### MAINE EPSCOR AT THE UNIVERSITY OF MAINE

Experimental Program to Stimulate Competitive Research

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### **Sustainability Solutions Initiative Update**

#### **Connecting Knowledge with Action for Effective Solutions**

Maine EPSCoR's Sustainability Solutions Initiative (SSI) is mobilizing the research power of the state's colleges and universities to help communities solve urgent challenges at the intersection of economic, environmental and social issues. Led by the Senator George J. Mitchell Center and funded by a grant from the National Science Foundation to Maine EPSCoR, SSI is one of the nation's largest and most innovative research programs focused on advancing the emerging field of sustainability science.

More than 100 researchers from a wide range of disciplines are now collaborating on SSI teams in over 20 projects in communities around the state. These teams are developing new tools to help Maine communities and policy makers make more informed decisions to support a sustainable future amid uncertainty about the economy, climate change, and other urgent challenges.

Over the past year, SSI teams have made significant progress in developing innovative ways to address key sustainability challenges. For example, the Sustainable Urban Regions Project, led by Charles Colgan, Professor of Public Policy at the Muskie School of Public Service at the University of Southern Maine, is developing computer simulation models to help cities and towns in Greater Portland and Greater Bangor make more informed choices about how they develop over time. These models could be used to help plan more energy-efficient development and transportation in the face of rising fuel prices, examine development prospects for empty big-box stores, and help solve other sustainability challenges.

Another SSI team, led by University of New England researchers Pamela Morgan, Associate Professor, Department of Environmental Studies, and Christine Feurt, Director of the Center for Sustainable Communities, is developing a first ever "report card" on the health of the Saco River Estuary, which surrounding communities are looking to as a source of renewal and economic development. Based on information needs identified by a wide range of stakeholders, the report card will serve as a tool to help improve policy decisions affecting the estuary, monitor its health, and

better protect its future.

Other SSI teams are conducting research that is contributing to new solutions on issues ranging from helping coastal communities weather storms to working with towns to balance growth and conservation to benefit both people and wildlife (see SSI's most recent Solutions newsletter at http://www.umaine.edu/ sustainabilitysolutions/news/solutions.html). Although SSI teams are working on diverse issues, they share key commonalities, such as including students at all levels from undergraduate to doctoral, collaborating with stakeholders every step of the way, and bringing together researchers from many disciplines. These teams also share a common goal: connecting knowledge with action to contribute to effective solutions for Maine.



### **Sustainability Solutions Initiative Highlight**

#### Unique Course Trains Students in Managing Boundaries to Advance Sustainability Solutions



Maine EPSCoR Sustainability Solutions Initiative graduate students interact with invited speakers who discuss their roles in an innovative boundary spanning course.

Creating solutions to sustainability challenges demands high levels of collaboration, coordination, and knowledge exchange. Engineers and scientists from diverse fields are building collaborative research teams to facilitate comprehensive assessments of problems. In addition, they are working with institutions and individuals beyond the walls of universities to identify relevant problems and deploy creative solutions. Working across disciplinary and institutional boundaries is central to this mode of science. Yet few academic programs train students for these research experiences.

UMaine faculty Kathleen Bell, David Hart, Laura Lindenfeld, and Brian McGill, who are part of the Maine EPSCoR Sustainability Solutions Initiative, created a unique graduate course earlier this year that prepares students for the challenges and opportunities of conducting sustainability science research.

Bell, an economist; Hart, a watershed scientist; Lindenfeld, a communication scholar; and McGill, an ecologist; designed the course to teach students about managing boundaries to advance sustainability solutions. Students learned about working collaboratively with researchers from different fields and with stakeholders from beyond the university's walls, gained knowledge about science and decision support, heard first-hand from researchers and decisionmakers engaged in sustainability science, and received training in communicating science to public audiences. While students benefited from reading articles on these themes, the content came to life through interactions with science practitioners and users. Panels of invited speakers allowed the students to engage with researchers, decision-makers, and other stakeholders about the boundary work necessary to address sustainability challenges. For example, Maine legislators encouraged students to think about how their research could inform pressing public policy issues. Staff from nongovernment organizations shared their experiences as boundary workers, navigating interactions between the public, private, and academic sectors. Collaborative research teams shared on-the-ground experiences including innovative research partnerships focused on tidal energy, bioenergy, and forest management issues.

