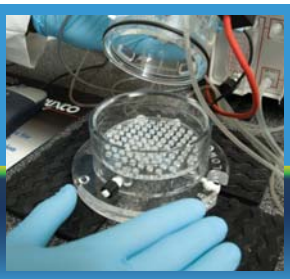
Maine EPSCoR FALL 2014 Newsletter

IN THIS ISSUE:

- NSF EPSCoR Sustainability Solutions Initiative Highlights
- Growing Our Own: Highlights on SSI Graduates
- Maine EPSCoR STEM Outreach & Workforce Development Programs
- NEW NSF EPSCoR Track 1 Award






MAINE EPSCoR

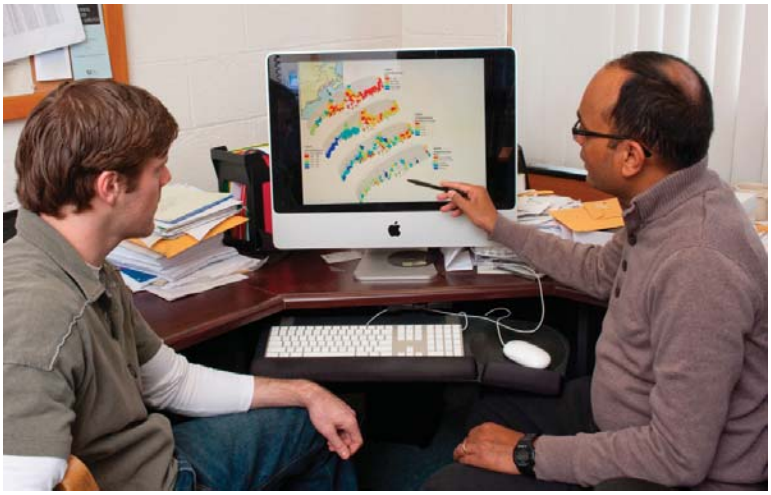
- Cutting-Edge Science
- Cyberinfrastructure
- STEM Education
- Workforce Development
- Economic Development

Sustainability Solutions Initiative Highlight

The New Normal: Culverts in Maine Stressed to the Limit

By Tamara Field

The culverts that snake beneath the streets, driveways, and fields of Maine's coastal towns were built to handle the normal load of water dumped on the state each year, the same amount communities had offloaded for years. But today there's a problem.



There's a new normal.

A recent review of statewide data by researchers at Maine EPSCoR at the University of Maine through the Sustainability Solutions Initiative (SSI) has shown that increases in both precipitation and storm severity over the past 10 years have damaged and destroyed culverts meant to last decades longer. In analyzing the data, researchers on SSI's Coastal Adaptation team, who are working closely with Midcoast-area communities, found that the culverts simply can't handle the increased run-off. And the problem is expected to intensify in coming years. Fixing it will be tough. Though Maine as a whole throws millions of dollars at stopgap repairs each year, roadblocks to improved infrastructure are numerous. Depending upon where they are located, culverts may be owned and governed by local, county, state, or federal entities. Many are on private land. Yet there are no agreed upon engineering or maintenance standards and little to no coordination between governing bodies.

Compounding the problem is the fact that municipalities and engineering firms often use outdated data to design and install culverts. Solutions will require a new level of coordination and partnership between these many different groups, or stakeholders. SSI researchers say a sustainable future depends on it: "These are real world dealings. If you want to solve the problem, you have to understand that this is a complex puzzle, that there are multi-linked pieces that need to be understood. It requires investment in our stakeholders. We have to find a way to see eye to eye, to have mutual understanding of scientific information within the context of real world issues and financial realities," said Shaleen Jain, (*pictured on right*) Assistant Professor of Civil and Environmental Engineering, co-leader of the Coastal Adaptation team with Esperanza Stancioff, Associate Extension Professor at University of Maine Cooperative Extension and Maine Sea Grant Program.

"This is novel. We are doing things differently than they've been done before," Stancioff said. "We have held several community meetings to discuss issues and to co-develop resources and tools. This is the intersection of the economic, social and environmental, the essence of the sustainability approach."

