2017 University of Maine Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The University of Maine Cooperative Extension has served the people of Maine for 104 years, and is a partnership of county, state and federal funding. By conducting Extension programs in every Maine County, we support UMaine's public education and service role as a land grant and sea-grant institution. Volunteer advisory boards, comprised of county residents, oversee budgets for the local offices and advise Extension staff on programming to meet local needs.

UMaine Extension's ongoing focus areas continue to be the **Maine Food System** through research and outreach related to agriculture, aquaculture, food processing, distribution, business education, food safety, and human nutrition; and **Youth Development** through 4-H programs with a focus on the STEM disciplines. These programs are well supported in a variety of ways by a planned program focused in Sustainable Community and Economic Development.
We are very proud of the data and success stories included in this report and we are pleased to take this opportunity to share information about these and other accomplishments and impacts.

Creating the next Agricultural Economy

Maine has the most diverse agriculture in New England. The longstanding agricultural focus for the past century has been wild blueberries, potatoes, dairy, livestock, poultry, grains, maple, fruits, vegetables and a vibrant ornamental horticulture industry. These areas, and others, are all changing to meet new opportunities and market demands. Cooperative Extension applied research and educational outreach is making a measurable difference in the advancement of opportunities for Maine farmers.
The growing demand for locally grown and processed small grains is an economic opportunity for Maine's farmers, and one that requires meeting the quality standards of high-value specialty markets. UMaine Extension and Experiment Station conducted diverse research and educational programs for the grain industry. Fourteen research projects developed region-specific information on grain variety performance, fertility and weed management strategies. Educational programs included farm demonstrations and tours, field days, an annual Maine Grain Conference, and a Grains & Oilseeds website and newsletter. The results have been impressive. Grain farmers, processors, and buyers improved their skills, markets, and business viability as a result of Extension's efforts. Farmers changed practices based on what they learned from Extension's Local Grains Program. These changes resulted in improved grain yields and quality, enhanced farm or grain business viability. Maine grew 3.6 times more organic small grains in 2016 as compared with 2011, and did so on 2.5 times more acres. Overall, there was a 20% increase in yield of these crops, and the total value of organic small grains and pulses produced by Maine farmers increased three-fold from 2011, exceeding $800,000 in 2016.

Maine is home to 60 breweries producing over 200 beers, and is a leader in the production of craft beers. Most of the ingredients are imported into the state, including the hops that give our products their unique character. A study UMaine School of Economics study found Maine breweries added $228 million to the state's economy in 2016 and employed 2177 people.

UMaine Extension established a hops variety trial and demonstration planting at the Maine Agricultural Experiment Station at Highmoor Farm to determine suitable types and production practices in Maine. An Extension Hops School educated new and potential growers about the crop by generating and providing information through research, and creating networks of farmers, buyers and producers. Eighty-nine new growers and potential growers attended the hops school, and 20 attended a hops twilight meeting. As a result of the trainings at least three new commercial hops plantings are being established, and a hops grower association is forming. Eighteen of the people attending the hops school intend to start a commercial hops yard within the next 3 years. Portland-based Allagash Brewing Co., which used over 115,000 pounds of local grains in 2017, has pledged to use 1 million pounds of Maine-grown grains annually by 2021.

Helping Traditional A Commodity Find New Opportunities

U.S. organic agriculture operations are rising, with USDA data showing a 13 percent increase in certified organic farms and businesses between 2015 and 2016. With this growth, organic dairy processors and farmers are expanding into what used to be a niche market. To meet market demands Maine organic dairy farmers needed to extend the grazing season and implement practices consistent with entering the value-added milk market.

To extend the grazing season Extension developed and assessed multi-cultivar mixtures of cool season perennial grass and legume species, and evaluated cool and warm season annual forages through agronomic research. The research results were shared with farmers. The impact:

- Over 200 northeastern organic dairies adopted or fine-tuned the use of annual forage crops to extend the grazing season.
- Fifty of the dairy farmers interviewed reported increased milk production and milk quality and reduced grain/feed purchases.
- Milk content of omega-3 fatty acids and CLA increased an average of 76 and 42%, respectively.

