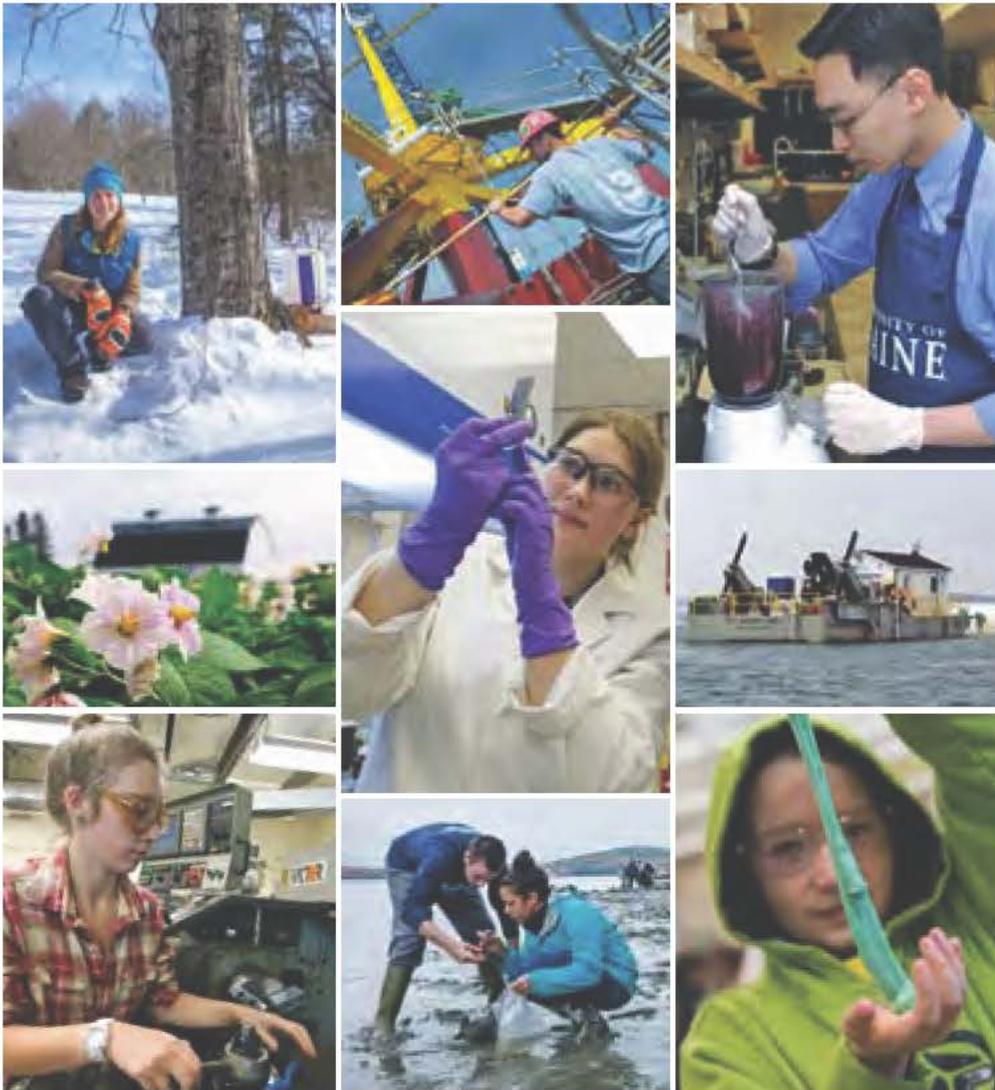


# MAINE STATE LEGISLATURE

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## Return on investment: Maine's Universities

Building our State's Economy through Research, Development and Jobs



MAINE ECONOMIC IMPROVEMENT FUND  
2014 ANNUAL REPORT



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Table A2-5

## FY2014 Maine Economic Improvement Fund

### UMS STATE-FUNDED RESEARCH TIMELINE

The following is a timeline of the MEIF and other state-funded research at the University of Maine System. Note: Bond funds are used for facility upgrades, construction and equipment purchases in accordance with state bonding requirements.

#### **November 3, 1998:**

Maine voters approved a \$20 million bond issue to improve the Maine economy by supporting innovative research and development. UMS received \$13.5 million from this bond for capital improvements and equipment purchases to support research and development. The bond proceeds were distributed between UMaine (\$10.8 million) and USM (\$2.7 million).

#### **June 4, 1999:**

Governor signed into law the Part II Supplemental Appropriation budget (Chapter 401) that appropriated \$2.5 million in 2000–01 to UMS on a “base budget” basis to pay the debt service on a \$25 million university R&D revenue bond. The university issued the revenue bond Aug. 15, 2000. It provides \$20 million for the UMaine Engineering Science Research Building and \$5 million for the USM Portland Science Building Lab Renovation.

#### **April 25, 2000:**

Governor signed into law a one-time supplemental appropriation (Chapter 731) that appropriated \$9 million for the renovation of teaching laboratories and classrooms in Aubert Hall at UMaine.

#### **June 11, 2002:**

Maine voters approved a \$35 million bond issue to be used in part to stimulate job growth. UMS received \$9 million, with the bond proceeds distributed to UMaine (\$5 million) for the Advanced Manufacturing Center and to USM (\$4 million) for the Mitchell Center.

#### **June 10, 2003:**

Maine voters approved a \$60 million bond issue to be used to stimulate job creation and economic growth. UMaine and USM received a combined \$15 million to support their research efforts, \$3.6 million of which was matching funds for MEIF R&D projects.

#### **November 8, 2005:**

Maine voters approved a \$20 million bond issue to be used to stimulate economic growth and job creation. UMaine received \$3 million for the development of the Laboratory for Surface Science and Technology, and renovations associated with the Graduate School of Biomedical Sciences. Maine voters also

approved an \$8.9 million bond related to agriculture and the environment. UMaine received \$800,000 for improvements to the Witter Teaching and Research Farm.

#### **November 6, 2007:**

Maine voters approved a \$50 million research, development and commercialization bond for facilities and equipment to support the sectors of Maine’s economy designated by the Maine Legislature in MEIF legislation. The 2007 bond created the Maine Technology Asset Fund (MTAF), with awards going to Maine companies, universities and nonprofit organizations following a peer-reviewed competitive process administered by the Maine Technology Institute. Through the first two rounds of the MTAF program (2008 and 2009), UMaine was awarded nine grants totaling \$19.9 million to further support Maine research, development and commercialization efforts. The University of Maine at Presque Isle received a \$96,800 grant to implement an information mapping and analysis facility.

#### **June 8, 2010:**

Maine voters approved an \$11 million bond to create jobs through investment in the Maine offshore wind energy research and development project, specifically a demonstration site and related advanced composites manufacturing to advance Maine’s energy independence. The 2010 bond will leverage \$24.5 million in federal funds. Note: for financial reporting purposes, the actual award took place in FY11.

#### **October 12, 2010:**

The Maine Technology Institute completed the third round of the Maine Technology Asset Fund (MTAF) competition, UMaine successfully competed for awards for five projects totaling \$3.54 million.



## Memo from the Chancellor

The Maine Economic Improvement Fund (MEIF) represents Maine's ongoing commitment between the state and our public universities, working together to advance research and economic development for the benefit of all Maine people. In July 2014, the University of Maine System Board of Trustees (UMS BOT) established Strategic Outcomes and metrics to measure the performance of the University of Maine System and its campuses. Included in these Strategic Outcomes are specific goals for research, economic development and workforce development. UMS BOT has applied these overall Strategic Outcomes to research and development, and has established new specific goals and metrics for the Maine Economic Improvement Fund to help achieve these outcomes. While these new metrics were approved at the end of FY14, they are applied to all FY14 MEIF activity and included in this annual report. By statute, MEIF-funded activity is restricted to Maine's seven statutorily established R&D sectors.

- In FY14, the state's \$14.7 million MEIF investment was leveraged at a rate of 3:1 by our UMS campuses for an additional \$44,871,626 in federal and private-sector grants and contracts in the seven sectors.
- MEIF funds and the external grant and contracts it leverages funded the work of over 400 researchers, technicians, and nearly 1,000 graduate and undergraduate students.
- These grants and contracts provided more than \$2 million to purchase major equipment to upgrade and outfit university labs.
- Maine's public universities secured new patents, worked with small businesses and startups, and provided R&D support to hundreds of companies and individuals.

