professional development in STEM, and STEM identity development. Jennifer has over ten years of experience teaching in higher education, and is also a former oceanographer/satellite-imagery analyst for the Naval Oceanographic Office at Stennis Space Center.

**Christine DeCarlo****SENCER and Engaging Mathematics Coordinator, Digital Media Manager*****National Center for Science and Civic Engagement***

Christine supports SENCER programming and the Engaging Mathematics initiative, and manages NCSCE's digital media. Christine's professional background is in K-12 science education, communication, and assessment. Prior to joining NCSCE, she developed science test questions and instructional materials for Assessment Technology, Incorporated, and taught marine biology courses at Newfound Harbor Marine Institute. Christine graduated from the University of Pittsburgh with a bachelor's degree in biology and a certificate in Latin American studies.

**Sarah Durkin****Professor of the Practice in STEM*****United States Naval Academy***

Sarah Durkin is a professor of the practice in STEM at the United States Naval Academy's STEM Center for Education and Outreach. Her interests include assessing the influence of informal STEM education on students, and the impact of teacher professional development in STEM project-based learning. Previously, she was a researcher at Pfizer Global Research and Development in cancer drug discovery. Sarah received her Ph.D. in biology from Eastern Virginia Medical School and Old Dominion University in Norfolk, VA.

**Alix D. Dowling Fink****Associate Professor of Biology, Dean of the Cormier Honors College*****Longwood University***

Alix Fink is an associate professor of biology and dean of the Cormier Honors College at Longwood University. She is involved in collaborative interdisciplinary projects across the university, working with faculty in the arts and sciences and partners in student affairs. With a colleague in physics, she developed an interdisciplinary, topic-driven general education science course known as *The Power of Water (POW)*, which is part of the SENCER Model Series. A second new general education course, this one a capstone experience for the academic core, has grown from Longwood's campus SENCER project. *Exploring Public Issues through Writing* is a transdisciplinary collaboration focused on the key challenges of the stewardship of our public lands, with particular emphasis on Yellowstone National Park. She has four recent publications on projects that are strongly SENCER oriented, including two derived from a collaborative research project by POW students and two stemming from the Yellowstone project. Outside of general education, she is part of a project to reframe the biology major curriculum through a process informed by the SENCER ideals, the key findings of the AAAS Vision and Change report, BIO2010, and other calls to action. She continues a student-centered research program in vertebrate ecology, focused specifically on the effects of disturbance on habitat use and demography of early successional birds and a range of bat species. In addition to her work on campus, she serves as a Leadership Fellow for SENCER and PULSE (Partnership in Undergraduate Life Sciences Education), and she co-directs the Chesapeake Bay SENCER Center for Innovation. In her free time, she enjoys an old farmhouse, a weedy garden, a pack of mutt dogs, and one bird-loving husband.

**Robert Franco*****Professor of Ecological Anthropology, Director of Planning, Research, Grants******Kapi'olani Community College, University of Hawaii***

An ecological anthropologist, Robert has published scholarly and policy research on the changing meaning of work, service, schooling, housing, and leadership for Samoans at home and abroad; health disparities confronting Samoan, Hawaiian, and Pacific Islander populations in the United States; the meaning and management of water in ancient Hawai'i; and sociocultural factors affecting fisheries in Samoa and the Northern Marianas. In 2009, he was lead editor in the publication of American Samoa's first written history.

At Kapi'olani Community College, University of Hawai'i, he serves as director of institutional effectiveness, and shapes an innovative ecology of learning. With institutional commitment and support from federal and foundation sources, the college has emerged as a leader in service-learning for improved student engagement, learning and achievement.

Nationally, he is a senior consultant and trainer for Campus Compact, and assisted in the development of the Carnegie Community Engagement Classification. He is a SENCER Leadership Fellow, and leads the Community College Affiliate Program of the National Council for Science and the Environment. He also leads the national Teagle Foundation project on stimulating civic and moral responsibility for diverse, equitable, healthy, and sustainable communities.



**Eugene Galperin****Associate Professor of Mathematics*****East Stroudsburg University***

Yevgeniy (Eugene) Galperin is associate professor of mathematics at East Stroudsburg University of Pennsylvania. His teaching experience includes most of the courses of the undergraduate curriculum. His primary research areas in pure and applied mathematics are Fourier Analysis, Functional Analysis, and Time-Frequency Analysis. His research in mathematical pedagogy is focused on instructional and course-design approaches directed at increasing students' motivation and awareness of the societal value of mathematics and on incorporation of wavelet transforms, signal processing, and image processing into the undergraduate mathematics curriculum. Eugene holds a Ph.D. in mathematics from the University of Connecticut.

**Hank Gruner****Vice President of Programs*****Connecticut Science Center***

Hank Gruner is the Vice President of Programs at the Connecticut Science Center where he oversees the design, development and implementation of a wide range of STEM-related education programming and exhibits for school and public audiences. He is working closely with the Connecticut State Department of Education on scaling up professional learning opportunities for teachers and education leaders in the state around the Next Generation Science Standards. Hank has more than thirty years of experience working in informal science education. Trained as a conservation biologist, he also works with state, regional and municipal planning agencies on the conservation of amphibians and reptiles.

**Rachel Hetlyn****Instructor of Practical Applications for STEM*****United States Naval Academy STEM Center for Education and Outreach***

Rachel Hetlyn is an instructor of practical applications (IPA) for STEM with the United States Naval Academy STEM Center for Education and Outreach. As an IPA, Rachel writes and teaches hands-on, project-based learning curriculum and works closely with midshipmen, teachers, and K-12 students to bring STEM outreach into local, national, and international communities. She brings with her experience from her work at the Museum of Science in Boston, where she was a Traveling Programs outreach educator for K-8 students. Rachel holds a bachelor's degree in geophysics and planetary sciences from Boston University.

**Jay Kelly****Assistant Professor of Biology and Environmental Science*****Raritan Valley Community College***

Jay Kelly is an assistant professor of biology and environmental science at Raritan Valley Community College in central New Jersey, where he teaches a variety of ecology and field biology courses. His primary areas of interest are the ecology and conservation of rare plant and animal species, forest ecology and management, coastal ecology, plastic ocean pollution, and toxins in consumer products. In his work he attempts to integrate the basic interests of science education, applied research, and public outreach to help advance student learning and community engagement of important environmental problems facing New Jersey today. He received a Ph.D. in ecology and evolution from Rutgers University in 2006, and a bachelor's degree in biology from Rutgers in 1998.