Providing Farm Labor with Training and Support

Maine AgrAbility helps farmers, loggers and fishermen facing physical or cognitive challenges, to enhance their ability to farm and live independently. AgrAbility specialists assess issues and offer adaptive recommendations. They provide education about safe work methods and connect people with other resources. Since the project began in 2010, Maine AgrAbility has provided technical information to 394 farmers and conducted on-site assessments for 91 agricultural workers. The diverse agricultural operations include dairy and livestock operations, Christmas tree farms, fruit orchards, agritourism, vegetable and maple syrup production, hay sales, managing woodlots and lobstering. Clients reported increased knowledge of their conditions and increased accessibility for their daily work.

UMaine Extension taught 14 skills based tractor safety courses for Maine youth. To support this programming, Extension collaborated with legislators, Maine Farm Bureau, the New York Center for Agricultural Health and Medicine, tractor dealerships, and local farms. In 2017, 109 individuals completed the 5 week, 20 hour, National Safe Tractor and Machinery Operation Program curriculum. Sixty-three people took the abridged Tractor Safety Short Course.

Mobilizing Maine People to Support Food Insecure Citizens

Maine has the highest rate of food insecurity in New England, and ranks 12th in the U.S. The USDA estimates over 15 percent of Maine households, or over 209,000 individuals, are food insecure. Forty-three percent of food-insecure people do not qualify for food stamps or other government programs. Since 2000, UMaine Extension's Maine Harvest for Hunger (MHH) program has mobilized gardeners, farmers,

businesses, schools, and civic groups to grow, glean, and donate quality produce to distribution sites (pantries, shelters, community meals) and directly to neighbors in need. Since 2000, MHH participants have distributed over 2.6 million lbs. of food to citizens grappling with hunger. In 2017, donations of 213,770 lbs. of fresh produce from over 100 Maine farms and hundreds of personal gardens went to 165 hunger alleviation distribution sites. Over 371 volunteers and 8 corporate partners logged over 5700 hours in support of this program. The value of the produce was over $360,000.

Since 2014, UMaine Extension has collaborated with the Maine Campus Compact to hold annual Maine Hunger Dialogues (MHD), inviting all Maine colleges and universities to send students and staff to learn about hunger on local, national, and global scales, and to leave with ideas and action plans for ending hunger in their regions.

In 2017, 80 student and staff from 14 campuses attended the MHD where they developed new partnerships, assessed community needs and assets, and set goals and steps to reach them. Eleven teams successfully applied for MHD grants to support new and existing initiatives. Teams used the funds to develop food recovery networks, initiate food pantries and resource hubs, donate fresh produce to food insecure students, conduct food drives and hunger awareness initiatives, and more.

Providing Essential Services

The University of Maine Animal Health Lab serves the state's veterinarians, livestock producers, and animal owners. The lab performs diagnostic services including necropsy, microbiology, virology, pathology, and special research support. It offers diagnostic support to clinicians, and assists in finding solutions for agricultural and aquacultural producers. In 2017, UMAHL tested over 10,000 samples, the great majority of which were from farm animals. It tested over 7,000 poultry samples and over 3,000 milk samples, thus allowing farms of all sizes to operate with more assurance of healthy animals and healthy products. Medium to large-sized poultry farms were able to meet their FDA-requirements for salmonella testing locally. Sheep and goat owners were able to find out whether their animals have enteric parasites, and what to do about it. Nearly 1000 samples from sheep and goats were tested for contagious diseases.

Helping Build Maine's New Economy

UMaine Cooperative Extension reaches over 5,600 businesses annually. Almost all are small businesses and focused on food. New food enterprises are providing employment and vitality to a growth sector of our economy. An example of this work is Gelato Fiasco, a gourmet gelato business. In 2014 this business produced 2,000 units a day with a workforce of ten. In 2017, with technical assistance and educational support from UMaine Extension, produced 13,000 units a day with 24 employees.

