MAINE ECONOMIC IMPROVEMENT FUND

A successful partnership among Maine's government, private sector and public universities to build Maine's economy and future workforce through research and development

Maine's Public Universities

UNIVERSITY OF MAINE SYSTEM

Annual Report FY15 • Presented to Maine State Legislature

Maine's Public Universities

UNIVERSITY OF MAINE SYSTEM

TABLE OF CONTENTS

MAINE ECONOMIC IMPROVEMENT FUND
2015 ANNUAL REPORT

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 specific goals and metrics for the Maine Economic Improvement Fund to help achieve these Strategic Outcomes. These metrics were approved at the end of FY14, and are applied to all FY15 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 FY15, the state's $14.7 million MEIF investment was leveraged at a rate of 3:1 by our UMS campuses for an additional $46,784,718 in federal and private-sector grants and contracts in the seven sectors.

- MEIF funds and the external grants and contracts it leverages funded the work of over 400 researchers and technicians, and more than 800 graduate and undergraduate students.

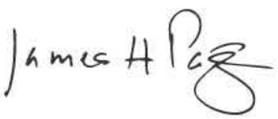
- These grants and contracts provided more than $2 million to purchase major equipment to upgrade and outfit university labs.

- Maine's public universities secured new patents, worked on development projects with large and small businesses and startups, and provided R&D support to over 500 companies and individuals.

As required in the statute that created MEIF 17 years ago, included with this FY15 MEIF report are financial and informational details.

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
University of Maine System

MEIF Background

The Maine Economic Improvement Fund (MEIF) represents the 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.

These funds provided through state appropriation to the University of Maine System are dollars specifically 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 well-established research, development and commercialization activities accounting for 97 percent of the MEIF activity. In 2009, the University of Maine System established the Small Campus Initiative Fund 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 in Maine's seven sectors.
- Attract and retain world-class researchers.
- Provide support for modern laboratories and state-of-the-art equipment.
- Create new products, patents, technologies, companies and exciting job opportunities in Maine.
- Create and sustain economic development and innovation.

MEIF funds often provide the required match to acquire these federal or private sector grants, and this investment in Maine's public 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 institutions with established research and graduate programs in all of the seven targeted research sectors and 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 400 faculty and staff, and over 800 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, 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 create MEIF specific goals and metrics. Several of the UMS Strategic Outcomes are performance targets for all R&D and economic development activity. The MEIF goals recognize that MEIF activity is restricted to Maine's legislatively selected seven R&D sectors and are, therefore, MEIF goals and metrics, and a subset of the overall UMS goals. The UMS Strategic Outcomes that apply to R&D activity are:

- Target 1 — Increase Research Capacity and Activity
- Target 2 — Support New Technologies, Licensing and Commercialization
- Target 4 — Increase Economic Development Partnerships

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.

R&D Strategic Outcomes and related MEIF goals are:

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.

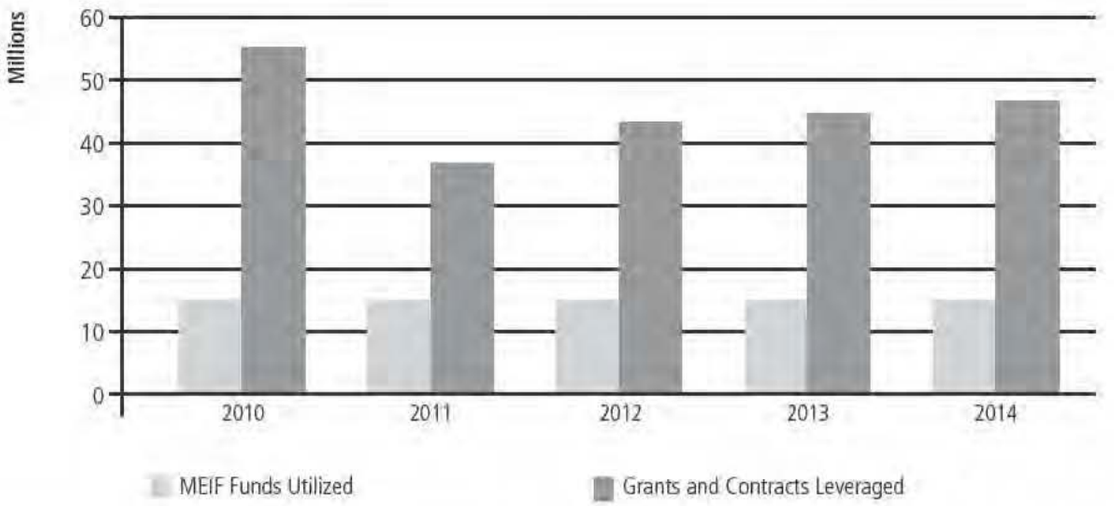
Table 1

FY15 Total Grants and Contracts	Number of Proposals	Total Proposal Value
Total Proposals Submitted	1,257	$203,903,978
Total Proposals Awarded	1,141	$91,423,164

Grants and Contracts Awarded in MEIF Sectors	FY13 MEIF Awards	FY14 MEIF Awards	FY15 MEIF Awards
Forestry and Agriculture	8,642,424	7,654,060	14,194,009
Aquaculture and Marine	7,045,322	9,153,389	15,187,566
Biotechnology	1,985,295	6,353,450	1,524,204
Composites	9,230,715	5,135,033	5,247,712
Environmental	5,781,658	7,959,264	4,349,651
Information Tech	7,422,675	2,520,521	4,473,781
Precision Manufacturing	1,130,746	1,414,700	780,694
Cross Sector	2,290,129	4,681,209	1,018,132
Total	$ 43,528,964	$ 44,871,626	$46,775,749

FY15 Dollar Increase	**$1,904,122**
FY15 Percentage Increase	**4.4%**

Figure 1 MEIF Return on Investment (UMS)
Tens of Millions Leveraged in Grants and Contracts
(Five-Year Snapshot)



In summary, the MEIF Target 1 for increasing external grants and contracts leveraged through MEIF investments saw an increase of 4.4 percent 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 that 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 remain steady. For the purpose of this report, a private-sector contract is counted as a single proposal submission.

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 MEIF sectors.

Table 2

MEIF Target 2 — Commercialization Activity	FY13	FY14	FY15
Revenue from Commercialization	$121,250	$96,726	$150,094
Number of Patents Filed	15	32	22
Number of Patents Issued	16	12	9
Number of License Agreements and License Options	6	6	16

FY15 percent revenue increase 55%

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, products and services 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. Patents take four to five years from application to issuance. Newly issued UMS patents reported in Table 2 and in Appendix 1 were filed four to five years ago. 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 to 10 years. UMS is focusing additional effort to accelerate the commercialization with private-sector partners and programs, such as the Maine Technology Institute and Maine Venture Fund.