**Denise Eby Konan****Dean of the College of Social Sciences and Professor of Economics*****University of Hawai'i at Mānoa***

Denise Eby Konan is Dean of the College of Social Sciences and professor of economics at the University of Hawai'i at Mānoa (UHM). As Dean, she provides leadership to twelve academic departments that provide about one-fifth of degrees awarded by the university. She served for two years as the Interim Chancellor and for three years as the Assistant Vice Chancellor of UHM. Denise is a Research Fellow at the University of Hawai'i Economic Research Organization (UHERO), where she previously served as the Director of the Energy & Greenhouse Gas Solutions (EGGS) research program. She also is the founding director of the Center for Sustainable Coastal Tourism at the University of Hawai'i Sea Grant College Program. A noted international trade economist, she publishes on issues of regional economic integration, trade in services, intellectual property rights, foreign direct investment and energy. She also serves as the academic lead for the university's Daniel K. Inouye Center for Democratic Leadership that advances public awareness through engagement and educational programs. An award winning teacher, Dean Konan is a SENCER Leadership Fellow. Her course, *Economics of Climate Change*, was the first economics SENCER Model Course.

**Rita Kranidis****Professor of English and Director of the Global Humanities Institute*****Montgomery College***

Rita Kranidis is professor of English and director of the Global Humanities Institute. She holds a bachelor's degree in English and women's studies from Mount Holyoke College, a master's in English from Long Island University's C W Post Center and a PhD in English from Stony Brook University. She has been teaching at the university and college levels for more than 20 years and has held faculty and administrative positions at Montgomery College since 2000. She has served as the English department's chairperson, credit English program coordinator, and as Women's Studies Campus Coordinator. She also created and led the Writing in the Disciplines Collegewide program, which won a national "Exemplary Program" award by the National Council for Teachers of English's Two Year College Association.

Prior to coming to Montgomery College, Professor Kranidis was an associate professor at Radford University in Virginia. She has also taught at University of Maryland's Professional Writing Program in College Park, Virginia Tech, Suffolk County Community College, the New York Institute of Technology, and as a graduate teaching assistant at Stony Brook University in New York.

**Danielle Kraus Tarka****Deputy Executive Director*****National Center for Science and Civic Engagement***

Danielle Kraus Tarka is the deputy executive director for NCSCE. She manages the day-to-day operations of the national office and ensures linkages across NCSCE's initiatives, as well as the websites to support communication and dissemination of resources. She researches new program opportunities, takes part in strategic planning activities, and contributes to grant preparation and management of awarded funds, including sub-grant programs. With Janice Ballou, she co-authored "STEM Practice and Assessment: SENCER's Influence on Educators," a chapter in the ACS Symposium book, *Science Education and Civic Engagement: The Next Level* (eds. Richard D. Sheardy and Wm. David Burns (2012, ACS). Danielle earned her bachelor's degrees in economics and French from the Pennsylvania State University and completed a nonprofit management executive certificate program at Georgetown University.

**Ellen Mappen****Project Director, Informal Science Partnership Programs*****National Center for Science and Civic Engagement***

Ellen Mappen is a senior scholar and the project director for Informal Science Education Programs at NCSCE. SENCER-ISE, an initiative funded by the National Science Foundation and The Noyce Foundation, looks to develop partnerships between SENCER faculty and informal science educators that benefit students and the general public. She was the founding and long-time director of the Douglass Project for Rutgers Women in Math, Science and Engineering (1986-2003). Under her direction, this initiative offered co-curricular activities at the precollege and undergraduate levels. Working with science, mathematics, and engineering faculty, she developed a research course for first-year students that involved small group projects and student presentations of their findings. She served as the course coordinator for number of years. Under her leadership, the project received the 1999 National Science Foundation's Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. From 2003-2006, she administered a program for high school students in a health sciences high school located in New Brunswick, New Jersey and organized programs for these students at a local medical center. Her academic background includes a Ph.D. in history from Rutgers University. She has written on women's participation in the workforce in late nineteenth and early twentieth century Britain and on the role of co-curricular initiatives for encouraging women to enter STEM studies. She is one of the authors of a Review of the Literature on Increasing the Representation of Women Undergraduates in STEM Disciplines Through Civic Engagement Pedagogies, along with then graduate student David B. Knight and Professor Stephanie L. Knight of the Pennsylvania State University (SECEIJ, Winter 2011. 3(1): 36M47). She co-authored, with the late Alan J. Friedman, Ph.D., Consultant for Museum Development and Science Communication, "SENCER-ISE: Establishing Connections between Formal and Informal Science Educators to Advance STEM Learning through Civic Engagement" (SECEIJ, Summer 2011. 3(2): 31M37). She and Dr. Friedman also co-authored a chapter, "Formal/Informal Science Learning through Civic Engagement: Both Sides of the Education Equation," in Science Education and Civic Engagement: The Next Level (eds. Richard D. Sheardy and Wm. David Burns (2012, ACS).

**Paul Martin****Senior Vice President of Science Learning*****Science Museum of Minnesota***

Over the past 30 years, Paul has been influential in the evolution of museums as a medium for engaging families and individuals in interactive learning. He has worked with over 100 museums and science centers on many groundbreaking projects and initiatives and has served as Co-Principal Investigator for the NISE Net (National Informal Science Education Network). Paul has held leadership positions with Museum Content Builders Inc., The Field Museum, Jim Henson Productions, the Minnesota Historical Society and the Science Museum of Minnesota.

**Rachel O'Neill****Professor of Molecular and Cell Biology*****University of Connecticut***

Professor O'Neill received her bachelor's in zoology from the University of Texas at Austin in 1992 and her PhD in genetics and human variation from La Trobe University in 1997. Rachel has been a faculty member at UCONN since 1999, having previously held positions at Princeton University, University of Melbourne and Rutgers University's Center for Theoretical and Applied Genetics. Among her university and professional duties, she serves as director of the Center for Genome Innovation within the Institute for Systems Genomics and serves on several editorial boards and federal grant review panels. While running an active research lab studying genome stability using genomics and cytogenetic approaches in a wide range of model systems, Rachel has been working with Hank Gruner from the CT Science Center on developing a program to develop training programs for outreach and communication among young scientists.

