Research Reinvestment Fund Activities Update

May 22-23, 2016

Board of Trustees Meeting

Rudman Winchell Board Room, Bangor Focus

Table of Contents

Overview

The University of Maine System (UMS) is responsible for conducting research and development that supports and expands the Maine economy. These efforts are primarily led by the University of Maine, the Land Grant and Sea Grant University of the State. UMaine partners with other UMS campuses to ensure that its efforts are indeed statewide in focus and impact. Examples of such partnerships include: EPSCoR Research Infrastructure Improvement (RII) grants (e.g., SEANET); Graduate School of Biomedical Science and Engineering (GSBSE); Aquaculture Research Institute (ARI); and Maine Technology Institute's (MTI) Manufacturing R&D Collaborative with UMaine's Advanced Manufacturing Center (AMC) and USM's Manufacturing Applications Center (MAC).

The objective of the Research Reinvestment Fund (RRF) is to strengthen research and development activities that are tied to Maine businesses and to industries that are critical to the future of Maine. The Board of Trustees (BOT) committed an initial $10.5M for this initiative, from savings accruing from the UMS Administrative Reviews ($2.1M/year for 5 years through FY 2019). Activities for the RRF commenced on 6/1/2015.

RRF Advisory Board

The primary mission of the RRF Advisory Board is to manage the Competitive/Seed grant funds for UMS researchers. The Advisory Board develops and implements the specific policies, processes, and criteria for RRF allocation for this fund. In addition the Advisory Board oversees the distribution of funds to ensure the greatest impact on research and economic development for the state. The table below lists current Advisory Board (AB) membership:

AB Member	Department	Affiliation
Operations Committee		
Carol Kim	Vice President for Research and Dean of the Graduate School	University of Maine
Jake Ward	Vice President for Innovation and Economic Development	University of Maine
David Neivandt	Associate Vice President for Research and Graduate Studies	University of Maine
Brian Beal	Professor, Marine Ecology	University of Maine at Machias
Seth Berry	Vice President, International Business Development	Kennebec River Biosciences
Sheena Bunnell	Professor, Business Economics	University of Maine at Farmington
Eric Landis	Professor, Civil Engineering	University of Maine
Tony Paine	Chief Executive Officer	Kepware
Kris Sahonchik	Director, Cutler Institute for Health and Social Policy	University of Southern Maine
Fred Servello	Associate Dean for Research, College of Natural Sciences, Forestry, and Agriculture	University of Maine
Terry Shehata	Senior Policy Associate: Research and Economic Development/MEIF Coordinator	University of Southern Maine
Miles Theeman	Former Vice President, Chief Sales and Marketing Officer, retired	Eastern Maine Healthcare System
Rebecca Van Beneden	Director of the School of Marine Sciences and Professor, Biochemistry and Marine Sciences	University of Maine
Jason Charland (ex-officio)	Director of Grant Development	University of Maine

I. *RRF Advisory Board Activities and Funding Programs Developed To Date*

- The RRF Advisory Board meets on a regular basis and convened on the following dates to discuss the implementation of various RRF initiatives across the UMS:

  2015: June 19, July 27, August 24, September 29, October 27, November 18 and December 21
  2016: February 16, March 16, April 13, and May 18

- The RRF Advisory Board developed and implemented three competitive funding programs for faculty and researchers across the UMS:

  1. **Seed Grants:** The purpose of the Seed Grants is to provide funding for pilot research that will enable UMS faculty/professional staff from all disciplines and ranks to strengthen research, commercialization and economic development activities.

  2. **Planning Grants:** The purpose of the Planning Grants is to encourage the formation of new collaborative research teams spanning UMS campuses in an effort to prepare these teams to submit competitive applications to UMS RRF Seed Grant or external funding competitions (federal, state, and/or private). RRF Seed and Planning Grant RFPs were announced to all UMS campuses on July 28, 2015

  3. **Graduate Student Assistantships:** The purpose of the Graduate Student Assistantships is to support graduate student research activities related to research, commercialization and economic development activities.

To date, the following funding rounds have occurred:

1. Seed Grants: Round 1 - Fall 2015 (Applications due 10/1/2015)
2. Seed Grants: Round 2 - Spring 2016 (Applications due 3/21/2016)
3. Planning Grants: Ongoing, submissions accepted on a rolling basis
4. Graduate Assistantships: Round 1 (Applications due 1/19/2016)

Funding rounds will continue through FY 2019. For the remainder of calendar year 2016 the following funding rounds are scheduled:

- Seed Grants: Round 3 – Fall 2016
- Graduate Assistantships: Round 2 – Winter 2016.

II. *RRF Funding Program Updates*

A. Seed Grants Round 1 (Fall 2015)

- **Seed Grant Applicants | Round 1:** The first round of competition for the UMS Research Reinvestment Fund Seed Grant Program garnered 48 proposals that included collaborations and partnerships among 128 principal and co-principal investigators representing all seven campuses. Of these applicant proposals, 28 of the investigators were from outside of the flagship campus (22% of all participating UMS investigators). Funds requested ranged from under $50K to up to $100K, and the total amount requested from all applicants was $4.2M. The proposals represented all of Maine's major industries and economic sectors with the most representation residing within the sectors of aquaculture/fishing, agriculture/natural resources, biotechnology and aging. The submitted proposals also included 35 external partners comprising Maine-based businesses and other organizations.
    - **Details of first round applicant data (Appendix I.A**.)

- **Seed Grant Awardees | Round 1:** For the first round of competition, Hanover Research was engaged to conduct an external review and to rank the proposals based on a rubric developed by the Advisory Board. The Advisory Board employed the external review in its deliberations. For this first round of the competition, the UMS Research Reinvestment Fund Seed Grant Program awarded 10 proposals that included collaborations and partnerships among 27 principal and co-principal investigators representing five UMS campuses. Of the awarded proposals, 5 of the investigators were from outside of the flagship campus (19% of all participating UMS investigators), which was a reasonable proportion of the total UMS applicant pool. The total amount awarded for the 10 funded projects was $837K. The Round 1 Seed Grant awards represented 6 of Maine's major industries and economic sectors, with the most representation residing within the aquaculture/fishing sector. The awarded projects also included 11 external partners comprising Maine-based businesses and other organizations. Projects were funded for 12 months (November 2015 – December 2016) and the research teams are required to submit an external follow-on funding application by November 1, 2017.
    - **Notable highlights to date from the first round seed grant awardees:**
        1. Two external small business partners have recently been awarded Small Business Innovation Research (SBIR) funding to support the commercialization of RRF project technologies
        2. Two follow-on proposals have been submitted to external funding agencies totaling $176K
        3. Activities on all awarded projects are well underway (see Appendix I.D for a full description of project highlights to date).
    - **A complete list of awardees from the first round is provided in Appendix I.B. A detailed breakdown of the first round awardee proposal data is provided in Appendix I.C. One page summaries of each of the 10**

awarded proposals is provided in Appendix I.D, which includes project abstracts, planned economic outcomes, and updates.

B. Seed Grants Round 2 (Spring 2016)

- **Seed Grants Applicants | Round 2:** The second round competition of the UMS Research Reinvestment Fund Seed Grant Program drew 48 proposals that included collaborations and partnerships among 169 principal and co-principal investigators representing all seven campuses. Of these applicant proposals, 36 of the investigators (21% of all participating UMS investigators) were from outside of the flagship campus compared to 30 in the first round. Fourteen of the applications were resubmissions from the first round that incorporated feedback from reviewers and advice from the UMaine Grant Development Office. Funds requested ranged from under $50K to up to $100K. The amount of total funds requested was $4M. The proposals represented all of Maine's major industries and economic sectors with the greatest representation from forestry, agriculture and marine resources. By design, proposals included collaboration with Maine-based businesses and organizations with a total of 36 external partners named in the applications.
    - **A detailed breakdown of the second round applicant data is provided in Appendix II.A.**
    - **Award decisions are expected to be made during the summer of 2016.**

C. Planning Grants (Rolling applications, Summer 2015 - present)

- To date 11 proposals have been received for consideration. All proposals were evaluated by participating RRF Advisory Board members according to a rubric developed by the Advisory Board and supplied in the application materials.
    - **A total of 6 proposals were selected for funding; a complete list of awardees to date is provided Appendix III.A. One page summaries for each awarded planning grant are provided in Appendix III.B.**

D. Graduate Assistantship Grants (Winter 2015)

- **Graduate Assistantship Round 1 January 2016:** A total of 12 RRF Graduate Assistantship proposals were received, representing faculty from 4 campuses, in addition to 9 external entities. All proposals were evaluated by participating RRF Advisory Board members according to a rubric developed by the RRF Advisory Board and supplied in the application materials. Eleven proposals were deemed meritorious and were selected for funding. The assistantships provide a stipend of $20,000 for a one year period (September 2016 – August 2017). The Principal Investigator is responsible for payment of tuition and 50% of the health insurance of the Fellow. A report will be required half way through the period of support to evaluate student progress toward meeting the stated objectives of the research. As a condition of the award, recipients must inform the Advisory Board if an external Project Grant application related to the graduate assistantship is submitted.
    - **A list of awardees from the first round is provided in Appendix IV.**

III. *Infrastructure Support to the Business Development Enterprise*

In order to expand UMS capacity to serve in the areas of business partnerships, technology transfer and commercialization leading to economic development, the University of Maine Office of Innovation and Economic Development (UMaine OIED) was authorized to hire two staff members employing RRF funds. On July 1 UMaine hired an Innovation Outreach Coordinator who began directing outreach to campuses in the fall of 2015 to identify innovation opportunities, including those related to student innovation. The Office of Innovation and Economic Development is in the process of hiring a Senior Technology Transfer and Commercialization specialist to be located in southern Maine and is working with USM on co-location.

Economic Development, Technology Transfer and Commercialization (UMaine OIED)

Economic Development Projects

Maine Accelerates Growth (MxG) was launched as a partnership between Maine Technology Institute, Maine Center for Entrepreneurial Development, Maine Community Foundation and the University of Maine, which are working to strengthen the innovation ecosystem throughout the state. As this network develops more local partnerships, UMS campuses will be engaged in networking the workforce development and innovation capacity of regions throughout the state.

UMaine OIED initiated 167 new projects with Maine companies through April 30, 2016

Partnership between University of Southern Maine and the University of Maine (OIED),

A Memorandum of Understanding (MOU) on the collaboration around economic development initiatives between UMaine, USM and UMS was completed and signed in December 2015

- UMaine and USM have been evaluating the existing and potential economic development and intellectual property assets of the USM programs
- USM and UMaine are developing a joint proposal to the Department of Commerce, Economic Development Administration, University Centers Program, to be submitted May 30, 2016
- UMaine assisted USM with matters related to intellectual property and industrial contracting. Examples include the establishment of a leasing structure for the newly launched Maine Cyber Security Cluster, and management of data ownership issues with Human Resources concerning departing faculty.
- UMaine will continue to support commercialization activities related to USM inventions by coordinating access to external patent counsel, marketing and advocating for inventors.