Some of the biggest problems stem from outdated architecture. Researchers on the Coastal Adaptation team found that many engineering firms still design culverts using precipitation data gathered in the 1960s. According to those predictions, a major precipitation event like a hurricane or tropical storm could be expected once every 50 years, researchers said. New data shows these kinds of storms are now predicted to hit every 12 years. This new information coincides with a rash of severe culvert damage reported around the state.

"There is currently no established method for managing storm water in a changing climate," said team researcher Alex Gray (*above left*). "There are no studies on costs versus benefits. There are few detailed city records on repairs. And there is no truly reliable prediction model of precipitation."

Gray and his colleagues have worked with stakeholders in two coastal municipalities: Ellsworth and Lincolnville. Both municipalities reported high rates of culvert damage and replacement in recent years. Before

"Culverts" continues on page 5

Sustainability Solutions Initiative Highlight

Paradigm Shift in Environmental Views

By Tamara Field

For social scientists, measuring opinion is a precise scholarship, an invaluable tool that must evolve and modernize if research is to advance. But this is no easy task. Opinion scales must have uniformity and wide acceptance, so studies can be compared and combined. Change is a challenge.

Researchers with Maine EPSCoR at the University of Maine's Sustainability Solutions Initiative (SSI) are at the forefront of such change, scrutinizing methodology and forging new paths.

In a paper published in the July issue of *Environmental Education Research*, SSI's Sustainable Behavior team leaders Caroline Noblet, Mark Anderson, and Mario Teisl question the full efficacy of the long-held gold standard for measuring personal views on the environment – the New Ecological Paradigm or NEP. Researchers have used this scale for decades to suss out individual stakeholder beliefs on numerous topics such as: the state of natural resources; an individual's relationship to the natural world; and their sense of whether people have abused the earth, improved it or something in between. Noblet, Anderson, and Teisl, however, thought something was missing from the accepted format.

The missing factor: broad ecological perspective. Researchers wanted to be able to measure stakeholders' views on nature simply for nature's sake. They suspected the NEP was missing the mark.

Noblet, Anderson, and Teisl tested their theory on three different stakeholder audiences: a random sampling of Maine citizens, SSI researchers, and a group of stakeholders participating in two different environmental conferences. In analyzing results, the researchers found that using the NEP to measure ecological perspective resulted in instability. Drawing on previous research and their statistical results, the three concluded that results within specific population groups should be more similar than they were. The results led them to question the reliability of the NEP as a metric for capturing ecological worldview.

The team has formulated an updated scale that adds a new component to the paradigm toolkit, one designed to capture broad ecological perspective. Participants are asked to suspend thoughts of their direct needs and consider nature simply for its own sake. Stakeholders are asked to read a statement and record their opinions on a scale from "agree strongly" to "disagree strongly." The statement reads, "Nature is valuable for its own sake, even if humans get no goods or services from it." They called it the "Environmental Motivation Scale." It was developed in partnership with Shannon McCoy, Assistant Professor of Psychology at UMaine, and researchers from Florida State University.

Using the newly conceived scale as its baseline, the team conducted a large survey designed to measure the opinions and behaviors of Maine stakeholders. The survey, sent to 8,000 Mainers, examines views on renewable energy technologies, energy efficiency programs, conservation, and the influences of different institutions such as the state of Maine, local government, nonprofits, and other bodies. One of the most important elements being assessed is an individual citizen's sense of personal power in creating a sustainable future and the role of prior behavior on future sustainable behavior. For example, if a person conserves heating energy does he or she feel entitled to use as much electricity as desired? The survey is the first by the University of Maine team to incorporate the new scale and will be compared to a 2010 survey that used the old paradigm. Results are being analyzed for publication.

Growing Our Own: Congratulations SSI Graduates

This past year was a banner year for graduates working with the Sustainability Solutions Initiative (SSI) and Maine EPSCoR at the University of Maine. Here are just a few of their stories.

Karen Hutchins Bieluch's doctoral research focused on building smarter, stronger community partnerships to promote sustainability. It went to the heart of the mission at UMaine's Sustainability Solutions Initiative at the Sen. George J. Mitchell Center.