MEIF Target 3

Derived from UMS Research and Economic Development Target 4

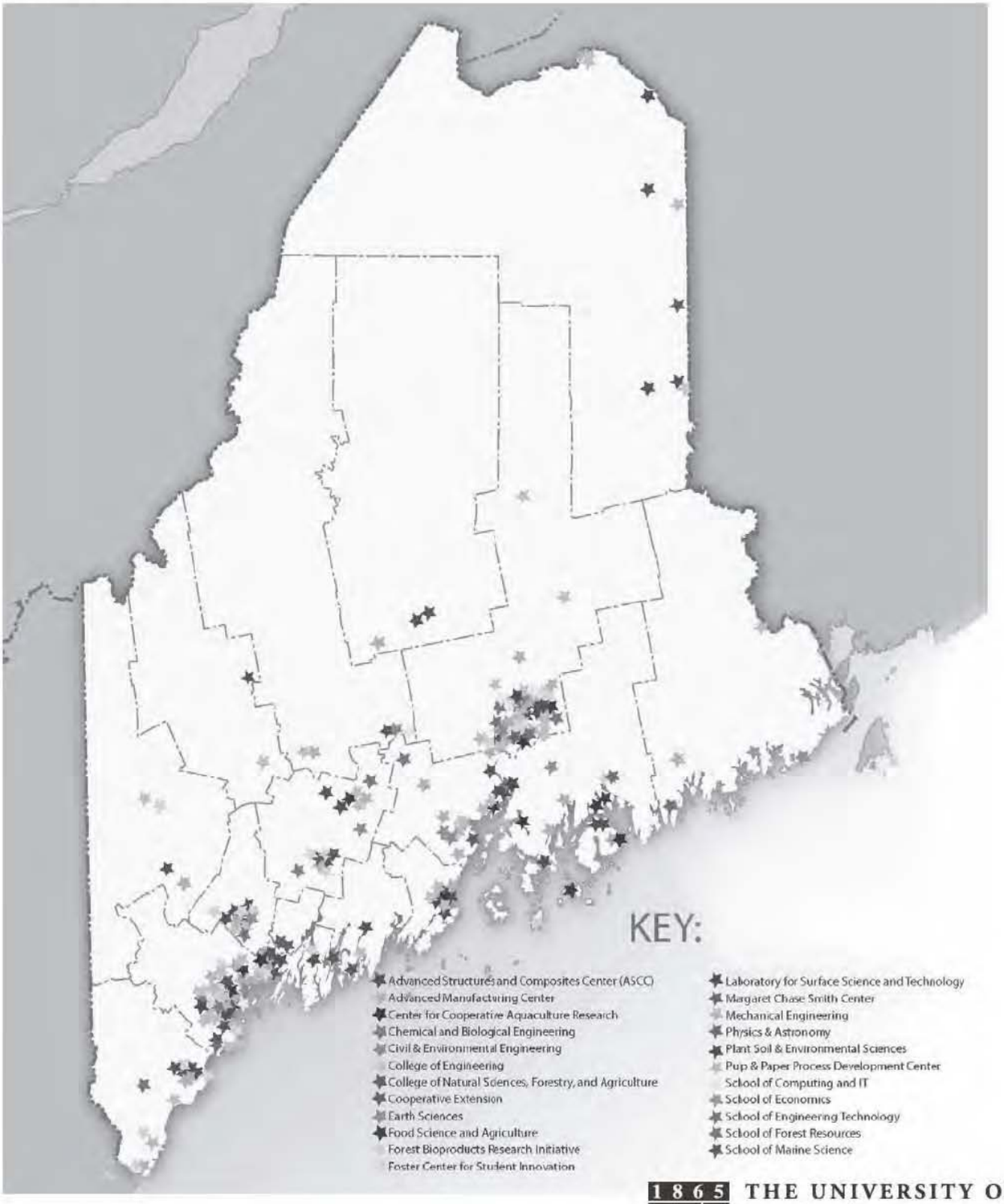
The UMS annual revenue from activities with business and industrial partners in the MEIF sectors increases from an FY13 baseline of $3.15 million to $6.75 million by FY17, and the number of business and industry contracts in MEIF sectors will increase from a baseline of 400 in FY13 to 450 in FY17.

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 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.

Table 3

MEIF TARGET 3 — Business and Industry Contracts	FY13	FY14	FY15
Revenue from Business and Industrial Contracts	$3,150,000	$4,371,999	$5,759,572
Number of Business and Industrial Contracts	400	500	624

Figure 2 UMS Industry Partnerships



MEIF Target 4

Support R&D Workforce Development

UMS shall maintain a concerted effort to involve faculty, staff and student participation 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.

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 in 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. Nonstudent employees are tracked as full-time equivalents (FTEs) based on a 40-hour/52-week work year. Student employees, tracked by head count, generally work less than 20 hours per week during the academic year.

Grant and contract revenue also is an important source of funding for students' salary, 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.

Table 4

MEIF Target 4 — Workforce Development	Wages Paid from MEIF	Wages Paid from Grants/Contracts	Totals
Number of Faculty Staff Supported (FTE = Full-Time Equivalent)	123	309.7	432.7
Number of Graduate Students Supported (Headcount)	49	285	334
Number of Undergraduate Students Supported (Headcount)	78	459	537

Student Costs from Grants and Contracts	FY13	FY14	FY15
Student Salaries and Wages from Grants and Contracts	5,001,942	4,877,650	4,603,696
Student Tuition Paid by Grants and Contracts	952,553	857,781	835,961
Student Fellowships Paid by Grants and Contracts	236,553	199,400	552,944
Student Health Insurance Paid by Grants and Contracts	167,893	282,848	62,967
Total Soft Money Student Support	**$6,358,941**	**$6,217,679**	**$6,055,568**

MEIF Success Stories

By leveraging MEIF funds, the University of Maine System has attracted more than $46.8 million in FY15 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 FY15 MEIF seven-sector projects from our campuses follow.

Bottom to top: Easton: released in February 2014 to the french fry industry — named for the town in Aroostook County — is praised for its high yields and its high-quality french fries. Caribou Russet: released in March 2015 — a cross between Silverton Russet and Reeves Kingpin — is a dual-purpose variety that has shown potential for the processing and fresh markets. The potato is named for Caribou, Maine. Sebec: released in February 2014 to the potato chip industry, was named for a lake in Piscataquis County. The variety has round to slightly oblong tubers, and is lightly textured, with buff-colored skin and white flesh.