As required in the statute, which created MEIF 16 years ago, included with this FY14 MEIF report are financial and informational details. We continue to monitor the impact on Maine's economy and participate in the state's independent evaluation of these investments. We will expand the report of these outcomes in future years. If you have any questions about MEIF projects, this report or other University of Maine System research and economic development programs, please contact me.

Sincerely,

James H. Page  
Chancellor

# MEIF Background

The Maine Economic Improvement Fund (MEIF) represents Maine's ongoing commitment between the state, the private sector and our public universities working together to advance research and economic development for the benefit of all Maine people.

Since the Maine Legislature established MEIF in 1997, MEIF has positioned the University of Maine System (UMS) at the center of statewide efforts to leverage economic development through targeted investment in university-based R&D. MEIF continues to be funded through an annual state appropriation to UMS and is periodically augmented through voter-approved bond referenda.

These funds provided through state appropriation to University of Maine System are dollars specifically provided to support university-based research, development and commercialization in the state's legislatively designated seven strategic technology areas:

- Advanced Technologies for Forestry and Agriculture
- Aquaculture and Marine Sciences
- Biotechnology
- Composites and Advanced Materials Technologies
- Environmental Technologies
- Information Technologies
- Precision Manufacturing

The University of Maine and the University of Southern Maine have established research development and commercialization activities accounting for 97 percent of the MEIF activity. In 2009, the Small Campus Initiative fund was established to promote seven-sector research and development activity at the other five UMS campuses and, as of 2013, Maine Maritime Academy (MMA).

## Role of MEIF

The role of MEIF is to provide researchers at Maine's public universities with the investment necessary to:

- Attain external grants and contracts to support R&D activities
- Attract and retain world-class researchers
- Provide support for modern laboratories and state-of-the-art equipment

- Create new jobs, products, patents, technologies, companies and exciting opportunities in Maine
- Create and sustain economic development and innovation

The MEIF funds often provide the required match to acquire these federal or private sector grants, and this investment in Maine's university R&D helps faculty and students successfully leverage tens of millions of dollars in grants and contracts annually.

MEIF money also supports equipment purchases or facilities renovations to make the universities more competitive for federal grants.

MEIF increasingly fosters university partnerships with business and industry through economic development collaborations, entrepreneur training programs, business incubators, business research and other programs. These efforts lead to new Maine-based products, technologies, patents and spin-off businesses.

The University of Maine and the University of Southern Maine are the two universities with established research and graduate programs in some or all of the seven targeted research sectors that have received MEIF funds, with 77.6 percent to the University of Maine, 19.4 percent to the University of Southern Maine, and 3 percent to the other campuses and Maine Maritime Academy.

Indicators of success show that Maine's MEIF investment is paying dividends by:

- Creating businesses and jobs, including the jobs of more than 1,000 faculty, staff and students working on MEIF-funded projects.
- Boosting Maine's economy by leveraging MEIF funds to bring federal and private-sector grants and contracts to Maine.
- Building capacity and expertise to help Maine companies solve problems and commercialize innovation.
- Helping commercialize patents, innovations and intellectual property.
- Capitalizing on natural resources and core strengths by focusing R&D efforts on economic sectors where Maine can make real gains. University research personnel use MEIF resources to support the staff, equipment and facilities they need to successfully pursue and develop research projects.

# Strategic Outcomes, Goals and Metrics

In July 2014, the University of Maine System Board of Trustees (UMS BOT) developed and approved Strategic Outcomes to measure the performance of the University of Maine System and its campuses. In October 2014, UMS BOT approved the use these newly developed Strategic Outcomes to develop MEIF specific goals and metrics. Several of the UMS Strategic Outcomes are performance targets for all R&D and economic development activity. The goals recognize that MEIF activity is restricted to the seven R&D sectors and are therefore a subset of the overall UMS goals.

The UMS Strategic Outcomes that apply to R&D activity are:

- I. Target 1  
Increase Research Capacity and Activity
- II. Target 2  
Support New Technologies, Licensing and Commercialization
- III. Target 4  
Increase Economic Development Partnerships
- IV. Overall Goal  
Support R&D Workforce Development

This report addresses those goals. In addition the University of Maine System reports R&D outcomes annually through the statutorily required survey of Maine R&D activity administered by the Maine Department of Economic and Community Development.

The R&D Strategic Outcomes and related MEIF goals are as follows:

## A. MEIF Target 1

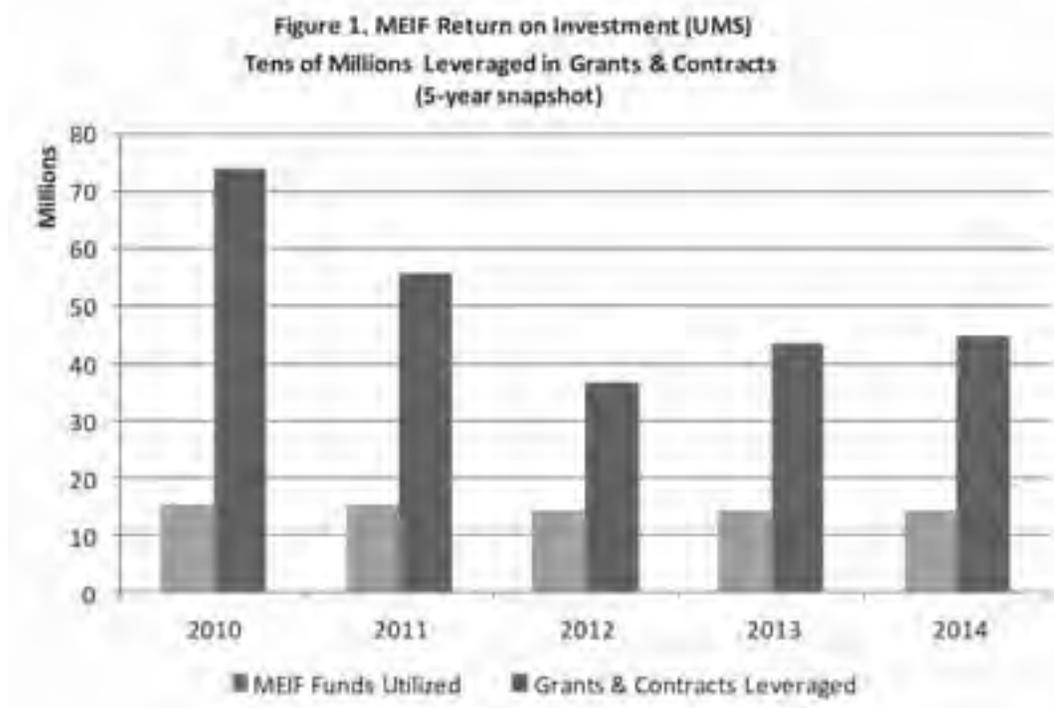
(derived from UMS BOT Research and Economic Development Target 1)

UMS maintains a sponsored programs grant and contracts effort growing greater than 3 percent annually on a three-year rolling average, from a 2013 baseline of \$45 million and NSF-defined total research expenditures of \$45 million in the MEIF sectors. Activity from the seven MEIF sectors will account for 50 percent of the total R&D grants and contracts with a 3 percent annual growth on a three-year rolling average. The FY13 baseline was a calculated percentage of total activity. Table 1 below shows the actual FY13 baseline at slightly less at \$43.5 million.

Table 1

<b>FY14 Total Grants and Contracts</b>	<b>Number of Awards</b>	<b>Total Award Value</b>
Total proposals submitted	1,252	\$286,439,522
Total proposals awarded	984	\$81,785,923
<b>Grants and Contracts Awarded in MEIF Sectors</b>	<b>FY13 MEIF Awards</b>	<b>FY14 MEIF Awards</b>
Forestry and Agriculture	8,642,424	7,654,060
Aquaculture and Marine	7,045,322	9,153,389
Biotechnology	1,985,295	6,353,450
Composites	9,230,715	5,135,033
Environmental	5,781,658	7,959,264
Information Tech	7,422,675	2,520,521
Precision Manufacturing	1,130,746	1,414,700
Cross Sector	2,290,129	4,681,209
Total	\$ 43,528,964	\$ 44,871,626
	<b>FY14 Increase</b>	<b>\$1,342,662</b> <b>3.08%</b>

## Strategic Outcomes, Goals and Metrics



In summary, the MEIF Target 1 for increasing external grants and contracts leveraged through MEIF investments saw an increase over the previous fiscal year. This favorable trend continues in a positive direction after decreases from FY10 through FY12. This is largely related to changes in the economy and the federal and private sectors partners who are beginning to slowly increase post-recession funding for R&D. Recognizing the lead time for proposal preparation, sponsor review and selection, and contract activity to begin there can be a one- to two-year lag in output.

