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

Maine EPSCoR

FALL 2011 Newsletter

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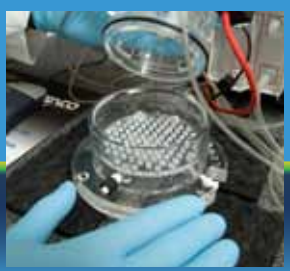



MAINE EPSCoR

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

YR2 Sustainability Solutions Initiative Research Update

SSI graduate students, Spencer Meyer and Michelle Johnson.

Maine's Sustainability Solutions Initiative

Meeting human needs while sustaining the planet's life support systems is emerging as one of society's greatest challenges. The Sustainability Solutions Initiative (SSI) is addressing this challenge in Maine by finding the best ways to advance economic and community development while maintaining a healthy environment.

SSI creates and supports innovative research partnerships in which Maine's colleges and universities help solve problems with intersecting economic, social, and environmental dimensions. Launched with a 5-year, $20 million National Science Foundation EPSCoR grant to Maine EPSCoR at the University of Maine in 2009, and matched by an additional $10 million, this SSI project is among the nation's largest and most innovative research programs in sustainability science.

The overarching goal of SSI is to develop Maine's capacity to conduct world-class, solutions-driven research in sustainability science that is distinguished by its innovative approaches to interdisciplinary collaboration and deep commitment to diverse stakeholder partnerships. A central principle of SSI is that natural science and engineering are necessary but not sufficient for understanding and solving urgent sustainable development problems, which also require expertise from the social sciences and other disciplines. Using Maine as a laboratory, SSI's focus reflects a broad consensus that landscape change science is a critical research frontier as well as a pressing challenge for sustainable development.

In its first two years, SSI has made significant progress on: 1) strengthening interdisciplinarity and building statewide capacity for collaborative research; 2) promoting university-stakeholder partnerships; and 3) advancing sustainability science research. Our research continues to focus on interactions among three primary arenas of landscape change: urbanization; forest ecosystem management; and linked climate-energy futures.

A Breadth of Expertise:

The challenges facing Maine—alternative energy development, forest management, urban planning, and other issues affecting sustainability—require multifaceted solutions.

SSI builds teams of faculty and students who collaborate across institutions and disciplines to solve problems together. More than 100 researchers, including biologists, economists, communications scholars and experts from many other fields are working on sustainability issues including: protecting clean drinking water; investigating renewable energy sources; improving forest management; and curbing invasive species.

SSI is building statewide capacity through research and education collaborations at eleven partner colleges and universities including the University of Maine, the University of Southern Maine, Bowdoin, Bates, Colby, and Unity Colleges, the University of New England, the University of Maine at Augusta, Farmington, Fort Kent, and Presque Isle. Workforce development collaborations are also being implemented with the state's community colleges and K-12 partners.

SSI Drives Research Innovation:

- 54 papers published in peer-reviewed journals to date
- 26 academic disciplines represented in interdisciplinary research teams from 11 Maine colleges and universities
- 30+ SSI conferences, workshops and seminars for students, researchers and stakeholders each year
- $400,000 EPSCoR investment in cyberinfrastructure including a cloud computing platform for SSI data
- SSI teams have brought in an additional $6 million so far through 42 successful grant applications

Maine's Sustainability Solutions Initiative (cont.)

SSI Connects Knowledge with Action:
» 150+ SSI meetings per year with stakeholders
» 27 public presentations and testimonies by SSI researchers to date
» 58 new stakeholder partnerships added in second year
» 216 on-going SSI collaborations with key stakeholders
» 558 technical presentations by SSI researchers to date

Stakeholders as Partners

SSI teams work with stakeholders as partners throughout the research process to ensure that findings are relevant to the problems they want to solve. We collaborate with stakeholders from local, state, and federal governments; tribal communities; non-governmental organizations; and business and industry.

Solutions for the Real World

All SSI projects consider local circumstances in seeking solutions. Research findings contribute to decision-making and public policy to achieve a better economic, social and environmental future for communities throughout Maine.

SSI also is educating new generations of problem-solvers to address current and future issues in sustainability. We offer post-doctoral fellowships and doctoral research assistantships, as well as research opportunities in sustainability science at the graduate, undergraduate and high-school levels. Maine EPSCoR has also formed a strong partnership with Maine's Science, Technology, Engineering, and Mathematics (STEM) community by taking a leadership role in the Maine STEM Collaborative.

