MAINE EPSCoR AT THE UNIVERSITY OF MAINE
Experimental Program to Stimulate Competitive Research

Maine EPSCoR

FALL 2013 Newsletter

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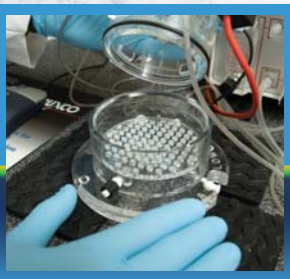


MAINE EPSCoR

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Sustainability Solutions Initiative Highlight

Transmitters, Travel and Terrain

Just where and how far amphibians travel from the vernal pool where they were hatched are questions researchers are trying to answer in the Sustainability Solutions Initiative (SSI), the Maine EPSCoR Research and Infrastructure Improvement Track I program at the University of Maine

A Maine wood frog wears a transmitter which helps track its location. Photo by Luke Groff.

Juvenile wood frogs are the long-distance travelers of their species, keeping the gene pool healthy as a small percentage may journey miles from the vernal pools where they were hatched in search of suitable habitat to begin their lives on land. Increasingly, however, these froglets must traverse landscapes altered by humans.

Britt Cline, an SSI PhD student in UMaine's Wildlife Ecology department, is studying how forestry, agriculture ,and suburban development affect the movements of juvenile wood frogs. Her findings will yield information that could be used by municipal officials, regulatory agencies, landowners, and others to more effectively manage land and habitat around vernal pools. Wood frogs typically use three kinds of habitat—the pools for breeding, forested wetlands for summering, and well-drained upland forests for hibernating—but little is understood about how land use practices affect their ability to travel between these places. The movements of the juvenile wood frogs are particularly difficult to study because they are forest-floor brown and tiny—about the size of a human's pinky fingernail.

Cline is collaborating with Nuri Emanetoglu, an assistant professor in the UMaine Department of Electrical and Computer Engineering, and Herbert Aumann, a senior technical staff member at Lincoln Laboratory at MIT, on an ingenious way to solve this tracking problem: tiny harmonic radar tags to help researchers follow frog movements. Research is continuing to see if these little tags enable further pinpointing of juvenile frog movements through the landscape. The findings could help address challenges ranging from seasonal land management practices to the improvement of vernal pool management zones that better connect and protect crucial habitat for different life stages of pool breeding amphibians.

Simultaneously, Luke Groff, also an SSI PhD student in UMaine's Department of Wildlife Ecology, is studying a different part of the wood frog life history: hibernation. Groff's research is showing that in addition to the frogs going back to the same pools to breed, some may also return to the same places to hibernate.

Knowledge-to-Action is an important component of sustainability science research. So Aram Calhoun, UMaine Professor of Wetland Ecology and Director of the Ecology and Environmental Sciences Program at UMaine, and other SSI researchers are using the results from this important habitat research to work with the US Army Corps of Engineers, other federal and state agencies, and Maine stakeholders, to create Special Area Management Plans to develop flexible vernal pool regulations that better accommodate economic development in a town or municipality by balancing conservation of vernal pools with the economic needs of local communities.

This is an example of how Maine EPSCoR's SSI research is serving as a valuable model system to explore more proactive, cost-effective approaches to sustainable development. SSI's ultimate goal is to provide the research-based knowledge that can help generate solutions to a wide array of sustainability-related challenges in and beyond Maine.

Sustainability Solutions Initiative Highlight

Turkeys, Testing and Tracking

Students at the University of Maine Augusta (UMA) catch turkeys to test for DNA as part of the Maine EPSCoR Sustainability Solutions Initiative.

Approximately 50,000 wild turkeys reside across all 16 counties in Maine, and are perceived as a nuisance species by some stakeholder groups and a welcome addition to the landscape by others. To complicate matters, turkeys are susceptible to a number of infectious diseases and may be in close contact with hunters, agricultural workers, and other animals.