The course challenged students to recognize and appreciate disciplinary and institutional boundaries. By linking academic scholarship with the real-world experiences of engineers, researchers, and stakeholders, students were encouraged to compare and contrast their interests and experiences with those of others.

Throughout the course, participants emphasized that dexterity is important to boundary management. Successful boundary management requires wearing multiple hats. Courses such as this innovative UMaine model offer a valuable tool that helps prepare students for the dynamic and complex research environments demanded by sustainability challenges.

### **SSI** Communications Center Completed

With over 320 participants working on the Maine EPSCoR SSI project at 11 colleges and universities, keeping everyone connected definitely presents a challenge. SSI also works with over 200 stakeholders from throughout the state, and it quickly became evident that we needed a large-scale solution for effective communication systems.

Planning began in the spring of 2011 to transform a garage at the Senator George J. Mitchell Center at UMaine – which is "home base" for SSI – into a stateof-the-art SSI Communications Center. After a yearlong process, the Center "goes live" in September.

The new Communications Center features large-scale videoconferencing capabilities, including full wall projection screens, multiple high-definition cameras, projectors, archiving/streaming capabilities, audio systems, Smartboard, and a large visualization wall.

The Center builds on other Maine EPSCoR cyberinfrastructure improvements that expanded



SSI's new Communications Center.

the state's high bandwidth capabilities and videoconferencing network to fully engage all SSI partner institutions, and is the final step in providing a statewide infrastructure that can support an effective virtual organization of this magnitude.

The new capacity allows for up to 90 videoconference or webcam connections at a time, and the space seats up to 80 people in person. This enhanced capability provides more than enough capacity for SSI institutions, participants, and stakeholders to take part in SSI All-Team meetings, discussion groups, seminars, workshops, and trainings.

### **MPBN "Sustainable Maine" Series**



ThecollaborationbetweenMaineEPSCoRandMainePublicBroadcasting Network(MPBN) hit a homerunlast spring, with both

of the Season 1 documentaries in the "Sustainable Maine" series being nominated for Emmy Awards.

Both episodes premiered September 2011. The first episode, "The Triple Bottom Line," introduces the research concepts behind the Maine EPSCoR SSI project, and examines how they are being applied in Cobscook Bay in a tidal power generation project, and with family forest owners in Central Maine. The second episode, "Desperate Alewives," takes a look at the efforts to restore Maine's alewife population to revitalize fisheries and communities.

Maine EPSCoR partnered with MPBN in 2010 to produce 2-3 documentaries each year that focus on SSI's research. Work just finished on the next three documentaries, which will premiere this fall:

• Episode 3: "Saving Our Lakes" focuses on the Belgrade Lakes region, where SSI researchers

are studying how development affects lake water quality and local economies. Premieres 9/27/12 at 8:30 pm; repeats 10/7/12 at 1:00 pm.

- Episode 4: "Basket Trees" looks at how SSI researchers have teamed up with Wabanaki basketmakers who weave exquisite baskets from Maine's brown ash tribal members, and state and federal agencies to rally against the threat of the emerald ash borer invasive beetle. Premieres 10/4/12 at 8:30 pm; repeats 10/21/12 at 1:00 pm.
- Episode 5: "Maine's Vernal Pools" showcases how an SSI research team is using local vernal pool conservation as a model to examine how towns can plan future development in ways that benefit people and wildlife alike. Premieres 10/11/12 at 8:30 pm; repeats 10/28/12 at 1:00 pm.

MPBN has just begun filming for the next three episodes (Season 3), which will wrap up by next summer and air in the fall of 2013. Once they have premiered on air, the documentaries can be viewed from MPBN's website at: http://www.mpbn.net/Television/ LocalTelevisionPrograms/SustainableMaine.aspx , or links can also be found on the Maine EPSCoR and SSI websites. Links to additional podcasts and researcher profiles are also available on all sites.