ADVANCED TECHNOLOGIES FOR FORESTRY AND AGRICULTURE

■ State's potato breeding program cultivates new varieties to grow the industry

The community of Presque Isle in the northernmost county in Maine is home to Aroostook Research Farm — the largest of five University of Maine experimental research facilities. In the summer months, the 425-acre farm is covered in rows of lush, leafy green plants adorned with tiny white and purple flowers.

Though the expansive fields make for a beautiful scene, researchers and farmers are more interested in the thousands of plump, starchy vegetables just inches below the Earth's surface. Since 1912, the farm has been ground zero for UMaine's potato research programs, serving as the hub for agriculture research and development for the state's potato industry. The university's potato breeding program introduces new varieties with improved disease resistance and marketability for potato growers in the eastern United States. This year, UMaine's breeding program produced 50,000 seedlings, each containing a unique set of genetic material that could hold the key to the next decade's successful potato varieties. In the past decade, the program, in partnership with the Maine Potato Board, has released three new varieties. The three — Easton, Sebec and Caribou Russet — had the competitive yield and quality attributes necessary to move from the research conveyer belt to market shelves.

umainetoday.umaine.edu/archives/fallwinter-2015/from-the-ground-up

■ Think big, go small

University of Maine researchers have been awarded $700,000 to develop eco-friendly particleboard panels with adhesive made of cellulose nanofibrils (CNF), as well as design a commercial-scale plant to manufacture the CNF. With one $350,000 grant, UMaine and the USDA Forest Service (USFS) are tasked with making strong, stiff and fully recyclable particleboard panels that can be used in countertops, door cores and furniture. The adhesive in the particleboard will be made from CNF rather than urea-formaldehyde. To optimize techniques and methodology, UMaine has been awarded another $350,000 to construct a commercial-scale CNF manufacturing plant with a capacity of 2 tons per day. UMaine will collaborate with USFS on the commercial plant project. UMaine researchers taking part in the project have a range of expertise — from forest products to chemistry and biological engineering.

COMPOSITES AND ADVANCED MATERIALS TECHNOLOGIES

■ Sea Trials

The University of Maine's one-eighth scale floating wind turbine successfully operated and collected data related to design capabilities for more than a year, including throughout a Maine winter. VolturnUS 1:8, the scale model of a 6 MW wind turbine featuring floating concrete hull technology, was equipped with more than 50 sensors. Among the yearlong data highlights: VolturnUS successfully withstood 18 severe storms equivalent to 50-year storms, and one 500-year storm, and the maximum tower inclination angle measured was less than 7 degrees. UMaine signed a $3.97 million cooperative research agreement with the U.S. Department of Energy (DOE), of which $3 million is DOE funding and $970,000 is cost share, to continue the design and engineering work of the full-scale VolturnUS floating hull. The full-scale floating hull is a patent-pending technology developed by UMaine's Advanced Structures and Composites Center. In June 2013, VolturnUS became the first grid-connected offshore wind turbine deployed in the Americas, and the first floating turbine in the world designed with a concrete hull and composites material tower.

umainetoday.umaine.edu/archives/fall-2014/sea-trials

AQUACULTURE AND MARINE SCIENCES

■ Advancing marine farming

A $20 million National Science Foundation EPSCoR (Experimental Program to Stimulate Competitive Research) grant established the Sustainable Ecological Aquaculture Network (SEANET) program in Maine. Maine EPSCoR at the University of Maine will use the grant to mobilize the collective capacity of Maine's coastal science resources to establish SEANET, a research network focused on sustainable ecological aquaculture. SEANET will take a multi-institutional research approach to gain a comprehensive understanding of how sustainable ecological aquaculture can interact with coastal communities and ecosystems. This public-private partnership led by UMaine, in collaboration with the University of New England and other institutions in Maine, will use the state's 3,500-mile coastline as a living laboratory to study physical oceanography, biophysical, biogeochemical, socioeconomic and policy interactions that have local, bioregional, national and global implications. Maine has multiple institutions with world-class expertise in marine sciences, engineering, climate change and social sciences. The SEANET research partners include UMaine, University of New England, University of Southern Maine, University of Maine at Machias, Bowdoin College, Maine Maritime Academy, St. Joseph's College, Southern Maine Community College, Bigelow Laboratory for Ocean Sciences and

Nadir Yildirim

STUDENT ACHIEVEMENT

Green insulation

In 2014, two University of Maine graduates set out to replace petroleum-based thermal insulation products with more environmentally friendly and sustainable options. Now, with support from several organizations, including the National Science Foundation and Maine Technology Institute, the pair's Orono-based company has created a prototype for the first completely eco-friendly thermal insulation foam board. Nadir Yildirim, a graduate of UMaine's innovation engineering program and a Ph.D. candidate in forest resources, and Alexander Chasse, a civil engineering alumnus, launched Revolution Research Inc. (RRI) to develop recyclable and reusable products using cellulose nanofibrils (CNFs). "I believe RRI will open a new page in the insulation industry," says Yildirim, who has been working with advanced nanocomposites for more than seven years, and conducts his Ph.D. research at UMaine's Advanced Structures and Composites Center. The company's focus is the creation and commercialization of thermal and acoustical insulation foam boards for use in the construction and packaging industries. One of the largest uses of energy is heating and cooling buildings, according to the researchers, which drives companies to search for products that improve insulation performance. RRI aims to use CNFs and green polymers to produce a thermal insulation board with a lower carbon footprint.

the Cobscook Community Learning Center. In addition, dozens of other partners and stakeholder groups will collaborate on the project's research, education, workforce development and economic development activities.

umainetoday.umaine.edu/archives/fall-2014/future-farming

■ Buoying aquaculture

University of Maine scientists have deployed an ocean-observing buoy at the mouth of the Damariscotta River to better understand how different types and scales of aquaculture can fit into Maine's working waterfront. The buoy is part of a National Science Foundation Sustainable Ecological Aquaculture Network (SEANET) project, geared to help the aquaculture sector maintain an environmentally and economically sustainable production path. Professor Neal Pettigrew's Physical Oceanography Group in the School of Marine Sciences will use data gathered by Mooring E0501 to map water circulation at the mouth of the river. The detailed circulation patterns will be integrated into ecosystem models under the supervision of Damian Brady, assistant research professor at the Darling Marine Center. The models will include results of environmental monitoring, field investigations and lab analysis, much of which will be conducted at the Darling Center. The Ocean Data Acquisition System, designed and constructed by Ocean Science and Technology LLC, includes technology developed for the network of deepwater buoys in the Gulf of Maine that are part of the Northeastern Regional Association of Coastal and Ocean Observing Systems.