Cruise Ship tourism is one of the fastest growing segments of Maine's tourism industry. In 2016, 377 cruise ships, carrying 283,000 passengers were scheduled to visit Maine's twelve ports, up 6 percent from 2015. Maine's busiest port, Bar Harbor, has experienced remarkable growth, hosting 117 cruise ships carrying 163,000 passengers in 2016. The UMaine School of Economics and UMaine Extension examined the economic impacts of cruise ship passengers visiting Bar Harbor. The study found that cruise ship passengers spent an average of $108.21 on goods and services in the town of Bar Harbor during 2016. The total annual economic impact of cruise ship passenger spending, including multiplier effects, was over $20 million in sales revenue throughout the Bar Harbor area. Small business merchants in Bar Harbor have found the report very useful to their cruise ship passenger marketing efforts and local policymakers have used it to educate the public about the economic importance of cruise ship tourism to the Bar Harbor economy.

Helping Youth Make Good Nutritional Choices

In 2017, EFNEP reached 3,120 youth through an average of six classes. As a result:

- 73 percent improved their abilities to choose foods according to current Dietary Guidelines.
- 47 percent used safe food handling practices more often.
- 29 percent improved their physical activity practices.
- 34 percent improved their ability to prepare simple, nutritious, affordable food

Creating Mentoring Relationships To Solve Real World Problems

Students in Belfast, Maine have been working with local naturalists, biologists and a drone pilot to survey and map their local watershed, where they will release classroom-raised salmon in 2018. Found in a handful of rivers in central and eastern Maine, the native Atlantic salmon population has been declining for several years due to changing environmental conditions. UMaine Extension offered the Tech Wizards 4-H program to the school and mentored the students in how to collect and record their data. Tech Wizards is a youth mentoring program that uses STEM education and service learning to help youth learn life and workforce skills, improve academic performance, and aspire to post-secondary education, productive careers, and community engagement. Through Tech Wizards, the students joined their science teacher and 4-H mentors and:

- Used videography and photography to record findings from water quality tests and biotic indices for evaluation by the scientific community, and used a local drone pilot to identify and mapped species vectors and barriers to salmon migration.
- Were introduced to career opportunities within science, technology, and art.

Statewide in 2017, Maine's Tech Wizards program matched 275 students with community mentors in 7 schools. Students participated in ongoing fieldwork, citizen science initiatives, and service learning.

In 2015 UMaine Extension created the 4-H STEM Ambassador program, which trains college students as caring mentors to youth, and who facilitate STEM activities with them, and help them learn about college and careers. In 2015-2016, 121 ambassadors reached over 1200 youth with at least six hours of hands-on STEM activities. The program often engages in underserved communities. In 2017, the program reached 1,026 youth at 63 community sites, including schools and afterschool partners, participated with teachers and administrators reporting high levels of satisfaction. This year, 105 college students trained in the development and delivery of informal STEM-based educational experiences, committed 2100 hours of time. Student ambassadors reported that without this program their instructional time with STEM would be reduced. As a result of this program participating youth have demonstrated positive attitudes, increased knowledge, and expanded interest in STEM and STEM careers.

Introducing Innovation into Traditional Education With Great Results

UMaine Extension and collaborators created Follow a Researcher® to increase youth understanding of the research process by engaging them directly with UMaine researchers in the field. Follow a Researcher® is a UMaine 4-H program using technology and social media to facilitate real-time conversations between youth and graduate student researchers working in remote locations around the world. The program is now a proven model that utilizes technology to engage new audiences with authentic scientific research, humanize the researcher, and make the research process personally relevant.

Since 2015, 4200 youth ages 7 to 18 and over 120 educators have engaged with three different researchers during expeditions to Peru, the Falkland Islands, and Antarctica. The program audience grows annually, and is attracting local and national media attention including being highlighted on the social media accounts of the National Public Broadcasting radio show and podcast "Science Friday". Educators are developing curricula units around the research expeditions. In development is the

Follow a Researcher® network, which will enable us to manage expeditions from multiple sites from our new website (followaresearcher.org) and engage 4-H programs and researchers from other universities to share expeditions with youth and educators from around the country and beyond.