Proposal preparation and submission remains steady. For the

purpose of this report, private-sector contract is counted as a single-proposal submission.

### B. MEIF Target 2

(derived from UMS BOT Research and Economic Development Target 2)

UMS annual revenue from commercialization including intellectual property licensing increases at least 20 percent annually on a three-year rolling average from a baseline of \$150,000 from the MEIF sectors.

Table 2

MEIF Target 2 – Commercialization Activity	FY13	FY14
Revenue from Commercialization	\$121,250	\$96,726
Number of Patents filed	15	32
Number of Patents issued	16	12
Number of License agreements and License options	6	6

In summary, revenue from the commercialization of intellectual property has decreased over the last several years.

Commercialization in Maine often relies on companies licensing UMS intellectual property to secure private equity investment to advance technology into markets. General trends in venture capital and private equity investments are slowly rebounding in Maine, and companies are starting to see new equity investments. In addition, UMS technologies generally fall into categories such as transportation infrastructure, pulp and paper, sensors and biotechnology. These sectors have been slower to rebound post-recession, and timelines from lab to market can take five–10 years. UMS is focusing additional effort to accelerate the commercialization with private-sector

partners and programs, such as the Maine Technology Institute and the Maine Venture Fund.

### C. MEIF Target 3

(derived from UMS Research and Economic Development Target 4)

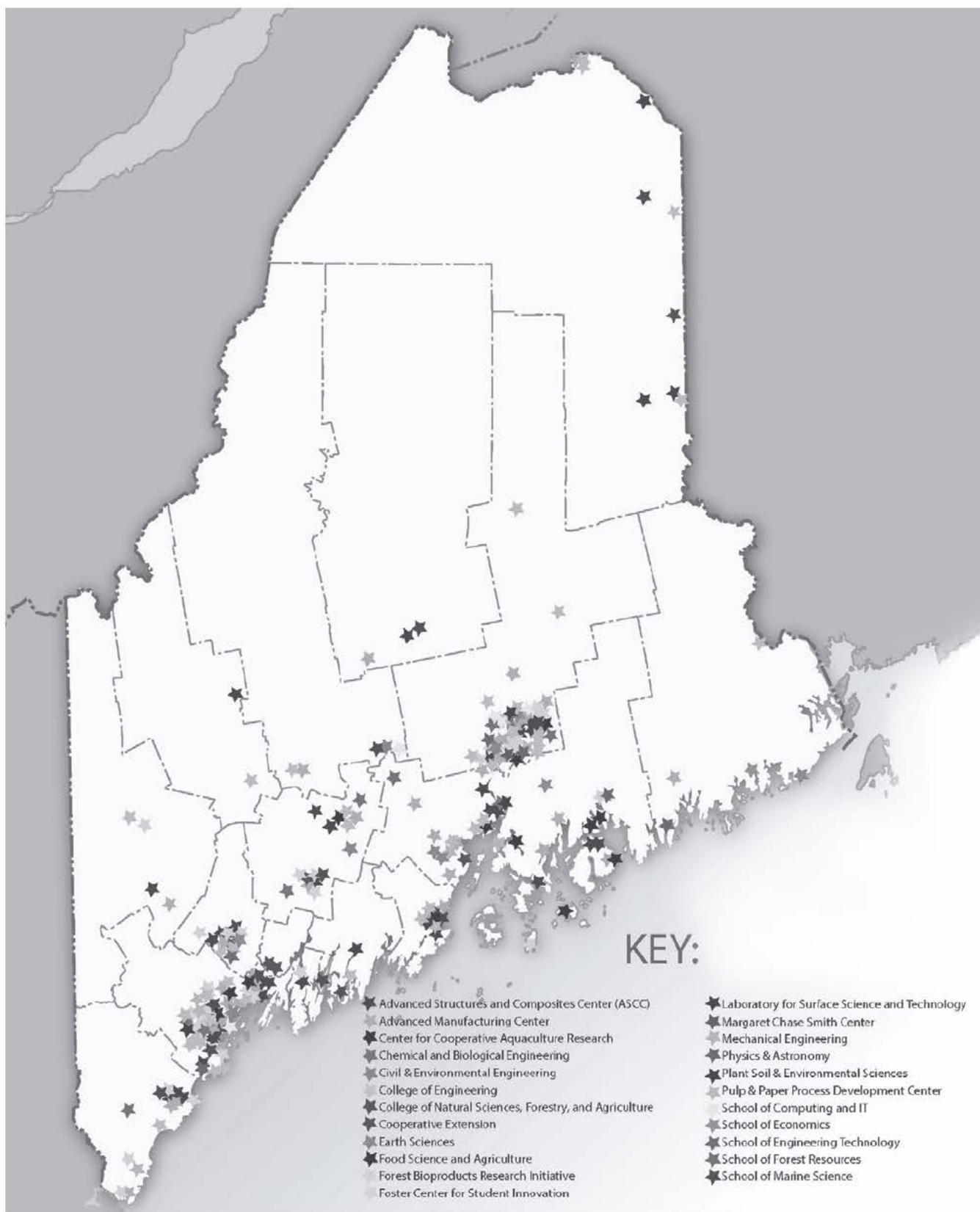
The UMS annual revenue from activities with business and industrial partners in the MEIF sectors increases from an FY13 baseline of \$3.15 million to \$6.75 million by FY17, and the number of business and industry contracts in the MEIF sectors will increase from a baseline of 400 in FY13 to 450 in FY17.

Table 3

<b>MEIF TARGET 3 – Business and Industry Contracts</b>	<b>FY13 baseline</b>	<b>FY14</b>
Revenue from Business and Industrial Contracts	\$3,150,000	\$4,371,999
Number of Business and Industrial Contracts	400	500

In summary, many MEIF investments not only leverage external grants and contracts, but through a combination of MEIF funds, and grant and contract funds, have helped UMS campuses build capacity to work directly with industry partners. Some industry partners will be companies licensing and commercializing UMS intellectual property, while many companies are working with UMS campuses to get assistance with solving their problems or perfecting their inventions and innovations. UMS projects with business and industry continue to grow and activity is meeting the goals and metrics of this target. Figure 2 on page 6 demonstrates the statewide nature of these partnerships for those contracts that are currently tracked. Many additional companies, inventors and entrepreneurs receive advice and guidance, but do not result in formal contracts.

Figure 2. UMS Industry Partnerships



## D. MEIF Target 4

### Support R&D Workforce Development

UMS shall maintain a concerted effort to involve faculty, staff and students participating in research, development and commercialization, and shall report annually the number of employees directly supported by MEIF funds and by grants and

contracts in the MEIF sectors. As external funding is hard to predict, there is no specific numerical goal for employee count, but UMS shall report the annual number of faculty, staff and students to indicate trends and identify opportunities for growth.

Table 4

MEIF Target 4 – Workforce Development	No. of employees where wages were paid by MEIF	No. of employees where wages were paid by from grants/contracts	Totals
Number of faculty staff supported (FTE=full-time equivalent)	127.98	296.6	424.58
Number of graduate students supported (headcount)	68	308	376
Number of undergraduate students Supported (headcount)	138	479	617
<b>Student costs from grants and contracts</b>	<b>FY13</b>	<b>FY14</b>	
Student salaries and wages from grants and contracts	\$ 5,001,942	\$ 4,877,650	
Student tuition paid by grants and contracts	952,553	857,781	
Student fellowships paid by grants and contracts	236,553	199,400	
Student health insurance paid by grants and contracts	167,893	282,848	
<b>Total soft money student support</b>	<b>\$ 6,358,941</b>	<b>\$ 6,217,679</b>	

In summary, state economic analysis predicts economic growth in Maine based on an available trained and educated workforce. Growth in the seven MEIF sectors is especially dependent on the available workforce. MEIF seven sector projects within UMS rely on regular faculty and staff, as well as many “soft money” employees — those hired to work on specific grants and contracts, and paid by those grant and contract funds. UMS employees and students gain valuable on-the-job training and experience, and may then contribute to the employment base within these sectors after completion of the grants or graduation.

Grant and contract revenue is a strong contribution to this workforce development. UMS counts employees involved in this activity and will continue to pursue the growth in employment numbers related to growth in grant and contract activity. Non-student employees are tracked as full-time equivalents (FTEs) based on a 40 hour, 52-week work year. Student employees are tracked by headcount, and generally work less than 20 hours per week during the academic year.