At the University of Maine at Augusta (UMA), a partner in the Sustainability Solutions Initiative (SSI) of Maine EPSCoR at the University of Maine, undergraduate students have been learning how to apply SSI models to investigate this particular place-based challenge. This opportunity is particularly exciting because it is the first time UMA has been able to involve their students in a statewide research program. Through range tracking, genetic analysis, and sampling for microbial health the students are helping to evaluate the impact the turkeys have on the region's agricultural and recreational landscape.

As a primarily undergraduate teaching institution, the UMA team integrates the research into their undergraduate biology and social science programs. Students who participate, present their work in posters, reports, and as part of peer-reviewed publications. The incorporation of student research into the classroom experience enhances STEM activities in the UMA curriculum. Additional summer research internships are also offered to students for field work.

SSI principles center around interdisciplinary research that is focused on solving real-world problems, place-based stakeholder-driven research questions, and implementing "Knowledge to Action." Like other SSI partners, UMA is building collaborations with diverse stakeholders and helping to strengthen public support for the role of science in solving societal problems.

The new addition of a social sciences partner to UMA's research project directly enhances their stakeholder outreach and communication, evaluation of stakeholder acceptance of repopulated wild turkeys, and knowledge to action activities within the group. On-going review of the research through group and stakeholder meetings continues to refocus research on achieving its sustainability goals.

In collaboration with their partners, the UMA team has discovered multiple pathogens in Maine wild turkeys including *Salmonella* and *Staphylococcus* bacteria and an unusual avian pox virus (LPDV). Based on research available, this is the first report of LPDV in Maine wild turkeys and the significance of LPDV for wild turkey populations or the risks for domestic fowl are not currently understood, nor is it known whether this identification represents an emerging pathogen or an endemic virus that was previously undetected. Based on these results, the Maine Inland Fisheries and Wildlife Department has temporarily halted wild turkey relocation-repopulation programs.

The hope is that methods developed at UMA will easily transfer to any Maine community who wishes to participate in an evaluation of its wild turkey population in the future. Collaborations around the project are strengthening stakeholder partnerships and creating a lasting network to support research and management of Maine's wild turkey population.

MPBN "Sustainable Maine" Series Continues for Third Season

Students at the University of New England (UNE) investigate the Saco River Estuary as part of the Maine EPSCoR Sustainability Solutions Initiative.

"Sustainable Maine," Maine EPSCoR's Emmy nominated science series is back for a third season! We continue to showcase how Maine's SSI researchers are partnering with stakeholders and communities to address some of the state's most complex issues.

All episodes in the series to date have been nominated for Emmy Awards, making the collaboration between Maine EPSCoR and the Maine Public Broadcasting Network (MPBN) a huge success.

The new season of Sustainable Maine will premiere in October as follows:

Episode 1:***"Return of a River"***- **Wednesday, October 2 at 9 p.m.** The Saco River Estuary has become a laboratory where scientists, students and community members are working together to learn how to sustain a very special place. The Maine EPSCoR SSI Saco River Project at the University of New England (UNE) benefits from the ideal location of the school situated right at the mouth of the Saco River, and more than 100 UNE students have already gained hands-on experience in sustainability science in this extraordinary classroom in their own backyard. While the river is much cleaner than it was 50 years ago, it courses through the shadow of massive mills that not only fueled the economy but also left a legacy tainted by pollution. To help planners and managers understand that impact, SSI researchers at UNE are combining their research with stakeholder consensus and developing a grading system to help assess the health of the estuary.

Episode 2: ***"Culvert Operations"*** - **Wednesday, October 9 at 9 p.m.** Extreme weather costs Maine communities millions of dollars in damage, and many experts predict that it's likely to get worse. Some communities are finding out the hard way that their culverts are no longer big enough to handle the increasing size of floods. It's estimated that there are hundreds of thousands of culverts in Maine, ranging from small drainages under driveways to moose-size culverts under major highways to keep streams and wildlife moving. Failed culverts can disrupt lives and commerce, threaten fragile ecosystems, and quickly swamp municipal budgets. "Culvert Operations" shows how one Maine EPSCoR SSI research team is working with communities to plan for future extreme weather events.