**Eliza J. Reilly**

**Director of Programs**

***National Center for Science and Civic Engagement***

Eliza Jane Reilly has two decades of experience in the design and implementation of programs and materials to advance curricular innovation, academic leadership, and faculty development and is currently the director of programs for NCSCSE. She has served as the executive director of the American Conference of Academic Deans and as a director of programs at the Association of American Colleges and Universities, where she was one of the original staff members for the SENCER initiative. In the last decade she has focused on campus-based faculty development and curricular integration through directorships of the Center for Liberal Arts and Society and the Phillips Museum of Art at Franklin & Marshall College, where she was adjunct faculty in American Studies. Eliza holds a master's in the history of art and a doctorate in American history from Rutgers University. She is the general editor of the SENCER Models, the co-editor of *Science Education and Civic Engagement: An International Journal*, and an advisory board member of SENCER-ISE.

**Marsha Semmel**

**SENCER-ISE Senior Advisor**

***National Center for Science and Civic Engagement***

Marsha L. Semmel works with museums, libraries, foundations, and various cultural organizations on lifelong learning, community engagement, leadership, philanthropy trends, 21<sup>st</sup> century skills, partnerships, and cultural policy. She currently serves as senior adviser to SENCER-ISE, a national academic/informal learning partnership project of the National Center for Science and Civic Engagement. She is also faculty at the Bank Street College of Education's graduate program in museum leadership.

From 2013-5, Ms. Semmel was senior advisor to the Noyce Leadership Institute, an initiative of the Noyce Foundation that supported executive-level leadership in science centers and other science organizations worldwide, with a focus on leadership in service of the public good.

Semmel served at the Institute of Museum and Library Services (IMLS) from 2003-13, where she was Director for Strategic Partnerships, Deputy for Museum Services, and Acting Director. From 1984-1996, she worked at the National Endowment for the Humanities, including three years as Director, Division of Public Programs, which supports projects in museums, libraries, and public media. Ms. Semmel's extensive museum experience includes President and CEO of Conner Prairie, a history museum near Indianapolis, and President and CEO of the Women of the West Museum, in Denver.

She has served on the boards of the American Alliance of Museums, the Colorado Digitization Program, and ArtTable, and currently is a board member for the Smithsonian Institution's Early Enrichment Center, the Council of American Jewish Museums, and the Museum of Language Arts. She is a member of The Museum Group and vice chair of the Arlington County Arts Commission.

**Lisa Shin****District Resource Teacher*****Heartland Educational Consortium***

Lisa Shin is a District Resource Teacher for Heartland Educational Consortium (HEC), one of Florida's three regional consortia, where she serves as the K-12 Math/Science resource for six rural districts in South Central Florida. She received a master's degree in mathematics education and a bachelor's degree in mathematics from the University of Florida and also holds a graduate certificate in mathematics from the University of Central Florida. Lisa taught honors and advanced placement high school mathematics in Florida for thirteen years before working at HEC, initially as a teacher trainer and facilitator for Florida's new math and science standards and currently as one of the coordinators for the FloridaLearns STEM Scholars program.

**Kyle Simmons****Faculty Development Events Manager*****National Center for Science and Civic Engagement***

Kyle Simmons is the faculty development events manager for NCSCE, SENCER, and related initiatives. In this role, he plans and manages NCSCE's signature annual events, the SENCER Summer Institute, and the DC Symposium, and provides support for other regional meetings. He also works with regional organizations and initiatives to ensure communication and the sharing of best practices. Kyle brings with him experience from his work with the Junior Statesmen Foundation, where he planned and managed civic education conferences for high school students. Kyle holds a bachelor's degree in political science from Howard University.

**Melissa Strongman****Director of Education*****Lindsay Wildlife Experience***

Melissa Strongman is director of education at Lindsay Wildlife Experience (formerly Lindsay Wildlife Museum) in Walnut Creek, California. At Lindsay Wildlife, Melissa oversees interpretation and learning experiences including public and school programs and takes a lead in development strong partnerships with like-minded organizations. Celebrating its 60th anniversary, Lindsay connects people with wildlife to inspire responsibility and respect for the world we share. Lindsay is a unique natural history and environmental education center where wild live animals are just inches away from visitors. Lindsay's animal hospital is a pioneer in the field of wildlife care and treats more than 5,500 animals each year.

In collaboration with St. Mary's College through the SENCER-ISE grant, Lindsay Wildlife is participating in the development of product materials to benefit Lindsay and the general public. Lindsay's unique role as wildlife environmental education center engages SMC students in civic engagement opportunities. Products have included development of an app and educational annotated slideshows for educational purposes. Melissa brings experience of formal education as a teacher and principal to informal science that engages all ages in the exploration and understanding of the world around us. Melissa has a master's degree in educational leadership from St. Mary's College.

**Amy Tuininga****Director, PSEG Institute for Sustainability Studies*****Montclair State University***

Amy Tuininga, PhD, is the director of Montclair State University's PSEG Institute for Sustainability Studies (PSEG ISS). She grows partnerships among faculty, students, administrators, government agencies, private corporations, and community groups to solve sustainability problems. Projects involve aspects of the environment, energy, water, food, natural resources, and economies that collectively function to build sustainable communities. She aims to develop the PSEG ISS as a source for innovation in sustainability and environmental management, a model of academic-corporate-community partnerships that advance sustainability science and build resilient communities that utilize informed, data-driven decision making. She most recently served as the Interim Chief Research Officer at Fordham University where she worked with collaborators at the Wildlife Conservation Society to create Project TRUE (Teens Researching Urban Ecology), an NCSCE-funded, and \$2.6m NSF-funded, tiered-mentoring program that serves underrepresented groups in STEM.