Grant and contract revenue is also an important source of funding for student salaries, tuition and other types of support, allowing many research-active students to offset their cost of education while getting valuable skills and on-the-job experience.

# MEIF Success Stories

By leveraging MEIF funds, the University of Maine System has attracted more than \$44 million in FY14 in federal and private-sector grants and contracts related to the seven strategic research areas. This funding directly results in work solving some of Maine most challenging problems and developing solutions, products and technologies, which benefits Maine's industries, communities and future workforce — our students. Examples of FY14 MEIF seven sector projects from our campuses follow.



Jenny Shrum is a Ph.D. student in UMaine's School of Biology and Ecology.

## ADVANCED TECHNOLOGIES FOR FORESTRY AND AGRICULTURE

### ■ Partnering with Maine Industry: Maple Syrup

The University of Maine in Orono is helping ensure that the beloved syrup of New England is safe from mycotoxins, including those created in the storage process. The research has included an independent project by third-year food science student Kaitlyn Feeney of Hermon, Maine. Her work in the Food Chemical Safety Laboratory, directed by Assistant Research Professor Brian Perkins, is part of UMaine's ongoing efforts to develop testing methods for syrup safety.

[umainetoday.umaine.edu/archives/spring-2014/how-sweet-it-is/syrup-safety](http://umainetoday.umaine.edu/archives/spring-2014/how-sweet-it-is/syrup-safety)

### ■ UMaine Grad Student Researching Effects of Weather on Sap Flow

Understanding more about the relationship between weather and maple sap flow, and how Maine syrup producers will adapt to changes in growing conditions is the focus of research being conducted by a University of Maine in Orono graduate student. Jenny Shrum, a Ph.D. candidate from Maine in the ecology and environmental sciences program in the UMaine School of Biology and Ecology, is attempting to unravel the biophysical relationships between weather and sap flow to help processes and harvesters in the future.

[umaine.edu/news/blog/2014/02/13/making-sense-of-maple-syrup](http://umaine.edu/news/blog/2014/02/13/making-sense-of-maple-syrup)

### ■ Industry Collaboration

Two new potato varieties — Easton and Sebec — have been developed by the University of Maine in Orono in partnership with the Maine Potato Board. The Easton was developed as a new French fry processing potato variety. The Sebec variety is expected to primarily be used for potato chip production in growing areas that currently rely on the standard chipping variety, Atlantic. Easton and Sebec are the first new varieties to be released by the University of Maine as a result of 10 years of potato breeding and growing trials to optimize these varieties to meet Maine's potato growers and processors needs. Funds from MEIF, the U.S. Department of Agriculture and the Maine potato industry (represented by the Maine Potato Board) support the potato breeding program, led by Greg Porter, professor of plant, soil and environmental sciences, and agronomy, and centered at Aroostook Farm in Presque Isle. The Easton variety is named after a northern Maine town in Aroostook County that is in the heart of Maine's most intensively cropped potato production area; the Sebec variety is named for a lake in Piscataquis County. Several other potato varieties are being evaluated for commercialization. New varieties are licensed for commercial production. Royalties from

successful commercialization will be used by the University of Maine and the Maine Potato Board to support the potato breeding program.

“The University of Maine has the research and development capability and commitment for developing new potato varieties, from the lab to the field, which takes years. They understand what the growers and the industry are looking for and need. We, in turn, as a board, have the capacity to promote the varieties and maintain the quality of seed certification required for the integrity of the variety and the market. We are already fielding questions from growers around the country, as well as in Maine. Both of these new potato varieties are very promising. This type of result is what makes this partnership truly advantageous for the future of our industry.”

— Don Flannery, executive director of the Maine Potato Board

## ■ Reaching Across the State to Support Maine Agriculture

With facilities in Orono, experiment stations throughout the state and Cooperative Extension staff in every Maine county, the University of Maine is uniquely positioned to support and expand Maine’s agricultural opportunities. Perhaps one of the strongest examples is the development and expansion of Maine’s wild blueberry sector. Blueberry Hill Farm in Jonesboro is the only university-based wild blueberry research facility in the nation. Research and development at the farm, together with on-campus research on new blueberry products and health benefits, have been a driving factor in the recent expansion of Maine’s wild blueberry industry.

“Thanks to comprehensive crop production research and development based at the University of Maine, Maine’s Wild Blueberry growers are leaders in the development and adaptation of knowledge-based cropping systems.” — Wild Blueberry Commission of Maine

## COMPOSITES AND ADVANCED MATERIALS TECHNOLOGIES

### ■ R&D and Commercialization Partnership at Work

The University of Maine’s Modular Ballistic Protection System saved lives inside the United States consulate during a September 2013 attack in Afghanistan’s Herat province,



### Connecting the dots

Growing up, Kathleen Crosby always played with her food. “I just wanted to experiment,” says the fourth-year University of Maine student from Georgetown, Maine, a food science and human nutrition major. In her first year at UMaine, Crosby learned about the seafood research of UMaine food scientist Denise Skonberg and joined her lab. “I grew up on the coast, and my dad’s a lobsterman, so I said, ‘I have to get in on this.’” In the lab, Crosby has been mentored by Skonberg and doctoral graduate student Brianna Hughes, who received her degree in May and is now a product development specialist with Ocean Spray. This past summer, Crosby interned with FMC Corporation in Rockland, Maine, a leading seaweed-based business that produces carrageenan. Because of her undergraduate research experience, Crosby was familiar with many of the instruments and had the skills to work in quality assurance, quality control and chemical analysis. “I really liked that, working in a real lab and seeing how much your work means in the food industry,” she says. In this, her senior year, Crosby is on a capstone project team developing a new product called Pretzel Craves that features a cranberry dough. When she graduates, Crosby hopes to work in food quality assurance or quality control — and, ultimately, product development.

## MEIF Success Stories

according to a U.S. State Department official, who notified Tex Tech Industries (TTI), the commercial manufacturer of the ballistic panels located in Monmouth, Maine, of the news. University researchers have continued to develop and improve the ballistic panels for use in military tents with various functions, shapes and sizes. UMaine students, including veterans who served in Afghanistan and Iraq, assist the researchers. Now Tex-Tech Industries is developing partnerships with other state-based companies and working to sell the UMaine-invented ballistic panels to agencies and corporations that have employees in high-risk locations worldwide.

[umainetoday.umaine.edu/archives/spring-2014/lifesaving-rd](http://umainetoday.umaine.edu/archives/spring-2014/lifesaving-rd)

## AQUACULTURE AND MARINE SCIENCES

### ■ Testing Water

University of Maine researchers have designed a handheld device that can quickly detect disease-causing and toxin-producing pathogens, including algal species that can lead to paralytic shellfish poisoning. The device — a colorimeter — could be instrumental in monitoring coastal water in real-time, thereby preventing human deaths and beach closures, says lead researcher Janice Duy, a recent graduate of UMaine's Graduate School of Biomedical Science and Engineering. University of Maine's Graduate School of Biomedical Science and Engineering (GSBSE) is a unique graduate program that includes the University of Maine in Orono as the Ph.D.-granting institution and five cooperating academic and research institutions in the state — The Jackson Laboratory, Maine Medical Center Research Institute, Mount Desert Island Biological Laboratory, University of Southern Maine, and University of New England College of Osteopathic Medicine.

[umainetoday.umaine.edu/archives/spring-2014/quality-data](http://umainetoday.umaine.edu/archives/spring-2014/quality-data)

### ■ Studying Impact to Fish and Lobsters of Rising Ocean Temperatures

A \$1.8 million National Science Foundation (NSF) grant will allow a multidisciplinary team of researchers to examine the impact of rising ocean temperatures on Gulf of Maine ecology and economics. Led by Andrew Pershing from the University of Maine and Gulf of Maine Research Institute in Portland, Maine, the team will conduct a four-year project as part of the NSF's Coastal SEES (Science, Engineering and Education for Sustainability) Initiative. This information will improve the State's ability to predict stocks that are directly related to management of commercial harvests.

## INFORMATION TECHNOLOGIES

### ■ Concept to Reality: Providing Creative Resources to UMaine and the Community

University of Maine's Innovative Media Research and Commercialization (IMRC) Center opened in a renovated and repurposed dining hall on Jan. 9, 2014. Students and other Maine entrepreneurs work in the center and use its resources, including state-of-the-art equipment, professional expertise and mentoring, and technical support in creative production and prototyping. The goal of the IMRC Center is to re-envision creative teaching, learning and research, linking new media and innovative problem solving with science and technology. This project was funded in part by a Maine Technology Asset Fund award from the Maine Technology Institute.