Episode 3: ***"Preserving Paradise"*** - **Wednesday, October 16 at 9 p.m.** Maine's landscape has been steadily changing. Houses, developments, and malls are sprouting up in places where crops once grew, cows grazed, rivers flowed unchecked, and forests thrived. Development can bring much needed social and economic benefits, but when it happens without forethought, there may be the risk of adverse long-term consequences. So what does the future hold, and are there alternatives? Join a team of Maine EPSCoR SSI researchers at the University of Maine as they explore the answers to these questions.

Once the episodes premiere on air, the documentaries will be available for viewing on MPBN's website at http://www.mpbn.net/Television/LocalTelevisionPrograms/SustainableMaine.aspx or links may also be found on Maine EPSCoR's website and the SSI website. Links to additional podcasts and researcher profiles are also available on all sites.

Save the Dates

Senator George J. Mitchell
Lecture on Sustainability

Wednesday September 25 at 1:00pm
Hauck Auditorium, UMaine, Orono

JANE LUBCHENCO, a marine ecologist and environmental scientist, has received a MacArthur "genius" award and 18 honorary doctorates. The scientific journal Nature named her "2010 Newsmaker of the Year."

In 2008, President Obama nominated Lubchenco to be NOAA's administrator. At NOAA, she focused on "restoring fisheries to sustainability and profitability, restoring oceans and coasts to a healthy state, developing a Weather-Ready Nation, promoting climate science and strengthening science and ensuring scientific integrity at NOAA."

In 2013, Lubchenco returned to Oregon State University, where she is the Wayne and Gladys Valley Professor of Marine Biology and Distinguished Professor of Zoology.

This event is free and open to all. Tickets are required. Please call 207/581-3244 or visit www.umaine.edu/mitchellcenter/

MAINE EPSCoR PRESENTS

SENCER-IZING YOUR CURRICULUM: BEST PRACTICES FOR LINKING STEM EDUCATION AND CIVIC ENGAGEMENT

OCTOBER 7, 2013
ABROMSON CENTER AT THE UNIVERSITY OF SOUTHERN MAINE, PORTLAND

OCTOBER 8, 2013
WELLS CONFERENCE CENTER AT THE UNIVERSITY OF MAINE, ORONO

THERE IS NO COST FOR THIS WORKSHOP, BUT REGISTRATION IS REQUIRED.

SENCER (Science Education for New Civic Engagements and Responsibilities) is an organization that applies the science of learning to the learning of science, all to expand civic capacity. SENCER courses and programs connect science, technology, engineering, and mathematics content to critical local, national, and global challenges.

Registration is open!

MAINE EPSCoR

Maine EPSCoR State Conference

September 30, 2013
Wells Conference Center at the University of Maine, Orono
Conference information and presentations:
www.umaine.edu/epscor/2013_state_conference

FY2012 Maine NSF EPSCoR Co-Funded Awards

The NSF EPSCoR Co-Funding program enables more awards to be made to researchers in EPSCoR jurisdictions from the Foundation's regular research, education, and special emphasis competitions by providing partial support for those proposals that merit review places at or near the cutoff for funding by the reviewing program. This mechanism operates internally within NSF and does not require any action on the part of the proposer. Since FY2000, 110 Maine NSF awards have received over $13M in co-funding, and enabled over $34M in projects to happen that would not have otherwise been funded.

FY2012 Maine NSF EPSCoR Co-Funded Awards

Institution	Title	PI Name	EPSCoR Funding:	Total Project:
University of Maine	SEP Integrated National Framework for Cellulosic Drop-in Fuels	Pendse, Hemant	$489,957	$1,800,000
University of Maine	Diffusional Landscapes for the Study of Neural Differentiation	Collins, Scott	$152,000	$310,000
University of Maine	IGERT: Adaptation to Abrupt Climate Change (A2C2)	Saros, Jasmine	$400,000	$1,184,380
University of Maine	Surface Termination and Shape Effects on Surface Induced Magnetism in Quantum Dots	Meulenberg, Robert	$165,000	$365,095
University of Maine	Collaborative Research: Developing an Antarctic Tephra Database for Interdisciplinary Paleoclimate Research (AntT)	Kurbatov, Andrei	$100,000	$88,581
TOTAL:		**5 awards**	**$1,306,957**	**$3,911,475**

Maine EPSCoR Cyberinfrastructure - Advanced Computing Group

Advanced Computing Group members (*pictured left to right*) Bruce Segee, Ami Gaspar, and Chris Wilson in front of the vWall in Smith Hall Room 107, the SSI Communications Center.