SSI addresses problems that matter to Maine:
» Projects address long-term sustainability challenges in three areas: forest ecosystem management, urbanization and climate-energy futures
» Researchers are leading over twenty long-term, Maine-focused projects
» 335 students have participated in internships with SSI faculty to date
» 272 new positions including postdoctoral fellows and doctoral students
» Over 340 individuals supported each year

Partnership with Maine Public Broadcasting Network

As part of a new collaboration between the Maine Public Broadcasting Network and Maine EPSCoR's Sustainability Solutions Initiative (SSI), the first two episodes of the "Sustainable Maine" TV series will premiere on Tuesday, September 27 at 8 p.m.

These original productions examine SSI's focus on sustainability science and showcase how SSI teams are combining biophysical sciences with social science and economics to study Maine's changing landscape, and how to sustain it for future generations.

In "The Triple Bottom Line," the title refers to the business concept that economic activity should not only benefit the traditional bottom line of profit, but also to meet the needs of the people and the planet. The show examines how this concept is being applied in real Maine settings, first in Cobscook Bay off the coast of Eastport, where potential new advances in tidal power generation must also co-exist with traditional fisheries, and on a private woodlot in Otisfield where the landowner must take into account long-term land productivity and Maine traditions of recreational land use on private woodlands.

In the second episode, "Desperate Alewives," scientists work with local fishermen and citizen scientists to study alewife runs in the Androscoggin and Kennebec River watersheds to highlight the social, ecological and economic links between the long-term health of fresh water rivers and lakes and the viability of coastal fisheries. Three more episodes in the "Sustainable Maine" series are currently being produced for broadcast in 2012.

This on-going series is supported by a grant from the National Science Foundation (NSF) to Maine EPSCoR at the University of Maine.

Sustainability Solutions Initiative Lecture

Dr. Aram Calhoun running a citizen scientist training on vernal pools.

Vernal Pool Conservation as a Model for Balancing Economic Growth and Natural Resources Protection in Developing Landscapes

Researchers in Maine EPSCoR's Sustainability Science Initiative are collaborating with Maine communities to develop improved strategies for balancing economic development with natural resource protection. Using vernal pools as a model system, they are investigating ways to advance sound economic development while conserving important wetlands in populated areas and working forests.

Vernal pools are small, seasonal wetlands that provide breeding habitat for fairy shrimp, wood frogs and spotted and blue-spotted salamanders, and also help sustain wildlife populations throughout the state. These springtime pools provide food at a critical time of year for wildlife including moose, bear and other mammals, as well as reptiles and migratory waterfowl.

In 2006, Maine passed the strongest vernal pool protection legislation in the nation, based on a decade of research by Dr. Aram Calhoun and other scientists in the eastern U.S. to help the state meet federal mandates. This legislation regulates development within 250 feet of "significant vernal pools," which provide exemplary breeding habitat for indicator species.

Calhoun and Maine Audubon created the Maine Municipal Vernal Pool Mapping and Assessment Project to educate communities about vernal pools. They have so far trained citizen scientists in 13 communities to map and assess significant vernal pools. This project provides landowners with free surveys, enables more informed town planning and encourages conservation of natural resources at the local level.

Now, Calhoun's team is collaborating with stakeholders on research projects that address emerging questions related to the legislation, natural resources conservation on private land and economic development. These include: filling in knowledge gaps in amphibian ecology, identifying stakeholder issues and roadblocks to conservation on private land and understanding the economic impacts of vernal pool and other natural resources conservation on landowners and town economies.

To better understand these questions, Calhoun's team is investigating the human dimensions of vernal pool and natural resources conservation in projects led by two PhD candidates. They are working with two of the communities that participated in the Vernal Pools Mapping Project to create model town plans that provide flexibility in conserving vernal pools and other natural resources while advancing economic development.

Such proactive planning offers potential benefits including cost savings by avoiding development in inappropriate areas, improved quality of life and effective conservation of important natural resources. Research findings will contribute insights into conserving natural resources on private land and sustaining ecological processes in human-dominated landscapes. Under this scenario, Maine can continue to provide important wildlife habitat in the heavily populated Northeast *and* a vibrant economy for its citizens.