In 2014 the UMaine 4-H Center at Bryant Pond and School Administrative District 44 created the Telstar Freshmen Academy (TFA), a yearlong, experiential program designed to engage students, build communities of learning, resilience and high aspiration for the high school years. The program is based on a rigorous small-group learning model that includes integrated academics, service learning, 21st Century Skills, and community mentoring. TFA creates an engaging school experience for the entire ninth grade class, with students attending outdoor programming at Bryant Pond every morning of the school year. 2017 marked the 3rd full year of Telstar Freshman Academy. This year's 9th graders are the first class in the district that will receive standards based diplomas. TFA students test scores are above the national average and improvements in aspiration toward college and careers. Parents of students report dramatic, positive changes in their children's behavior, including improvements in self-confidence, impulse control, speaking, writing, and problem solving abilities A positive, supportive culture was created in the freshmen class, high school culture was improved, and the bond among the students, TFA staff, and community was strengthened.

Thank you for the partnership of the USDA-NIFA in bringing Extension education, applied research and services to the people of Maine. We look forward to your feedback on this report.

Executive Summary--Maine Agricultural & Forest Experiment Station

The Maine Agricultural and Forest Experiment Station has been conducting research and providing outreach to Maine and its people for over 125 years. Experiment Station research and development focuses on the natural resources that have been key elements of Maine's economy, including agriculture and food, forestry and wood products, in-shore marine fisheries and aquaculture, wildlife and the environment and natural area conservation that makes Maine a unique destination.

The Maine Agricultural and Forest Experiment Station regularly seeks input from a variety of advisory groups, regular meetings with constituency groups, at field days and other research-associated events, and through direct interaction of faculty with cooperators and constituents. Below is a summary of activities and accomplishments in major areas; documentation of work in related areas is included in the body of the annual report.

Research and Outreach Support for Maine's Crop-Based Agriculture

Maine wild blueberry growers have been working closely with the University of Maine and Experiment Station since the 1940s. The industry grows an average of 90 million lbs. with an annual market value of >$173 million in frozen processed product. Station researchers are conducting research in refining Intergrated Pest Management (IPM) recommendations for native pests and diseases by enhancing IPM programs with applied research models and regional monitoring systems, studying effects of climate change on pollination and examining effects of changing temperatures and precipitation on disease occurrence, and providing new knowledge on effects of increased climate variability on crop physiology and yield.

Large- and small-scale potato growers face significant production challenges due to climate change, plant diseases, other pests and high input costs. Potatoes are the leading agricultural commodity in Maine with a total economic value of >$500 million dollars and employing over 6000 people. Station researchers are developing improved potato varieties as part of a regional multi-state effort that will produce high yields, enhance stress tolerance of northern Maine climate conditions, and have improved resistance to diseases. Several new varieties have been released in recent years in an industry partnership with the Maine Potato Board. Other researchers continue to expand our fundamental understanding of common and emerging potato pests and diseases (Colorado potato beetle, PVY virus, pink rot, black rot) and work to develop improved monitoring and control methods.

Station researchers support development of the rapidly growing small-scale conventional and organic agriculture sector in Maine with research on weed ecology and management, new cover cropping systems for northern vegetables, such as broccoli, and cropping systems for new grain varieties for bread and brewing industries, and in other research areas.

Research and Outreach Support for Maine's Livestock Agriculture

Station researchers are presently studying monitoring systems, treatments and pasture management options for controlling a pasture parasite detrimental to the growing sheep industry in Maine; working with colleagues in multiple states in the northeast on collaborative equine disease research; and studying alternative forages and forage quality for milking cows.

Research and Outreach Support for Maine Aquaculture

Station researchers have critical roles in discovery, outreach, and assisting with pilot programs for the growing aquaculture industries in Maine including support of finfish, shellfish, and sea vegetables sectors. Aquaculture is the fastest growing food production industry in the world. A recent economic study found that the aquaculture industry in Maine had >$130 million impact. Most of this revenue is generated from Atlantic salmon farming, and while this industry is profitable, siting and therefore industry expansion is potentially limited because of endangered species interactions, sea lice and superchill. However, eastern oyster and sea vegetable aquaculture has grown considerably in recent years. With 3,500 miles of shoreline, Maine has enormous potential for growth. Station scientists are heavily involved in all aspects of the industry including studies to understand salmon chilling, sea lice ecology, endangered Atlantic salmon ecology, development of disease resistant oysters, sea vegetable ecology and variety development.