Maine EPSCoR is actively partnering with the new Advanced Computing Group (ACG) for the University of Maine System, which serves the supercomputing, visualization, data, and cloud needs for UMaine and the six other PUI campuses of the UMaine System. This group manages the new high performance computer that was installed at UMaine in 2012, and is available for use by all SSI researchers and students across the state.

This year with Maine EPSCoR support, ACG hired two new professionals to support the SSI research initiative's data needs. Ami Gaspar is the new Data Outreach Specialist and Chris Wilson is the new Data Specialist. They are working diligently to help SSI achieve its data management plan objectives.

The team works one-on-one with SSI researchers to meet their needs for data collection, storage, sharing, and archiving and is refining the existing DSpace data system and developing a new Maine Dataverse Network system which will allow SSI research data to be available publicly.

Maine EPSCoR Cyberinfrastructure Continued

Advanced Computing for Everyone Brown Bag Series

The Advanced Computing Group (ACG) and Maine EPSCoR at UMaine present this brown bag series as a way to learn more about the services this group provides. You're invited to attend any or all of the following sessions — feel free to bring your lunch. All presentations are in Room 107 Norman Smith Hall (Mitchell Center) at UMaine, and available virtually via videoconferencing or webcam (contact us for more information on this option).

Wednesday October 2, 2013 - 12:30 - 1:30 pm
Intro to ACG Data Management (DM)
Need to know more about NSF's data management compliance? Join Chris and Ami to find out more. Get information on how the ACG can help develop and implement data management plans for your NSF project. Become NSF-compliant and better positioned to receive future grant monies. Various data storage solutions will also be covered.

Wednesday, October 9, 2013 - 12:30 - 1:30 pm
Intro to the ACG Visualization Wall (vWALL) - Get the Big Picture?
Tired of sacrificing resolution to view large data close up? Want to present the bigger picture clearly? The vWALL located at Norman Smith Hall on the UMaine campus provides a wall of six displays measuring 12 ft by 4 ½ ft. Maximizing the resolution of one display's resolution power to the collective of six 55-inch displays coupled with high speed fiber connectivity, this system delivers real time data streaming in a big way. Come see it for yourself. It allows you to see your images, such as map data for example, without having to continually zoom in to see more detail and zoom out to see more area.

Wednesday, October 16, 2013 - 12:30 - 1:30 pm
Intro to ACG Cloud Computing (CC) with Virtual Machines
How much of your research depends on a single PC working correctly? How long would it take to recover from a hardware failure? Tired of maintaining computers? Want to spend more of your time on your research and less time (and money) on computer maintenance? Want to share a dedicated computer among multiple users with little risk? Want reliable, cost effective, and fast computing power? Realize all this and more with virtual machine (VM) technology. VM allows you to design a custom built "machine" or a copy of an existing computer's specs to be stored and retrieved on any designated computer. VM's are regularly backed up and provide integrated software management.

Wednesday, October 23, 2013 - 12:30- 1:30 pm
Intro to ACG High Performance Computing (HPC)
Want to get results faster or many more results in the same time? High Performance Computing (HPC) parallel processing allows for multiple computations (large data sets) to be processed in a faction of the time it takes for a single high speed computer. It's like having 50 or 100 computers dedicated to processing your project's data. Achieve faster results, spend more time in the field and less time behind the computer, and bring your projects up to speed.

For more information about this series, contact Ami Gaspar at (207) 561-3578 or via email at ami.gaspar@maine.edu. For additional information about ACG services, visit their website at www.acg.maine.edu.