Take her survey of municipal officials in the state of Maine. Her work with these critical stakeholders resulted in an important finding: the factor that made these officials most likely to consider a problem-solving partnership with a university was personal belief. In other words, a municipal official's own belief that a venture held value or that researchers could offer important perspectives led to greater openness. Working with a team from SSI's Knowledge-to-Action Collaborative, Bieluch sent surveys to more than 2,400 municipal officials in Maine and had a rousing response, with over 1,000 surveys returned. About 86 percent of Maine municipalities are represented in the results.

For the past two semesters, Bieluch has been a Visiting Assistant Professor in UMaine's Department of Communication and Journalism. She taught classes on research topics and health communications. This summer, she will conduct research with a team studying citizen science program development and effectiveness in the river herring fishery.

Michelle Johnson, doctoral candidate in UMaine's Ecology and Environmental Science program and graduate research assistant with the Sustainability Solutions Initiative, will join the US Forest Service's New York City Urban Field Station as a Social Scientist/ Ecologist this fall.

Johnson, a member of SSI's Alternative Futures team who helped develop the award-winning Maine Futures Community Mapper (MFCM), will work with a variety of stakeholders including city parks officials, non-governmental organizations and the general public in the field station's effort to develop and promote natural areas in urban settings.

Bridie McGreavy's doctoral work at UMaine's Sustainability Solutions Initiative, a program of the Sen. George J. Mitchell Center, extended far beyond the constructs of her discipline and far beyond the boundaries of the university.

McGreavy was a research fellow on SSI's Knowledge-to-Action team. Her work focused on building more resilient partnerships between stakeholders – such as communities or non-governmental entities – and universities.

McGreavy has accepted a postdoctoral fellowship with the New England Sustainability Consortium (NEST). Led by UMaine's Mitchell Center and the University of New Hampshire, NEST is a regional research partnership focused on strengthening the scientific basis for decision-making in the management of coastal systems. Her research with this group will continue to focus on communication and collaboration.

Spencer Meyer, a Sustainability Solutions Initiative doctoral candidate in UMaine's School of Forest Resources, along with faculty advisors Rob Lilieholm and Chris Cronan, has been awarded the 2014 President's Research Impact Award for the development of a sophisticated online mapping tool that allows Maine communities to visualize future landscape scenarios in localized areas.

A member of SSI's Alternative Futures Team, Meyer led the development of the Maine Futures Community Mapper (MFCM) over four years with team leader Lilieholm, Associate Professor of Forest Policy, Cronan, Professor of Plant Biology and Ecology, and Michelle Johnson, an SSI doctoral candidate in UMaine's Ecology and Environmental Science program. The groundbreaking tool will allow town planners,

Growing Our Own: Congratulations SSI Graduates *continued*

conservationists, developers, and the general public to better understand and manage community assets – both in terms of conservation and economic development – now and in the future.

Meyer, who has been at UMaine for 12 years as both a student and staff member, has been accepted into The Nature Conservancy's (TNC) NatureNet Fellows Program and will begin a two-year fellowship at Yale University's School of Forestry and Environmental Studies this fall. Meyer will work together with Yale and TNC colleagues to address questions about how to prioritize future conservation efforts to sustain the environmental and economic benefits of utilizing forests as natural infrastructure.

SSI PhD graduate **Michael Quartuch** has accepted an offer for a postdoctoral research associate position within the Human Dimensions Research Unit (HDRU) at Cornell University. Mike will be working with HDRU staff and faculty on two research projects led by assocate professor Richard Stedman and professor and department head Dan Decker. Each project deals with understanding and identifying social issues associated with hunting and wildlife management. Mike will also be working in close collaboration with representatives from the New York State Department of Environmental Conservation. His position began in mid-July.

Quartuch, a member of the People, Landscapes, and Communities (PLACE) team, worked on identifying stewardship characteristics to help with our understanding of Maine's family forest landowners. His research will lead to more effective outreach, assistance, and policy programs both within Maine and beyond.

Hollie Smith, a doctoral candidate in UMaine's Communication and Journalism program will be moving to Rhode Island to be an Assistant Professor of Communication Studies at the University of Rhode Island.

Smith, a member of the Knowledge to Action team, worked on a variety of different projects that looked at how to involve stakeholders into the research process and make knowledge more accessible and applicable to different stakeholder groups. Her research focused on the intersection of science, policy, and media as they relate to environmental issues.