**David Ucko****SENCER-ISE Senior Advisor*****National Center for Science and Civic Engagement***

David Ucko shares his experience advancing informal science education as president of Museums+more LLC. He co-chairs a National Research Council study on Effective Chemistry Communication. At NSF, he was acting division director and deputy director, Division of Research on Learning, and ISE section head. There, he initiated CAISE, NISE Net, the Framework for Evaluating Impacts of Informal Science Education Projects, and the NRC Learning Science in Informal Environments study. In prior roles, Ucko was founding president of Kansas City's Science City at Union Station, deputy director for the California Museum of Science & Industry, and vice president for Chicago's Museum of Science & Industry. Ucko served as Presidential appointee on the National Museum Services Board, and chaired the ASTC Advocacy and Publications Committees. He wrote two college chemistry textbooks while teaching at Antioch College and City University of N.Y. Ucko is a AAAS Fellow and a Woodrow Wilson Fellow. He holds a Ph.D. in inorganic chemistry (M.I.T.) and B.A. in chemistry (Columbia).

**John Varady****Highlands County School Board Administrator*****Heartland Educational Consortium***

John Varady is a district administrator with the School Board of Highlands County, serving at Heartland Educational Consortium (HEC), where he works as one of the coordinators for the FloridaLearns STEM Scholars program. HEC, one of Florida's three regional educational consortia, serves six small and rural districts in Central Florida. John is also the district director for the Advancement Via Individual Determination (AVID) i3 Grant initiative for Highlands County. He received a master's degree in educational leadership from the University of South Florida and a bachelor's degree in exceptional student education from the University of Central Florida. Prior to coming to HEC, he taught students with special needs at the elementary and high school level for 12 years.

**Julia Washburn****Associate Director for Interpretation and Education*****National Park Service***

Julia Washburn is the National Parks Service Associate Director for Interpretation and Education. She is a conservation professional with more than 20 years experience working to help people of all ages form deep personal connections with their environment and heritage. Prior to rejoining the NPS in September 2010, Julia served as an interpretive planning consultant and provided staff support to the National Parks Second Century Commission regarding a national vision for education in the next century of the National Park Service. Previously, she served as interpretive specialist for the NPS Conservation Study Institute at Marsh-Billings-Rockefeller National Historical Park, and senior vice president for Grants and Programs at the National Park Foundation, the congressionally chartered, non-profit fundraising partner of the National Park Service. She has also worked as a park ranger and education specialist at six national parks, the NPS National Capital Region Office, and as a science teacher in the U.S. Peace Corps. She holds a master's degree in museum education leadership from Bank Street College of Education and a bachelor's degree in biology and psychology from Mount Holyoke College. Currently, Julia also serves as an adjunct professor in the George Washington University museum education graduate program.

**Tom Wood****Associate Professor of Conservation Studies*****George Mason University***

Tom Wood is an associate professor at George Mason University where he coordinates conservation studies at New Century College. He has been with the SENCER project since the inception of the program. Presently he serves as Co-Director of the SENCER Center for Innovation-Chesapeake Bay. Through SENCER, Tom developed the Smithsonian Mason Semester, a resident learning community semester at the Smithsonian's Conservation Biology Institute, and was founding director of the Mason Center for Conservation Study. He has been instrumental in the development of many learning communities with natural history and conservation-based themes including *Mysteries of Migration: Consequences for Conservation Policies*, one of the four initial SENCER Model Courses adopted in 2001. He has represented SENCER as a consultant to several universities implementing curriculum reform. He presently serves as director of Environmental Studies on the Piedmont, a conserved landscape offering opportunities for K-12, public, undergraduate and graduate teaching and research. He represents SENCER in President Obama's Great Outdoors Initiative and is working to identify opportunities for informal science education. Tom was the recipient of George Mason University's Teaching Excellence Award in 1999.

## INVITED POSTER PRESENTATIONS

### FROM FOREST TO PRAIRIE: HABITAT RESTORATION PROJECTS AT ANTIOCH COLLEGE ARE PATHWAYS FOR INFORMAL SCIENTIFIC EDUCATION AND CITIZEN SCIENCE ENGAGEMENT

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*Antioch College and the Glen Helen Nature Preserve*

Collaborators from Antioch College and the Glen Helen Nature Preserve developed a multi-faceted program to engage school children, community members, and college students in informal science education and habitat restoration activities. During year one of the SENCER-ISE project, the focus was to use outdoor education and hands-on projects to educate participants on the impact of invasive species, the benefits of invasive removal, and native plant restoration in the forest of the Nature Preserve. A novel facet of this work was collaboration between college students and senior citizens in plant propagation activities of native forest species. During year two of the project, changes in key personnel resulted in the conclusion of forest phase of the collaboration and the development of new prairie and pollinator projects on the main campus of Antioch College. The new location provides increased physical access for visitors, as well as opportunities for more frequent interaction and research of the restored habitat areas. With the Pollinator Pathway project, advanced science classes at Antioch worked to research restoration goals, target species, and programs for monitoring success. During 2015, two public training workshops were held on selection of native host plants for pollinator habitat, and citizen science monitoring of native bees using social media. Both year one and year two activities were structured similarly, where K-12 students, college students, senior citizens, and members of the community have been involved with habitat restoration (planting, maintenance), scientific educational programming and applied restoration ecology. Additional new partnerships in Dayton and at Ohio State in Columbus Ohio have enhanced the outreach, scientific expertise, and scope of this project.

*Authors: Cherokee Hill-Reed, Kim Landsbergen, Julia Navaro, of Antioch College  
Janene Giuseffi of the Glen Helen Nature Preserve, Antioch College*

### SENCER-ISE SENTINELS OF SHORELINE CHANGE

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*Brooklyn College - CUNY and Gateway National Recreational Area, National Park Service*

Plastic pollution has increasingly become a major environmental concern as it accumulates in ocean gyres, placing marine life in peril. How do we address this issue in a way that is locally-focused but globally connected? Brooklyn College partnered with the Gateway National Recreational Area of the National Park Service to develop collaborative learning communities around authentic data collection and civic action that focuses on the stewardship of Jamaica Bay and other New York waterways. With plastic marine debris identified as a central ecological concern, we focused the scientific data collection activities around the identification, collection and cataloguing of the plastic marine debris found on local shorelines. During the first year of the project, a group of K-12 teachers were engaged in a series of collaborative learning sessions in order to develop and test marine debris collection activities with their students. An existing data collection protocol from the National Oceanic and Atmospheric Administration (NOAA) was used and subsequently adapted to focus on plastics.