### MAINE EPSCOR AT THE UNIVERSITY OF MAINE

### **SSI May Research Retreat**

Over 80 SSI members gathered in May at the Schoodic Education & Research Center in Acadia National Park for the annual SSI Research Retreat. After a collaboration "mixer" and SSI update, each SSI team had 4 minutes to present their research progress in an innovative "pecha kucha" style. This was followed by several "World Café" discussion sessions that experimented with new approaches to communicating research in more effective ways.

The next day featured several panels: 1) graduate students reflected on the challenges and opportunities of being an interdisciplinary SSI PhD student; 2) SSI





Partner institutions (SSPs) discussed some of the unique challenges they face; 3) a third panel compared different approaches to modeling in the context of multiple research focuses; and 4) a fourth panel examined the complexities of solutions-driven research. Three "teasers" were also presented as possibilities for future workshops on developing multiple future scenarios, participatory modeling, and knowledge to action. The day ended successfully with continuing discussions of how to best sustain SSI beyond EPSCoR.

**Save the Dates** 



Keynote Speaker Pamela Matson, Stanford University with remarks by Senator George J. Mitchell

# EPSCOR Save the Date! Maine EPSCOR State Conference

September 24, 2012 Wells Conference Center at

the University of Maine, Orono

Tuesday, September 25, 2012 1:00 pm, Hauck Auditorium University of Maine, Orono, ME

Senator George J. Mitchell Lecture on Sustainability

### Maine EPScoR at the NSF EPSCoR National Conference

Maine was well-represented at the 22nd National NSF EPSCoR Conference in Couer d'Alene, ID last October, with 16 individuals taking part in the four-day event.

In addition to NSF EPSCoR Project Director Michael Eckardt, SSI Research Project Director David Hart, Maine EPSCoR Director Vicki Nemeth, and Maine EPSCoR Program Assistant and Diversity Specialist Jennifer Dunham, participants also included 3 SSI UMaine faculty members and one from UMaine Fort Kent, 6 SSI graduate students, and 2 Maine legislators.

SSI faculty member Kathleen Bell was an invited presenter for the Water and Environment session, and spoke on "Getting to Water and Environment Solutions Through Sustainability Science." Vicki Nemeth was an invited presenter on the NSF Communicating Science Panel, and outlined how Maine EPSCoR has taken the NSF communications training to an in-depth level with our SSI teams.

SSI graduate student Karen Hutchins won the Judges' Pick Runner-Up Prize for her poster "Linking Knowledge with Action Through Municipality-U n i v e r s i t y P a r t n e r s h i p s : Predicting Interest in and Preference for Partnerships."

And SSI graduate student Spencer Meyer was the lucky winner of an iPad for having been able to give away all of



SSI graduate student Karen Hutchins receives her poster award from NSF EPSCoR Head Henry Blount.

his ribbons in the networking exercise that encouraged students to talk with faculty and others about their research posters.

This was an exciting opportunity for Maine's faculty and students to network extensively with participants from other EPSCoR jurisdictions, and to showcase the high level of research and integrated education that is part of Maine EPSCoR's efforts in the state.

## FY2011 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, 105 awards have received over \$12M in co-funding, and enabled over \$30M in projects to happen that would not have otherwise been funded.

FY2011 Maine NSF EPSCoR Co-Funded Awards				
Institution	Title	PI Name	EPSCoR Funding:	Total Project:
University of Maine	CAREER: Using hydroclimatic thresholds and changing baselines to develop decision tools for adaptive water use policy	Jain, Shaleen	\$203,270	\$406,551
University of Maine	REU Site: Explore It! Building the Next Generation of Sustainable Forest Bioproduct Researchers	Neivandt, David	\$250,000	\$500,000
University of Maine	Collaborative Research: A Reaction Kinetics Database for Modeling Biogeochemical Systems	Olsen, Amanda	\$33,072	\$66,145
University of Maine	NUE: Nano Science And Laboratory Experience (ScALE) at UMaine	Smith, Rosemary	\$100,000	\$200,000
University of New England	Collaborative Research: Fluids for Life Science Studies	Vesenka, James	\$44,290	\$88,581
TOTAL: 5 awa			\$630,632	\$1,261,277

#### Maine Policy Review Sustainability Issue

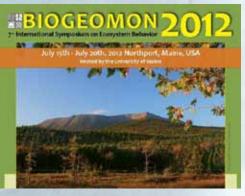
UMaine's Margaret Chase Smith Policy Center partnered with the Maine EPSCoR SSI project this past spring to produce a special issue on SSI research and partnerships. This is widely distributed to politicians and key thought leaders in Maine, and SSI is currently planning follow-up events around this issue. The full document can be downloaded from the Margaret Chase Smith Policy Center website at: http://mcspolicycenter. umaine.edu/.