"Culverts" continued from page 2

suggesting ideas, Jain, Gray, and their team met with officials and citizens in both towns, a move which goes to the heart of SSI's grounding principle of equal partnerships. One solution, in other words, does not fit all. Researchers found that each municipality wanted something different. While Ellsworth was interested in a long-term engineering/planning approach, Lincolnville was keen on a less technical, easy-to-implement solution.

Right now, Ellsworth is working toward a multi-year storm water plan. Armed with new information from researchers, city officials and citizens are on the cusp of important decisions such as the mapping of culvert infrastructure and changes in engineering strategy. Jain said the team hopes to continue to support Ellsworth with advanced weather modeling and education.

Lincolnville has taken a straightforward approach, one that is likely to be realistic for a majority of Maine towns, which don't have large budgets for engineering. The bottom line: If you've replaced a culvert twice in the same place, put in a bigger one next time.

"If you've had to replace an 18-inch culvert twice over the last few years, put in a 24-inch culvert instead. It's not perfect science, but it's a real world solution," Gray said.

Work in the near future is focused on the creation of a statewide culvert map, a massive project that would attempt to document the hundreds of thousands of culverts in the state for use in future management and planning.

Said Gray: "This is uncharted territory."

Save the Dates

Senator George J. Mitchell Lecture on Sustainability

Thursday, October 2, 2014 at 1 pm
Hauck Auditorium, UMaine, Orono

This event is free and open to all. However, tickets are required. Please call 207.581.3244 for reservations or go to umaine.edu/mitchellcenter.

Bill Clark is the Harvey Brooks Professor of International Science, Public Policy and Human Development at Harvard University's John F. Kennedy School of Government. Trained as an ecologist, his work focuses on the human transformation of the earth, the implications of that transformation for our well-being over the long run, and the design of interventions to improve our collective prospects. He has been actively engaged in the conception and nurturing of "sustainability science," an emerging global program to better link knowledge with action in support of equitable and sustainable development.

The event is sponsored by the Senator George J. Mitchell Center for Sustainability Solutions

If you are a person with a disability and need an accommodation to participate in this program, please call 207.581.3244.

The Univesity of Maine is an equal opportunity, affirmative action institution.

We're Hiring!

Director of Research Administration & EPSCoR

The **Director of Research Administration & EPSCoR** (Experimental Program to Stimulate Competitive Research) utilizes a well-rounded, entrepreneurial set of skills to provide professional leadership, vision, and overall program management for the Maine EPSCoR office at the University of Maine, and supports other research initiatives and activities for UMaine. Maine EPSCoR implements large-scale, statewide infrastructure and other programs for innovative research, STEM education, workforce development, diversity, and cyberinfrastructure in key areas of importance for the state of Maine.

ESSENTIAL DUTIES/RESPONSIBILITIES:
A. Serve as the Director of Maine EPSCoR at the University of Maine. Provides leadership, manages and reports on the scientific, administrative, educational and economic programs of the EPSCoR portfolio, exercising a high level of independent judgment and self-direction.
Includes responsibility for developing, implementing, administering, and overseeing comprehensive & integrated strategies for EPSCoR research and education infrastructure & other programs supported by participating federal agencies (NSF, DOE, NASA, USDA, DoD, etc.).
• B. Assist with the University's overall strategies for the development of increased research funding, capacity, and competitiveness.

KNOWLEDGE & SKILL QUALIFICATIONS:
Required:
• Master's degree preferred, Bachelor's degree required with typically at least 3-5 years of related experience showing increasing responsibility with grants and contracts administration, financial and human resources management, and complex program development, implementation, and management. A Bachelor's degree combined with substantial experience in the above may be considered.
• Relevant experience in program administration, implementation, and oversight in a setting involving scientific research and integrated education.
• Exceptional leadership skills, including team-building, facilitation, conflict resolution, group processes, and the expertise to develop a vision and motivate others to achieve it.
• Exceptional verbal and written communication skills, including technical writing and effectively engaging in public speaking and lead planning sessions.
• Strong organizational skills including attention to detail and accuracy, effective supervision and mentoring skills, and experience managing a fast-paced office with professional staff at a variety of levels.
• Excellent skills in exercising sound judgment and discretion in dealing with sensitive issues and challenging situations.
• Demonstrated experience successfully leading a complex, multi-institutional initiatives.
• Excellent grant writing and project development skills, including visioning, strategic planning, and setting goals, objectives, and metrics.
• Proven success working independently and collaboratively in a high-visibility professional setting.
• Demonstrated commitment to diversity and broadening participation in the implementation of programs and strategies.
• Ability to travel frequently in- and out- of-state, requiring a valid driver's license.