### ■ Cyber Security

The Maine Cyber Security Cluster at the University of Southern Maine (USM), along with the University of Maine at Fort Kent (UMFK) and the York County Community College (YCCC) are implementing an inter-institutional Virtual Cybersecurity Collaborative Learning Laboratory (VCCLL) as a shared educational environment that allows Maine students from highly varied geographic locations to gain practical collaborative experience in preventing and mitigating cyber-attacks in real time over a protected network. Funded by NSF, VCCLL combines technological problem solving, ethical training, and strategic communications opportunities for students in a unique and currently topical setting where students must identify and resolve cyber-security exploits across Maine. Inter-institutional collaborations of this type are rare and promise to yield novel research findings, as well as tangible advantages to Maine's students. Recently, the U.S. National Security Agency and Department of Homeland Security designated Maine's public universities collectively as a Center for Academic Excellence in Information Assurance Education, a distinction that has been given to about 130 individual institutions, but never before a full university system.

### ■ Web-Based Systems to Support Disadvantaged Populations

The overarching aim of this interdisciplinary research cluster is to foster resilience for disadvantaged populations by providing avenues for safe social interaction and educational activity using innovative online environments. This aim is undergirded with well-established knowledge that social isolation is a barrier to life success and individuals are best poised to grow and succeed — educationally, economically, and socially — when provided with high-quality mentoring, support, social attention and

connection, and learning opportunities. Through creatively crafted and delivered Web-based environments tailored to the needs and interests of specific disadvantaged populations, we are also supplied with rich data to study site usage patterns and discourse to inform both best practices and future developments.

The interdisciplinary perspectives of this research cluster and our work with a range of USM students has culminated in a unique brand of synergistic expertise in creating Web-based systems to reach and support people who may otherwise lack essential life opportunities, and we are currently developing our own research cluster website for promoting and marketing our knowledge and skills to other potential clients. This group has been afforded the resources to build our capabilities in this unique area, engage students in applied activities to enhance their educations, and establish working community partnerships toward the goal of promoting social, educational and economic successes of populations facing adverse life challenges.

[usm.maine.edu/research/disadvantaged-populations](http://usm.maine.edu/research/disadvantaged-populations)

## ENVIRONMENTAL TECHNOLOGIES

### ■ Maine Tidal Power Initiative's Latest Research and Collaboration

The University of Maine is one of 15 recipients splitting \$16 million from the U.S. Department of Energy to fund projects related to efficiently capturing energy from waves, tides and currents. The UMaine initiative is one of seven Environmental Monitoring of Marine and Hydrokinetic Projects under the funding. The \$494,000 UMaine project received \$394,000 from the Department of Energy to use data on fish interactions with Ocean Renewable Power Company's TidGen Power System in Cobscook Bay, Maine, to predict the probability of fish naturally encountering deployed energy devices. The projects are expected to increase the power production and reliability of wave and tidal devices, and help collect data on how deployed devices interact with the surrounding environment. The research also will aid in understanding the effects of marine and hydrokinetic devices on local fish populations, says principal investigator Gayle Zydlewski, associate professor and researcher in the UMaine School of Marine Sciences and member of the Maine Tidal Power Initiative. Maine Tidal Power Initiative members include representatives from the University of Maine, Maine Maritime Academy, the town of Wiscasset and the U.S. Army Engineer R&D Center. A full listing is here:

[umaine.edu/mtpi/partners-collaborators](http://umaine.edu/mtpi/partners-collaborators)

[umainetoday.umaine.edu/archives/fall2013/current-events](http://umainetoday.umaine.edu/archives/fall2013/current-events)



### From intern to manager

Recent University of Maine business school graduate Emma Wilson spent most of FY14 — her senior year — working as an intern for a small Orono business as part of the Blackstone Accelerates Growth Innovate for Maine Fellows Program offered through UMaine's Foster Center for Student Innovation. Wilson, of Greenville, Maine, says she applied for the internship program because she knew it helped local startups and taught students about innovation. She was placed with Zeomatrix, a startup business focused on bringing UMaine's patented zeolite technology in odor-absorbing paper products to market. As an intern, she was in charge of handling the launch of the Zeo Litter Bag — a compostable paper bag made with the company's proprietary zeolite technology that absorbs the odor of used cat litter and cat waste. The bag is also biodegradable and better for landfills, she says. Wilson has continued on as an employee of the company as she works on accelerating the growth of this product line. Innovate for Maine internships are one facet of Blackstone Accelerates Growth (BxG), an outreach effort to create and sustain jobs and economic development in Maine by supporting entrepreneurship and innovation.

[umaine.edu/news/blog/2014/10/08/emma-wilson-from-intern-to-manager](http://umaine.edu/news/blog/2014/10/08/emma-wilson-from-intern-to-manager)

### ■ Attracting Maine Students to STEM

Empowering female and minority high school students, their teachers and communities to create innovative hands-on solutions to the environmental problems related to stormwater management is the goal of a three-year project at the University of Maine, funded by the National Science Foundation (NSF). The goal is to attract students in the engineering field to STEM education by investigating innovative and cost-effective solutions to local stormwater problems. The project will also produce new watershed maps and management plans for several streams that will lead to improved water quality.

**“Using the tools of engineering technology, real-time data management and Web-based digital mapping, students will be directly involved in every project stage — from design of water-quality sensing units to implementation of community outreach programs about stormwater pollution issues.”**

— Mohamad Musavi, UMaine associate dean of the College of Engineering and professor of electrical and computer engineering, and principal investigator of the project.

Participating Maine High Schools include Bangor High School, Edward Little, Auburn, Hampden Academy, Orono High School, Casco Bay High School, Deering High School, Portland, Washington Academy, Machias, Shead High School, Eastport, and Calais High School. UMaine lead students: Ph.D. student Joel Castro, Old Town, Maine; Joshua Kovach, Woodland, Maine; Wendeline Choiniere, Brunswick, Maine.

[umaine.edu/news/blog/2013/09/18/education-empowerment](http://umaine.edu/news/blog/2013/09/18/education-empowerment)

### ■ UMaine’s Offshore Wind Energy Research and Development Initiatives

With funding from the Maine Technology Institute and the U.S. Department of Energy, the University of Maine’s Advanced Structures and Composites Center is leading the effort to enable cost-effective measurements of hub-height wind speeds in deepwater where fixed-based towers are not feasible. The patent-pending DeepCLidar is a buoy-mounted LiDAR system, which is a remote sensing technology that measures the speed of the wind at various heights above the buoy by illuminating a particles in the air with a laser and determining their speed by analyzing the reflected light. The first very successful sea trials of this buoy were complete during FY14 and next stages of commercial development and production are planned for FY15.

[umainetoday.umaine.edu/archives/fall-2013/winds-of-change/cost-effective-measurements](http://umainetoday.umaine.edu/archives/fall-2013/winds-of-change/cost-effective-measurements)

## PRECISION MANUFACTURING

### ■ A Shingle Every Second

Ecoshel, a company that produces cedar shingle panels, has opened a new factory in Ashland, Maine. Ecoshel engaged the University of Maine’s Advanced Manufacturing Center (AMC) to develop Smart Shingle Production System. AMC, along with private and public partners, designed, developed and built a prototype manufacturing assembly line for the company. The line, which includes custom manufacturing equipment, blends conventional woodworking systems with state-of-the-art controls and laser-scanning technology. The Ecoshel project created more than 11 jobs and provided a learning experience for UMaine engineering students.

Bryan Kirkey, owner and CEO of Ecoshel, was referred to AMC by the Maine Technology Institute to pursue his goal of having a cutting-edge manufacturing facility in Maine. AMC collaborated with private industry partners such as Dana Hodgkin, owner of Manchester, Maine-based Progress Engineering, as part of the design, engineering and prototyping team. AMC plays this role for many Maine companies, developing new products and precision manufacturing systems.

[umaine.edu/news/blog/2014/06/25/a-shingle-every-second](http://umaine.edu/news/blog/2014/06/25/a-shingle-every-second)

### ■ Building Innovation: Manufacturing Partnership

Since 2010, the University of Maine’s Advanced Manufacturing Center (AMC) and University of Southern Maine’s Manufacturing Applications Center (MAC) have developed a seamless partnership, providing access to University of Maine System resources that assist hundreds of technical companies and entrepreneurs in the state develop their technology and engineering concepts. Both AMC and MAC excel at hands-on assistance by taking real ideas and commercializing them into viable products that benefit manufacturing in the state. The partnership’s impact on industry has grown immensely after Maine Technology Institute (MTI) awarded the AMC/MAC partnership an MTI Cluster Development Program Grant to expand activities. Today, hundreds of clients develop new technologies, proof of concepts, prototypes, manufacturing processes, business plans and market research with the help of UMaine and USM.