Maine EPSCoR Outreach and Workforce Development

Native STEM Scholarship Development Program

Maine EPSCoR has had an on-going commitment to fostering Native American student involvement in its programs. The Maine EPSCoR Native STEM Scholarship Development Program (NSSDP) is a long-term initiative to engage Wabanaki students through their cultural heritage and environmental legacy to encourage and promote persistence in STEM (science, technology, engineering, and math) through college and into a career. This year was packed with activities!

To help meet the goals of this initiative, Maine EPSCoR employs two Native American Collaborative Graduate Research Assistants each year. Current students are Joshua Crofton-MacDonald, who is a Master's student in Ecology & Environmental Science, and tish carr (intentionally spells it lower case), who is a Master's student in Forestry. These students help make connections with youth in tribal communities and on campus, and through their efforts, all aspects of the Maine EPSCoR Native outreach program have grown.

Research Assistant Josh Crofton-MacDonald

Currently, Josh and tish both provide support to the Traditional Ecological Knowledge (TEK) program for Native students in junior and senior high school, and to the American Indian Science and Engineering Society (AISES) for undergraduate and graduate students at UMaine.

During this past year, the TEK program has worked with the Penobscot Indian Nation's Teen Center to introduce Native American youth to a variety of STEM-oriented experiences and professions. Emphasis is placed on training, career development, and linking science with traditional ecological knowledge. This year, through hands-on activities, AISES members shared interesting and exciting aspects of their academic programs with the teens to encourage their interest in STEM. This pilot program will be expanded to also include Maine's other tribal communities during the upcoming year.

In addition, the NSSDP program conducted the first week-long **wskitkamikw** [w] summer camp. Fifteen high school campers attended, representing three of the area Wabanaki tribes – Penobscot, Passamaquoddy, and Maliseet. Instructors included Native elders, teachers, and environmental science professionals from throughout Maine. During camp, students participated in different activities all geared to increase their knowledge of the land, science, and their connection to both.

"I think the greatest indication of success was talking to one camper who definitely didn't want to be at camp initially, and in the end didn't want to leave," described tish carr, who coordinated the camp.

Once the campers completed their session at camp, there are a number of other opportunities available for them to continue their interest and engagement. For high school students who have been part of the camp or TEK program, there are stakeholder internships being made available by Maine EPSCoR, designed in partnership with the Penobscot Indian Nation Department of Natural Resources and the UMaine Wabanaki Center. These internships allow students to gain real-life work experience alongside professionals in STEM fields, and can hopefully help to address future tribal workforce needs in these areas.

"Our goal is to connect all of our Maine EPSCoR programs and keep Native students engaged from grade school through college. So we're looking for mechanisms to make these programs sequential and sustainable," said tish. "Native American culture explains that individuals have an impact on everything, and all of these programs respectfully strive to continue to make that link for students while relating it to traditional science concepts."

Research Assistant tish carr

Maine EPSCoR Outreach and Workforce Development

Camp CaPella Wild Adventures

Who wouldn't want to participate in a "Wild Adventure?" For students with disabilities, this represents a unique opportunity to be a scientist every day, something many of these campers don't get the chance to do on a regular basis in school or in their lives.

Two years ago, Maine EPSCoR at the University of Maine began a unique partnership with Camp CaPella in Dedham to provide STEM programming to its summer campers. Camp CaPella provides services to children (aged 5 and older) and adults with a primary diagnosis of physical and/or developmental disabilities.

Campers hail from all over the state, and this summer, 3/4 of the campers were returning. In Maine EPSCoR's "Wild Adventures" program, campers have the chance to look at aquatic plants under a microscope, build self-propelled "boats" out of water bottles, and use supportive educational applications on iPads.

Throughout the Maine EPSCoR program, campers are also encouraged to explore careers related to sustainability science. One of the goals of the program is to spark an interest in learning more about the interactions of the natural and social world around them.

Counselor Sam Bedore gets a boat ready to launch

Sam Bedore, the "Wild Adventures" leader, is an Elementary Education and Psychology student at the University of Rhode Island. She is from Glenburn and this is her third summer at Camp CaPella. "I love doing Wild Adventures! It's a great experience for me since I want to be a teacher. I'm learning with them."