YR2 Sustainability Science Initiative Research Highlight 3

Senator George J. Mitchell Lecture on Sustainability: *Helping Science Speak for Itself: Improving Communication Between Scientists and Citizens*

On October 13, 2011, the Senator George J. Mitchell Center for Environmental & Watershed Research and the Sustainability Solutions Initiative will host Baruch Fischhoff of Carnegie Mellon University for a lecture on sustainability entitled: Helping Science Speak for Itself: Improving Communication Between Scientists and Citizens.

Baruch Fischhoff is a cognitive psychologist and professor of social and decision sciences at Carnegie Mellon University. His talk will focus on his research on using "non-persuasive communication" to explain science to the public in ways that help people make more informed decisions about complex issues.

Fischhoff, whose leadership roles including chairing the FDA's Risk Communication Advisory Board and serving on EPA's Scientific Advisory Board and chairing its Homeland Security Advisory Committee, focuses on helping the public understand and respond to health and environmental risks. His research interests include establishing a new interdisciplinary approach to communicating science to the public.

This event is scheduled for noon at the Wells Conference Center at the University of Maine and is free and open to the public. Tickets are required. Please call (207)581-3244 or visit www.umaine.edu/waterresearch/

Coming Soon - SSI Communications Center

Building and maintaining partnerships is a major component of the SSI program, and it requires effective communication systems to support it. With over 340 researchers, postdoctoral associates, professionals, graduate, undergraduate, and high school students directly working on the Maine EPSCoR SSI project at eleven colleges and universities, keeping everyone connected definitely presents some challenges. Plus these individuals also work with over 200 additional stakeholders from business/industry, government, non-profits, and other educational institutions throughout the state.

Which is why Maine EPSCoR initiated plans last spring to transform a former garage area at the Senator George J. Mitchell Center at UMaine, which is the "home base" for SSI, into a state-of-the-art SSI Communications Center. When completed later this fall, the Center will feature large-scale videoconferencing capabilities that include full wall projection screens, multiple high-definition cameras and projectors, archiving/streaming capabilities, audio systems, and a large-scale visualization wall. Videoconference capacity will allow up to 90 connections at a time, and the space seats up to 80 people in person. This enhanced capability will provide more than enough capacity for all SSI institutions, participants, and stakeholders to join together to take part in SSI team meetings, discussion groups, seminars, etc.

Stay tuned for the "after" photo and update in our next newsletter!

Maine EPSCoR STEM Outreach and Workforce Development

Maine EPSCoR High School Research Experience Program

Siobhan Harrity analyzes data she assisted in collecting during a research trip.

The Maine EPSCoR High School Research Experience Program aims to increase student STEM skills and encourage career interests in STEM disciplines by bringing high school students to UMaine to work with faculty and graduate students. The high school students actively worked in the labs and in the field, assisting researchers and presenting the results of their collaborations in both reports and public seminar presentations. This year's focus was on fields related to SSI's sustainability science research.

During the summer of 2011, a total of 22 high school students from Orono High School participated in research internships. Students apply through their school and are chosen in a selective process, and several elect to continue their internships through the following academic year.

This program provides high school students with the opportunity to directly participate in cutting-edge research with faculty teams at a time when they are thinking about and formulating their post-high school plans. Through interviews with these participants we have determined that many can develop or solidify an interest in studying a STEM field in college through their experience conducting what they consider relevant and beneficial "real-world" research. The program both expands their interests if they were not interested in STEM and focuses them if they already were. Each year many of these students subsequently enroll at UMaine, and several are able to continue their internships as undergraduate students.

As a culmination of their experience, the students write a research report and present their research during an evening program open to the public. This year the students' projects ranged broadly in topic with titles such as, "Insect Predation in Blueberry Fields," "Working with the SSI Knowledge-Action Team," "Wind Energy in Maine," "State Mercury Advisories Report," and "Using Cerceris Wasps to Find Emerald Ash Borer."

Alex Bulteel collects fire ants from a test container into a holding jar. His research focused on controlling the invasive species in Maine.