Year two of the project focused on a) refining the plastic protocol based on feedback from teacher and student implementation, and b) developing teaching modules based on plastic marine debris for undergraduate courses. The teacher activities resulted in classroom-based curricula and activities connected to the marine debris protocol and the undergraduate modules resulted in student-created artifacts that bring awareness to the issue of marine debris and the local urban environment. The final year of activities will focus on introducing the protocols and activities to a larger teacher and community audience and engaging participants in civic engagement informed and inspired by the data collection.

*Authors: Brett Branco, Jennifer D. Adams, and Heather Sioux of Brooklyn College - CUNY  
Dan Meharg and Yasemin Kaynas of the Gateway National Recreational Area, National Park Service*

## **CONNECTING WATERSHED PARTNERS IN PAKISTAN AND AMERICA - NEAR PEER MENTOR PERSPECTIVES**

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*Cleveland State University, Hiram College, Kent State University, Lahore University of Management Sciences*

The Igniting Streams of Learning in Science International (ISLSI) STEM Academy Program hosted its second Pakistani-America Institute at Case Western Reserve University, Hiram College, and the Shoals Marine Laboratory. Five Pakistani high schools and five high schools of the Cleveland Metropolitan School District each formed a learning community of six high school students and a teacher supported by one of six American or six Pakistani undergraduate or graduate Near Peer Mentors in a three week discovery learning program. The Near Peer Mentors modeled inquiry learning using local environments, activities that were designed to enhance people-to-people relationships in education, while fostering local partnerships between the U.S. and Pakistan and promoting cultural understanding. Pre and post institute surveys supplemented by daily reflections, google hangouts, videos and photos produced by learning communities, analysis of biomonitoring outcomes in the field, and formal scientific presentations by mixed groups. These activities enhanced relationships between diverse groups and advanced non-traditional leadership roles for women and minorities. Each learning community learned how to document the development and implementation of a service learning project that will engage their fellow peers while improving the understanding of those engaged about local issues associated with water and the world water crisis. Near Peer mentors modeled inquiry learning while engaging students and teachers, mixing "fun" with "work". Videos produced by the student participants at the beginning and the end of the institute documented dramatic changes in student understanding of local environments and in student perceptions and behaviors as professional scientists. Service Learning projects will be showcased at the ISLSI virtual summit on World Water Day, March 22, 2016.

*Authors: Isabella Williams, Matthew Wright, Michelle Rankin, and Ryan Zittel of Hiram College  
Kevin Heller and Matthew Petrunak of Kent State University  
Brenna Taylor of Cleveland State University  
Nasir Abbas, Adnan Ali, Ifrah Hassan, Ayesha Nazir, Shahrukh Swati of the Lahore University of Management Sciences*

### *Connecticut Science Center and the University of Connecticut*

Advances in genomics are rapidly increasing our understanding of not only the human body, disease and health-related issues but how humans and other species interact and respond to changing environments. Genomics represents a scientific frontier that connects with individuals and families at the most personal level, with the potential to shape the future of human healthcare. However, advances in genomics and their implications for personalized medicine are far outpacing public awareness and knowledge. The Connecticut Science Center and the University of Connecticut partnered to engage the public in developing a conceptual understanding of genomics. This partnership served a dual purpose in that it afforded opportunities to gain new perspectives on best practices in communication skills at the public-scientist interface.

During the first summer of the project graduate students from UCONN conducted interviews of randomly selected adults visiting the Science Center to assess their awareness of genomics and understanding of core genomics concepts. Although few respondents demonstrated an awareness of genomics or a grasp of core concepts, there was a clear interest in genomics as it applied to personal and family health. During the second summer graduate students worked with Science Center program staff and high school students to co-design and test genomics learning activities with various audiences. Content of the activities was based on the results of the previous survey.

The final summer of the project will continue testing the learning activities including embedding additional assessment. Data collected from the project is informing the development of a genomics exhibit and genomics lab planned for opening at the Science Center in 2017-2018. This effort includes establishing a formal partnership between the University and the Science Center to connect the public with genomics learning experiences through these new venues and develop strong communication skills in public outreach as a core component of scientific training at the postgraduate level.

*Authors: Hank Gruner of the Connecticut Science Center*

*Rachel O'Neill of the University of Connecticut*

## **SCIENCE FROM THE START: ENGAGING INFORMAL SCIENCE EDUCATION, RESEARCHERS AND UNDERGRADUATES IN EARLY CHILDHOOD STEM LEARNING**

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### *Cornell University and the Sciencenter*

The lack of confidence in science skills among teachers and parents is an issue of civic importance that, if addressed, has the potential to increase science engagement and school readiness in young children. The Sciencenter partnered with Cornell's Early Childhood Cognition Lab both to provide a real-world setting to study children's learning and to engage parents and teachers in providing the best environment to nurture that learning. Cornell students have developed and tested signs for parents and children to make connections between Sciencenter exhibits and their daily lives. With these signs, students looked at ways parents and children build categories around "water." Students shared their research and facilitated hands-on activities at workshops for families and at professional development workshops for Head Start teachers. Through the use of these tools and at workshops, parents and teachers have come to understand some of the research into early childhood cognitive development and how they can support their children's science learning.

In turn, students have had the opportunity to apply their theoretical learning about early childhood cognition in an informal science education setting, creating richer learning experiences for them as scientists. The partners assessed the use of science vocabulary and the encouragement of science behaviors by parents and teachers. We documented an increased incidence of science behaviors - observing, classifying, experimenting, predicting, and using tools. Overall, the partnership has produced undergraduate students who see the topic of early childhood development not only as something they are researching, but also as one of civic importance. In turn, the Sciencenter is committed to integrating current research into exhibits and programming to improve learning environments for the young children in our community.