Research Reinvestment Fund Grant Activities

UMaine OIED participated in the Planning Grant awarded to the Darling Marine Center for the development of a proposal for the submission to the Marine Economy Bond solicitation from the Maine Department of Economic And Community Development. This resulted in a $14 million proposal "Alliance for Maine's Marine Economy" which includes UMaine and UM Machias as well as 10+ other statewide

partners. No final decision made on the award yet.

UMaine OIED has worked closely with Research Reinvestment Fund seed grant applicants and recipients. This includes patent applications, licensing, MTI grants and development work utilizing Innovation Students.

- *Development of structural wood plastic composite timber for innovative marine applications*
- *Prototype Development for Detection of Wine and Beer Spoilage Yeasts*
- *Novel Fire Resistant Low Formaldehyde Emitting Fiberboard Panels Made from Deadwood or Wood Residuals and Nanocellulose*
- *Development of additively manufactured highly porous implantable devices that promote post-surgical wound healing and a biological transcutaneous seal: Testing of implant material and internal pore geometry in a porcine model*

UMaine OIED received RRF Graduate Student awards for two students to build an ambassadors program to engage more faculty, staff and both graduate and undergraduate students in industry partnerships, entrepreneurial activities and commercialization. These students are testing strategies at UMaine that can then be adapted to do outreach at each of the UMS campuses.

Innovation Outreach to Students System wide:
UMaine OIED operates the Innovate for Maine program, and is engaging students from the other system campuses and companies in those communities.

Over the last year OIED has piloted various events and programs through the Foster Center for Student Innovation that engage students, faculty, staff and community members with the idea that each can be delivered and replicated at the other campuses across the state.

Future Planned Activities:
SUPPORTING YOUR CAMPUS THROUGH INNOVATION & ECONOMIC DEVELOPMENT

- **Complete hiring of an Economic Development/Business Development Professional in Portland to be located at USM**

- **Innovation Curriculum Certificates** (for students) - *To change the world by enabling innovation. By everyone. Everywhere. Every day.*
    - Innovation Engineering is a groundbreaking program that provides a systematic approach to innovation. The fundamental concepts of the program include tools and methods for creating, communicating, and commercializing meaningfully unique ideas.
    - For students, it may be offered as an undergraduate (four course) or graduate (three course) certificate designed to complement any major or field of study including the sciences, arts, humanities, business, engineering, and education. In the program, students learn how to employ the tools and methods of innovation in their field of interest. These skills are essential to participation in the global economy and will prepare graduates to lead the commercialization of new products, services and

technologies.

- **Idea Coaching** (for students, faculty, staff) *with business incubation specialists*
  - Free support is offered to students who want to bring their ideas to life. They may receive coaching in-person during on-campus office hours, or by phone, with one of our business incubation specialists.

- **Innovation Internships/Co-ops** (for students and businesses)
  - **Innovate for Maine Fellows Program**
    - Innovate for Maine Fellows Program connects the best and brightest Maine college students with Maine's most exciting, growing companies and business leaders in an effort to help create and grow jobs across the state of Maine. Emphasizing innovation and entrepreneurship, the program prepares students to collaborate with companies on innovation projects that accelerate company growth and give students a paid, meaningful, hands-on internship experience.
  - **Custom Internship Program** – We help individuals build and facilitate their own signature internship programs to meet the unique needs of our students and community. This can be done through the strategic use of course offerings, grant funding, etc.
  - For any internship/co-op program, we exist to help recruit businesses and students, make connections, plan networking events, and assist with overall program coordination.

- **Informal Learning Programs** (for students, faculty, staff, community members and businesses)
  - Students may not have the time in their schedules to fit a new course or certificate into their program of study, even though they may be interested in learning more about innovation and entrepreneurship. In order to help students plan these events, the program will provide sample marketing materials and help make connections to speakers and promote and link to community partners.
  - Sample programs include:
    - Back to Basics Business Series: Assessing Ideas
      - *Announcement: "Come learn how to create ideas, determine their value, and protect them from being stolen! Followed by a one-hour individual Q&A with the event speaker".*
    - *Workshop with alumni - (find campus specific examples)*
    - Technology/Product Commercialization Workshop
      - Training in the process of taking an idea through the commercialization process

- **K-12 Program Development** (for community)
  - Many K-12 teachers are eager to bring new, experiential learning opportunities to their students. We can help plan programming for

hour/half/full day workshops and connect individuals with educators who are eager to get involved.

- **Invention Convention** (for community)
    - The Maine Invention Convention was started in the early 1990s by a few passionate teachers. It offers middle school students a hands-on opportunity to learn STEM concepts in a meaningful, interdisciplinary and experiential way. Each year the program reaches approximately 1,200 students across the state. The top 10% are invited to a state competition held each May at the University of Maine. There are many opportunities for campuses to get involved, from offering on-campus workshops for these students, to working with teachers to support them within the classroom.

- **Business and Economic Development Structures and Networks** (for business and community members)
    - We will help to identify and create community events (for example, Big Gig, Pecha Kucha, Greendrinks) to facilitate interactions among the university community, including students, faculty and staff with business and community leaders focused on networking and showcasing innovations.
    - As a team, we will work together to expand connections with business and economic development organizations in selected regions, with a particular focus on workforce development, entrepreneurship and innovation support.

IV. ***Infrastructure Support to the Research Enterprise***

Grant Development Staff

- The UMaine Grant Development Office (GDO) provides support for: large grant applications; high profile programs with systemwide and statewide impact; emerging and signature areas of excellence; proposal resubmissions; and junior faculty grant submissions. The types of support provided include grantsmanship/grant writing and review, budget development, targeted funding opportunity searches, and overall project management. In addition, GDO staff actively conduct outreach activities for research faculty across the UMS to engage and encourage high quality grant submissions.
- The GDO is directed by *Jason Charland*, who serves as an ex-officio member of the RRF Advisory Board, providing staffing support to execute RRF initiatives. Jason is responsible for leading and facilitating the development, preparation and submission of research grants identified as high priority by the Vice President for Research.
    - Jason coordinated the grant review process with Hanover Research (external reviewer) and the RRF Advisory Board for the seed grant competitions. He also oversaw outreach meetings with 35 of the 38 PIs (92%) from the first round of the RRF seed grant competition; discussing strategies to strengthen resubmissions as well as identification of other external funding opportunities
    - A site visit to UMA was conducted to assist in identifying funding opportunities for the Aviation program
    - Since September 2015, GDO staff has assisted with the submission of 39 proposals to external sponsors totaling $43.9M ($7.3M indirect)
- The GDO employed RRF funds to hire two grant specialists to work with faculty and professional staff on grant proposal submissions:
    - Dawn Hoelz was hired as a Grant Development Specialist in September of 2015. Her responsibilities are to provide faculty with various grant development needs such as seeking funding opportunities, facilitation of proposal development meetings, connecting projects with collaborators, establishment of timelines, grantsmanship advice along with basic copy editing, as well as budget development assistance, administrative coordination of proposal forms and documents, and development and implementation of various training sessions. Within her current capacity, Dawn has played a key leadership role in UMS's $14M application to the Maine Department of Economic and Community Development (DECD) Maine's Marine Economy and Jobs Bond, as well as UMaine's $10.5M COBRE application to NIH in January 2016. She recently assisted with an undergraduate research fellowship proposal to the USDA, focused on Maine's food system. The proposal team included faculty from UMaine's School of Food and Agriculture, Cooperative Extension, and the Honors College, in addition to five other UMS campuses (UMM, UMFK, UMA, UMPI,

and UMF).

- Luke Doucette was hired as a Grant Development Specialist in September of 2015. Within his current capacity as a Grant Development Specialist, Luke has initiated outreach efforts to stimulate interest and increase new grant submissions toward DoD R&D programs that align with specific researcher areas of interest. To date, these efforts have led to 3 new grant submissions toward DoD agencies worth nearly $1.9M. These submissions also involve the participation of small hi-tech businesses located in Maine who are active commercialization partners on all of these proposals. These funding opportunities represent new potential business for UMS sponsored research, where in all cases Luke provided significant contributions on identifying relevant programs and small business teaming partners, as well as assistance with proposal structure, content, and direction.

Office of Research and Sponsored Programs Staff

The UMaine Office of Research and Sponsored Programs (ORSP) added three FTE staff with RRF funding to enhance organizational capacity to process awarded grants and contracts.

Sub-award Officer
Jennifer R. Sweet was hired on July 1, 2015 as the Sub-award Officer in ORSP. Jennifer is responsible for managing the flow of subaward activity that includes the development, review, negotiation, and execution of all subaward agreements for the University as well as preparing modifications to existing subaward agreements and providing oversight on behalf of ORSP.

Grant Accountant
Jason Sliwoski, a Grant Accountant in UM's Office of Research and Sponsored Programs, was hired in September of 2015 and provides grant accounting services for awards made by sponsors and also provides financial management services for ORSP.

Administrative Specialist
Leisa Preble is an Administrative Specialist in ORSP supporting the office's Pre-Award, Information Management and Compliance groups. She joined the ORSP staff on April 4, 2016, replacing Wendy Powers, who after one year in the RRF-supported Administrative Specialist position became a Grants and Contracts Specialist.

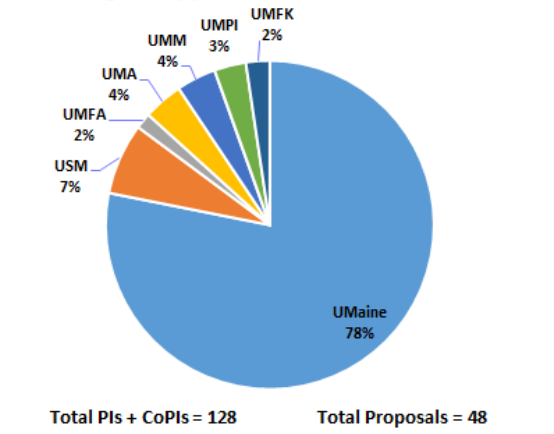
Associate Vice President for Research

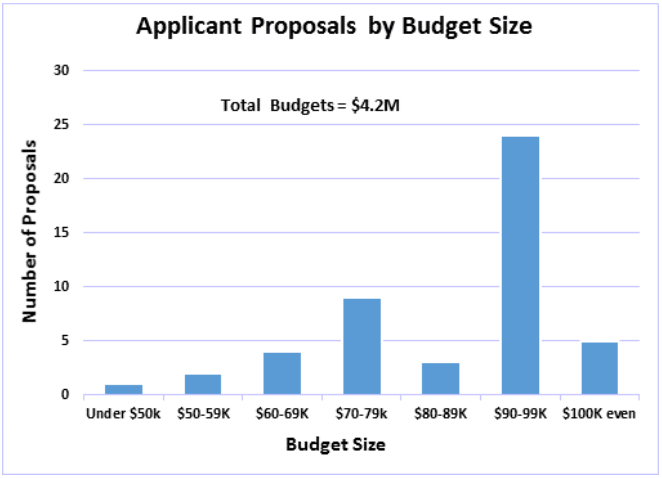
- David Neivandt, UMaine Associate Vice President for Research and Graduate Studies is supported 0.25 FTE by RRF funds to develop interdisciplinary and/or multidisciplinary research collaborations, serve as the faculty liaison for the EPSCoR office, administer faculty-related issues regarding graduate education, assist in moving key research and development areas forward, and make research connections between UMS campuses. Activities to date:
    - Served on the Operations Committee of the RRF Advisory Committee and co-led the development and implementation of a Seed Grant, a Planning Grant, and Graduate Assistant Grant competitions
    - Hired a new Director for the Maine State EPSCoR Office
    - Serves as the Executive Director of the $20M EPSCOR RII Track 1 SEANET award
    - Assisted UMaine VPR Kim with development and implementation of the system-wide Aging Initiative
    - Visited all UMS campuses to facilitate the formation of new research and development collaborations, in addition to promoting the RRF.