MAINE POLICY REVIEW

Margaret Chase Smith Policy Center

#### **BIOGEOMON 2012 Data Literacy Teacher Workshop**



Maine EPSCoR partnered with The Acadia Learning Project to pilot a firstever K-12 teacher professional development component in conjunction with

the BIOGEOMON 2012 International Symposium on Ecosystem Behavior, which was held in Northport, Maine on July 15-20, 2012. The overarching goal of the workshop was to provide teachers with an opportunity to work with a practicing scientist on an authentic data set to develop their own skill and content knowledge related to data literacy.

Acadia Learning is a collaboration of the Schoodic Education and Research Center Institute (SERC),

the University of Maine, and Maine Sea Grant, and engages teachers and students in participatory scientific research opportunities.

Fourteen teachers from throughout Maine took part in the symposium itself. They then participated in their own follow-up workshop to learn science data literacy concepts and practice. They were partnered with 8 of the symposium's presenting scientists and 3 science educators, and worked with the scientists' data sets to further develop their analytical skills. The scientists will continue acting as mentors and following up virtually with the teachers throughout the academic year as they implement their new knowledge in the classroom.

Stephen Norton, symposium organizer and UMaine Professor Emeritus, School of Earth and Climate Sciences said of the teacher workshop: "It was an amazing experience to watch these teachers learn, working with world-class scientists."

#### **RiSE Center STEM Educators Conference**

The Maine Center for Research in STEM Education-the RiSE Center, located at UMaine, Orono—provides an integrated approach to University-based research and professional development in science and mathematics education. Maine EPSCoR partnered with the RiSE Center this summer to sponsor a conference on "Integrating STEM Education Research into Teaching: Knowledge of Student Thinking".

Held June 20-22 at UMaine, the conference brought together 125 K-16+ STEM educators and researchers for talks, panels and workshops, with the goal of bringing research-supported practices into classrooms and building a community to support this change.

Themes of the conference included: 1) using disciplinebased education research in middle, secondary, and postsecondary STEM classrooms; 2) research-supported strategies to increase participation and learning in STEM, particularly among students from underrepresented groups; 3) building effective partnerships to implement research-guided practices in the classroom; and 4) research-supported strategies for STEM teacher preparation and professional development.

### **Native STEM Scholarship Development Program**

### **UMaine Native Students Attend National Climate Change Conference**

With support from the U.S. Environmental Protection Agency (EPA), the Houlton Band of Maliseets, and Maine EPSCoR, four undergraduates, two graduate students, and one faculty attended the American Indian Alaskan Native Climate Change Working Group Spring Meeting at the Tohono O'odham Indian Nation in Arizona in April 2012.

The students found the conference to be a "call to action." Kyle Lolar, a student who attended, said, "Society's still trying to debate, 'Is climate change



During the summer 2012. Maine of EPSCoR Native Collaborative Graduate Research Assistant Natalie Michelle conducted environmental an science segment for a youthcamporganized

by Nee-loon, a multi-tribal non-profit organization. Michelle taught around 20 Native elementary to middle school-aged kids about the intersection of scientific

Native Youth Attend Native Earth Camp

Maine EPSCoR provided travel support for three Native high school students to attend the "Native Earth: Northeast Regional Native Youth Environment Camp" in Syracuse, New York. These three students, with chaperones from their tribe, attended the 10day summer camp with other indigenous youth from around the region.