*Authors: Tamar Kushnir of the Early Childhood Cognition Lab, Cornell University  
Michelle Kortenaar of the Sciencenter*

## **GROWING PROJECT TRUE – A PARTNERSHIP ENGAGING TEENS THROUGHOUT NYC IN TIERED MENTORING OF STEM RESEARCH**

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*Fordham University and the Wildlife Conservation Society*

Project TRUE (teens researching urban ecology), a program supported by a partnership between the Wildlife Conservation Society and Fordham University, began with a single graduate student leading teen research inquiry at the Prospect Park Zoo during the academic year. Now, 50 teens each year come from high schools throughout the city to conduct research, led by 18 undergraduates and directed by six graduate students, in a summer-based tiered mentoring program. This program is the focus of a large social science research project to determine whether this educational model is scalable and meets the goal of exciting interest in STEM among underrepresented groups of teens. The partnership between formal and informal science learning institutions provides undergraduates and graduate students with an opportunity to “serve as a PI” and learn from zoo educators to communicate science to lay audiences. Zoo educators learn scientific research methods. Teens connect with excellent role models to learn about college and majoring in STEM while exploring nature in their home/urban environments and designing their own studies. The two year pilot academic year Project TRUE served four cohorts - a total of 51 teens, 100% from underrepresented groups, 45% non-English speaking at home, representing 10 schools in Brooklyn. The pilot offered 92 Project TRUE sessions, totaling 269 hours of programming. The students built a blog: <http://wcsurbanecology.wordpress.com/> and hosted two multi-institution Bronx Science Consortium Poster Symposia, with 81 posters presented and 220 individuals in attendance at the Bronx Zoo’s free day. Eight students attended the Wildlife Conservation Society Teen Conservation Conference, and three students participated in the Museum of the City of New York’s Social Activism Workshop, indicating the beginning of dissemination outcomes from Project TRUE.

*Authors: Amy Tuininga of Montclair State University (formerly of Fordham University)  
Karen Tingley of the Wildlife Conservation Society*

## ASSESSING STUDENT LEARNING GAINS IN GENERAL EDUCATION SCIENCE CLASSES

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*George Mason University*

The Student Assessment of their Learning Gains (SALG) tool was used to enhance George Mason University's (GMU) assessment of the Natural Science General Education Learning outcomes. Three areas of questions were covered in this assessment: questions preprogrammed into the SALG instrument, questions corresponding to course goals defined by the GMU General Education committee, and specific questions from the syllabi of GEOL 101 and GEOL 102 that reflected the professors' learning goals. Data on student learning gains is collected in four general areas: understanding and memorization of basic concepts, skills attained, affective learning (attitudes, beliefs and positive or negative experiences) and habits or lifelong learning skills the student carries with them for their life. Questions were also asked about how teaching styles, help they received in the class from faculty, TA's and peers, graded activities and feedback, and other resources helped their learning. For the lab classes, we also asked specific questions about each lab. Students in GEOL 101 and 102 took the surveys after they had completed the class. This data will be used to assess if the students are confident in their learning gains, are understanding and meeting the University Learning outcomes, and their attitudes about the class. Also, it will help faculty know if they are teaching to the Natural Science outcomes. Finally, these surveys can be used as formative assessment to improve the lecture and labs in GEOL classes.

*Authors: Tyler Fabian and Julia Nord*

## THE FLORIDALEARNS STEM SCHOLARS PROGRAM –INFORMAL SCIENCE EDUCATION AS A CATALYST FOR ENGAGING GIFTED AND TALENTED STUDENTS IN FLORIDA'S SMALL AND RURAL DISTRICTS

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*Heartland Educational Consortium and Broward College*

According to the 2010 Florida Council of 100 Report, *Closing the Gap*, within a decade nearly 9 out of 10 new jobs will require credentials in a STEM discipline and education beyond a high school diploma. Despite the growth in this area, participation and accessibility to STEM enrichment and rigorous courses is a concern in rural areas, particularly for high achieving students. Recognizing the need for small and rural districts to enhance science, technology, engineering, and mathematics (STEM) curricula for gifted and talented secondary students, the Panhandle Area Educational Consortium (PAEC), the Heartland Educational Consortium (HEC), and the North East Florida Educational Consortium (NEFEC) implemented the FloridaLearns STEM Scholars (FLSS) Program.

Through the FLSS Program, students have received multiple opportunities to gain and internalize rigorous, personalized content knowledge in mathematics, science, engineering and technology; engaged with role models from colleges, universities and those working in STEM fields; connected with peers, college and university faculty members, and those in the workplace who share interests in STEM; and developed an appreciation for the application of STEM subjects in the workplace. By providing various weekend and summer Informal Science activities, as well as in-school counseling, high school students in 28 of Florida's small and rural districts have gained additional access to rigorous STEM courses, increased opportunities for real-world STEM problem-solving and research, as well as the ability to make informed career choices and increase the likelihood of their success in post-secondary STEM curricula or in the workplace.

*Authors: Lisa Shin, John Varady of the Heartland Educational Consortium  
Theo Koupelis of Broward College*

## **INCREASING CLIMATE CHANGE RESILIENCY THROUGH EDUCATION - A CARIBBEAN COMMUNITY MODEL**

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*Hiram College and Counterpart International*

The Igniting Streams of Learning in Science International (ISLSI) program has joined with Counterpart International in an ambitious initiative to change attitudes and transform behaviors of the citizens of local coastal communities in the Dominican Republic in managing natural resources for sustainability. The program improves youth access to science and analysis for decision making while developing effective communication skills needed to promote changes in attitudes and behaviors of the citizens of local coastal ecosystems.

The approach is to make classroom science real by establishing a network of youth bound together with a common goal: improving understanding of the impact of climate change through the integration of biomonitoring experiences of local consequence into classrooms. In the Fall of 2014 leaders met with non-traditional partners in science education, including NGOs and private enterprises, already in long-running relationships with Counterpart International, to implement a work plan. In May 2015 the program targeted bilingual private schools as the platform for launching the program which will: 1) introduce youth to the science of biomonitoring for assessing local impacts, 2) pair schools with non-traditional partners in education, and 3) increase understanding of the connection of youth to the environmental impacts that they will investigate. In August, program leaders worked with private schools in establishing the Dominican Environmental Education Program (DEEP). Six schools have since then determined a protocol for investigations this fall of physical and chemical parameters at two beaches near Santa Domingo. In October, school learning communities will meet to launch the program formally with results to be presented at the ISLSI virtual summit on World Water Day, March 22, 2016. The program has already generated a new environment fostering collaboration.