APPENDIX I: RRF Seed Grants | Round 1

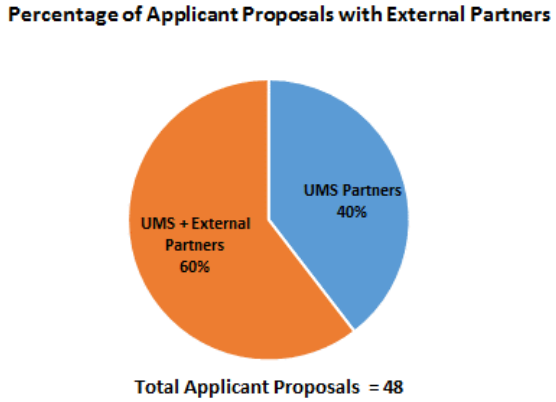
APPENDIX I.A: Round 1 | Applicant Data

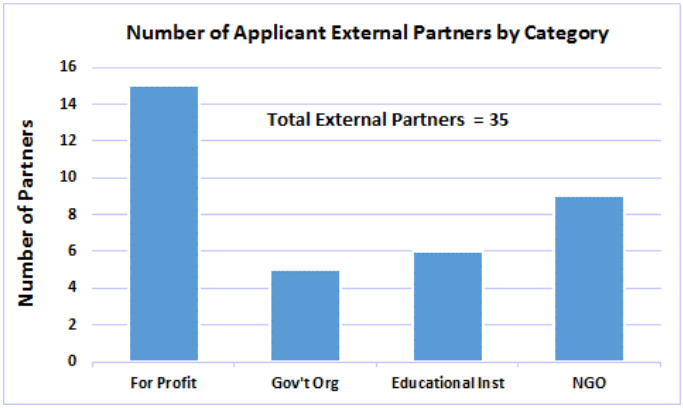
Proposal Data



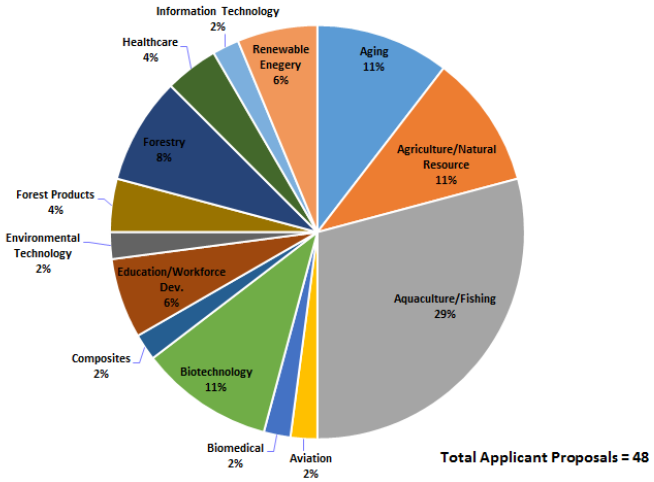


External Partner Data





Economic Sector Data

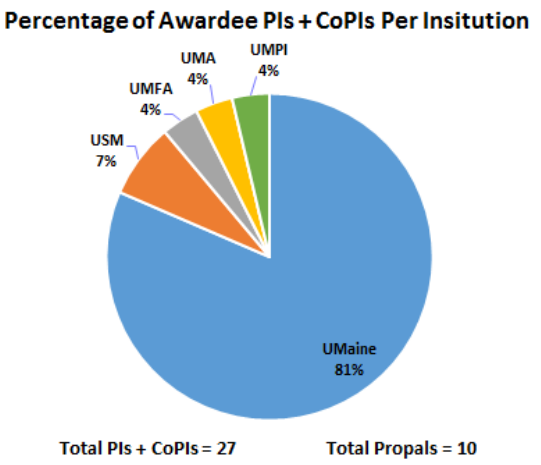


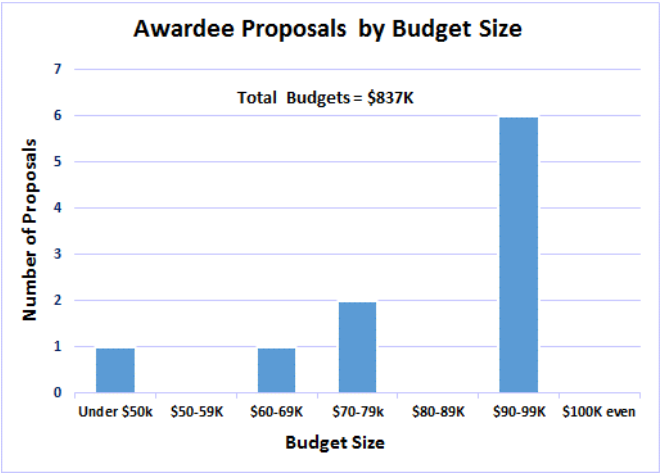
APPENDIX I.B: Round 1 | Awardee List

Principal Investigator	Partners	Project Title
Frank Drummond (Biology and Ecology, UMaine)	Scott Dobrin (Biology, UMPI); Ron Butler (Biology, UMFA); Joseph Staples (Environmental Sciences, USM); Christopher Lage (Biology, UMA)	*The Health of Maine's Bumble Bee Community*
Douglas Gardner (ASCC, UMaine)	Yousoo Han (Advanced Structures and Composites Center, UMaine); Steve Ruell (Innovasea); Duncan Mayes (Stora Enso)	*Development of structural wood plastic composite timber for innovative marine applications*
Laurie Connell (Marine Sciences, UMaine)	Rosemary Smith (Electrical Engineering, UMaine); Jason Perkins (Allagash Brewing)	*Prototype Development for Detection of Wine and Beer Spoilage Yeasts*
Mehdi Tajvidi (Forest Resources, UMaine)	Douglas Bousfield (Chemical and Biological Engineering, UMaine); John Hunt (Forest Products Laboratory, USDA)	*Novel Fire Resistant Low Formaldehyde Emitting Fiberboard Panels Made from Deadwood or Wood Residuals and Nanocellulose*
Heather Hamlin (SMS/ARI, UMaine)	Deborah Bouchard (Cooperative Extension/ARI, UMaine); Jean McRae (Civil & Environmental Engineering, UMaine); Benjamin King (Regenerative Biology, MDI Biological Laboratory)	*Effects of Ocean Acidification on Reproduction in American Lobsters*
Peter Van Walsum (Chem & Bio Engineering/FBRI, UMaine)	Balunkeswar Nayak (Food Science and Nutrition, UMaine); John Belding (Advanced Manufacturing Center, UMaine); Daniel Martinez (Environmental Science, USM)	*Energy Recovery Dehumidification (ERDH) for energy efficient increased drying capacity of high quality sea vegetables*
Andrei Alyokhin (Biology and Ecology, UMaine)	Tap Pryor (Acadia Harvest, Inc.); Michael Peterson (Mechanical Engineering, UMaine); Edward Bernard (Molecular & Biomedical Sciences, UMaine)	*Sustainable Bio-conservation Technology for Aqua-feed Production and Waste Management*
Ian Bricknell (Marine Sciences/ARI, UMaine)	Deborah Bouchard (Cooperative Extension/ARI, UMaine); William Wolters (USDA National Cold Water Marine Aquaculture Center/NCWMA); Leighanne Hawkins (Cooke Aquaculture)	*A Novel Approach to Prevent Super-chill in Atlantic Salmon*
James Weber (Food and Agriculture, UMaine)	Ian Dickey (Eastern Maine Medical Center); David Neivandt (Chemistry & Biological Engineering, UMaine); Anne Lichtenwalner (Food and Agriculture, UMaine)	*Development of additively manufactured highly porous implantable devices that promote post-surgical wound healing and a biological transcutaneous seal: Testing of implant material and internal pore geometry in a porcine model*
Paul Rawson (Marine Sciences, UMaine)	Carrie Byron (Marine Science, University of New England); Chris Davis (Maine Aquaculture Innovation Center)	*Development of Tools for Measuring the Costs of Feeding and Food Utilization in Eastern Oysters*

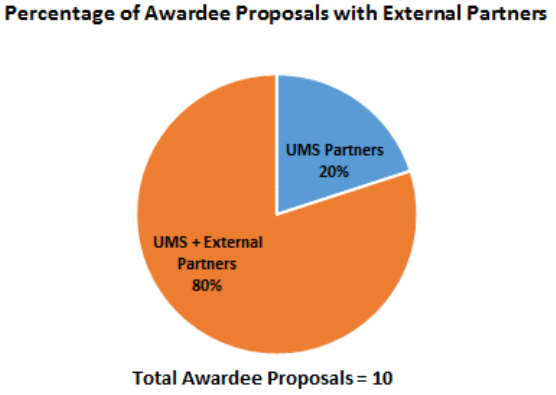
APPENDIX I.C: Round 1 | Awardee Data

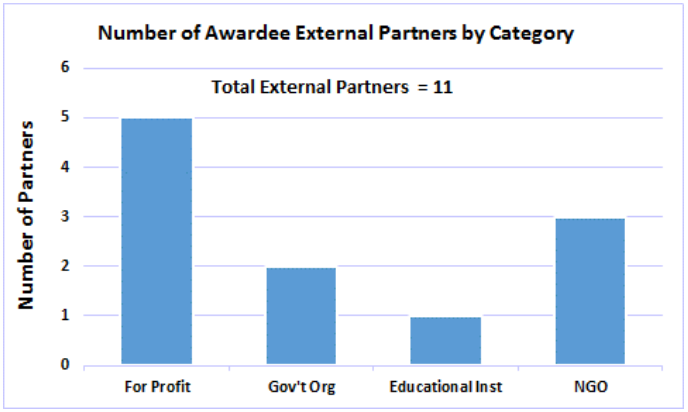
Proposal Data



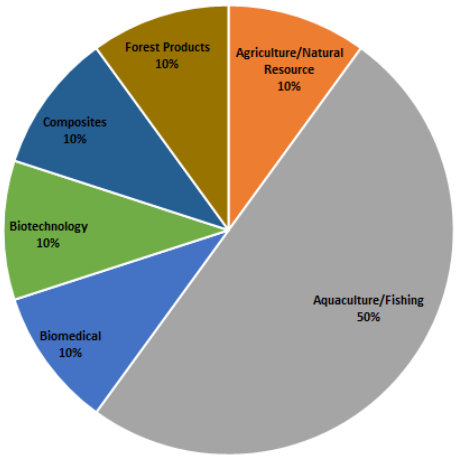


External Partner Data





Economic Sector Data



APPENDIX I.D: Round 1 | Awardee Abstracts & Updates

"Prototype Development for Detection of Wine and Beer Spoilage Yeasts"
Principal Investigator: Laurie Connell (Marine Sciences, UMaine)
Co-PIs: Rosemary Smith (Electrical Engineering, UMaine); Jason Perkins (Allagash Brewing)
External Collaborators: Allagash Brewing Company
Budget: $ 68,361
Economic Sector(s): Biotechnology, environmental technology, and precision manufacturing