### **Two New SSI Native Collaborative Research Assistants Hired**

Maine EPSCoR's two Native Collaborative Graduate Research Assistants, Natalie Michelle and Anthony Sutton, both received their Master's degrees in the summer of 2012. These students were very successful in connecting with youth in tribal communities and on campus over the past two years.

actually happening?' We know it is happening. We've seen it. It's in our stories. It's been that way for a long time."

The conference focused not on "what's coming," but how Native communities could face present impacts together. All of the students said they felt motivated to pursue studies and research that would enable them to help their tribes better face these threats of global climate change going forward.

### **Native Youth Camp**



knowledge and tribal knowledge in the natural world, and about the importance of sustainability in order to continue native traditions

furthering their education to better serve their tribe and

felt the camp was a great opportunity to learn and take

Though they all went into it with an interest in the environment and science, some were able to focus those interests into more specific career paths, such as aquatic preservation. All expressed an interest in

that knowledge home.

Two new assistants have been recruited to carry on their education and outreach efforts with the Native community: Kristine Reed, a Ph.D. student in Anthropology and Environmental Policy and Joshua Crofton-MacDonald, a Master's student in Ecology & Environmental Science, joined SSI this September.

#### **Camp CaPella Expands STEM Programming**

This summer Maine EPSCoR expanded its partnership with Camp CaPella of Dedham, Maine to provide STEM programming to its campers with disabilities five days a week. The previous year's pilot program featured activities involving environmental sustainability and related careers one day a week. This year these topics became one of their daily four-part activity rotations, titled, "Wild Adventures".

Beth Smyth-Handley, a local middle school science teacher who works with the camp, continues to lead this project. This year she designed topics with the help of the Chewonki Foundation, an academic institution on the coast of Maine that provides traveling educational programs. With funding from Maine EPSCoR, educators from Chewonki were able to visit the camp each week and give one of four presentations, "Owls of Maine," "Water and Wildlife," "Fur, Feathers, and Feet," and "Predators." The remaining days Smyth-Handley led the campers in activities and outdoor exploration that complemented these presentations. These ranged from looking at aquatic plants under microscopes to using

educational applications on iPads to building s e l f propelled "boats" out of water b o t t l e s, vinegar, and baking soda.



"When the campers were told they were going to be scientists they got so excited," says Smyth-Handley. "Many of our campers have never done these things. 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."

During seven weeks of camp, 125 campers participated, ranging in age from elementary school kids to adults.

### Preparing High School Students with Disabilities for Postsecondary STEM Opportunities

In December of 2011, the University of Maine's Center for Community Inclusion & Disability Studies (CCIDS), with support from Maine EPSCoR, began a pilot program to support the transition of Maine high school students with disabilities into STEM-related postsecondary educational opportunities.

In this first year of programming, CCIDS held three



workshop sessions for high schools students a round the state. Sessions one and two were held at sites on the University of Maine campus in Orono and the University of Southern Maine campus in Portland, with the two groups connected virtually by videoconference. The third session was held at the University of Maine for students from both groups. They visited different STEM departments and explored elements of campus life, along with continued workshops on subjects such as self-advocacy, resources and accommodations, and effective participation in mentoring relationships and internships.

Nine students participated in each of the first two sessions and eight students came to Orono for the third. These students expressed how much they learned, particularly about attending a four-year college, and that they'd like to see the program continued. One student said, "I have much more understanding of college and STEM careers and heard about so many options." CCIDS is now in the process of recruiting students for their second year of programming.

### Upward Bound Studies Climate Change & Sustainability of Human Behavior

The University of Maine's Upward Bound Math-Science Summer Program, with support from Maine EPSCoR, focused their 2012 group research project on climate change and the sustainability of human behaviors.

Over the course of six weeks, 28 atrisk high school students worked with researchers on campus, as well as citizen scientists, on ice cores, peat bog cores, vernal pools, and human behavior. Mark Anderson and Caroline Noblet, faculty researchers with the Sustainability



Students examining vernal pool specimens.

Solutions Initiative (SSI), facilitated the human behaviors segment. Jenny Shrum, a graduate student on the SSI project, also helped facilitate the vernal pools segment.