*Authors: Dennis Taylor of Hiram College*

*Mary Louise Holly and Sonya Wisdom of Kent State University*

*Paul Guggenheim and Michael Kunz of Counterpart International*

*Paula Frohring of the Paul and Maxine Frohring Foundation*

*Tim Sisson of the Cleveland Metropolitan School District*

## **HAWAII AS A MODEL SENCER STATE**

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*Kapiolani Community College and The University of Hawai'i at Mānoa*

In Hawai'i, we have, for some years, been developing a SENCER culture across institutions, campuses, disciplines, and communities - substantially strengthened and inspired by SCI-West regional meetings and house calls. We continue to "SENCERize" individual courses and civic engagement programs and initiatives - aiming at the creation of a strong SENCER State network of researchers and practitioners committed to integrating indigenous knowledge, social sciences, and natural sciences in the curriculum, with the goal of solving important issues of our time.

The poster presents an overview and a few concrete examples of the ongoing work by representatives from a number of institutions and programs, including examples of curriculum development for courses and community-engagement projects based on collaboration across disciplines and institutions. Our work is supporting the University of Hawai'i System as a Hawai'ian and Oceanic place of learning.

*Authors: Robert Franco of Kapiolani Community College, University of Hawaii*

*Hokulani Aikau, Ulla Hasager, and Denise Konan of the University of Hawai'i at Mānoa*

## **PRESERVING WILDLIFE HABITATS AND EMPOWERING STUDENTS: A GROWING PARTNERSHIP**

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### *The Lindsay Wildlife Experience and Saint Mary's College*

Saint Mary's College of California and Lindsay Wildlife Experience recently began a partnership on numerous educational endeavors. Using SENCER-ISE support, the two institutions are successfully completing projects and discovering new avenues of collaboration, which are explored in this presentation. These two SENCER-ISE projects are 1) the creation of an iPhone app launched in June of 2014 and 2) the mapping of McNabney Marsh, which will continue this Fall. The Lindsay Wildlife Experience app was designed to educate the public about how to interact with California's wildlife. The students and faculty at Saint Mary's College created an app that was both instructional for the students and could also be used by the public. A number of challenges were addressed, such as personnel changes and intellectual property rights. The mapping project was designed with two sampling years (2013 and 2015) to measure change on this marsh. Student generated maps were recorded and improvements in this educational endeavor were incorporated for the October 2015 sampling. The two major challenges that have arisen are a delay in the construction of wider tidal access into the marsh, and the California drought. The new avenues of collaboration have grown from the interaction on the two defined projects and the two institutions have begun recognizing the benefit of their partnership.

*Authors: Steve Bachofer, Alice Baldrige, and Weiwei Pan of Saint Mary's College of California  
Michele Setter and Melissa Strongman of the Lindsay Wildlife Experience*

## **GREEN GIRLS: RENEWABLE ENERGY ACTIVITIES FOR SCIENCE AND CIVIC ENGAGEMENT**

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### *The Martha O'Bryan Center and Middle Tennessee State University*

The Middle Tennessee State University (MTSU) Women In STEM Center in collaboration with the Martha O'Bryan Center in Nashville is changing the STEM equations for children in middle Tennessee. Green Girls is a program funded by TN-SCORE – Tennessee Solar Conversion and Storage Outreach Research & Education. The Green Girls team, led by Caleb Hough, Penny Howard, and Judith Iriarte-Gross, provided hands-on projects renewable energy along with STEM career information for girls and boys in grades 5 to 9. The leadership team incorporated discussions about learning basic math, science and writing while in middle and high school. Included in these discussions was the importance of renewable energy research and finding solutions to energy problems. The leadership team also discussed STEM career pathways with the students. Green Girls learned how renewable energy careers related to stronger sustainable environment as well as Tennessee's workforce and economic development. This three year project, Green Girls, helped to build STEM capacity, civic engagement and a diverse workforce in Tennessee.

*Authors: Penny Howard of the Martha O'Bryan Center  
Caleb Hough and Judith Iriarte-Gross of the WISTEM Center, Middle Tennessee State University*

## **BUILDING A NETWORK FROM TWO NETWORKS: SUCCESSES AND CHALLENGES**

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*New Mexico EPSCoR, the New Mexico Museum of Natural History and Science, and the University of New Mexico*

The New Mexico Informal Science/Current Research Network focuses on two issues of importance to New Mexicans—water and energy. We bring together a network of informal science education institutions (NM ISENet) with a network of university-based researchers (NM EPSCoR) to enhance collaboration that will engage learners of all ages in STEM issues related to water and energy.

The goal of this collaboration is for ISE institutions to provide two avenues to communicate important current research. Primarily, a series of statewide and regional meetings connect researchers to educators, the public and policy makers. Secondly, students and faculty engaged in research provide intellectual and material resources to inform ISE programs and exhibits.

With the support of SENCER funding, we have successfully hosted two annual meetings for the ISE Net community, with guest speakers John Falk and Jamie Bell. A third meeting is currently being planned. However, the success of the regional meetings has been patchy; most of these events have been hosted by one or two core NM ISE Net institutions rather than by many institutions from throughout the state. We are working on the challenge to improve the distribution of regional meetings by developing “mini grants” to host these events that are being promoted to both NM ISE Net and NM EPSCoR.

Another ongoing challenge is to improve communication between the two networks, and to understand the priorities and language of each network. Educators face the challenge of developing relationships with individual researchers when their time is already limited, while researchers do not always appreciate the opportunities for broader impact that NM ISE Net can provide. We continue to learn the best way to establish long-term collaborations.

*Authors: Selena Connealy of New Mexico EPSCoR*

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## **PRELIMINARY RESULTS OF FOREST RESEARCH AND CIVIC ENGAGEMENT BY STUDENTS AND CITIZEN SCIENTISTS IN CENTRAL NEW JERSEY IN 2014-2105**

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*New Jersey Audubon and Raritan Valley Community College*

Raritan Valley Community College and NJ Audubon were funded by the SENCER-ISE program in 2013 to develop a partnership to engage students and citizen scientists on issues of forest health in central New Jersey. This poster presents preliminary results of the ecological research and outreach components of this project, including forest bird surveys and rapid assessment of invasive plant species and deer herbivory conducted by citizen scientists conducted in 2014, and studies of associated forest plant communities by student interns. Forest data were analyzed by project leaders and students on the impacts of invasive species and deer herbivory on forest structure and composition. Presentations and recommendations were developed by students and project leaders and made to local officials in 2015, and policy changes to improve the condition of their forests were implemented directly as a result.