SUPERVISORY RESPONSIBILITIES: Supervises professional and classified personnel, and student and temporary employees.

For more information and a complete job description, go to: https://umaine.hiretouch.com/job-details?jobID=20762&job=director-of-research-administration-epscor

The University of Maine is an EEO/AA employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, sexual orientation, age, disability, protected veteran status, or any other characteristic protected by law.

Maine EPSCoR Outreach and Workforce Development

Building Tomorrow's STEM Workforce by Connecting Research and Education Through Partnerships

For many years, Maine EPSCoR at the University of Maine has sponsored a summer program through the UMaine Upward Bound Math Science (UBMS) program. The program 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 and are first generation college bound students and/or from low income households.

Last summer's class focused specifically on the Maine Sustainability Solutions Initiative (SSI) and finding solutions for highlighted project research problems. One of the problems proposed to students was the need for a salamander trap that was inexpensive, portable, and designed in a way that none of the specimens would be hurt. Several of the UBMS student groups worked on the problem through a partnership with the Foster Center for Student Innovation. One of the groups produced a trap design, that with a few modifications, researcher Kristine Hoffman *(pictured above*) is now deploying in the field.

Hoffman is studying breeding ecology, habitat selection, and life histories of blue-spotted salamanders – Ambystoma laterale. Through her research, she discovered a unisex breed of salamanders, which are the result of prior hybridizing, who steal sperm from the Ambystoma laterale.

"Kristine Hoffmann's enthusiasm and care for preserving the blue-spotted salamander is an inspiration. Learning about the salamander and creating the trap for them has made me want to help preserve all Maine's wildlife and beauty. I am glad the trap we created could help her with the wonderful work she is doing," explains Courtney Perry, senior at Schenck High School.

During the winter, Hoffman was able to recruit the services of UMaine's Wildlife Society members to build the traps. On an evening in March, 27 UMaine students arrived to volunteer to assemble the pieces needed to make 90 traps.

With a cost of less than $6, "The traps are working 50 times better than what I expected," describes Hoffman, "I'm getting lots of salamanders each time I go out to check the traps." Hoffman checks the traps two times a day at several area vernal pools. By collecting more salamanders, Hoffman is able to submit many more samples to the lab, and in turn collect more data to learn more about this special species of blue spotted salamander.

There is a possibility of pursuing a patent for the design or selling the newly invented traps commercially, since no trap currently on the market meets the all the requirements that Hoffman listed. Additionally, Hoffman's research is helping to inform future proposed legislation about zones of conservation in Maine.

Maine EPSCoR Outreach and Workforce Development

"Grab-and-Go" Kits Educate Kids on Sustainability

Maine EPSCoR at the University of Maine partnered with 4-H, the youth development program of the University of Maine Cooperative Extension, to create "grab-and-go" curricula and toolkits based on the Sustainability Solutions Initiative (SSI) research topics.

Four toolkits are now available that focus on specific SSI research areas, including the Emerald Ash Borer and Invasive Species, Maine's Lakes, Vernal Pools, and River Restoration. The toolkits are available to 4-H volunteers, teachers, and others who are interested in educating youth in STEM (science, technology, engineering, and mathematics).

The inquiry-based, hands-on activities were thoroughly tested with youth during the spring, evaluated, then refined and packaged. Adam Cilli (*pictured above*), a UMaine doctoral candidate in history who revised the lessons to make them as clear and user-friendly as possible, says, "It's been exciting testing the kits with teachers and students. The process has allowed me to change the kits as the feedback comes in."

The benefits of these particular toolkits are that students are using research which was conducted in Maine by Maine researchers. The information is current and place-based and allows students to do science in their own backyard. The activities reinforce science concepts and are tied to the Next Generation Science Standards.

Professional development opportunities focused on the toolkits created are currently being offered to formal and informal educators. "The kits really extend learning for students beyond the classroom and incorporate elements of citizen science. There is something for everyone, as the activities we included incorporate many different learning styles," explains Laura Wilson, 4-H Science Professional.