Upward Bound has been a longterm partner with Maine EPSCoR, often receiving funding for individual activities. However, this was only the second year they have been able to focus their whole summer research project on Maine EPSCoR's research infrastructure improvement grant theme.

#### **Orono High School Internship Program Completes Sixth Year**

In June of 2012, a new group of 18 Orono High School students were welcomed to the University of Maine campus to begin their summer research internships. These students were placed in a variety of departments, working side-by-side with university faculty, postdoctoral fellows, and graduate students on current, cutting-edge research. This program has experienced enormous success in its six years, with many students continuing to work for their mentors through the academic year and across summers, both as high schools students and undergraduates. This fall three students will continue their work during the school year with the support of Maine EPSCoR.



2012 Orono High School student research interns shown with their advisors.

#### **Maine EPSCoR & SSI Partner with ADVANCE Grant**

In the past year,

has partnered with

the University of Maine's National

Science Foundation

A D V A N C E

grant, the Rising

Tide Center, on a

number of fruitful

activities. During

2011-2012

EPSCoR

Maine

the



academic year, the Sustainability Solutions Initiative (SSI) and the Rising Tide Center, along with a number of

other campus sponsors, conducted an Interdisciplinary Research Workshop series. Three were held each semester on a variety of topics with many SSI faculty participating as speakers.

The Rising Tide Center held its first networking conference in May of 2012. This event was held for women faculty across the University of Maine System as well as the private colleges around the state. Guest speakers presented on relevant topics such as the work/ life balance, partner accommodations, mentoring, and campus climate. Vicki Nemeth, Maine EPSCoR Director, also presented on an on-line database in development that will facilitate networking, mentoring, and collaborations.

### 2012 Maine STEM Summit - Maine STEM Collaborative



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 Maine.

As part of its mission to increase the quality of STEM is education, aspirations, and awareness in Maine, the S Collaborative convened its third Maine STEM Summit on March 20, 2012 at Colby College in Waterville. This event brought together stakeholders from diverse sectors, with over 310 participants spanning the breadth and depth of Maine's STEM efforts including: higher education faculty and professionals; K-12 teachers, students, counselors, & administrators; business and industry; government leaders; and nonprofit organizations engaged in informal STEM education.

Titled "Maine-Based STEM: Broadening Our Engagement," the summit focused on moving Maine beyond the 2nd summit's goal of STEM awareness into community engagement by:

1) increasing awareness about innovative STEM work in Maine;

2) forging partnerships among teams of teachers, administrators and community business leaders related to STEM teaching, learning and community connections;

3) and developing specific action steps that can be undertaken to improve student aspirations or achievement in STEM.

The Summit presented an exciting opportunity for full

engagement and participation by all, with the morning program featuring seven speakers from the Maine business and education community who presented on opportunities that could help strengthen STEM education for Maine students. The afternoon featured a unique "Unconference" format, where the focus of the sessions was spontaneously determined by the participants during the morning of the Summit. This allowed for a very open group dynamic approach to assist in better understanding the ideas, issues, and best practices happening in Maine STEM.

In addition to the day's activities, the 2012 STEM Summit Blog and Resource Cache, sponsored by the Maine Department of Education, allowed participants to engage in conversations and to share resources before and after the conference. And in the Exhibit section, student STEM mentorship experiences were showcased.

The "Unconference" sessions resulted in the identification of some key next steps for the Maine STEM Collaborative to consider:

- Continue to raise awareness about the importance of STEM for Maine by reaching out to school board members, educators in other disciplines, and the general public.
- Move from awareness of the need for STEM education to engagement by creating opportunities for students.
- Support teachers with effective professional development that increases content knowledge and improves instructional practice.
- Help business partners and higher education to actively reach out to partner with K- 12 schools by creating STEM-related internships, outreach programs, and career awareness activities.
- Gather and share in-depth information on careers and career pathways, and their connection to Maine's economy.
- Reach out to undergraduate, graduate, and postdoctoral students in these initiatives.

Membership in the collaborative is free and open to anyone interested in supporting STEM education for Maine's future. Applications and more information can be found at http://www.umaine.edu/epscor/ STEMCollab.htm. MAINE EPSCOR AT THE UNIVERSITY OF MAINE



#### **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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