*Authors: Nellie Tsipoura of New Jersey Audubon*

*Jay Kelly of Raritan Valley Community College*

*Paul Smith's College and The Wild Center*

Climate science is complex, and often involves technical terminology and jargon, which makes it difficult to communicate to the a broad audience. Too often educators present data, but then fail to meet the intended learning outcomes and there is mounting evidence that simply turning up the volume on the scientific facts and figures is not enough to get more people interested and engaged in climate change.

By combining communication and interpretive techniques with up-to-date science, students were taught to weave threads of tangible facts and data with the intangible concepts that people connect with emotionally. The result is communication that audiences can see and feel – a fusion of data, ideas, meanings and universal concepts.

Students used these tools to design and deliver presentations for targeted audience groups in the community that interpreted climate change in a regional context. The success of the course for the students and the effectiveness of the presentations for the community were both evaluated.

*Authors: Rob Carr and Stephanie Ratcliffe of The Wild Center  
Curt Stager of Paul Smith's College*

## HOW THE REAL-TIME LOCATION OF PEOPLE AND THINGS CAN SAVE LIVES AND ENHANCE SECURITY

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*Southern Connecticut State University*

An alarm rings, and a screen lights up with the name and photo of an elder care resident. Someone needs immediate help – but their location is unknown. The technology to accurately monitor the location of people and things throughout a building or facility has existed for years, but hardware costs and the difficulty of deployment have been prohibitive. Thanks to the increasing widespread availability of consumer focused wireless technology, being able to track the location of people and things in real-time is no longer unattainable.

Having the ability to instantly find lost personal items, or locating friends with a smartphone has become a very popular use of location tracking technology. Although popular, these recent capabilities have been nothing but "nice things to have." As a result of new and more affordable technologies, tracking the location of people and things in real-time has become an absolute necessity in today's heavily dynamic environment. Whether it is a smartphone in a pocket, a hands-free headset, or a small, inexpensive tag attached to a car's dashboard or a pet's collar, location can be determined with impressive accuracy through the use of Vestigo and one or more pre-configured receivers.

Vestigo is an open source proof of concept and educational project developed to demonstrate the ability and practicality of using the Bluetooth standard as a means to track an object's location in real-time. The project was developed as the result of Steven Abbagnaro's undergraduate capping project at Southern Connecticut State University, and done with the support of faculty member Dr. Lisa Lancor. The research done to develop the project is now open-source and available to the public for use and study.

*Authors: Steven Abbagnaro and Lisa Lancor*



## **FOOD FOR THOUGHT: AN INVESTIGATION ON FOOD WASTE**

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*Texas Woman's University*

Over 19% of the waste we Americans bury in landfills comes from food scraps and about 25% of the food Americans take home is eventually wasted. Since food waste is such a major issue in America today, the goal of this project was to conduct an investigation in an on-campus university cafeteria (known simply as “the Underground”) in order to answer the question, “How much food is the school throwing away?” The Underground cafeteria is the only venue on-campus that accepts the TWU weekly meal plan and has an all-you-can-eat buffet system, making it a busy place on the Texas Woman’s University campus. The data not only revealed how much food was wasted, but whether the waste came from the students or the cafeteria staff. We believe the information collected during the course of this investigation sheds some light on the issue of food waste in a university setting and will help inspire efforts to reduce our waste. This project also includes a few recommendations on how we can reduce this waste in the future and make our campus a better place. This information could potentially help campuses across the country improve their sustainability measures and get students involved in the preservation of our precious resources.

*Author: Hannah Hagler and Cynthia Maguire*

## **ON TARGET TO SUSTAINABILITY**

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*Texas Woman's University*

For their Spring 2015 class project, the team at Target Food Distribution Center in Denton, Texas invited students from the TWU Community Conversations in Sustainability (SCI 3013) class to visit their facility and see their operation in action. The students eagerly welcomed this opportunity to apply what they have been studying in class to a real world Learn by Doing project.

Target Brands, Inc. has a long history of giving back to the communities where they do business, and has ecofriendly and globally sustainable practices which are a part of that strategy. Target already does an outstanding job with their corporate responsibility through charitable work within communities and being environmentally conscientious through providing sustainable lifestyles and products, smart development, and efficient operations.

The purpose of the project is to bring those elements back to the distribution centers and challenge Target to make even greater strides locally through implementing our newly suggested sustainable practices. Ideas for improving sustainable operations were offered in four areas: Energy Usage, Water Usage, Recycling and Human Resources. Selected highlights are included on this poster.

*Authors: Melanie Alsabrook, Kathleen Happ, Linda Hordern, Cynthia Maguire, David Rylander, Iliana Smiley, Raven Williams, and Christine Wong*

### *United States Naval Academy*

The goal of the United States Naval Academy's STEM Center for Education and Outreach (STEM Center) is to promote hands-on, experienced-based and project-based learning (PBL) methodology for K-16 STEM educators and students nationwide. The STEM Center conducted pre- and post-event surveys for the undergraduate (midshipmen) facilitators of informal STEM education and outreach events. The survey data reveals midshipmen gains in confidence, communication of STEM concepts, motivation to remain in STEM pipeline, and leadership due to their experiences. Consisting of multiple-choice, Likert-scale, and open-ended questions, survey results are of interest to other organizations providing informal STEM or science outreach and those interested in gauging gains made by activity educators, judges, mentors, or facilitators.

*Authors: Rachel Busiek, Jennifer da Rosa, Sarah Durkin, Rachel Hetlyn, and Angela Leimkuhler Moran*

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Partial support for NCSCE has been provided by grants from the National Science Foundation (NSF-DUE 1224488, NSF-DRL 1237463, NSF-DUE 1322883), the W.M. Keck Foundation, and Assistance Agreement No. NE00E01029 awarded by the Environmental Protection Agency. This publication has not been formally reviewed by NSF, EPA, or the W.M. Keck Foundation. Opinions, findings, conclusions, and/or recommendations expressed do not necessarily reflect the views of NSF, EPA, or the W.M. Keck Foundation. The EPA does not endorse any products or commercial services mentioned.