She adjusts her teaching methods based on the group she is teaching and their abilities. Throughout the "Wild Adventures" session, she guides the campers in activities and outdoor exploration.

Beth Smyth-Handley, a local middle school teacher, was the camp's original coordinator and creator. She designed activities with the assistance of the Chewonki Foundation, an academic institution on the coast of Maine that provides traveling lessons in natural history. Live animals and a myriad of teaching tools, such as a whale skeleton or a container full of biodiesel, help students learn important lessons about the natural world and the conservation of life and resources on Earth. With support from Maine EPSCoR, educators from Chewonki are able to visit the camp each week.

This year's "Wild Adventures" program expanded to include a day trip to a local bird sanctuary and taking specially adapted kayaks out to explore the lake around the camp.

The program runs for seven weeks and serves more than 125 campers with disabilities each summer, who most likely would not have the opportunity to experience scientific inquiry, let alone be encouraged to explore and pursue STEM careers.

According to Beth Smyth-Handley, "It seems to be inherent to our population of campers to love the outdoors and all it encompasses. However, they are often left out of the experience. When the campers were told they were going to be scientists, they got so excited."

Maine EPSCoR Outreach and Workforce Development

How I Spend My Summer Vacation - Upward Bound

For many high school students, spending their summer at a University, working on research projects, and publishing papers is a bit out of the ordinary. This summer, 35 students participated in the UMaine Upward Bound Math Science (UBMS) program, learning about technology, leadership, and group dynamics.

Over the years, Maine EPSCoR at the University of Maine has partnered with UBMS to support summer programs, allowing approximately 150 students to complete the program and learn valuable skills that will assist them during their college careers.

2013 Upward Bound Class - Photo by Matthew Leavitt.

Upward Bound provides educational opportunities for high school students interested in pursuing STEM (science, technology, engineering, and mathematics) college majors and careers. Students are selected from rural and urban areas of Maine and Massachusetts.

This year's Upward Bound group program focused solely on the Maine Sustainability Solutions Initiative (SSI) research. With SSI members Kristine Hoffman, Rob Lilieholm, John Peckenham, Darren Ranco, Amy Arnett, and Colleen Tierling, the student groups focused on solutions for catching salamanders, measuring and tracking lake water levels, and ways to save fish in a hydroelectric turbine. Groups were encouraged to choose which project they wanted to work on and were required to write a research paper and create a video documentary of their experience.

Stephanie Decker is a freshman Biology major at UMaine.

Kelly Ilseman, the assistant director of the year-long program which is part of UMaine's College of Education and Human Development, has been working with the program for the past 13 years. Kelly grew up in Guilford and received two masters' degrees from UMaine in Science and Environmental Education and Human Nutrition. "I grew up like a lot of our students – I was a first generation college student and am from a low income household. Furthering my education was a path to build a different life." Upward Bound provides opportunities to students that changes their lives by giving them the support they need to pursue secondary education.

This year's curriculum included a new partnership with the UMaine Foster Center for Innovation. The program was hands on, allowing students to decide as a group which current SSI research problem could be solved through an invention or innovation, and to design a solution to that problem with their peers. According to Ilseman, "They really saw the connection between their designs, and the ability to help scientists improve their ability to perform research and/or support scientists' ultimate practical research outcomes."

Stephanie Decker, a rising freshman from Millinocket, is a great example of the program's impact. She is attending UMaine in the fall, majoring in Biology, and has been a part of the UBMS program for three years. Stephanie was a member of one of the teams that worked on new salamander traps for Kristine Hoffman and thought the format of this summer's UBMS program provided opportunities to really connect with her classmates. She will be continuing her individual research with Seanna Annis, Associate Professor of Mycology, School of Biology & Ecology, studying fungi in maple syrup. "I'm thrilled to be able to continue my work in the fall as a work-study student. Dr. Annis has been a terrific mentor."