Abstract: The goal of this project is to develop a new handheld instrument, called the *InstaProbe*, which will provide the only near-instantaneous solution to detect certain environmental microbes from a complex matrix with minimal sample preparation. The proposed instrument is based on prior art developed at UMaine as part of Federally funded research focused on detecting harmful marine algal blooms, known as red tide. For this project, the target application will be the rapid detection of spoilage organisms during wine or beer production, and will involve collaborations with the Allagash Brewing Company for product testing.

Planned Economic Outcomes:

- Collaborating with Maine small business (Allagash Brewing Company)
- The filing of one US provisional patent
- Forming a new startup company to commercialize the technology
- Submitting one proposal for an NSF SBIR through the newly formed startup company
- Interactions with and potential commercial backing from Constellational Consortium (third largest wine and spirits distributor)

Notable Highlights to date:

We have been in additional contact with Constellation Consortium – the third largest wine and spirits consortium in the world. They have been very eager to work with us as soon as we get a product closer to testing. We have focused on the most important steps of enhancing the detection chemistry with very encouraging early results. The previous method was light sensitive and difficult to handle small volume. We have made the switch to the rotation PNA probes and increased sensitivity, even before optimization, by several fold. In addition, this new method is much easier to handle and gives very reliably consistent results. A series of local companies have been contacted to determine what the market interest is. We have determined that many of the small brewers are not yet concerned with quality control, demonstrating that our primary market will be with larger companies.

ALLAGASH BREWING COMPANY

"Novel Fire Resistant Low Formaldehyde Emitting Fiberboard Panels Made from Deadwood or Wood Residuals and Nanocellulose"
Principal Investigator: Mehdi Tajvidi (Forest Resources, UMaine)
Co-PIs: Douglas Bousfield (Chemical and Biological Engineering, UMaine); John Hunt (Forest Products Laboratory, USDA)
External Collaborators: USDA
Budget: $ 100,231
Economic Sector(s): Forest products, pulp and paper, composite panels

Abstract: This project involves a collaboration between several UMaine units and the USDA Forest Products Laboratory on the production of a novel fire-resistant fiberboard building material that can be sourced solely from deadwood and other wood residues without the use of a formaldehyde-based resin in a fully environmentally friendly production system. This product will provide a unique incentive for the forest products industry to maximize the utilization of low-value wood and reduce hazardous fuels and other wood residues from forests.

Planned Economic Outcomes:

- Provide proof-of-concept work for the production of a new class of fiberboard panel
- Submitting one proposal to the USDA's Wood Utilization Program

Notable Highlights to date:
The project is still at the very early stages but we are very hopeful that the outcomes will be satisfactory. Below are a few bullet points of what already has been done:

- Direct collaboration with USDA Forest Products Laboratory (FPL) in Madison, WI. We have one Co-PI directly involved and they will help with some of the fire performance tests.
- An international postdoc has been hired and started work on the project. This is an important diversity aspect of the project.
- We have managed to attract the interest of two industrial partners to invest and/or collaborate on projects similar to what we are doing here. One industrial partner has already singed an NDA with UMaine for a development work to start soon.

"Effects of Ocean Acidification on Reproduction in American Lobsters"
Principal Investigator: Heather Hamlin (SMS/ARI, UMaine)
Co-PIs: Deborah Bouchard (Cooperative Extension/ARI, UMaine); Jean McRae (Civil & Environmental Engineering, UMaine); Benjamin King (Regenerative Biology, MDI Biological Laboratory)
External Collaborators: MDI Biological Laboratory
Budget: $ 69,264
Economic Sector: Maine's lobster fishery

Abstract: Marine invertebrates, such as lobster, support valuable commercial fisheries in Maine valued at nearly $457 million in landings, and have a 3x to 5x multiplier on the total dollar value of the extended industry. Recent findings indicate that increasing levels of ocean acidification (OA) and water temperatures generate physiological stresses to all life-stages of lobster, and present a significant threat to Maine's marine economy. The focus of this project is develop a cutting edge hormone assay technique that will monitor specific genetic markers within lobsters to determine the effects of OA an water temperature, and ultimately provide the critical data needed to pursue larger research funding opportunities to fully fund this project.

Planned Economic Outcomes:

- Re-submitting one NSF grant on OA which was reviewed favorably but requested more preliminary data to be funded
- Submitting one new proposal on the effects of water temperatures to the NOAA/Saltonstall-Kennedy program

Notable Highlights to date:

Although we intend to run the trial from Oct-Dec 2016, we have purchased a portion of the equipment to evaluate on an existing system to ensure the pH dosing system will perform as expected. We have begun discussions with a SEANET graduate student (Meghan Capps) who is currently conducting research with lobsters, and she is interested in working with us on collecting additional samples. We have worked with the Department of Marine Resources to collect the lobsters used to evaluate system performance. From these lobsters, we have isolated microbial DNA from the shell surface to optimize extraction techniques, and have been successful in collecting bacterial levels above what is required for the assay. We have also collected hemolymph, which we will use to optimize ecdysteroid assays.

"*Energy Recovery Dehumidification (ERDH) for energy efficient increased drying capacity of high quality sea vegetables"*
Principal Investigator: Peter Van Walsum (Chemical & Biological Engineering/FBRI, UMaine)
Co-PIs: Balunkeswar Nayak (Food Science and Nutrition, UMaine); John Belding (Advanced Manufacturing Center, UMaine); Daniel Martinez (Environmental Science, USM)
Budget: $ 73,701
Economic Sector: Aquaculture

Abstract: Seaweed aquaculture is a global activity with an annual worth of $5.65 billion. We propose to investigate Energy Recovery DeHumidification (ERDH) as a highly energy efficient means for the drying of seaweed and other sea vegetables at moderate temperature, which is necessary to preserve the valuable antioxidant properties of the product. Development of inexpensive and effective methods for drying sea vegetables will help to develop this nascent industry in Maine and increase the supply of healthful and sustainable food.

Planned Economic Outcomes:

- Explore funding opportunities to commercialize the technology via SBIR/STTR and MTI
- Explore patentability of the technology
- The ERDH drying facility will be made available for end users to optimize their research and commercial needs

Notable Highlights to date:
Based on drying data collected at different temperatures and humidity levels, we have confirmed initial predictions that low temperature and low humidity drying conditions will be optimal for drying seaweed. Outcomes from a meeting of stakeholders indicated that our dryer should be able to handle both large (feet long) pieces of seaweed as well as chopped (inch wide) pieces, as both are of interest to producers. Also, it was decided to not pursue integration of solar assisted drying with dehumidification at this time. Van Walsum, Belding and Nayak visited Nyle Industries in Brewer, Maine, which is a manufacturer of energy efficient drying equipment with considerable expertise in assembly and design of drying equipment. From this visit it was determined that a drying chamber similar to one of their standard systems modified to be capable of both cross flow and up flow ventilation would be useful so as to study the effects on both hanging and tray-supported seaweed samples. Currently we are working to define details of the final specifications desired. Budgetary limitations may require that we do part of the modification and assembly work on campus at the AMC.

"*Sustainable Bio-conservation Technology for Aqua-feed Production and Waste Management*"
Principal Investigator: Andrei Alyokhin (Biology and Ecology, UMaine)
Co-PIs: Tap Pryor (Acadia Harvest, Inc.); Michael Peterson (Mechanical Engineering, UMaine); Edward Bernard (Molecular & Biomedical Sciences, UMaine)
External Collaborators: Acadia Harvest Inc.
Budget: $ 92,487
Economic Sector(s): Aquaculture and marine technology, environmental technology, advanced technologies for forestry and agriculture

Abstract: Maine's aquaculture industry is the largest in the U.S. and is growing rapidly. However, it currently relies on aquafeeds made with fish meal and fish oil from wild-caught small fishes, which is not an economically and environmentally sustainable approach. We propose adopting an alternative aquafeed production technology that relies on biological conversion of organic wastes using black soldier fly, Hermetia illucens (L.). Our project will result in technology that allows producing large volumes of fly larvae at low cost to meet the needs of Maine aquaculture industry in sustainable aquafeed.

Planned Economic Outcomes:

- Collaborating with Maine aquaculture business (Acadia Harvest)
- Developing an industrial process for a rapidly growing business segment

Notable Highlights to date:

- Recruited two graduate and one undergraduate students to work on the project
- Had $57,448 in additional funding approved by the NSF's Small Business Innovation Research Program
- Established breeding colony of black soldier fly, *Hermetia illucens* (L.)
- Constructed several working prototypes of incubators for rearing larvae
- Identified several sources for wastes to use for rearing larvae; conducted preliminary testing of the suitability of some of those wastes for larval development
- Held several brainstorming sessions on optimizing fly rearing process

"A Novel Approach to Prevent Super-chill in Atlantic Salmon"
Principal Investigator: Ian Bricknell (Marine Sciences/ARI, UMaine)
Co-PIs: Deborah Bouchard (Cooperative Extension/ARI, UMaine); William Wolters (USDA National Cold Water Marine Aquaculture Center/NCWMA); Leighanne Hawkins (Cooke Aquaculture)
External Collaborators: USDA NCWMA, Cooke Aquaculture
Budget: $ 78,463
Economic Sector: Atlantic salmon aquaculture industry

Abstract: This project will investigate a novel approach to mitigating superchill in cultured Atlantic salmon. Superchill is a physiological collapse in salmon occurring during periods of extremely cold weather in Maine's waters. The Maine salmon aquaculture industry has stated that superchill risk is the major limiting factor for growth of the industry. The remaining sites suitable for salmon aquaculture are vulnerable to superchill events. If superchill risk was mitigated, production could reach three times the current levels increasing from $76 million to $228 million annually.