Research and Outreach for the Nutritional Well-Being of Maine's People

Station scientist have a long track record of research on promoting healthy eating, the health benefits of nutraceuticals in fruits, food safety monitoring, and environmental chemistry in relation to foods and drinking water. Notable new progress has been made in understanding approaches to increasing fruit and vegetable intake in children and young adults, understanding the impacts of blueberries on vascular health, and the nature of potential nutraceuticals in fruits of greater interest in the marketplace today, such as elderberries.

Advancing Maine's Forest-based Economy

The forest and wood products industries of Maine are in the midst of significant change with important economic ramifications for the state. A federally sponsored Economic Development Assistance Team has issued a plan to revitalize and direct the forest-based industry of Maine and the University of Maine and Experiment Station have significant roles in conjunction with private, federal and state efforts. Station scientists are studying the design of silviculture systems for optimizing yield and alignment with future product streams, monitoring spruce budworm risk and assisting with management options, developing new technologies and modeling approaches (Lidar, unmanned aerial vehicles) to increase management efficiency, creating new composite and structural building materials, analyzing the social aspects and management of family forests, investigating workforce issues of rural communities in northern Maine and many other aspects of forest ecology and management to advance forest management, sustainability and economic growth.

Advancing Aquatic Ecosystem Conservation and Improving Fisheries Management and in Maine

Maine is rich in aquatic resources that encompass the breadth of the state from estuarine areas on the coast to fishless ponds in the western and northern mountains with a myriad of rivers, streams, and lakes in between. The state's extensive and varied waters provide a natural laboratory for understanding the ecology of these ecosystems and their vertebrate and invertebrate organisms and for the conservation of these systems and species. Stations scientists are conducting studies on all aspects of river restoration after dam removal in large river systems in the Kennebec and Penobscot Rivers, including on anadromous and catadromous fish species of special concern, riverine bird populations, marine nutrient transfers to freshwater systems, fish passage and movements around dams. Other examples of important station research include studies of fish movements around experimental tidal power devices, human impacts on stream vertebrate assemblages, water dynamics in watersheds and between ground and surface waters, and long-term impacts of atmospheric nitrogen and climate change on watersheds. These studies are done in close collaboration with natural resources agencies or businesses and have great utility in policy development and permitting processes.

Research and Outreach Support for Maine's Terrestrial and Semi-Aquatic Wildlife

Forestry, agriculture, aquaculture and coastal activities all result in significant interaction with terrestrial and semi-terrestrial wildlife populations in Maine as do other recreational, human development, and industrial activities. Station scientists have active research in these realms with outputs of great value to policy makers, regulators, and natural resource managers. Examples include 1) research on predators (Canada lynx, American marten), grouse species, and bats in northern forests and in relation to forest management, 2) research on coastal and other water birds of special concern that inhabit inland, coastal, and island habitats, 3) the ecology and management of vernal pool habitats and associated amphibian populations, and 4) the human dimensions and policy aspects of wildlife management problems.

Expenditure Summary
In our 2017 Plan of Work, the Maine Agricultural & Forest Experiment Station (MAFES) estimated 38.4 SYs for 2017; the actual number of SYs was 46.8 for FY2017. For FY2017, MAFES expended $2,228,158 (Actual Formula Funds), $4,841,834 (Actual Matching Funds), $675,372 (Actual All Other Funds), for a total of $7,745,364. We are continuing to report on McIntire-Stennis and Animal Health projects in the appropriate program area. The All Other Funds column for our program areas includes totals spent on these funds (MS and A) and their associated match.