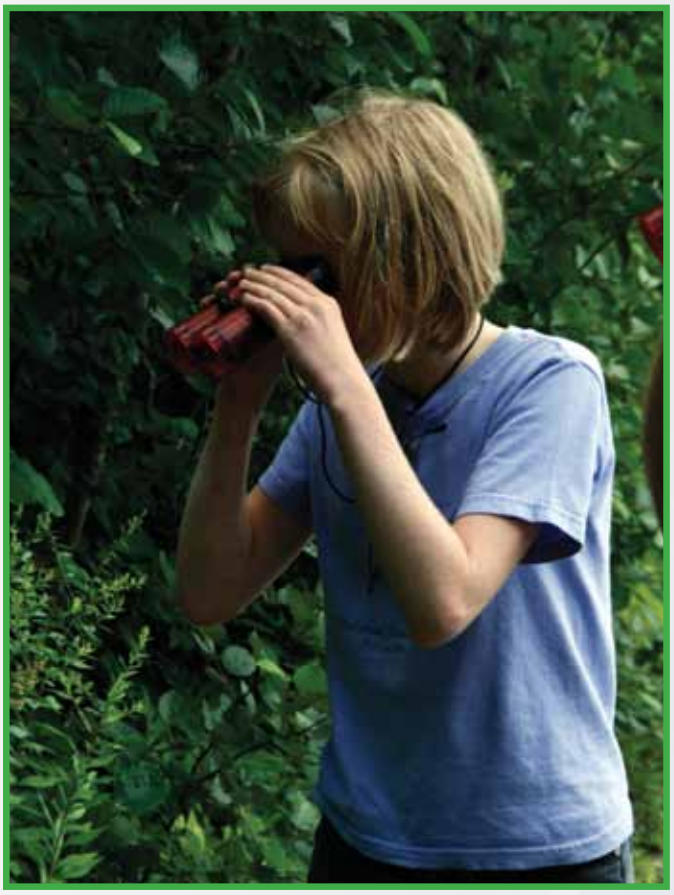
The summer 2011 Orono High School interns pictured with their faculty and graduate student advisors.

Maine EPSCoR STEM Outreach and Workforce Development

Maine EPSCoR Forms Partnership with Camp CaPella to Provide Nature Programming to Campers

This summer Maine EPSCoR formed a new partnership with Camp CaPella of Dedham, Maine to provide STEM educational programming to youth and adults with disabilities. Each week, campers were introduced to an environmental sustainability topic that could be explored using their lakeside surroundings, utilizing special materials provided with funding from Maine EPSCoR.

Beth Smyth-Handley, a science teacher at Dedham Middle School who works with the camp every summer, took the lead on this project. She developed three rotating topics for this year's pilot program: birds, aquatic wildlife, and trees and wildlife. Each of these topics included a discussion of related studies and potential career paths as well as hands-on activites and outdoor investigation.



Campers learned to use iPads to investigate birds found at Phillips Lake and around Maine (above) and binoculars to examine wildlife around the camp (left).

The bird project, for example, involved discussion of ornithology as the campers were shown stuffed toy birds and listened to their calls. Then they were able to use an iPad application to identify those same birds from amongst hundreds of species. Finally, they went for a walk around the campgrounds with binoculars to try and find them first-hand. Even if they didn't see any that day, campers learned to notice marks in a tree made by one of the birds they had talked about (a woodpecker) and about how important habitat preservation is.

During seven pilot activities in seven weeks of camp, 138 campers were able to participate in this special outreach opportunity. And with continued support from Maine EPSCoR, Camp CaPella plans to expand their nature segment for future summers when it will be part of their morning rotation of activities, five days a week.

Camp CaPella is located on Phillips Lake and provides recreational and educational opportunities for people with disabilities at their waterfront summer camp.

Maine EPSCoR STEM Outreach and Workforce Development

Native STEM Scholarship Development Program

Sweet Grass Project

Native STEM Scholar Natalie Michelle works with a student to prepare sweet grass seedlings.

Sweet grass is a hot commodity. Not only do Native people in Maine use it culturally for basket-making, prayer offerings and gifts to honor a person of significance, but it has become a high-demand item for Natives and non-Natives alike for its aromatic qualities. Conservation efforts have become an area of concern due to its decrease in habitat and inaccessibility to Native people as a result of private landownership.