Planned Economic Outcomes:

- Collaborating with Maine aquaculture business (Cooke Aquaculture)
- Submitting one proposal to the Northeastern Regional Aquaculture Center (NRAC) and/or USDA-Agricultural and Food Research Initiative

Notable Highlights to date:

1.) Proposal submission: A full proposal was submitted to the Northeastern Regional Aquaculture Center: Funding request of $165,624 for 2 years (no indirects are allowed with NRAC). Notification of awards are pending with decisions on funding expected by late summer 2016. If awarded, the project will begin in September 2016. The project title is also "*A Novel Approach to Prevent Super-chill in Atlantic Salmon"* and will greatly expand on the RRF work. Research collaboration will continue with the USDA ARS for significant diet formulation and feed trials. Cooke Aquaculture strongly supported the proposal and the proposed project involves direct participation by Cooke. Cooke Aquaculture's lead veterinarian, Leighanne Hawkins and US marine production manager, David Morang will be informed of all research progress. Chris Bartlett, Maine Sea Grant's extension agent is stationed in Eastport Maine where Cooke has primary salmon culture operations. Bartlett will take the lead role in Extension activities and communication with Cooke Aquaculture. Project management will be carried out on a monthly basis with regular assessments of progress communicated to UMaine, NCWMAC, URI and Bartlett. It is anticipated that Bartlett will organize a workshop at the end of year 1 and year 2 with PIs and collaborators also extending to Cooke Aquaculture's marine site managers and site staff.

2.) Progress of research: The Precision System Osmometer for the freezing point depression measurement and experiments with has been purchased and received (this took 2 months from

ordering to receipt). Standard curves and assays are being optimized. Planning for the first diet trial and USDA ARS is underway.

"*Development of structural wood plastic composite timber for innovative marine applications*"
Principal Investigator: Douglas Gardner (Advanced Structures and Composites Center, UMaine)
Co-PIs: Yousoo Han (Advanced Structures and Composites Center, UMaine); Steve Ruell (Innovasea); Duncan Mayes (Stora Enso)
External Collaborators: Innovasea, Stora Enso
Budget: $94,274
Economic Sector(s): Composite materials technology and aquaculture

Abstract: The overall goal of this project is to evaluate the potential of a structural wood plastic composite material (WPC) technology for use in marine applications; more specifically, its application in fish cage pens. Aquaculture structures operate in one of the most demanding of environments in which most materials do not survive for long. Traditional materials that have longevity do not have sufficient strength or affordability. To resolve this problem, UMaine researchers will team with Maine aquaculture businesses to construct an improved cage that utilizes a UMaine patented WPC technology that is stronger, stiffer and less prone to degradation as compared to current WPC materials.

Planned Economic Outcomes:

- Collaborating with Maine aquaculture businesses (Innovasea and Stora Enso)
- Submitting one proposal to the USDA SBIR program
- Submitting one proposal to MTI

Notable Highlights to date:

- Industry partner has pending USDA SBIR grant supporting Phase 1 commercialization of technologies funded by this project.

"Development of Tools for Measuring the Costs of Feeding and Food Utilization in Eastern Oysters"
Principal Investigator: Paul Rawson (Marine Sciences, UMaine)
Co-PIs: Carrie Byron (Marine Science, University of New England); Chris Davis (Maine Aquaculture Innovation Center)
External Collaborators: University of New England, Maine Aquaculture Innovation Center (MAIC)
Budget: $40,896
Economic Sector: Aquaculture

Abstract: Maine's oyster culture industry has grown substantially since its inception four decades ago. Continued growth of the industry will rely on increasing the efficiency of production through improved and more uniform growth of oysters on Maine's farms. To accomplish this, the goal of this project is to provide detailed knowledge of the genetic and ontogenetic variation in food utilization and costs of food acquisition in oysters supporting improved site selection and selective breeding for oysters with improved food conversion efficiency.

Planned Economic Outcomes:

- Collaborating with Maine aquaculture business (Pemaquid Oyster Co/MAIC)
- Submitting proposals to USDA National Institute of Food and Agriculture AFRI Animal Health and Production Program and Special Grants Program for Aquaculture Research

Notable Highlights to date:
Our proposed work addresses three interconnected objectives: 1) Determine temporal variation in the efficiency of food utilization and metabolic costs for eastern oysters provided with natural food sources, *in-situ*, 2) Determine the degree to which food conversion efficiency in oysters varies both as a function of oyster size and environmental temperature, and 3) Estimate the level of variation in feeding efficiency within and between existing lines of selectively bred eastern oysters. To address these objectives requires the design and testing of feeding chambers for smaller classes of oysters and other shellfish. These chambers incorporate fiber optic oxygen sensors that will allow us to compare the feeding efficiency under real-world field conditions. We are currently testing various chamber sizes and configurations in the lab to determine the minimum size of shellfish on which we can reliably measure feeding efficiency. We are confident we will identify an appropriate chamber design by late spring when we will then have an opportunity to test the chambers, *in-situ*. At the same time, we are conditioning and preparing to spawn eastern oysters so that we will have ready access to smaller size classes of oysters to deploy in our chambers. We are confident that these two activities will generate important data of direct use to Maine's aquaculture industry, but the data will also support proposals to the Northeast Regional Aquaculture Center (USDA, NRAC; fall 2016), the National Institute of Food and Agriculture (Spring 2017) and the NOAA National Marine Aquaculture Initiative.

"*Development of additively manufactured highly porous implantable devices that promote post-surgical wound healing and a biological transcutaneous seal: Testing of implant material and internal pore geometry in a porcine model"*
Principal Investigator: James Weber (Food and Agriculture, UMaine)
Co-PIs: Ian Dickey (Eastern Maine Medical Center); David Neivandt (Chemisty & Biological Engineering, UMaine); Anne Lichtenwalner (Food and Agriculture, UMaine)
External Collaborators: Eastern Maine Medical Center
Budget: $99,632
Economic Sector(s): Biomedical industry and medical care centers

Abstract: This project will complete a controlled *in vivo* study of University of Maine-designed medical implants in a porcine model of skin healing. If successful, the proposed study would revolutionize the medical implant industry because currently available transcutaneous implants suffer high rates of post-surgical infections from superficial bacteria that migrate into deeper tissues. The proposed work supports economic development in the Maine biomedical industries by establishing UMaine and our collaborators at Eastern Maine Medical Center as "Centers of Excellence" in clinical testing of porous materials in human surgical implants.

Planned Economic Outcomes:

- Submitting one proposal to the Defense Health Program / Department of Defense

Notable Highlights to date:
Our team is currently preparing for the RRF-funded porcine wound-healing study that is scheduled to start in June 2016. We are also finalizing negotiations with Stryker Orthopedic, a global leader in human implant technology, to provide additively manufactured porous implants for use in this study. Four upper executives in Stryker's engineering and advanced manufacturing divisions recently visited our team to discuss new porous metal technology that might be tested in the porcine wound healing model during this project, and they concluded the meeting by expressing their desire to collaborate with UMaine to test new implant designs using *in vivo* and *in vitro* models. Dr. Dickey is scheduled to present our 2015 transcutaneous implant study in rabbits to an international audience at the World Biomaterials Conference in Montreal in May 2016. Other members of our team will also attend the WBC to make new contacts and to learn about cutting edge technology in medically relevant biomaterials.

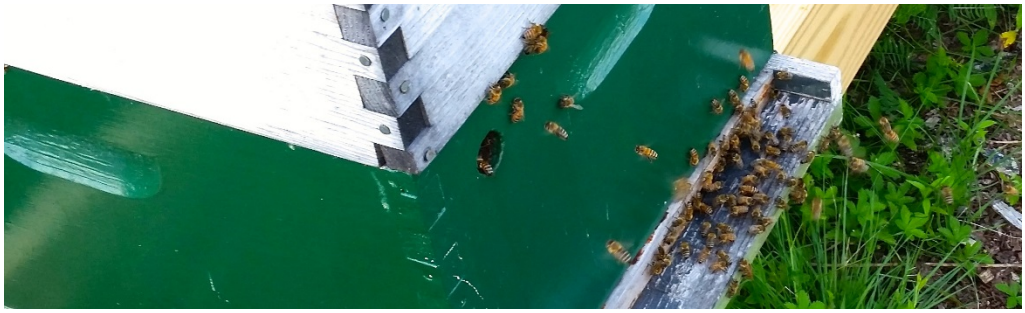
"*The Health of Maine's Bumble Bee Community"*
Principal Investigator: Frank Drummond (Biology and Ecology, UMaine)
Co-PIs: Scott Dobrin (Biology, UMPI); Ron Butler (Biology, UMFA); Joseph Staples (Environmental Sciences, USM); Christopher Lage (Biology, UMA)
Budget: $90,627
Economic Sector(s): Maine's natural resources: agriculture, especially fruit production

Abstract: The goal of this project is to investigate the 'health' of Maine bumble bees in light of their critical importance to Maine commercial businesses. Since 2006, global concern has emerged about decline of bumble bees. This is due to the collapse of the honey bee, a pollinator that is a major component of both global and Maine agricultural production. Bee decline is a serious matter and requires a large team to investigate its multiple dimensions.

Planned Economic Outcomes:

- Submitting proposals to the US EPA, USDA, and/or the NSF; and the Maine chapter of the USDA/MRCS agency

Notable Highlights to date:
1. Had a meeting with all of the cooperators (Butler, Dobrin, Drummond, Lage, and Staples) to initiate the detailed protocols for data collection.
2. Finalized and wrote data collection protocols.
3. Met with Judith Tomasik in the School of Biology and Ecology and set up sub-accounts for each Co-PI to facilitate spending.
4. Designed a bumble bee workshop for all Co-PIs and their students to attend at Orono to indoctrinate all researchers to bumble bee biology. This will occur in mid-May.
5. Designed and set a date for a field training session to teach data collection techniques and insure that all data collection is standardized.
6. Submitted and received a grant from the UMaine Sustainable Solutions Institute to develop a computer simulation model of the blueberry agroecosystem, with a specific module for bumble bee population dynamics and pollination. This grant was titled: Grower Based Analytical Analysis for the Wild Blueberry Agro-ecosystem, and funded for $9,948.
7. Recruited a visiting scientist from China who is a computer scientist to begin constructing a bumble bee simulation model. This model is almost complete and ready for field testing using some of the data that will be collected under the 2015 UMS Research Reinvestment Fund Seed Grant. This model will be used in addition to the bumble bee health data collected for a future grant proposal.