■ NOAA funds lobster, finfish, mussel projects

Lobsters, fin fish and mussels are the focus of three research projects chosen for more than $850,000 in funding from the National Oceanic and Atmospheric Administration's Saltonstall-Kennedy (S-K) Grant Program to benefit the U.S. fishing industry. One project seeks to determine if increasing ocean temperature is causing the decline in the population of lobsters in southern New England. Another seeks to improve the survival of cusk and Atlantic cod bycatch from lobstering. The third will use the experimental shellfish hatcheries at UMaine's Darling Marine Center in Walpole, Maine and the Marine Biological Laboratory in Woods Hole, Massachusetts to develop technology to cost-effectively produce mussel seed to meet the needs of the Northeastern United States mussel culture industry.

■ Intertidal ecology

Understanding the biodiversity of bacteria associated with marine algae that contribute to ecosystem health in the rocky Atlantic intertidal zone is the focus of a study led by three University of Maine researchers. Susan Brawley, a professor of plant biology in the School of Marine Sciences, heads the three-year project. At UMaine, she is working with John Singer, a professor of microbiology, and Benildo de los Reyes, a professor of biological sciences. The study is a collaborative research project with Hilary Morrison at Marine Biological Laboratory (MBL) and is funded by a more than $1.4 million grant from the National Science Foundation — $986,515 to UMaine and $480,016 to MBL. The research will focus on interactions between microbes and intertidal macroalgae — seaweeds — and how their relationships change in response to natural and human-driven environmental stresses. The study will determine how bacteria change depending on the season, position within the intertidal zone and latitudinal range. The research has the potential to serve as an important trans-Atlantic baseline of the microbiomes' biodiversity.

umainetoday.umaine.edu/archives/springsummer-2015/intertidal-ecology

■ Delivering fresh sea vegetables

The University of Maine is working with a Bristol, Maine company to study the shelf life and nutritional values of aquacultured sea vegetable products. Maine Fresh Sea Farms, a startup based on the Damariscotta River, is one of five Maine companies to share more than $471,000 in Value Added Producer Grants from the U.S. Department of Agriculture's Rural Development Program. The federal grants were awarded in August 2014 to preserve rural jobs at companies that process and add value to agricultural products. Maine Fresh Sea Farms received funding to help create a business plan and study the feasibility of delivering fresh aquacultured sea vegetable products to the marketplace using agricultural produce and seafood distribution systems, the USDA said. The funds also will help the company retain jobs and create more in the next decade.

INFORMATION TECHNOLOGIES

■ Cybersecurity

The Maine Cyber Security Cluster (MCSC) at the University of Southern Maine is the seminal public/private partnership initiative for cybersecurity in Maine. MCSC provides Maine with one-stop shopping for cybersecurity. Due to its outreach efforts with its many partners and collaborators, it has achieved a high level of recognition with business, industry, state, federal and military entities. It exists as the central participant to grow the many facets of cybersecurity education, training, and workforce and economic development in Maine. MCSC has recently received funding from the Maine Technology Institute and the National Science Foundation. MCSC has also received recognition as a National Security Agency Center of Academic

Excellence. With MEIF and MTI funding, MCSC is developing a Critical Infrastructure Protection Research and Operations Cyber Range that will provide a secure virtual environment for businesses, government and military agencies to conduct classified and unclassified research and development, as well as cyber warfare training and education. This cyber range includes the USM Portland Cyber Security Lab, and a Sensitive Compartmented Information Facility at Brunswick Landing, and collaboration with similar facilities in several states. There is also ongoing training of Coast Guard and other state and federal employees using cyber range simulations. The past year has seen the creation of a first of its kind systemwide Cyber Security Bachelor of Science Degree, and a Bachelor of Science in Information Technology at USM, as well as a USM Cyber Security Literacy minor for students in nontechnical fields. Graduates of MCSC, as well as students in externships, have been placed in cybersecurity positions in Maine businesses, including Unum, MaineHealth, Sage Data Security and WEX.

■ Health informatics research

The University of Southern Maine's Health Informatics Research Cluster represents an interdisciplinary team of faculty and staff researchers engaged in strategic partnerships with health care, public health and health data organizations. Its mission is to support health informatics development in the region, while enhancing Maine's capacity to provide efficient, high-quality clinical and population health services. Responding to economic and policy forces driving health system transformation, the team's foci include development of innovative health data resources, health data analytics and mobile health technology. A major collaborative initiative from the Health Informatics Research Cluster, the Tumor Registry Electronic Medical Record (TREMR), will contain data from Maine Medical Center's (MMC) electronic medical record on patients with cancer. It will also contain regional population density, household income, race/ethnicity and data on distance from health care providers. Investigators will use TREMR to generate evidence that informs cancer policies and interventions focused on: 1) modifiable behaviors, such as smoking, diet and physical activity, and cancer screening; 2) care quality and safety; and 3) barriers to cancer care and disparities. The goals of the project are to build TREMR, establish governance that allows it to be used while protecting patient privacy, promote the vibrant use of TREMR among the community of cancer researchers, and define and carry out analyses that inform the policy objectives of the Maine Cancer Consortium. Funding for this project comes in part from the Maine Cancer Foundation.

Get a grip

Developing a noninvasive procedure to determine the viability of lobsters for shipping was the goal of a recent cross-discipline research project led by a University of Maine undergraduate student. Matthew Hodgkin, a fourth-year animal and veterinary sciences major from Colebrook, Connecticut, developed a method to evaluate lobster livelihood based on claw strength. He collaborated with Bob Bayer, executive director of the Lobster Institute at UMaine; Michael Peterson, a mechanical engineering professor; and Thomas McKay, a fourth-year mechanical engineering technology student. Inspiration for Hodgkin's research came from Bayer, who had approached Peterson two years ago as a result of a press inquiry about the strength of lobster claws. Peterson and McKay then built a device to measure the closing strength of a lobster's crusher claw. Hodgkin has since worked with Bayer to determine if the device could be used to predict the viability of lobsters for shipping. Knowing a lobster's viability is relevant to Maine's primary seafood industry because it can determine if the crustacean is most suitable for shipping live or going straight to a processing plant, according to Hodgkin.

umainetoday.umaine.edu/archives/springsummer-2015/get-a-grip

■ Health lifestyle technologies

The efforts of this research cluster to develop an IT prototype for a Web-based comprehensive lifestyle management intervention targeted at college students were generally a success. Two pilot studies were conducted as part of the two-year seed development project. In each of the pilot studies, University of Southern Maine residential college students were recruited to participate in a four-week intervention in which they interacted with a newly created comprehensive website containing information and activities related to management of a healthy lifestyle. Much of the qualitative data obtained offered useful insights into aspects of the IT prototype that were most helpful, as well as those that could be made more interactive and engaging. Study participants agreed they gained knowledge in participating in the pilot studies; and they were very forthcoming as to how this knowledge and their interaction and behavior could be delivered in ways that were more interactive and more engaging in real time. A manuscript of this project, with results from the two pilot studies, is being written for submission to a peer-reviewed journal. In addition, two grants have been submitted by research cluster members for federal funding for work related to health management and technology.