Partners include: Manufacturers Association of Maine, Maine Manufacturing Extension Partnership, Eastern Maine Development Corporation, Northern Maine Development Commission, University of Maine faculty and staff, Biotech Association of Maine, Maine industry partners, Robotics Institute of Maine, STEM Coalition of Maine and Maine Center for Entrepreneurial Development.

## BIOTECHNOLOGY

### ■ How Common Pathogens Become Killers

How does a normally peaceful agent break through a previously impenetrable barrier and become a potential killer? This year, Robert Wheeler received a five-year, \$500,000 fellowship from the Burroughs Wellcome Fund to figure that out. The University of Maine Assistant Professor of Microbiology will study how and why *Candida albicans* — the most common human fungal pathogen — transforms from an innocuous yeast in the digestive tract of a person with a healthy immune system to a potentially fatal fungus in vital organs of a person whose immune system has been compromised. Wheeler is one of 12 scientists nationwide to receive the 2014 Investigators in the Pathogenesis of Infectious Disease Award.

[umaine.edu/news/blog/2014/06/03/breaking-barriers](http://umaine.edu/news/blog/2014/06/03/breaking-barriers)

### ■ Health Analytics and Health System Transformation

Maine is on the cutting edge for many health data developments, including having the only operational, statewide Health Information Exchange, and one of the first all-payer claims data warehouses. UMS's Research Cluster will tackle challenges to data access and operability, and other big data problems in health care delivery, financing and population health. Because of their participation in this cluster, four students and several faculty were recruited to become members of the Healthcare Data Warehousing Association (HDWA), a national health care data organization, and offered complimentary registrations to HDWA's annual conference, which was held in Portland in 2014. Through this conference, students and faculty had the opportunity to network with, and learn from, national and local leaders in health data analytics who are at the forefront of developing solutions for healthcare data needs.

## INNOVATION AND ENTREPRENEURSHIP

### ■ Gorham Lamp Headed to Commercialization

The Gorham Lamp is a benchtop and microscope illumination system currently in second-stage prototype development at University of Southern Maine. Joseph Staples has been able to move this project from rough proof of concept to a marketable technology that has already generated inquiry from commercial entities. Bids are currently being solicited from local contract manufacturers to develop commercial-grade demonstration models that will be used to assess user reaction to this technology and to attract potential licensees. This project represents the potential for innovation that exists in laboratories and other facilities throughout the UMaine System and is an excellent example of Maine investing in Maine.



### Soft-shell clam research at the University of Maine at Machias

The FY14 Small Campus Initiative (SCI) awards were focused mostly in southern Maine, in Cumberland County, and examined strategies for growing and raising soft-shell clams, *Mya arenaria*, that were produced at the Downeast Institute (DEI) – University of Maine at Machias' (UMM) Marine Field Station. The work focused on finding new strategies for managing both wild and cultured clam seed in an environment under severe predation pressure from invasive green crabs, whose populations have exploded recently due to warming trends in seawater temperatures. UMM and DEI are collaborating with a private company, Stewards of the Sea LLC, and the town of Freeport, Maine to examine effects of: sediment buffering on wild clam recruitment; presence of adult soft-shell clams on wild clam recruitment; the combined effect of fencing and netting on growth and survival of cultured clam seed, as well as wild clam recruitment; and the effect of stocking density on cultured clam growth and survival. In addition, two other projects focused on learning about the dynamics of green crabs in selected areas of the upper and lower Harraseeket River in Freeport, and demonstrating the utility of rearing soft-shell clam seed to clambers and local elected officials using a bivalve nursery upweller. The work leveraged a \$350,000 grant from the National Marine Fisheries Service, Saltonstall-Kennedy program that will extend the program through 2016.

[downeastinstitute.org/2014-field-trials.htm](http://downeastinstitute.org/2014-field-trials.htm)



### Rockweed research at Maine Maritime Academy

Maine Maritime Academy's FY14 MEIF-SCI award is investigating the importance of surplus reproductive material of the two most abundant intertidal rockweeds to nearshore marine environments. In addition, laboratory studies have been examining the response of rockweed reproductive materials on the commercially important blue mussel. During the first year of the grant, field sampling was conducted across three study locations in the Gulf of Maine: Holbrook Island in Penobscot Bay, Schoodic Peninsula in Frenchman's Bay and Great Wass Island in Western Bay. Laboratory experiments have been completed at Maine Maritime Academy (MMA) and at the Down East Institute Marine Field Station in Beals. Preliminary results of feeding trials using *Ascophyllum* reproductive material with juvenile mussels showed significantly more growth (metric=shell length) in treatment diets (phytoplankton and a pulse of sperm, egg, or zygote) compared to a control diet of only phytoplankton. Seasonal field sampling of macroinvertebrates has been completed for stable isotope food web characterization and the data are being processed currently. This research has fostered scientific collaboration between MMA, Brian Beal at UMM and the University of Texas at Austin (Dr. Kenneth Dunton, a UMaine alum). It also supported undergraduate research experiences for MMA student Sarah Brochu of Hardwick, Vermont, and UMM students Melissa Burnham of South Portland and Anna Davis of South Addison. Characterizing the timing of reproduction (phenology) of the harvested rockweed, *Ascophyllum nodosum*, has also led to collaboration between MMA and rockweed business Source Maine, Inc., in Brunswick.

## MEIF Success Stories



### SUCCESS

By leveraging MEIF funds, UMS has attracted more than \$250 million in federal and private-sector grants and contracts related to the seven strategic research areas. This funding directly results in Maine products and technologies such as biofuels, pulp and paper products, new potato varieties, aquaculture technologies and software that lead to improvements in Maine's industries.



### RETURN ON INVESTMENT

Each year, the state's MEIF appropriation is matched by tens of millions of dollars in federal and private funds for important university research. UMaine as the state of Maine's land grant institution utilizes its long-established research capacity and infrastructure to attract the majority of these matching funds. Other UMS schools continue to build and partner in federal and private-sector grants and contracts.



### STRATEGIC IMPACT

In the MEIF's most recent five-year period, \$341 million was received to perform research and development related to the targeted areas.



### CREATING JOBS

More than 1,300 full-time equivalent jobs are funded annually in Maine through funds leveraged and expended related to MEIF. These positions include faculty, graduate assistantships, undergraduate students involved in research, and other key staff.

Table A1-1

**University of Maine System New Patent Applications Filed FY14**

<b>Title</b>	<b>Application</b>	<b>Type Filing Date</b>
BIODEGRADABLE MATERIALS AND METHODS OF MAKING THE SAME	United States	24-Sep-2013
RADIO-FREQUENCY IONIZATION OF CHEMICALS	PCT	13-Sep-2013
POLYMERIC COMPOSITE MATERIALS AND METHODS OF MAKING THEM	PCT	30-May-2014
EXTRACTION OF LIGNOCELLULOSICS FOR PRODUCTION OF FIBERS AND A PRECIPITATE-FREE HEMICELLULOSE EXTRACT	PCT	7-Feb-2013
MODIFIED PREHYDROLYSIS-KRAFT PULPING WITHOUT FORMATION OF "STICKY LIGNIN" IN THE PRE-HYDROSATE	U.S. Provisional	17-Sep-2013
IMPROVED METHODS OF CANCER DETECTION	PCT	23-Apr-2014
CELLULOSE NANOFIBRILS REINFORCED POLYPROPYLENE NANOCOMPOSITES: MECHANICAL AND MORPHOLOGICAL PROPERTIES	U.S. Provisional	18-Jul-2013
SYSTEMS AND METHODS FOR INTERFERENCE MITIGATION IN PASSIVE WIRELESS SENSORS	U.S. Provisional	29-Aug-2013
SYNTHESIS OF BACTERIAL CELLULOSE IN LOW-COST CULTURE MEDIUM USING HOT WATER EXTRACTED WOOD SUGARS	U.S. Provisional	12-Mar-2014
WIND TURBINE TOWER ASSEMBLY AND CONSTRUCTION METHOD	U.S. Provisional	28-Feb-2014
WIND TURBINE PLATFORM MOORING AND CONSTRUCTION	U.S. Provisional	6-Feb-2014
POTATO AF3001-6 (EASTON)	U.S. Plant	7-Jan-2014
POTATO AF0338-17 (SEBEC)	U.S. Plant	7-Jan-2014
FLOATING WIND PLATFORM AND CONTROLS	U.S. Provisional	24-Sep-2013
COMPOSITE STRUCTURAL MEMBER	United States	3-Sep-2013
REMOTE WIND RESOURCE ASSESSMENT	U.S. Provisional	8-Dec-2013
COATING FORMULATION TO DEVELOP MICRON SIZED LASER INDUCED 3-D FLUORESCENT ACTIVE STRUCTURE	U.S. Provisional	13-Aug-2013
ILLUMINATION SYSTEM (USM)	U.S. Provisional	12-Aug-2013