APPENDIX I.E: Round 1 | Rubric

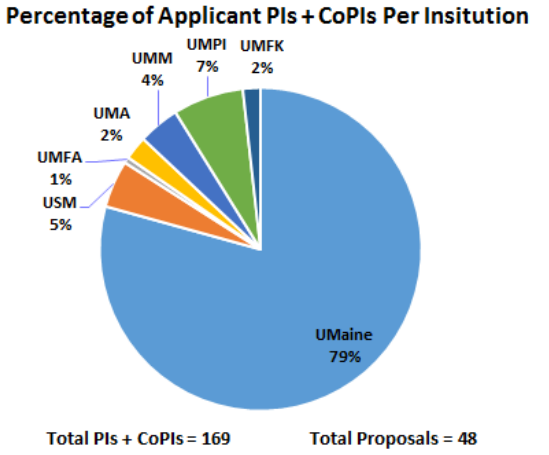
2015 Research Reinvestment Funds (RRF) Planning Grant Program

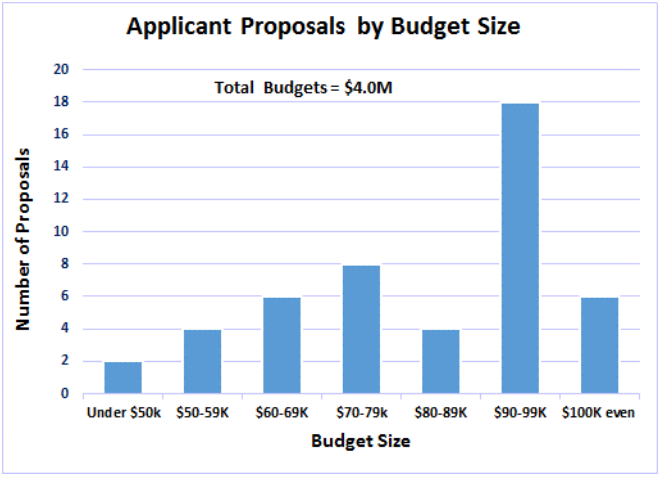
Intellectual merit 35 POINTS	**Poor (0 POINTS)**	**Good (15 POINT)**	**Very Good (25 POINTS)**	**Excellent (35 POINTS)**	**Score**
Evaluation Criteria for Intellectual Merit	Proposed research unlikely to lead to completion of objectives; methodologies not well suited; poorly articulated hypotheses/researc h h questions	Proposed research likely to lead to partial completion of objectives; methodologies suitable; some unresolved questions regarding the hypotheses/research questions	Proposed research likely to lead to completion of objectives; methodologies are suitable and well-reasoned; hypotheses/ research questions largely clear	High probability that the research will lead to completion of objectives; methodologies very well suited and reasoned; hypotheses/ research question clear and appropriate	
Relevance to Maine's economy 30 POINTS	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (20 POINTS)**	**Excellent (30 POINTS)**	**Score**
Evaluation Criteria for Relevance to Maine's Economy	No clear link of the proposed activities to Maine's economy. Likelihood of job creation, workforce and economic development low	Proposed activities somewhat linked to Maine's economy. Likelihood of job creation, workforce and economic development moderate	Proposed activities well linked to Maine's economy. High likelihood of job creation, workforce and economic development	Proposed activities intimately linked to Maine's economy. Likelihood of job creation, workforce and economic development very high	
Likelihood of additional funding 20 POINTS	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (15 POINTS)**	**Excellent (20 POINTS)**	**Score**
Evaluation Criteria for Likelihood of additional funding	Proposed research unlikely to lead to external funding	Proposed research somewhat likely to lead to external funding; Targets lacking	Proposed research likely to lead to external funding; Targets given	Proposed research highly likely to lead to external funding; specific targets given	
Extent of Collaboration 15 POINTS	**Poor (0 POINTS)**	**Good (5 POINT)**	**Very Good (10 POINTS)**	**Excellent (15 POINTS)**	**Score**
Evaluation Criteria for Extent of Collaboration	Proposal has no evidence of collaboration across the UMS and/or external partners, collaborations are not clearly linked to the proposed activities, roles and responsibilities are not clearly defined	Proposal has some evidence of collaboration across multiple campuses and/or external partners, collaborations are linked to the proposed activities, roles and responsibilities are somewhat defined	Proposal has good collaboration across multiple campuses and/or external partners, collaborations are well linked to the proposed activities, roles and responsibilities are defined	Proposal has strong evidence of collaboration across multiple campuses and/or external partners, collaborations are clearly linked to the proposed activities, roles and responsibilities are clearly defined	
TOTAL POINTS					

APPENDIX II: RRF Seed Grants | Round 2

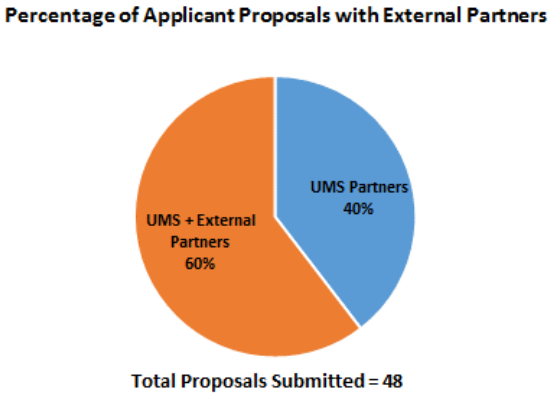
APPENDIX II.A: Round 2 | Applicant Data

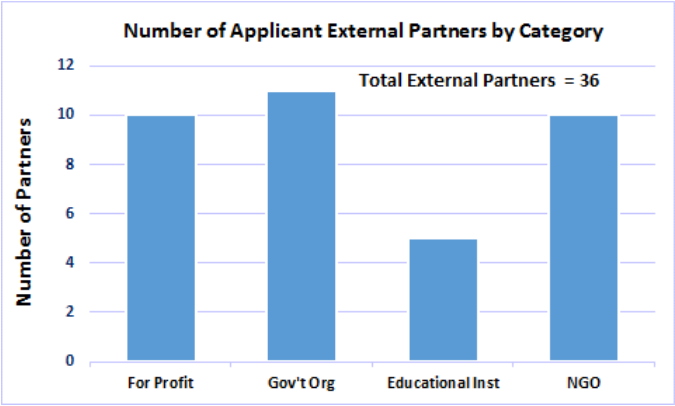
Proposal Data



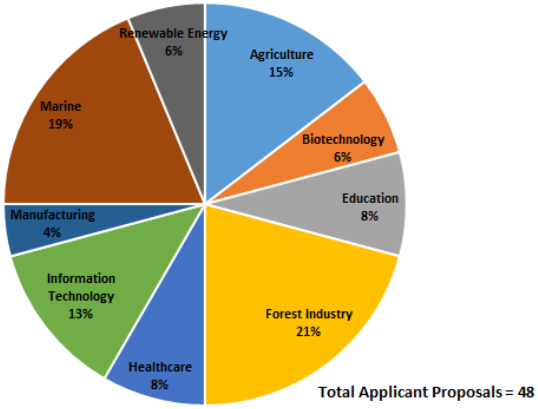


External Partner Data





Economic Sector Data



APPENDIX II.B: Round 2 | Rubric

2016 Research Reinvestment Funds (RRF) Seed Grant Program

Evaluation Criteria

Intellectual merit: 25 POINTS	**Poor: (0 POINTS)**	**Good: (15 POINTS)**	**Very Good:(25 POINTS)**	**Excellent(25 POINTS)**	**Score**
Evaluation Criteria for Intellectual Merit	Proposed research unlikely to lead to completion of objectives; methodologies not well suited; poorly articulated hypotheses/research questions	Proposed research likely to lead to partial completion of objectives; methodologies suitable; some unresolved questions regarding the hypotheses/research questions	Proposed research likely to lead to completion of objectives; methodologies are suitable and well-reasoned; hypotheses/ research questions largely clear	High probability that the research will lead to completion of objectives; methodologies very well suited and reasoned; hypotheses/ research question clear and appropriate	
Relevance to Maine's economy 40 POINTS **Note: Proposals may address aspects of workforce development, economic development, or both. A maximum of 40 points will be awarded, irrespective of the workforce development/economic development approach taken**	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (20 POINTS)**	**Excellent (40 POINTS)**	**Score**
Evaluation Criteria for Relevance to Maine's Economy-Workforce Development	No clear link of the proposed activities to Maine's economy. Likelihood of job creation, workforce training, internships, workforce development low	Proposed activities somewhat linked to Maine's economy. Likelihood of job creation, workforce training, internships, workforce development moderate	Proposed activities well linked to Maine's economy. High likelihood of job creation, workforce training, internships, workforce development	Proposed activities intimately linked to Maine's economy. Likelihood of job creation, workforce training, internships, workforce development very high	
AND/OR					
Evaluation Criteria for Relevance to Maine's Economy-Economic Development	No clear link of the proposed activities to Maine's economy. Likelihood of job creation, commercialization, licensing, technology, economic development low	Proposed activities somewhat linked to Maine's economy. Likelihood of job creation, commercialization, licensing, technology, economic development moderate	Proposed activities well linked to Maine's economy. High likelihood of job creation, commercialization, licensing, technology, economic development	Proposed activities intimately linked to Maine's economy. Likelihood of job creation, commercialization, licensing, technology, economic development very high	
Likelihood of additional funding 20 POINTS	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (15 POINTS)**	**Excellent (20 POINTS)**	**Score**
Evaluation Criteria for Likelihood of additional funding	Proposed research unlikely to lead to external funding	Proposed research somewhat likely to lead to external funding; Targets lacking	Proposed research likely to lead to external funding; Targets given	Proposed research highly likely to lead to external funding; specific targets given	
Extent of Collaboration 15 POINTS	**Poor (0 POINTS)**	**Good (5 POINT)**	**Very Good (10 POINTS)**	**Excellent (15 POINTS)**	**Score**
Evaluation Criteria for Extent of Collaboration	Proposal has no evidence of collaboration across the UMS and/or external partners, collaborations are not clearly linked to the proposed activities, roles and responsibilities are not clearly defined	Proposal has some evidence of collaboration across multiple campuses and/or external partners, collaborations are linked to the proposed activities, roles and responsibilities are somewhat defined	Proposal has good collaboration across multiple campuses and/or external partners, collaborations are well linked to the proposed activities, roles and responsibilities are defined	Proposal has strong evidence of collaboration across multiple campuses and/or external partners, collaborations are clearly linked to the proposed activities, roles and responsibilities are clearly defined	
TOTAL POINTS					