B UMaine's Cyber Defense Team

The University of Maine Cyber Defense Team advanced to a regional competition at Syracuse University in March. Members of the team competed at the annual Northeast Collegiate Cyber Defense Competition after placing fifth in a preliminary competition with 13 other schools. According to the National Collegiate Cyber Defense Competition, the contest simulates security operations for a small company. Teams must quickly familiarize themselves with network systems and software before beginning to defend against attacks, while also providing customer service to users. George Markowsky, professor of computer science at UMaine, is the team's faculty adviser.

■ Aging elders

University of Maine seniors in the New Media Department are developing a fall detection device for older adults to use outside their homes. Benjamin Herold-Porter of Biddeford, Maine and Heather Anderson of Jonesboro, Maine have created a prototype that can detect when the person wearing the device has fallen and automatically text a programmed cell phone number without requiring user action. The students, who were enrolled in a new media wearable device class before starting their capstone, were inspired to create technology that would benefit their relatives.

umaine.edu/news/blog/2015/05/01/new-media-students-develop-fall-detection-device-for-older-adults

ENVIRONMENTAL TECHNOLOGIES

■ NASA, UMaine study phytoplankton

University of Maine oceanographer Ivona Cetinic is participating in a NASA project to advance space-based capabilities for monitoring microscopic plants that form the base of the marine food chain. Phytoplankton — tiny ocean plants that absorb carbon dioxide and deliver oxygen to Earth's atmosphere — are key to the planet's health. And NASA wants a clear, global view of them. NASA's Ship-Aircraft Bio-Optical Research (SABOR) mission will bring together marine and atmospheric scientists to tackle optical issues associated with satellite observations of phytoplankton. The goal is to better understand marine ecology and phytoplankton's major role in the global cycling of atmospheric carbon between the ocean and the atmosphere.

umaine.edu/news/blog/2014/07/17/seeing-the-sea

■ Residents support energy efficiency

Fifty-two percent of surveyed Maine adults supported increasing all Mainers' monthly electricity bills to invest in renewable energy options and/or energy efficiency programs to reduce carbon emissions. That's according to a University of Maine study that also found 37 percent of the nearly 400 respondents viewed energy efficiency and renewable energy investments as complementary. They divided the money evenly — giving half to renewable energy investment and half to energy efficiency programs. UMaine economist Caroline Noblet and colleagues conducted the study in 2013, the same year fossil fuels (81 percent) and nuclear energy accounted for more than 90 percent of energy use in the United States. "Energy choice studies generally only gauge support (or not) for a policy; rarely do they take the next step — as we have done here — to look at how people would allocate these investment dollars," Noblet says.

umaine.edu/news/blog/2015/03/24/umaine-study-residents-support-investing-in-energy-efficiency-renewable-energy

BIOTECHNOLOGY

■ Gorham Lamp

The Gorham Lamp, a benchtop and microscope illumination system developed at the University of Southern Maine by Joseph Staples, is moving closer to production. The device is a unique product designed to provide circular oblique illumination for users of stereo microscopes. Staples is currently working with three Maine-based companies, Formworks LLC (product development and marketing packet), SPC MicroSystems (electronics engineering and design), and MechArtisans LLC (mechanical engineering and design), to produce a series of prototypes that will be field tested in fall 2015. Feedback from the field tests were incorporated into the final product, along with designs for manufacturing a bill of materials and production estimates for potential licensees. The right to license and manufacture the Gorham Lamp will be up for bid in spring 2016. The Gorham Lamp has drawn interest from major manufacturers around the U.S. and in Europe. If produced in Maine, the first production units of the Gorham Lamp could reach the market as early as the last quarter of 2016.

PRECISION MANUFACTURING

■ On the market

A new device on the market, developed by O'Brien Medical in Orono in collaboration with the University of Maine Advanced Manufacturing Center, has the potential to improve detection of diabetic peripheral neuropathy that can lead to limb loss. ETF128, an electronic tuning fork named one of the Top 10 innovations in podiatry by *Podiatry Today* magazine, was patented last year and is now manufactured by Saunders Electronics in South Portland, Maine. The 128-Hz device offers a significant improvement over current methods used by doctors to detect diabetic peripheral neuropathy, a nervous system disorder with symptoms of pain, sensation loss and weakness in limbs. The development of ETF was made possible through a collaboration with Dr. Todd O'Brien, president and founder of O'Brien Medical, and UMaine's Advanced Manufacturing Center, an engineering support and service center dedicated to promoting manufacturing economic development in Maine.

Photo courtesy of O'Brien Medical

Small Campus Initiative

■ Universty of Maine at Farmington

In collaboration with Ross Hickey, vice provost for research integrity at USM, the University of Maine at Farmington submitted a DEA Schedule I application that recently received preliminary approval. The secondary application also has been submitted. While awaiting DEA approval, UMF has been working on developing the methodologies. Because hops *(Humulus sp)* is a close relative of cannabis, sharing 90 percent of the genome, UMF researchers have been using hops as a model system to develop both the cannabinoid, terpene and DNA barcoding methodology. In the cannabinoid and terpene analysis, the method has been validated and researchers are now using the established method to analyze terpenes in unknowns. In the DNA barcoding project, UMF validated a DNA isolation procedure and is currently working to optimize the PCR reaction. Once DEA permitted, these validated methods will be used to analyze medical cannabis samples.

■ Maine Maritime Academy

In collaboration with Penobscot East Resource Center in Stonington, Maine Maritime Academy has designed a trimaran lobster boat with significant reductions in fuel consumption. The goal of MMA's MEIF project is to complete the final refinements to the design, perform final analysis and testing, and identify and partner with a boatbuilder. These efforts will allow MMA to pursue future grants for construction of a full-scale prototype. The team met with six Maine boatbuilders, and three large and three small yards to discuss the project. Strength analysis has begun using the new geometry model. Tank testing of the final sidehull shape is not complete, as MMA would like to use UMaine's new W^2 Ocean Engineering Lab instead of traveling out of state again. The W^2 Lab is up and running, but the tow carriage portion needed for MMA tests is still under construction. MMA will likely need an extension on this part of the project.