Table A1-2

## University of Maine System — Patents Issued FY14

Title	Patent No.	Issue Date
RING GRATING SPECTROMETER	8717560	6-May-2014
THERMOPLASTIC COMPOSITES CONTAINING LIGNOCELLULOSIC MATERIALS	2346929 Europe	12-Feb-2014
EDGE REINFORCEMENT OF STRUCTURAL PANELS KEEPS OUT MOISTURE	2545216 Canada	11-Feb-2014
PROCESS FOR PRODUCING CARBON NANOTUBES AND CARBON NANOTUBES PRODUCED THEREBY	8632744	21-Jan-2014
COATED WOOD PRODUCTS FOR BALLISTIC RESISTANCE	8596018	3-Dec-2013
METHOD OF FORMING A COMPOSITE STRUCTURAL MEMBER	8591788	26-Nov-2013
COMPOSITE STRUCTURAL MEMBER	8522486	3-Sept-2013
CONTAINER SECURITY SYSTEM WITH CONDUCTIVE GRIDS AND BYPASS RESISTORS	8487763	16-July-2013
SHEET PILING FOR RETAINING WALLS WITH COLUMNAR VOIDS	2549939 Canada	7-July-2013
PROCESS OF TREATING A LIGNOCELLULOSIC MATERIAL WITH AN ALKALI METAL BORATE PRE-EXTRACTION STEP	8475627	2-July-2013
USE OF PROLINES FOR IMPROVING GROWTH AND/OR YIELD	8551917	8-Oct-2013
USE OF PROLINES FOR IMPROVING GROWTH AND/OR YIELD	1945035 LITH and LATV	27-Mar-2014
TRANSGENIC PLANTS HAVING ENHANCED GROWTH CHARACTERISTICS\N	315884 MEXI	29-Nov-2013
TRANSGENIC PLANTS HAVING ENHANCED GROWTH CHARACTERISTICS\N	591185 NEWZ	3-Sep-2013

Table A2-1

## FY2014 Maine Economic Improvement Fund

### A HISTORY OF LEGISLATIVE ACTIONS ON APPROPRIATING STATE RESEARCH FUNDS

The following is a summary of the actions of the 118th–126th (first regular session) Maine Legislature with regard to appropriating research and development funds to the University of Maine System

#### 118th LEGISLATURE

March 26, 1997: Governor signed into law the Economic Improvement Strategy (Chapter 24) that appropriated \$500,000 to UMS for research.

April 1, 1998: Governor signed into law the Economic Improvement Strategy (Chapter 643, Part LL, Sec. S-3) that appropriated \$4 million to UMS for research. These funds were allocated from the FY98 year-end State surplus for use in FY99.

#### 119th LEGISLATURE

March 15, 1999: Governor signed into law the Part I Current Services budget (Chapter 16) that appropriated \$4 million in 1999–2000 and 2000–01 to UMS on a “base budget” basis for research. This extends the one-time FY99 \$4 million research appropriation that was funded from the FY98 year-end state surplus.

June 4, 1999: Governor signed into law the Part II Supplemental Appropriation budget (Chapter 401) that appropriated an additional \$5.55 million in 1999–00 and an additional \$50,000 in 2000–01 to UMS on a “base budget” basis for research.

April 25, 2000: Governor signed into law the Part II Supplemental Appropriation budget (Chapter 731) that appropriated \$300,000 in 2000–01 to UMS on a “base budget” basis for the Maine Patent Program.

#### 120th LEGISLATURE

June 21, 2001: Governor signed into law the Part II Supplemental Appropriation budget (Chapter 439) that appropriated an additional \$2 million in 2002–03 to UMS on a “base budget” basis for research.

March 25, 2002: Governor signed into law a deappropriation (Chapter 559) that reduced the FY03 \$2 million Supplemental Appropriation by \$1 million.

July 1, 2002: Governor signed a Financial Order that curtailed the FY03 \$2 million Supplemental Appropriation by an additional \$1 million. This eliminated the FY03 increase of \$2 million for research, bringing the FY03 research and development appropriation back to the FY02 level of \$10.1 million.

November 18, 2002: Governor signed into law a Supplemental Appropriation budget (Chapter 714) that deappropriated the \$1 million curtailment that was signed July 1, 2002.

#### 121st LEGISLATURE

March 27, 2003: Governor signed into law the Part I Current Services budget (Chapter 20, Part RR) that appropriated \$100,000 in 2003–04 and 2004–05 on a “base budget” basis for research.

January 30, 2004: Governor signed into law a Supplemental Appropriation budget (Chapter 513, Part P, Sec. P-2) that includes a provision to transfer to MEIF up to \$2 million of any unbudgeted State revenue remaining at the close of FY04. The full amount was subsequently transferred to UMS. This same Chapter 513, Part P, Sec. P-3 made the \$2 million part of the MEIF FY05 base appropriation.

#### 122nd LEGISLATURE

March 29, 2006: Governor signed into law a Supplemental Appropriations budget (Chapter 519, Part A, Sec. A-1) that includes providing one-time funding of \$600,000 in FY07 for the commercialization of research and development activity, and for the Gulf of Maine Ocean Observing System.

#### 123rd LEGISLATURE

June 7, 2007: Governor signed into law a budget (Chapter 240, Part A, Sec. A-68) that provides an increase of \$1.5 million in FY08 and an additional \$1 million in FY09 on a “base budget” basis for research.

#### 124th LEGISLATURE

May 28, 2009: Governor signed into law a budget (Chapter 213, Part A, Sec. A-67) that maintains the annual funding at the FY09 level of \$14.7 million.

#### 125th LEGISLATURE

June 15, 2011: Governor signed into law a budget (Chapter 380) that maintains the annual funding at \$14.7 million. May 29, 2012: PUBLIC Law (Chapter 698) creates the formula funding for the Small Campus Initiative, reserving a percentage of MEIF exclusively for the five smaller campuses of the University of Maine System.

#### 126th LEGISLATURE

June 10, 2013: Governor signs into law (Chapter 225) an amendment to the MEIF statute to include Maine Maritime Academy as a MEIF eligible small campus.

June 26, 2013: Legislature approves into law a budget (Chapter 368) that maintains the annual funding at \$14.7 million.

Table A2-2. Maine Economic Improvement Fund  
**LEGISLATIVE HISTORY OF STATE RESEARCH APPROPRIATIONS FOR OPERATIONS**  
 NEW APPROPRIATION By Legislative Session

**118<sup>th</sup> LEGISLATURE**

	<u>FY98</u>	<u>FY99</u>	<u>Total 2-Year</u>
UM	\$400,000	\$3,200,000	\$3,600,000
USM	100,000	800,000	900,000
<b>Total</b>	<b>\$500,000</b>	<b>\$4,000,000</b>	<b>\$4,500,000</b>

**119<sup>th</sup> LEGISLATURE**

	<u>FY00</u>	<u>FY01</u>	<u>Total 2-Year</u>
UM	\$4,440,000	\$40,000	\$4,480,000
USM	1,110,000	10,000	1,120,000
<b>Total</b>	<b>\$5,550,000</b>	<b>\$50,000</b>	<b>\$5,600,000</b>

**120<sup>th</sup> LEGISLATURE**

	<u>FY02</u>	<u>FY03</u>	<u>Total 2-Year</u>
UM	\$0	\$0	\$0
USM	0	0	0
<b>Total</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**121<sup>st</sup> LEGISLATURE**

	<u>FY04</u>	<u>FY05</u>	<u>Total 2-Year</u>
UM	\$80,000	\$1,600,000	\$1,680,000
USM	20,000	400,000	420,000
<b>Total</b>	<b>\$100,000</b>	<b>\$2,000,000</b>	<b>\$2,100,000</b>