APPENDIX III: RRF Planning Grants 2015-2016

APPENDIX III.A: Planning Grants | Awardee List

Principal Investigator	Partners	Project Title
Lenard Kaye (Center on Aging, UMaine)	Carol Kim (Office of the Vice President for Research, UMaine)	University of Maine System-Wide Cross Campus Workshop in Aging Research
Heather Leslie (Marine Sciences, UMaine)	Paul Anderson (Maine Sea Grant, UMaine); Jake Ward (Economic Development, UMaine)	Building Campus and Community Connections to Advance Research Development and Communication for Maine's Marine Economy
Fei Chai (Marine Sciences, UMaine)	Joshua Stoll (Marine Sciences, UMaine); Ziwen Ye (Marine Sciences, UMaine)	Changing Seafood Economy: Understanding China's Increasing Appetite for Gulf of Maine Seafood
Yong Chen (Marine Science, UMaine)	Robert Boenish (Marine Science, UMaine); Jocelyn Runnebaum (Marine Science, UMaine)	Working Group on Incidental Catch and Discard Mortality of Groundfish in Gulf of Maine Fisheries
Janet Fairman (Exercise Science, UMaine)	James Artesani (Education, UMaine); Catherine Fallona (Education, USM); Pat Red (Education, USM); Brian Cavanaugh (Education, UMF)	Building a Collaborative Partnership to Support K-12 Educator Professional Development in Maine
Heather Leslie (Marine Sciences, UMaine)	Jake Ward (Economic Development, UMaine)	Planning for the Future of Shoreline Infrastructure of the Darling Marine Center to Enhance Capacity in Applied Marine Science Education

APPENDIX III.B: Planning Grants | Awardee Abstracts & Updates

"University of Maine System-wide Cross Campus Workshop in Aging Research"
Principal Investigator: Lenard Kaye (Center on Aging, UMaine)
Co-PIs: N/A
External Collaborators: N/A
Budget: $ 5,000
Economic Sector(s): Aging, Health Care, Recreation/Leisure, Technology and Information Systems

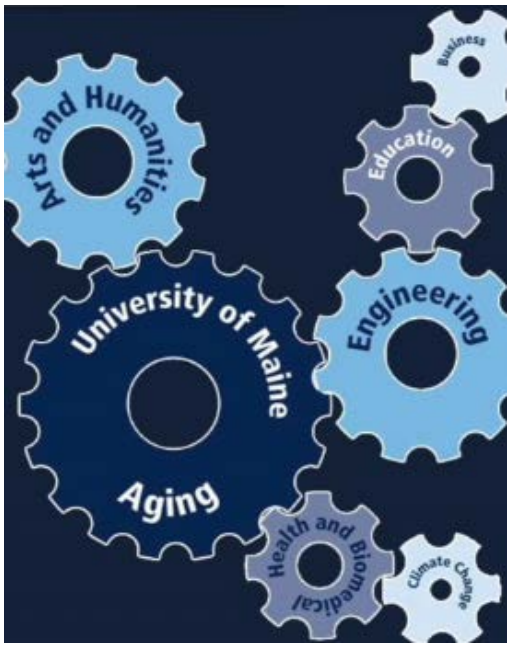
Abstract: The UMaine Center on Aging (CoA), in conjunction with the Office of the Vice President for Research (OVPR), proposed to convene a one-day System-wide workshop for 50-75 faculty on August 25, 2015 for the purpose of growing an inter-campus collaborative network in aging and technology research . A System-wide initiative will be advanced that engages cross disciplinary and inter-professional faculty for the purpose of building expertise across the UMS. A major aim of this initiative is to expand team-based research inquiry into technologies, products, and programs that respond to the economic and workforce expansion opportunities created by Maine's distinction of having the oldest populace in the nation.

Planned Project Outcomes:

- Conduct a UMS cross campus workshop
- Preparation of an RRF Seed Grant application
- Preparation of subsequent technology and aging research proposals

Notable Highlights to date:

- UMaine spearheaded the *August 2015 Aging Symposium* in Orono to leverage expertise from UMS campuses as well as external partners from across the state. All seven UMS campuses were represented and faculty from multiple academic areas met to discuss emerging opportunities in addressing Maine's rural-aging phenomenon. This symposium was the inaugural event of the *UMS Aging Initiative.* Under the direction of Vice President for Research Dr. Carol H. Kim, nearly 100 UMS researchers have committed to collaborate to promote aging research collaborations between and among UMS campuses.
- Since the symposium, the UMS Aging Initiative has begun the first stages of identifying research potential and cross-campus collaborations. A leadership structure has been developed, research-leads have been selected from multiple campuses to facilitate the work of the collaborative teams and recruitment of additional system-wide members has commenced. A GA will staff the workgroups through AY 16-17



"Building Campus and Community Connections to Advance Research Development and Communication for Maine's Marine Economy"
Principal Investigator: Heather Leslie (Marine Science, UMaine)
Co-PIs: Paul Anderson (Maine Sea Grant, UMaine), Jake Ward (Economic Development, UMaine)
External Collaborators: N/A
Budget: $5,000
Economic Sector(s):

Abstract: We will convene UMS researchers, marine industry professionals, and stakeholders statewide to assess industry needs and identify a cohesive set of capital investments. Based on this collaborative deliberation, we will write and submit a unified funding proposal to the State of Maine Department of Economic & Community Development that addresses the Maine's Marine Economy and Jobs Bond priority: "…to facilitate the growth of marine businesses and commercial enterprises that create jobs and improve the sustainability for the State's marine economy." Only one $7,000,000 grant will be awarded statewide to the winning proposal that presents a well-conceived, 10-year strategic initiative.

Planned Project Outcomes:

- Identify and conduct meetings with a team of collaboratively minded individuals who are knowledgeable about commercial fishing, aquaculture, and value-added seafood processing
- Submitting a competitive proposal in response to the RFP "Maine's Marine Economy and Jobs Bond" that outlines capital investments, distributes benefits across multiple sectors, and has a transformative impact on the sustainability of Maine's marine economy.
- At least two other grant submissions to NSF, NOAA, USDA/NIFA, MTAF, SBIR/STTR and/or private philanthropy.

Notable Highlights to date:

- The Alliance of Maine's Marine Economy (AMME) was formed and is comprised of wide array of stakeholders including UMaine and UMM, and many other NGOs and for profit small businesses.
- A proposal was written and submitted in December of 2015 to the $7M Maine Marine Bond described above. Within this proposed effort, four major initiatives and infrastructure improvements were identified which included 1) facilitating business development by establishing a capital investments program, 2) accelerating product innovation by constructing a new Food Innovation Incubator, 3) assessing and preventing risks to resource health by constructed a new Aquatic Animal Health Facility, and 4) anticipating changes in product supply by improving infrastructure at the Mainer Research and Development Facilities at UMM, DMC, and GMRI.

"A changing Seafood Economy: Understanding China's Increasing Appetite for Gulf of Maine Seafood"
Principal Investigator: Fei Chai (Marine Sciences, UMaine)
Co-PIs: Joshua Stoll (Marine Sciences, UMaine); Ziwen Ye (Marine Sciences, UMaine)
External Collaborators: N/A
Budget: $ 4,985
Economic Sector(s): Maine Fisheries, Seafood Processors and Distributors

Abstract: The purpose of this planning initiative is to develop a proposal to study the factors that are reshaping the seafood trade dynamic between the US and China, with a particular emphasis on Maine exports. This research is motivated by a recent federal policy decision that encourages seafood trade to China and, in Maine, the surge of seafood exports. In understanding the socioeconomic and cultural drivers behind this economic frontier, we aim to help Maine's seafood industry navigate this uncertain transition and anticipate future market shifts.

Planned Project Outcomes:

- Conduct preliminary scoping trip to southern China to meet and make connections with key informants in the industry, government, and academic sectors;
- Define core research questions based on exploratory trip and continued discussion with collaborators in China and the US;
- Develop a UMS RRF Seed Grant proposal and establish a partnership with NOAA Fisheries Office of International Affairs by way of a Cooperative Institute for the North Atlantic Region (CINAR) agreement;
- Work with the Continuing Education program to develop a complementary travel course, open to the fishing industry and all UMS campuses.

Notable Highlights to date:

- We completed a 14 day scoping trip to five cities in China. We went to 5 fish markets (Aberdeen Fish Market (HK), Yantian Seafood Market (SZ), Huangsha Seafood Market (GZ), Bashi local market (XM), and Tongchuan Seafood Market (SH)) and 3 university campuses, meeting with more than 20 fisheries experts.
- Our research team gave seminars at City University and Xiamen University, describing the scope of our project.
- We are in the process of forming a collaborative research project with the Shanghai Fisheries Association. Through this project our aim is to use data from SFA to analyze changes in seafood availability at the Tongchuan Seafood Market over the past 20 years. This project has the potential to inform future research and provide the basis for future grant proposals.
- We are scheduling meetings with the Maine Lobstermen's Association, NOAA Fisheries Office of International Affairs, and other organizations/agencies to report back on our trip.

"Working Group on Incidental Catch and Discard Mortality of Groundfish in Gulf of Maine Fisheries"
Principal Investigator: Yong Chen (Marine Science, UMaine)
Co-PIs: Robert Boenish (Marine Science, UMaine); Jocelyn Runnebaum (Marine Science, UMaine)
External Collaborators: N/A
Budget: $4,610
Economic Sector(s): Fisheries, Coastal Communities

Abstract: Groundfish (e.g. Cod, cusk, halibut) stocks in the Gulf of Maine (GOM) currently are at or near historically low population levels. Fishery closures and reductions of quota have caused the loss of thousands of fisheries jobs and stressed Maine's coastal economies. Recently there has been a surge of innovative fisheries research from a small collection of institutions in the Northeast, all independently directed at solving parts of this fisheries crisis. Fish stock rebuilding will depend on collaboration from the entire spectrum of stakeholders. We propose a meeting of these institutions with industry leaders to form a working group to address this issue.

Planned Project Outcomes:

- The formation of a sustainable working group that communicates regularly and meets annually
- The working group cohesively working toward securing large multi-institutional grants to further research. Specifically, the working group could be very competitive for the NOAA Coastal SEES coastal ecosystem grant. The scope of this award involves 3-5 years of funding and awards $800,000-$2,000,000.
- The working group will contribute to the field by publishing findings in peer-reviewed journals.

Notable Highlights to date:

- Assembled a Working Group and reserved a date and location for our first meeting.
- Members of our lab have made trips to recruit researchers from the New England Aquarium, UMass Dartmouth, UMass Boston, University of New England, NOAA fisheries, Mass DMF, and others.
- We expect to have around 30 participants attending, ranging from research scientists, to graduate students, state officials, and industry. In addition, we placed a particular focus on student involvement by reaching out to some standout graduate students from the aforementioned institutions to help facilitate discussion for a portion of the day dedicated to developing new problem solving strategies related to bycatch.