Planned Programs--Maine Agricultural & Forest Experiment Station
Maine Food System
In our 2017 Plan of Work, we estimated that there would be 19.0 SYs in this program area; the actual SYs allocated for 2017 were 21.5. During FY2017, MAFES expended $1,195,841 (Hatch), and $2,664,660 (1862 Matching), and $0 (1862 All Other), for a total of $3,860,501 in this program area. MAFES research in this program area has resulted in a number of outputs for FY2017, including savings to growers, completed projects, peer-reviewed and other publications, presentations at professional meetings, workshops, and other venues.
There were several outcomes in this program area during FY2017. To highlight a few: Potato breeding for improved quality and pest resistance continued in ME along with other states. Fifty-eight advanced breeding clones in the ME program showed high levels of late blight resistance during 2016. Research to support Maine's 550 wild blueberry growers included a pollination study that helped growers determine how much capital to invest in for honey bee rental in 2017. This was very important information because the value of the Maine wild blueberry crop dropped to a historical low level. Extensive Experiment Station research in support of Maine's agricultural sector included hoop house research and biologically based soil fertility systems. Growers applying the information shared from the hoop house research reported savings of $50 to 450 in production costs per tunnel with an average economic benefit to growers amounting to $975 per house. To support the diversification of the Maine aquaculture industry by responding to health issues of aquaculture species and pre-empting them, three vaccine formulations were developed. At least

one is to be taken forward for commercial development by a Maine-based aquaculture company.

Climate Change

In our 2017 Plan of Work, we estimated 2.4 SYs in this program area; the actual number of SYs allocated for 2017 was 2.8. During FY2017, MAFES expended $167,131 (Hatch), $404,405 (1862 Matching), and $22,929 (1862 All Other) for a total of $594,465 in this program area. MAFES research in this program area has resulted in a number of outputs for FY2017, including completed projects, publications, and presentations at professional meetings, workshops, and other venues.

An outcome in this program area during FY2017 to note: The development of the Maine Integrated Forest Ecosystem Service (MIFES) model. The model is currently functioning and capable of estimating trends in growing forest stocks, the provision of harvested biomass and industrial roundwood, and forest carbon sequestration in both standing forests and harvested wood products for 8 forest types in the state of Maine.

Sustainable Community and Economic Development

In our 2017 Plan of Work, we estimated that there would be 6.2 SYs in this program area; the actual number of SYs allocated for 2017 was 11. During FY2017, MAFES expended $287,967 (Hatch), $601,080 (1862 Matching), $138,410 (1862 All Other) for a total of $1,027,457 in this program area. MAFES research in this program area has resulted in a number of outputs for FY2017, including completed projects, publications, and presentations at professional meetings, workshops, and other venues.

There were several outcomes in this program area during FY2017. To highlight two: A growing grassroots community-based window insert movement serves 17 communities in Maine. An analysis of the program estimates annual energy savings for window inserts at $104/yr, & up to $329/yr, with a simple payback period of less than one month for low-income customers (special discount pricing) & 2.6 years for regular customers. Research found that over the nine-year sample period (2001-2009), temporary shellfish pollution closures contributed to an estimated loss of $3.6 million in forgone revenue (2014 dollars), approximately 27.4% of total revenue. These results highlight the variability of the impacts of closures and the information burden for efficient management of shellfish areas and coastal waters.

Sustainable Natural Resources

In our 2017 Plan of Work, we estimated 10.8 SYs in this program area; the actual SYs allocated for 2017 were 11.4. During FY2017, MAFES expended $577,219 (Hatch), $1,171,689 (1862 Matching), and $514,033 (1862 All Other) for a total of $2,262,941 in this program area. MAFES research in this program area has resulted in a number of outputs for FY2017, including completed projects, peer-reviewed and other publications, and presentations at professional meetings, workshops, and other venues.

There were several outcomes in this program area during FY2017. To highlight one: Completion of a cluster analysis that identifies nine statistically distinct watershed settings with varied patterns of surface flow generation and downstream movement. The cluster analysis provides a basis for a cost efficient surface water and headwater observatory network.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	94.6	{No Data Entered}	38.4	{No Data Entered}
Actual	78.9	0.0	46.8	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External University Panel
- External Non-University Panel
- Expert Peer Review
- Other (Volunteer advisory boards and County Executive Committees)

2. Brief Explanation

In an ongoing effort to maintain valuable and relevant programming, faculty and staff engaged in formal and informal review by discipline-specific review panels and advisory groups that help to provide focus. While this results in defined programming intentions for the near- and long-term, the process is dynamic and ongoing throughout the year, and can result in new work to address emerging issues at any time. Programming merit and success for faculty members is also reviewed by faculty peers and supervisors through reappointment, promotion, and post-tenure processes established by the faculty and administration and codified in employment contracts. A unique process exists for non-faculty programming professionals who undergo annual reviews by supervisors, and peer reviews every 4 years.