This is why Natalie Michelle, an SSI graduate assistant with the Native STEM Scholarship Development Program, is working to spread awareness and equip Native youths with the knowledge to plant sweet grass on Native-owned land. In the summer of 2011 she travelled to the four Native tribes in Maine with seedlings for kids to plant and spoke with them about the importance of the grass and how they could help in sustainability and conservation efforts. Approximately 50 kids, K-12, participated in these activities.

A Native student plants sweet grass seedlings.

Emerald Ash Borer Project

The emerald ash borer (EAB) poses a real threat to the ash trees of Maine. It's spread is uncomfortably close and containment efforts may not be enough.

The brown ash is an integral part of Native culture in Maine, providing the material for the time-honored craft of basketmaking. Not only would the loss of this tree be a blow to their tradition, but it would have a severe economic toll on the community as well. Many Native people make their livelihoods making and selling baskets.

This is why Darren Ranco, SSI faculty member and chair of Native American Programs, is going on the offensive. He is working with the Native community and other stakeholders to develop the knowledge and skills to protect this important resource.

As part of a STEM outreach effort, he co-directed a hands-on workshop in the summer of 2010 that showed students and their families from the Penebscot Nation how to identify the brown ash and how to collect and preserve its seeds. Additional workshops for other tribes in the state are planned.

Native students collecting brown ash seeds.

Maine EPSCoR Cyberinfrastructure

Maine EPSCoR Hosts the NECC

The Northeast Cyberinfrastructure Consortium (NECC) is a group of five states that have come together to collaborate on enhancing regional connectivity and cyber-enabled collaborative research and education. The NECC states consist of Maine, Vermont, New Hampshire, Rhode Island, and Delaware, and together they received a collaborative NSF EPSCoR RII Track 2 award of $6M in 2009 as well as several NIH INBRE supplements to begin the process of bringing the northeast out of the "black hole of connectivity" for research and education.

NECC members at the second annual consortium meeting in Orono, ME in March, 2011.

Over 40 participants attended the second annual NECC meeting at the University of Maine in Orono in March 2011, with program officers from NSF EPSCoR and NIH INBRE also in attendance. Presentations covered each state's CI progress and cyber-enabled collaborative research, and activities in workforce development, diversity, and external engagement. Members also focused discussion on how to sustain NECC's momentum on a regional basis.

Maine EPSCoR Receives NSF EPSCoR C2 Award

Maine EPSCoR has just received a $1M award from NSF EPSCoR for their Inter-Campus and Intra-Campus Cyber Connectivity (RII C2) program. The two-year project, entitled "Maine EPSCoR End-to-End Connectivity for Sustainability Science Collaboration," will allow Maine to continue to build on the progress it has made over the last few years in enhancing the connectivity of its research, higher education, and K-12 institutions through MaineREN, Maine's Research and Education Network.

Maine's cyberinfrastructure efforts to date have focused on building networking and computing power at the state level, with an emphasis on expanding the state's optical network to overcome basic connectivity limitations. This RII C2 project will leverage those multi-million dollar investments that have already been made for the installation of 1,100 miles of middle-mile fiber optic cable, shared computing resources for high performance computing and cloud computing, the Maine School and Library Network, the Maine Learning Technology Initiative, and high-performance visualization and videoconferencing.

The primary bottleneck still remaining in Maine's cyberinfrastructure landscape has been the final connection between the fiber backbone and the researchers and students on the university and college campuses. By filling relatively small gaps in cyber-connectivity through this RII C2 project, Maine will be able to make very large gains in the effectiveness of the state's cyberinfrastructure that will allow researchers to fully utilize the existing multi-million dollar investments to improve research effectiveness, promote collaboration, improve K-12 interaction, and develop the future workforce of the state.

The specific focus of this RII C2 project is to close those gaps in cyber-connectivity for the Maine EPSCoR Sustainability Science Initiative (NSF EPSCoR RII Track 1) researchers and students at the campuses of the University of Maine system. These gaps are preventing the delivery of true end-to-end connectivity between Maine's researchers and the advanced networking services provided over MaineREN. By extending the reach of the enhanced MaineREN fiber backbone directly to the individual researchers, the high speed connectivity required to conduct cyber-enabled research and integrated education will allow for advances in

Maine EPSCoR Cyberinfrastructure

Maine EPSCoR Receives NSF EPSCoR C2 Award (cont.)

discovery and innovation, collaboration, workforce development, and broadened participation.