Building a Collaborative partnership to Support K-12 Educator Professional Development in Maine"
Principal Investigator: Janet Fairman (UMaine)
Co-PIs: James Artesani (UMaine), Catherine Fallona (USM), Pat Red (USM), Brian Cavanaugh (UMF)
External Collaborators: N/A
Budget: $3,026
Economic Sector(s): STEM Education, Professional Development, Improving K-12 student academic outcomes

Abstract: This proposal seeks to develop a collaborative partnership to strengthen the state's capacity to support K-12 educator professional development. More effective teaching will improve student learning outcomes, which will have long-term economic impacts for the state. Better prepared high school graduates will have stronger skills for work and improved readiness for post-secondary education and careers that pay good wages. Higher-performing schools can help make Maine even more attractive for in-migration and for investors seeking a skilled workforce for new business start-ups or expansions. Better employment opportunities can reduce "brain drain" and keep young workers in Maine.

Planned Project Outcomes:

- Plan for submission of a seed grant proposal and pilot project for fall 2016
- Provide a written report of progress toward the goals and outcomes at the completion of the planning grant and planned work after the grant.

Notable Highlights to date:

- Our planning team of faculty have held meetings by phone and video conferencing to plan our work.
- We are currently developing a survey to use as a needs assessment tool in our three regional meetings with district teams. We are reaching out to school districts to identify the best date and time for these regional meetings. Anticipated meeting dates are May or early June.
- The agenda of the meeting is being developed at this time. We anticipate including time to present MEPRI research findings related to PD needs in Maine, conducting the survey for needs assessment, small group discussion in teams and across district teams, and planning for next steps

"Planning for the Future of Shoreline Infrastructure of the Darling Marine Center to Enhance Capacity in Applied Marine Science Education"
Principal Investigator: Heather Leslie (Marine Science, UMaine)
Co-PIs: Jake Ward (Economic Development, UMaine)
External Collaborators: Shep Erhardt (Maine Coast Sea Vegetables), Patrice McCarron (Maine Lobsterman's Association)
Budget: $5,000
Economic Sector(s): Marine Technology, Aquaculture/Food Production, Fisheries

Abstract: Researchers, industry professionals, and other stakeholders will meet to assess current and future needs for shoreline infrastructure at the Darling Marine Center (DMC), within the context of the University of Maine (UMS) system. As University of Maine's marine laboratory, the DMC is a vital platform for applied marine research, workforce development, and K-20 education for the state and nation. To complement the strategic and master planning underway at the DMC, we propose to focus explicitly on shoreline infrastructure so as to ensure appropriate development and access to the facilities needed to conduct cutting-edge, industry-relevant research and education.

Planned Project Outcomes:

- Conduct a needs assessment in collaboration with research, education, industry and community representatives
- Identify potential funding for research infrastructure
- Establish contract with Pine Tree Engineering to develop three alternative for a future pier and associated shoreline infrastructure
- Draft a plan to secure funding for the shoreline infrastructure project
- At least two grant submissions are expected as an outcome

Notable Highlights to date:

- This project is the most recently funded planning grant (April 2016). Planning activities for conducting needs assessment as well as other project activities are will commence soon and will be reported on in future RRF update reports.

APPENDIX III.C: Planning Grants | Rubric

Intellectual merit 35 POINTS	**Poor (0 POINTS)**	**Good (15 POINT)**	**Very Good (25 POINTS)**	**Excellent (35 POINTS)**	**Score**
Evaluation Criteria for Intellectual merit	Proposal has no compelling evidence that the intellectual merit of the research and development area proposed for the new collaboration is sufficient to eventually lead to an extramurally funded and successful project.	Proposal has some evidence that the intellectual merit of the research and development area proposed for the new collaboration is sufficient to eventually lead to an extramurally funded and successful project.	Proposal has good evidence that the intellectual merit of the research and development area proposed for the new collaboration is sufficient to eventually lead to an extramurally funded and successful project.	Proposal has strong evidence that the intellectual merit of the research and development area proposed for the new collaboration is sufficient to eventually lead to an extramurally funded and successful project.	
Relevance to Maine's economy 30 POINTS	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (20 POINTS)**	**Excellent (30 POINTS)**	**Score**
Evaluation Criteria for Relevance to Maine's economy	No clear link of the proposed activities to Maine's economy. Likelihood of job creation, workforce and economic development low	Proposed activities somewhat linked to Maine's economy. Likelihood of job creation, workforce and economic development moderate	Proposed activities well linked to Maine's economy. High likelihood of job creation, workforce and economic development	Proposed activities intimately linked to Maine's economy. Likelihood of job creation, workforce and economic development very high	
Likelihood of additional funding 20 POINTS	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (15 POINTS)**	**Excellent (20POINTS)**	**Score**
Evaluation Criteria for Likelihood of additional funding	Proposed research unlikely to lead to external funding	Proposed research somewhat likely to lead to external funding; Targets lacking	Proposed research likely to lead to external funding; Targets given	Proposed research highly likely to lead to external funding; specific RPG targets given	
Extent of Collaboration 15 POINTS	**Poor (0 POINTS)**	**Good (5 POINT)**	**Very Good (10 POINTS)**	**Excellent (15 POINTS)**	**Score**
Evaluation Criteria for Extent of Collaboration	Proposal has no evidence of collaboration across the UMS and/or external partners, collaborations are not clearly linked to the proposed activities, roles and responsibilities are not clearly defined	Proposal has some evidence of collaboration across the UMS and/or external partners, collaborations are linked to the proposed activities, roles and responsibilities are somewhat defined	Proposal has good collaboration across the UMS and/or external partners, collaborations are well linked to the proposed activities, roles and responsibilities are defined	Proposal has strong evidence of collaboration across multiple and/or external partners, collaborations are clearly linked to the proposed activities, roles and responsibilities are clearly defined	
TOTAL POINTS					

APPENDIX IV: RRF Graduate Assistant Grants 2016-2017 | Rolling

Appendix IV.A: GA Grants | Awardee List

Principal Investigator	Partners	Project Title
Damian Brady (Marine Sciences, UMaine)	Bureau of Public Health, Maine Department of Environmental Protection, Maine Shellfish Advisory Council	Modeling estuarine circulation on Maine mudflats to improve shellfish harvesting
Jason Bolton (Food Science & Cooperative Extension, UMaine)	Maine Technology Institute	OIED RRF Proposal for 2 Graduate Assistantships
Yong Chen (Zoology & Marine Science, UMaine)	Maine Department of Marine Resources	Estimating spatial non-stationarity of American lobster
Yong Chen (Zoology & Marine Science, UMaine)	Maine Department of Marine Resources, NOAA	RRF Graduate Assistant Proposal for PhD Candidate
Yong Chen (Zoology & Marine Science, UMaine)	Northeast Fisheries Science Center, NOAA, Gulf of Maine Research Institute	Incorporating environmental variability into assessment and management of American lobster (Homarus americanus)
Yong Chen (Zoology & Marine Science, UMaine)	Northeast Fisheries Science Center, NOAA	Development of a modeling framework to assess the effects of environmental heterogeneity in sea scallop (Placopecten magellanicus) abundance, distribution, and growth: Application to the Maine fishery
Yong Chen (Zoology & Marine Science, UMaine)	NOAA, Maine Department of Marine Resources	Facilitating Development of Statistical Models to improve estimation of incidental cod catch
Teresa Johnson (Marine Sciences, UMaine)	Northeast Fisheries Science Center	Marine Biology and Marine Policy MS student working to inform the management and planning efforts in the lobster industry
Lenard Kaye (Social Work, UMaine)	Scope of this project is across the UMS campuses	GA Support Request to Bolster Aging Research Connections across the UMS
Michael Mason (Chemical and Biological Engineering, UMaine)	EMMC	Variable Porosity Nanocellulose Solid Forms for Biomedical Applications
Krish Thiagarajan (Mechanical Engineering, UMaine)	General Dynamics Bath Iron Works	Advancing marine technology for naval and commercial ships using the Alfond W2 OCean Engineering Laboratory

Appendix IV.B: GA Grants | Rubric

Intellectual merit 25 POINTS	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (20 POINTS)**	**Excellent (25 POINTS)**	**Score**
Evaluation Criteria for Intellectual merit	Proposed research has significant deficiencies which compromise its likelihood of success	Proposed research has minor deficiencies but is likely to be somewhat successful	Proposed research is well conceived and is likely to be successful	Proposed research is very well conceived and is highly likely to be successful	
Relevance to Maine's economy 30 POINTS	**Poor (0 POINTS)**	**Good (10 POINT)**	**Very Good (20 POINTS)**	**Excellent (30 POINTS)**	**Score**
Evaluation Criteria for Relevance to Maine's economy	No clear link of the proposed activities to Maine's economy. Likelihood of job creation, workforce and economic development low	Proposed activities somewhat linked to Maine's economy. Likelihood of job creation, workforce and economic development moderate	Proposed activities well linked to Maine's economy. High likelihood of job creation, workforce and economic development	Proposed activities intimately linked to Maine's economy. Likelihood of job creation, workforce and economic development very high	
Mentoring Plan 15 POINTS	**Poor (0 POINTS)**	**Good (5 POINT)**	**Very Good (10 POINTS)**	**Excellent (15 POINTS)**	**Score**
Evaluation Criteria for Mentoring Plan	Advisory committee composition and/or background are not appropriate, advisor/co-advisors lack experience, location and coursework are not well conceived and/or day-to-day advising is not available	Advisory committee composition and background are largely appropriate, advisor/co-advisors are somewhat experienced, location and coursework are somewhat problematic and/or day-to-day advising is generally available	Advisory committee composition and background are appropriate, advisor/co-advisors are experienced, location and coursework are well conceived and/or day-to-day advising is available	Advisory committee composition and background are highly appropriate, advisor/co-advisors are very experienced, location and coursework are very well conceived and day-to-day advising is available	
Extent of Collaboration 15 POINTS	**Poor (0 POINTS)**	**Good (5 POINT)**	**Very Good (10 POINTS)**	**Excellent (15 POINTS)**	**Score**
Evaluation Criteria for Extent of Collaboration and Appropriateness of the Participants	Proposal has no evidence of collaboration across the UMS and/or external partners, collaborations are not clearly linked to the proposed activities, roles and responsibilities are not clearly defined	Proposal has some evidence of collaboration across the UMS and/or external partners, collaborations are linked to the proposed activities, roles and responsibilities are somewhat defined	Proposal has good collaboration across the UMS and/or external partners, collaborations are well linked to the proposed activities, roles and responsibilities are defined	Proposal has strong evidence of collaboration across multiple and/or external partners, collaborations are clearly linked to the proposed activities, roles and responsibilities are clearly defined	
Continued Support 15 POINTS	**Poor (0 POINTS)**	**Good (5 POINT)**	**Very Good (10 POINTS)**	**Excellent (15 POINTS)**	**Score**
Evaluation Criteria for Plans for Student Support Beyond the Funding Period	No plan for continued student support beyond the funding period	Decent plan for continued student support beyond the funding period with some likelihood of success	Strong plan for continued student support beyond the funding period with high likelihood of success.	Comprehensive plan for continued student support beyond the funding period with very high likelihood of success.	
TOTAL POINTS					