We partner with regional Extension programs in the Northeast Region whose active vision is to coordinate translational research, education, outreach, and diversity programming to address problems, opportunities, and workforce development. Our primary mission is to enhance regional cooperation and improve coordination of regional Extension program initiatives for our region. Partners are:
University of Connecticut
Cornell University
University of Delaware
Delaware State University
University of District of Columbia
University of New Hampshire
University of Maine
University of Maryland
Maryland Eastern Shore
University of Massachusetts
Penn State University
University of Rhode Island
University of Vermont
Rutgers University
West Virginia University
West Virginia State University
The station uses its standard external scientific review process for continuing faculty proposing new five-year projects and a fast-track project approval process for new faculty. The fast-track process is intended for new faculty, where an accelerated approval process and a shorter two-year project period better meets the needs of the faculty member and station. A total of 18 projects went through the process in FY2017.

For the standard process, Experiment Station faculty prepare a pre-proposal reviewed by the MAFES Research Council, which is comprised of senior faculty. Following Research Council review to ensure that the proposed work falls within the purview of MAFES, addresses an important need identified by

stakeholders, and that the project director possesses the expertise to conduct the research, full proposals are developed. The full research proposals are sent out for external, expert peer review. Upon completion of the external reviews, proposals are returned to the researchers, who make changes based on the comments of the reviewers. Finally, the proposals are reviewed and approved by the Research Council before being submitted to USDA for final approval.

The fast-track process goal is to complete project development and obtain USDA approval in four months. The shorter time line for fast-track projects is achieved by using an abbreviated and internal proposal review, reducing proposal requirements, and expediting processing. Proposals are reviewed by a member of the Research Council and a faculty member to ensure that the proposed work meets all the expectations inherent in the standard process.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Other (Research using relevant current and first-source data)

Brief explanation.

UMaine Extension has learned from our constituents that high-quality engagement is best when the issue is current. We choose to engage stakeholders as needs and issues arise. Our matrix of programs involves citizen and volunteer group input, and our staff works closely with community, and commodity stakeholders to guide their work. Selected examples:

• Our partnership with local executive committees who provide direction and advice to our programs and help to prioritize regional efforts.
• Interactions with the UMaine Board of Agriculture, a formed by state statute, advises us on agricultural research and Extension priorities.
• The Maine Wild Blueberry Commission who represents growers and processors, and administers a state tax fund of over $1 million.
• The Maine Potato Board composed principally of Maine potato farmers who offer advice and support for research. The Board also administers a state tax fund to support Maine's most valuable agricultural commodity.
• The Maine 4-H Foundation Board who work as a close partner to enrich youth experiences through our 4-H Youth Development Program.
• A variety of advisory boards formed with targeted intent to guide the work of our most important programs. Examples: Maine Sea Grant Policy Advisory Board, Tanglewood 4-H Camp Board, Bryant Pond Learning Center Board, and the Maine Board of Pesticides Control.
• We also partner with discipline-specific groups whose mission is to achieve success in a given area. Examples: Maine Organic Farmers and Gardeners Association, Maine Science, Technology, Engineering and Math Collaborative, and the Sportsman's Alliance of Maine.