The research and education focus that will be enabled by this project is the Maine EPSCoR Sustainability Science Initiative (SSI), which is our NSF EPSCoR RII Track 1 project. Based at the University of Maine (UMaine), which is the state's flagship research and education institution, SSI also includes participation by the other primarily undergraduate campuses of the University of Maine System, plus five private colleges: Bates, Bowdoin, Colby, and Unity Colleges; and the University of New England.

FY10 NSF EPScoR Co-Funding Awards to Maine

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 NSF program. This mechanism operates internally within NSF and does not require any action on the part of the proposer. Since FY2000, 115 awards have received over $14M in co-funding, and enabled over $33M in projects to happen in Maine that would not have otherwise been funded.

FY2010 Maine NSF EPSCoR Co-Funded Awards

Institution	Title	PI Name	EPSCoR Funding:	Total Project:
Bates College	Shetland Islands Climate and Settlement Project: Multidisciplinary Analysis of Environmental Catastrophes on Northern Coastlines	Bigelow, Gerald	$203,048	$257,324
Bates College	MRI: Acquisition of a High-Power Narrow-Band Tunable Laser System for Use in Physics Research	Lundblad, Nathan	$150,000	$308,095
Bowdoin College	RI: Small: RUI: Spatial Prototypes	Chown, Eric	$122,584	$245,168
St. Joseph's College	Integration of Spectroscopic Techniques Across the Undergraduate Curriculum	Benfaremo, Nicholas	$99,016	$198,033
University of Maine	CDI-Type II: Collaborative Research: Perception of Scene Layout by Machines and Visually Impaired Users	Beard-Tisdale, Mary-Kate	$349,000	$700,937
University of Southern Maine	CAREER: Evolutionary Computation and Bioinformatics	Congdon, Clare	$200,000	$200,000
TOTAL:		**6 awards**	**$1,123,648**	**$1,909,557**

Maine STEM Collaborative STEM Summit

The Maine STEM Collaborative, begun in 2007, is a statewide partnership of education, research, business, government, and non-profit sectors who have come together to foster the improvement of science, technology, engineering, and mathematics (STEM) education in the state.

The Collaborative's vision is that Maine will have a strong educational foundation in science, technology, engineering, and mathematics that will propel the state toward economic prosperity, and its mission is to work to increase the quality of STEM education, aspirations, and awareness in the state through the integration, coordination, and promotion of efforts.

As part of addressing its mission, the STEM Collaborative has sponsored two statewide STEM Summits, which bring together over 300 stakeholders from diverse sectors to examine the challenges and opportunities for STEM education in Maine. Past summits have included representation from higher education, K-12 teachers and administration, business/industry, government, nonprofits, K-12 students, and undergraduate students.

The 2012 Maine STEM Summit, which will be held at Colby College in the spring of 2012, will help Maine's STEM community to understand the importance of partnerships and coalition building in order to address these challenges and opportunities. Conference sessions will focus on understanding effective partnerships in the context of three significant STEM strands: K-8 Foundations in STEM: Engineering and Sustainability; and Education and Workforce Development.

American students continue to lag internationally in STEM education, making them less competitive for the jobs of present and the future. A recent U.S. Department of Commerce study shows that over the past 10 years, growth in Science, Technology, Engineering and Mathematics (STEM) jobs was three times greater than that of non-STEM jobs. The report also shows that STEM jobs are expected to continue to grow at a faster rate than other jobs in the coming decade.

Watch for further details to be distributed regarding this upcoming opportunity. For more information on the Maine STEM Collaborative, see:
www.mainestem.org
www.mmsa.org
www.umaine.edu/epscor

Former Governor King at the 2010 STEM Summit.

MAINE EPSCoR

2011

Maine EPSCoR State Conference

September 26, 2011, 8 am-5:30 pm

Wells Conference Center at the University of Maine, Orono

To view presentations from this conference, visit our website at www.umaine.edu/epscor

5717 Corbett Hall, Room 444
Orono, ME 04469-5717

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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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