■ University of Maine at Augusta

A University of Maine at Augusta project has focused on understanding the complexity of aircraft simulation and its potential application for improving flight training education, while potentially reducing cost. UMA has invested in a Full Motion Redbird FMX Flight Simulator, and work has begun presenting simulation training to every private pilot student this year. This simulator is an FAA-approved Advanced Aircraft Training Device. With such an FAA designation, students can credit some time flown in this device toward time required for instrument and commercial flight ratings. System software on the Redbird simulator includes a series of modules set up as gaming tasks. This "gaming" software provides coaching queues for pilots, then evaluates performance and provides a score sheet on selected aspects of the maneuver. The effectiveness of this training has been discussed with training experts at the Aircraft Owners and Pilots Association (AOPA) and has been received with great interest. UMA will provide an evaluation of the effectiveness of this simulator training at the completion of this grant.

In addition, UMA has partnered with United Technologies Center (UTC) in Bangor, Maine to develop science, technology, engineering and math (STEM) modules for use in grades K–12 in flight simulation, particularly flight dynamics. Flight dynamics will cover such topics as basic math and physics for students across a broad range of educational experiences, while making these topics fun and applicable. UTC has a strong gaming programming center and UMA will leverage this capability to develop a set of STEM modules for use in local schools. UMA is building these partnerships now.

UMA looks forward to successful completion of this grant in May 2016. It is expected that the results of this grant will positively impact the training of pilots in the UMA Aviation Program by reducing costs, keeping course completion rates in the allocated time frame, and elevating the UMA Aviation Program to be the top Aviation Training Program in the Northeast in five years.

■ University of Maine at Machias and Downeast Institute

With lessons learned about routine monitoring and maintenance of field plots, and the necessity to hire skilled labor, the University of Maine at Machias and the Downeast Institute devised a six-pronged project to investigate green crabs and their effects on softshell clams. The NOAA-SK award of $348,767 is for the project: "Demonstrating Shellfish Aquaculture Technology in Pilot and Commercial Scale Projects: Creating New Opportunities for Maine's Coastal Communities." Other collaborators are Stewards of the Sea, LLC in Freeport. Two progress reports are online.

(downeastinstitute.org/2014-field-trials.htm).

■ University of Maine at Machias

The University of Maine at Machias is examining factors affecting the hatchery, nursery and growout phases of the Arctic surfclam, *Mactromeris polynyma*, to create new economic opportunities for businesses and entrepreneurs in Down East Maine. Arctic surfclams are a $50 million fishery in Atlantic Canada, where the species is harvested by large factory ships that dredge surfclams from sandy/muddy bottoms at depths of up to 200 feet. The foot of the bivalve is processed to produce hokkigai for sushi- and sashimi-style dishes, and Asian cuisine. Although the species exists in the Gulf of Maine, it does not occur at commercial densities. UMM has obtained broodstock animals from Canada with permits from Maine's Department of Marine Resources, and has begun to investigate the hatchery, nursery and growout phases of the Arctic surfclam as a possible new culture fishery in eastern Maine. Early studies in the hatchery production and research center of UMM's Marine Science Field Station informed UMM researchers of the importance of cold (< 10°C) temperature and various phytoplankton (single-celled marine algae) species to bring adults into a spawning condition. It is possible to spawn the same adults three to four times a year to produce larvae and juveniles. The nursery phase is intermediate between the hatchery and growout phase, and one that takes animals that have reached 2-3 mm from the hatchery where they have fed primarily on cultured phytoplankton to a highly controlled field scenario, where thousands are grouped in cages or floating trays with the goal of attaining sizes of 8–15 mm in shell length. UMM researchers have found that juvenile surfclams grow/survive very well in trays lined with small aperture mesh (i.e., window screening), as long as the trays are submerged. Floating trays result in poor survival and surfclams with stunted/disfigured shells; completely submerged trays result in relatively high survival and excellent growth to the target size (over a six-month period). The most important phase is the growout, where juveniles are moved from nursery trays to field plots. The most significant growout result obtained to date has been excellent survival of post-nursery juveniles planted in the lower intertidal. Normally, *M. polynyma* is a subtidal species in its native habitat; however, determining that it can survive in the lower intertidal opens a new line of thinking about how to culture this species that does not involve large, subtidal tracts (such as for blue mussels, oysters or salmon). In addition, equipment to plant, protect and harvest intertidal surfclams becomes less complicated and costly compared to what it would be if the species were grown subtidally. To date, UMM field experiments have shown that growing animals to 1¼– to 1½–inch (32–38 mm) in the lower intertidal is possible after two years post-planting. Planting size is critical, and so, too, is protecting vulnerable juveniles from crustacean predators, such as crabs and lobsters. Protective netting can be applied to intertidal tracts to deter predators, although the effectiveness of the netting is clam size-dependent, with best results in clams of an initial size of 15–20 mm in length, and sub-par results for clams of an initial size of < 10 mm in length. Because the cost of growing clams to a 15–20 mm size in a nursery setting adds an additional year to bringing them to a commercial size, studies are continuing to examine methods of deterring predators on the smallest sizes of cultured surfclam seed.

✓ SUCCESS

By leveraging MEIF funds, UMS has attracted more than $46.8 million in FY15 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, which 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. The University of Maine as the state'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 within federal and private-sector grants and contracts.

✓ STRATEGIC IMPACT

In 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 400 full-time equivalent jobs are funded annually in Maine through the funds leveraged and expended related to MEIF. These positions include faculty, technicians and research staff. Over 800 graduate and undergraduate students are funded for their involvement in research, development and commercialization.