For more information about the UMaine Cooperative Extension/4-H Science Toolkits, please visit their website at http://umaine.edu/4h/youth/4-h-projects/science-engineering-technology/4-h-science-toolkits/.

Maine EPSCoR Receives NSF Track 1 Grant for SEANET

A $20 million National Science Foundation EPSCoR (Experimental Program to Stimulate Competitive Research) grant will establish a Sustainable Ecological Aquaculture Network (SEANET) program in Maine.

Maine EPSCoR at the University of Maine will use the grant to mobilize the collective capacity of Maine's coastal science resources to establish SEANET, a research network focused on sustainable ecological aquaculture. SEANET will take a multi-institutional, transdisciplinary research approach to gain a comprehensive understanding of how sustainable ecological aquaculture can interact with coastal communities and ecosystems.

This multi-institutional, public-private partnership led by UMaine, in collaboration with the University of New England and other institutions in Maine, will use the state's 3,500-mile coastline as a living laboratory to study physical oceanography, biophysical, biogeochemical, socioeconomic and policy interactions that have local, bioregional, national and global implications.

Maine has multiple institutions with world-class expertise in marine sciences, engineering, climate change and social sciences. The SEANET research partners will initially include UMaine, UNE University of Southern Maine, University of Maine at Machias, Bowdoin College, Maine Maritime Academy, St. Joseph's College, Southern Maine Community College, Bigelow Laboratory for Ocean Sciences and the Cobscook Community Learning Center. In addition, dozens of other partners and stakeholder groups will collaborate on the project's research, education, workforce development and economic development activities.

The SEANET research program will utilize the field of sustainability science to understand the social and environmental connections, and feedback loops among sustainable ecological aquaculture and coastal communities and coastal ecosystems.

"This research project will use various types of science to understand how aquaculture fits in our multi-use working waterfront, while building partnerships and training students, so that we can use similar approaches to other coastal resource management issues in the future." said Paul Anderson, director of SEANET at the University of Maine.

"I am delighted that the National Science Foundation selected Maine EPSCoR for this Research Infrastructure Improvement grant," said Sen. Susan Collins. "Through tourism, commercial fishing, and sea farming, our state's economy is highly dependent on the ecological well-being of the Gulf of Maine. This grant will help fund the vital research performed by faculty and students at the University of Maine and its partners at other research and education institutions in the state as they seek to find new ways to support the cultural and economic traditions of Maine's working waterfronts and assist local governments in making informed decisions regarding coastal usage."

Maine EPSCoR Receives NSF Track 1 Grant for SEANET *continued*

"This award is great news for the university, its partners, and indeed, the entire state of Maine," said Sen. Angus King. "This important funding will help establish a new and innovative network of experts who will work together to advance our understanding of Maine's working waterfronts, which are a vital part of our state's economy. It will also benefit countless students who will gain valuable research and field experience, making this a win for everyone involved. I look forward to seeing the good work it will support."

Rep. Mike Michaud said: "This significant investment is wonderful news for the University of Maine, all of those involved with EPSCoR, and the entire state. Maine has established itself as a leader in innovation when it comes to better understanding how we can both support our valuable ecosystems and ensure they are strong drivers of our economy, and I'm excited that this grant will further that work. I know this grant will allow that innovation to continue, and I look forward to following the project."

"The coast of Maine is not only a big part of our economy but it's an important part of what makes our state unique," said Rep. Chellie Pingree. "Our history and our future are wrapped up in our coastline, and this grant is going to help us better understand the risks and opportunities for our coastal economy. It's a big investment in the university and coastal communities that will pay big dividends in the future."

University of Maine President Susan Hunter affirmed the project's importance, saying, "This NSF grant recognizes the leadership and contribution of University of Maine scholars and students who aim to support coastal ecosystems, economies, and communities by promoting sustainable policies and practices in Maine."

University of New England President Danielle Ripich said, "UNE is committed to building research and programs to support the marine economy of Maine. This public-private partnership brings two great institutions together to improve our coastal enterprises. Together with all the partners, we can do good things for Maine."

For more information see www.umaine.edu/epscor/

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Supported by National Science Foundation awards

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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