Maine & NH EPSCoR Tackle Problems Related to Shellfish and Shores

Maine and New Hampshire's coastal tourism and shellfish industries contribute millions of dollars annually to the regional economy. In Maine in 2010, coastal tourism and recreation added $1.1 billion to Maine's gross domestic product, while shellfish landings in that same year generated revenues of $347 million. But these industries and the coastal environment they depend on are vulnerable to a variety of factors, including pollution, climate change, and invasive species.

A team of researchers led by the University of Maine (UMaine) and the University of New Hampshire (UNH) will conduct a three-year study of the many factors affecting the health of their shared coastal ecosystem. This collaboration, funded by a new $6 million award from the National Science Foundation (NSF) EPSCoR Track 2 program, aims to strengthen the scientific basis for decision making related to the management of recreational beaches and shellfish harvesting. This research is a direct outgrowth of Maine's Sustainability Solutions Initiative (SSI), the current NSF EPSCoR Track 1 program.

The project, titled the New England SusTainability Consortium (NEST), is managed by the EPSCoR programs at UMaine and UNH in partnership with College of the Atlantic, University of New England, University of Southern Maine, Great Bay Community College, Plymouth State University, and Keene State College. In Maine, researchers will also collaborate with several state agencies and other stakeholders, including the Maine Department of Environmental Protection (DEP), Maine Department of Marine Resources (DMR), Maine State Department of Education (DOE), and Maine Healthy Beaches (MHB).

"I am delighted that the National Science Foundation selected the New England SusTainability Consortium, for this Research Infrastructure Improvement grant," said Senator Susan Collins (R-ME). "Through both tourism as well as commercial fishing, our state's economy is highly dependent on the ecological wellbeing of the Gulf of Maine. This grant will help fund the vital research performed by faculty and students at the University of Maine as they seek to find ways to reduce pollution caused by coastal runoff and assist local governments in making informed decisions regarding the closure of beaches and shellfish beds."

"This is good news for Maine, and indeed for all coastal areas," said Senator Angus King (I-ME). "Our shellfish industry is facing many threats – climate change, warming oceans, acidifying waters, and an increase in green crabs, which are decimating clam flats. Our state simply can't lose another fishery. I look forward to seeing the results of the good work that this grant will enable, like hopefully more targeted closures of flats. Our changing environment is a big problem, and while we work out broad solutions, we must also focus on mitigating the direct impacts on people and ecosystems."

UMaine President Paul W. Ferguson affirmed the project's importance, stating, "This NSF grant recognizes the leadership and contribution of University of Maine scholars who aim to support coastal ecosystems, economies, and communities by promoting sustainable policies and practices in Maine."

The project combines scientific knowledge and local expertise to improve resource management decisions. There is widespread agreement among resource managers and scientists in both states that current beach and shellfish management decisions are challenging and can be improved by strengthening partnerships among scientists, managers, and communities.

NEST uses a collaborative process where resource managers and other stakeholders participate in defining problems, identifying research needs, interpreting results, and designing solutions. The team will select a number of study sites in each state to investigate how natural processes like water flow in rivers, and human activities like land development, in coastal watersheds influence bacterial dynamics. Project research will advance understanding of how environmental and climatic conditions affect the dynamics of bacterial pathogens. The project studies how human activities contribute to and are affected by these bacterial dynamics and related public resource management decisions. Coupling these distinct strands of research offers a more comprehensive view of beach and shellfish management. This innovative approach seeks to generate cost-effective strategies for reducing bacterial pollution. By identifying solutions that strategically avert risks to humans, while supporting economic development and ecosystem health, NEST will develop regional capacity between Maine and New Hampshire to advance sustainability solutions through science.

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RETURN SERVICE REQUESTED

Supported by the National Science Foundation under award #0904155

Maine State EPSCoR Committee:
Maine EPSCoR is overseen by the Maine Innovation Economy Advisory Board, a statewide steering committee of individuals from Maine's education, research, and business communities and state government. The Board is under the auspices of Maine's Office of Innovation.

For more information see: **www.maineinnovation.com**
The Maine Science & Technology Action Plan can also be downloaded at this site.

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