Appendix 1 — UMS Intellectual Property

Table A1-1

University of Maine System New Patent Applications Filed FY15

Title	Application	Type Filing Date
PROCESS FOR RECOVERY OF ACETIC ACID FROM BIOMASS	US – PROVISIONAL	7/3/2014
SYSTEM AND APPARATUS FOR ILLUMINATING A SPECIMEN (USM Campus)	US	7/18/2014
COMPOSITE BUILDING PRODUCTS BOUND WITH CELLULOSE NANOFIBERS	US, Canada	7/30/2014
REMOTE WIND RESOURCE ASSESSMENT	US – PROVISIONAL	8/12/2014
DANDY MAN PURPLE RHODODENDRON (USM Campus)	US	8/27/2014
METHOD AND SYSTEM FOR COMPLETE INTERFERENCE MITIGATION IN PASSIVE WIRELESS SENSORS AND RFID TAGS	US	8/28/2014
COMPOSITE WELDABLE PANEL WITH EMBEDDED DEVICES	US	9/12/2014
CONTAINER HAVING COMPOSITE WELDABLE PANEL WITH EMBEDDED DEVICES	US	9/12/2014
FLOATING WIND TURBINE SUPPORT SYSTEM	PCT	9/24/2014
STYLIZED ADAPTIVE MOBILITY DEVICE	US – PROVISIONAL	10/1/2014
TRANSGENIC ALGAE ENGINEERED FOR HIGHER PERFORMANCE (USM)	US	10/16/2014
SOFT TISSUE IN-GROWTH OF POROUS, THREE-DIMENSIONALLY PRINTED, TRANSCUTANEOUS IMPLANTS OF VARYING MATERIAL AND PORE GEOMETRY	US – PROVISIONAL	2/3/2015
METHOD OF ASSEMBLING A FLOATING WIND TURBINE PLATFORM	PCT	2/6/2015
METHOD OF MOORING ONE OR MORE FLOATING WIND TURBINE PLATFORMS	PCT	2/6/2015
METHODS OF CONSTRUCTION, ASSEMBLY AND LAUNCH OF A FLOATING WIND TURBINE	US – PROVISIONAL	2/24/2015
HYBRID CONCRETE — COMPOSITE TOWER FOR A WIND TURBINE AND METHOD OF MANUFACTURING	PCT	3/2/2015
RADIO-FREQUENCY IONIZATION OF CHEMICALS	US	3/6/2015
CHEMOENZYMATIC SYNTHESIS OF TREHALOSE ANALOGUES (USM)	US	3/6/2015
PLANT GLUTAMINE PHENYLPYRUVATE TRANSAMINASE GENE AND TRANSGENIC PLANTS (USM)	Japan	3/11/2015
FLOATING CONCRETE WIND TURBINE DESIGN AND METHOD FOR MODULAR CONSTRUCTION AND LAUNCH	US – PROVISIONAL	4/20/2015
METHODS FOR THE PRODUCTION OF HIGH SOLIDS NANOCELLULOSE	US – PROVISIONAL	4/23/2015
FLOATING PLATFORM DESIGN TO SUPPORT A WIND ENERGY KITE OFFSHORE	US – PROVISIONAL	5/6/2015
HIGH EFFICIENCY PRODUCTION OF NANOFIBRILLATED CELLULOSE	PCT	5/6/2015
A METHOD TO CONTROL THE HYDROPHILICITY OF CELLULOSE	US – PROVISIONAL	5/14/2015
INCREASING PLANT GROWTH BY MODULATIN OMEGA — AMIDASE EXPRESSION IN PLANTS (USM)	US	6/19/2015

Table A1-2

University of Maine System — Patents Issued FY15

Title	Patent No.	Issue Date
RECOVERY OF ACETIC ACID FROM WOOD EXTRACTS — US	8,785,688	7/22/2014
RAPIDLY DEPLOYABLE LIGHTWEIGHT LOAD RESISTING ARCH SYSTEM — Canada	2,595,432	8/5/2014
RAPIDLY DEPLOYABLE LIGHTWEIGHT LOAD RESISTING ARCH SYSTEM — US	8,850,750	10/7/2014
TRANSGENIC ALGAE ENGINEERED FOR HIGHER PERFORMANCE	8,865,451	10/20/2014
COMPOSITE WELDABLE PANEL WITH EMBEDDED DEVICES — US	8,865,285	10/21/2014
CARGO CONTAINER INTRUSION MONITORING — US	8,866,655	10/28/2014
COMPOSITE STRUCTURAL MEMBER — US	8,935,888	1/20/2015
INCREASING PLANT GROWTH BY MODULATING OMEGA-AMIDASE EXPRESSION IN PLANTS - China	CN 102884195	2/25/2015
SHEET PILING PANELS WITH ELONGATED VOIDS — France, UK, Germany	1,706,546	5/13/2015
OPEN CIRCUIT GRATING FOR HITH TEMPERATURE ENVIRONMENTS — US	9,048,807	6/15/2015
RECOVERY OF ACETIC ACID FROM WOOD EXTRACTS — Canada	2,704,414,	6/16/2015
INCREASING PLANT GROWTH BY MODULATION OMEGA-AMIDASE EXPRESSION IN PLANTS	9,068,194	6/30/2015
PROCESS FOR IMPROVING THE ENERGY DENSITY OF FEEDSTOCKS USING FORMATE SALTS — China	ZL 201180068513.0	9/1/2015

Appendix 2 — MEIF Financial History and Tables

Table A2-1

A History of Legislative Actions on Appropriating State Research Funds

The following is a summary of the actions of the 118th–127th (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 1999–2000 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 signed 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 approved into law a budget (Chapter 368) that maintains the annual funding at $14.7 million.

127th LEGISLATURE

June 30, 2015: Legislature approved into law a budget (Chapter 267) that increases the annual funding by $2.65 million in each year of the biennium.

Table A2-2

Legislative History of MEIF New Appropriations

118th LEGISLATURE

	FY98	FY99	Total 2-Year
UM	$400,000	$3,200,000	$3,600,000
USM	100,000	800,000	900,000
Total	$500,000	$4,000,000	$4,500,000

119th LEGISLATURE

	FY00	FY01	Total 2-Year
UM	$4,440,000	$40,000	$4,480,000
USM	1,110,000	10,000	1,120,000
Total	$5,550,000	$50,000	$5,600,000

120th LEGISLATURE

	FY02	FY03	Total 2-Year
UM	$0	$0	$0
USM	0	0	0
Total	$0	$0	$0

121st LEGISLATURE

	FY04	FY05	Total 2-Year
UM	$80,000	$1,600,000	$1,680,000
USM	20,000	400,000	420,000
Total	$100,000	$2,000,000	$2,100,000

122nd LEGISLATURE

	FY06	FY07	Total 2-Year
UM	$0	$540,000	$540,000
USM	0	60,000	60,000
Total	$0	$600,000	$600,000

*One-time funding

123rd LEGISLATURE

	FY08	FY09	Total 2-Year
UM	$1,200,000	$720,000	$1,920,000
USM	300,000	180,000	480,000
S.C. INITIATIVES	0	100,000	100,000
Total	$1,500,000	$1,000,000	$2,500,000

124th LEGISLATURE

	FY10	FY11	Total 2-Year
UM	$0	$0	$0
USM	0	0	0
S.C. INITIATIVES	0	0	0
Total	$0	$0	$0