**122<sup>nd</sup> LEGISLATURE**

	<u>FY06</u>	<u>FY07</u>	<u>Total 2-Year</u>
UM	\$0	\$540,000	\$540,000
USM	0	60,000	60,000
<b>Total</b>	<b>\$0</b>	<b>\$600,000</b>	<b>\$600,000</b>

One time funding

**123<sup>rd</sup> LEGISLATURE**

	<u>FY08</u>	<u>FY09</u>	<u>Total 2-Year</u>
UM	\$1,200,000	\$720,000	\$1,920,000
USM	300,000	180,000	480,000
INITIATIVES	0	100,000	100,000
<b>Total</b>	<b>\$1,500,000</b>	<b>\$1,000,000</b>	<b>\$2,500,000</b>

**124<sup>th</sup> LEGISLATURE**

	<u>FY10</u>	<u>FY11</u>	<u>Total 2-Year</u>
UM	\$0	\$0	\$0
USM	0	0	0
INITIATIVES	0	0	0
<b>Total</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**125<sup>th</sup> LEGISLATURE**

	<u>FY12</u>	<u>FY13</u>	<u>Total 2-Year</u>
UM	\$0	\$0	\$0
USM	0	0	0
INITIATIVES	0	0	0
<b>Total</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**126<sup>th</sup> LEGISLATURE**

	<u>FY14</u>	<u>FY15</u>	<u>Total 2-Year</u>
UM	\$0	\$0	\$0
USM	0	0	0
INITIATIVES	0	0	0
<b>Total</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**Total Yearly Research Appropriation for FY14**

	<u>FY14</u> <u>Appropriation</u>
UM	\$11,466,000
USM	2,866,500
UMM	200,000
UMFK	0
UMA	0
UMFK	0
UMA	0
UMPI	0
UMS	73,895
MMA	93,605
<b>Total</b>	<b>\$14,700,000</b>

Table A2-3. Maine Economic Improvement Fund  
**UTILIZATION OF FY2014 OPERATING RESEARCH APPROPRIATION BY TARGETED RESEARCH AREAS**

UMAINE	Source of R&D Funds					Utilization of R&D Funds				Balance
	FY2014 R&D Base Budget	Unused R&D Funds from Prior Years As Reported	Adjustment to Prior Years Unused R&D Funds	Adjusted Unused R&D Funds from Prior Years	FY2014 Total R&D Funds Available	FY2014 R&D Actual Expenditures	Transferred To Match Grants & Contracts	Transferred Between R&D Accounts	Total R&D Funds Utilized	Unused Funds Carried Forward To FY2015 <sup>1</sup>
Targeted Research Area										
Adv. Technology Forestry & Agriculture	\$ 1,929,418	\$ 437,383	\$ -	\$ 437,383	\$ 2,366,801	\$ 2,443,567	\$ 163,638	\$ (548,111)	\$ 2,059,094	\$ 307,707
Aquaculture & Marine Science	1,768,695	(2,376,872)	-	(2,376,872)	(608,177)	2,743,669	554,932	(2,844,873)	453,728	(1,061,905)
Biotechnology	859,577	1,174,587	-	1,174,587	2,034,164	1,227,995	21,049	504,039	1,753,083	281,081
Composites	2,326,188	67,490	-	67,490	2,393,678	2,198,342	395,608	(219,526)	2,374,424	19,254
Environmental	1,354,840	706,881	-	706,881	2,061,721	1,552,686	39,864	261,011	1,853,561	208,160
Information Technology	1,593,036	(845,483)	-	(845,483)	747,553	2,260,287	1,037,842	(1,723,117)	1,575,012	(827,459)
Precision Manufacturing	1,433,705	327,348	-	327,348	1,761,053	1,702,987	117,338	(118,606)	1,701,719	59,334
Cross Sector	200,541	(208,362)	-	(208,362)	(7,821)	400,193	(24,726)	(414,978)	(39,511)	31,690
Unassigned - reallocated by System	-	(544,477)	-	(544,477)	(544,477)	-	(544,477)	-	(544,477)	-
Total State Funding	\$ 11,466,000	\$ (1,261,505)	\$ -	\$ (1,261,505)	\$ 10,204,495	\$ 14,529,726	\$ 1,761,068	\$ (5,104,160)	\$ 11,186,633	\$ (982,138)
UM Cost Sharing Funding <sup>2</sup>	5,104,160	-	-	-	5,104,160	-	-	5,104,160	5,104,160	-
Total Funding	\$ 16,570,160	\$ (1,261,505)	\$ -	\$ (1,261,505)	\$ 15,308,655	\$ 14,529,726	\$ 1,761,068	\$ (0)	\$ 16,290,793	\$ (982,138)

<sup>1</sup>Includes year-end equipment carry-over funds (equipment ordered, not received, and not paid).

<sup>2</sup>Salary and benefits from University.

USM	Source of R&D Funds					Utilization of R&D Funds				Balance
	FY2014 R&D Base Budget	Unused R&D Funds from Prior Years As Reported	Adjustment to Prior Years Unused R&D Funds	Adjusted Unused R&D Funds from Prior Years	FY2014 Total R&D Funds Available	FY2014 R&D Actual Expenditures	Transferred To Match Grants & Contracts	Transferred Between R&D Accounts	Total R&D Funds Utilized	Unused Funds Carried Forward To FY2015 <sup>1</sup>
Targeted Research Area										
Biotechnology	\$ 1,428,131	\$ 683,429	\$ -	\$ 683,429	\$ 2,111,560	\$ 1,537,089	\$ 53,582	\$ (1,227,930)	\$ 362,741	\$ 1,748,819
Information Technology	308,805	(2,140)	-	(2,140)	306,665	158,661	153,667	(464,444)	(152,116)	458,781
Precision Manufacturing	-	-	-	-	-	648	-	(648)	-	-
Unassigned - reallocated by System	1,129,564	814,561	-	814,561	1,944,125	-	91,957	1,693,022	1,784,979	159,146
Total State Funding	\$ 2,866,500	\$ 1,495,850	\$ -	\$ 1,495,850	\$ 4,362,350	\$ 1,696,398	\$ 299,206	\$ -	\$ 1,995,604	\$ 2,366,746

<sup>1</sup>Includes year-end equipment carry-over funds (equipment ordered, not received, and not paid).

Table A2-4. Maine Economic Improvement Fund  
**FY2014 SUMMARY UTILIZATION OF OPERATING RESEARCH APPROPRIATION BY UNIVERSITY**

	Source of R&D Funds				Utilization of R&D Funds					Balance
	FY2014 R&D Base Budget	Unused R&D Funds from Prior Years As Reported	Adjustment to Prior Years Unused R&D Funds	Adjusted Unused R&D Funds from Prior Years	FY2014 Total R&D Funds Available	FY2014 R&D Actual Expenditures	Transferred To Match Grants & Contracts	Transferred Between R&D Accounts	Total R&D Funds Utilized	Unused Funds Carried Forward To FY2015 <sup>1</sup>
UMAINE	\$ 11,466,000	\$ (1,261,505)	\$ -	\$ (1,261,505)	\$ 10,204,495	\$ 14,529,726	\$ 1,761,068	\$ (5,104,160)	\$ 11,186,633	\$ (982,138)
USM	2,866,500	1,495,850	-	1,495,850	4,362,350	1,696,398	299,206	-	1,995,604	2,366,746
UMM	200,000	63,660	-	63,660	263,660	217,198	-	-	217,198	46,462
UMFK	-	4,898	-	4,898	4,898	4,896	-	-	4,896	2
UMPI	-	74,116	-	74,116	74,116	71,914	-	-	71,914	2,202
UMA	-	-	-	-	-	-	-	-	-	-
UMS	73,895	-	-	-	73,895	11,942	-	-	11,942	61,953
MMA	93,605	-	-	-	93,605	14,495	-	-	14,495	79,110
<b>Total State Funding</b>	<b>\$ 14,700,000</b>	<b>\$ 377,019</b>	<b>\$ -</b>	<b>\$ 377,019</b>	<b>\$ 15,077,019</b>	<b>\$ 16,546,569</b>	<b>\$ 2,060,274</b>	<b>\$ (5,104,160)</b>	<b>\$ 13,502,682</b>	<b>\$ 1,574,337</b>

<sup>1</sup> Includes year-end equipment carry-over funds (equipment ordered, not received, and not paid).

<sup>2</sup> UM Cost Sharing.



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