125th LEGISLATURE

	FY12	FY13	Total 2-Year
UM	$0	$0	$0
USM	0	0	0
S.C. INITIATIVES	0	0	0
Total	$0	$0	$0

126th LEGISLATURE

	FY14	FY15	Total 2-Year
UM	$0	$0	$0
USM	0	0	0
S.C. INITIATIVES	0	0	0
Total	$0	$0	$0

127th LEGISLATURE

	FY16	FY17	Total 2-Year
UM	$2,056,400	$0	$2,056,400
USM	514,100	0	514,100
S.C. INITIATIVES	79,500	0	79,500
Total	$2,650,000	$0	$2,650,000

Total Yearly Research Appropriation for FY15

UM	$11,466,000
USM	2,866,500
UMM	200,000
UMFK	0
UMF	0
UMA	62,196
UMPI	0
MMA	75,304
Total	$14,700,000

S.C. Initiatives = Small Campus Initiatives

University of Maine at Augusta	UMA
University of Maine at Farmington	UMF
University of Maine at Fort Kent	UMFK
University of Maine at Machias	UMM
University of Maine at Presque Isle	UMPI
Maine Maritime Academy	MMA

Table A2-3

Utilization of FY15 Operating Research Appropriation by Targeted Research Areas

UMAINE

Targeted Research Area	FY2015 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	FY2015 Total R&D Funds Available
	Source of R&D Funds				
Adv. Technology Forestry & Agriculture	$ 1,611,540	$ 307,707	$ -	$ 307,707	$ 1,919,247
Aquaculture & Marine Science	1,504,919	(1,061,905)	-	(1,061,905)	443,014
Biotechnology	1,208,291	281,081	-	281,081	1,489,372
Composites	1,187,935	19,254	-	19,254	1,207,189
Environmental	2,044,287	208,160	-	208,160	2,252,447
Information Technology	2,291,789	(827,459)	-	(827,459)	1,464,330
Precision Manufacturing	1,274,576	59,334	-	59,334	1,333,910
Cross Sector	342,663	31,690	-	31,690	374,353
Total State Funding	[1] $ 11,466,000	[1] $ (982,138)	[1] $ -	[1] $ (982,138)	[1] $ 10,483,862
UM Cost Sharing Funding [2]	5,352,382	-	-	-	5,352,382
Total Funding	$ 16,818,382	$ (982,138)	$ -	$ (982,138)	$ 15,836,244

[1] Includes year-end equipment carry-over funds (equipment ordered, not received, and not paid).
[2] Salary and benefits from University.

USM

Targeted Research Area	FY2015 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	FY2015 Total R&D Funds Available
	Source of R&D Funds				
Biotechnology	$ 1,445,825	$ 1,748,819	$ (1,428,135)	$ 320,684	$ 1,766,509
Information Technology	276,182	458,781	(308,804)	149,977	426,159
Environmental	-	-	-	-	-
Unassigned - reallocated by System	1,144,493	159,146	1,736,939	1,896,085	3,040,578
Total State Funding	$ 2,866,500	$ 2,366,746	$ -	$ 2,366,746	$ 5,233,246

[1] Includes year-end equipment carry-over funds (equipment ordered, not received, and not paid).

Table A2-4

FY15 Summary Utilization of Operating Research Appropriation by University

	FY2015 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	FY2015 Total R&D Funds Available
	Source of R&D Funds				
UMAINE	$ 11,466,000	$ (982,138)	$ -	$ (982,138)	$ 10,483,862
USM	2,866,500	2,366,746	-	2,366,746	5,233,246
UMM	200,000	46,462	-	46,462	246,462
UMFK	-	2	-	2	2
UMPI	-	2,202	-	2,202	2,202
UMA	92,196	-	-	-	92,196
UMF	-	-	-	-	-
UMS	-	61,953	-	61,953	61,953
MMA	75,304	79,110	-	79,110	154,414
Total State Funding	$ 14,700,000	$ 1,574,337	$ -	$ 1,574,337	$ 16,274,337

Utilization of R&D Funds				Balance
FY2015 R&D Actual Expenditures	Transferred To Match Grants & Contracts	Transferred Between R&D Accounts	Total R&D Funds Utilized	Unused Funds Carried Forward To FY2016
$ 2,698,742	$ 170,906	$ (893,520)	$ 1,976,128	$ (56,881)
2,748,548	1,183,259	(1,105,558)	2,826,249	(2,383,235)
1,448,399	(10,324)	(309,874)	1,128,201	361,171
1,961,680	(688,479)	(889,929)	383,472	823,717
2,006,013	147,911	(630,193)	1,523,731	726,716
2,332,834	444,554	(743,245)	2,034,143	(569,813)
2,095,408	-	(697,841)	1,397,567	(63,657)
641,570	6	(82,222)	559,354	(185,001)
$ 15,933,394	$ 1,247,833	$ (5,352,382)	$ 11,828,845	$ (1,344,983)
-	-	5,352,382	5,352,382	-
$ 15,933,394	$ 1,247,833	$ -	$ 17,181,227	$ (1,344,983)

Utilization of R&D Funds				Balance
FY2015 R&D Actual Expenditures	Transferred To Match Grants & Contracts	Transferred Between R&D Accounts	Total R&D Funds Utilized	Unused Funds Carried Forward To FY2016
$ 1,315,864	$ (1,084)	$ (1,241,432)	$ 73,348	$ 1,693,161
311,967	19,356	(1,276,889)	(945,566)	1,371,725
4,511	-	(84,775)	(80,264)	80,264
-	(87,308)	2,603,096	2,515,788	524,790
$ 1,632,342	$ (69,036)	$ -	$ 1,563,306	$ 3,669,940

Utilization of R&D Funds				Balance
FY2015 R&D Actual Expenditures	Transferred To Match Grants & Contracts	Transferred Between R&D Accounts	Total R&D Funds Utilized	Unused Funds Carried Forward To FY2016
$ 15,933,394	$ 1,247,833	$ (5,352,382)	$ 11,828,845	$ (1,344,983)
1,632,342	(69,036)	-	1,563,306	3,669,940
184,034	-	-	184,034	62,428
2	-	-	2	-
2,100	-	93	2,193	9
1,298	-	-	1,298	90,898
-	-	(40,000)	(40,000)	40,000
12,554	-	39,915	52,469	9,484
61,070	-	(8)	61,062	93,352
$ 17,826,794	$ 1,178,797	$ (5,352,382)	$ 13,653,209	$ 2,621,128

800.804.3200 • 207.973.3240 • maine.edu