We maintain an ongoing open dialogue with Maine Legislators and County Commissioners to communicate our program focus areas and to respond to the needs that have been identified

through their constituents.
The Maine Agricultural & Forest Experiment Station encouraged stakeholder input by hosting (along with the college leadership) formal meetings with advisory groups including the Board of Agriculture (three times), the Forest Resources Advisory Committee, and the Coordinating Committee of the Maine Cooperative Fish and Wildlife Research Unit. This year again, as a way to encourage more participation by state legislators, one Board of Agriculture meeting was held in the state capitol building.
Experiment Station leaders and staff regularly attend monthly meetings of the Agricultural Council of Maine (AGCOM) as a way to maintain effective communication with the wide array of agricultural organizations in the state. MAFES faculty, through their interaction with stakeholder groups and individuals in both formal and informal settings, also continued to encourage stakeholder participation. Our research facilities hosted field days for apples, small fruits, and vegetables, potatoes, grains, and wild blueberries and other interests of growers, which allow researchers and administrators to learn more about the needs of the stakeholders in attendance. Overall, the station makes every effort to allow all groups and individuals to express their suggestions and concerns about station-sponsored research through the mechanisms discussed above.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Needs Assessments
- Use Surveys
- Other (Identify and analyze issues)

Brief explanation.

In the agricultural and forestry sectors, the major stakeholder groups are identified through coordinating and advisory committees such as the Board of Agriculture, the Forestry Research Advisory Committee, and the Coordinating Committee of the Maine Cooperative Fish and Wildlife Research Unit. MAFES provides input on potential committee members as do the current member stakeholder groups. For agriculture and forestry, MAFES maintains a list of all known stakeholder groups, and these groups are contacted on a regular basis. Individual stakeholders are identified in a variety of ad hoc ways including through faculty and department/school contacts as well as UMaine Cooperative Extension.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Survey of the general public
- Meeting specifically with non-traditional groups

- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Other (Research using relevant current and first-source data)

Brief explanation.

Input is collected through formal organization processes (Board of Agriculture, Forest Resources Advisory Committee, and Maine Cooperative Fish and Wildlife Research Unit Coordinating Committee) and feedback on research programs of faculty via stakeholder grant review programs (Wild Blueberry Commission of Maine Advisory Committee, Maine Potato Board, Cooperative Forestry Research Unit). Faculty researchers meet with and collect input from both traditional and nontraditional stakeholders at the group and individual level.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- To Set Priorities

Brief explanation.

An example: A new programming direction came through our successful Maine Harvest for Hunger program that works with farmers, gardeners, and other volunteers across the state to donate surplus produce to those with limited access to fresh fruits and vegetables. The new initiative is the Maine Hunger Dialogues that mobilized national and international students and professionals from 17 Universities and many organizations to develop local and regional projects to actively address the issue of hunger. This new venture has had four years of success with a fifth year being planned. With the recent closure of five pulp and paper mills in the last few years, the Maine delegation urged the U.S. Government through the Department of Commerce to engage all federal economic support and recovery programs that could assist this challenged industry and the impacted communities. Partnering with private companies, the University of Maine with the participation of several Experiment Station faculty members, non-profit organizations and impacted communities, the Department of Commerce initiated the Economic Development Assessment Team (EDAT) to evaluate the Maine situation and bring federal programs into a coordinated effort to grow this sector. The Maine Forest Products Council, the Maine Pulp and Paper Association, the Maine Professional Loggers Association, the Small Woodland Owners Association of Maine, the Maine Development Foundation and the University of Maine partnered on this process resulting in a unique collaboration between the private companies, trade associations and the public sector to develop a Vision and Roadmap for Maine's Forest Economy.

The Clapp Greenhouses advisory committee, made up of the associate director, superintendent, and faculty users of the greenhouses, conducted a series of listening sessions across campus to develop a concept plan for facility modernization that increases research capacity, improves safety and pest control, and reduces energy costs. A proposal to the Maine Technology Institute Maine Technology Asset Fund 2.0 to fund a portion of the Clapp Greenhouse modernization was submitted. Though it was declined, other funding continues to be pursued.

Brief Explanation of what you learned from your Stakeholders

Through our partnership with the UMaine College of Natural Sciences, Forestry, and Agriculture and the Maine Agricultural and Forest Experiment Station, we represent the Maine Food and Agricultural Initiative, which support stakeholder-driven agricultural research and Extension education for Maine. Examples of recent projects include:

- Soil solarization for enhanced weed control in vegetables
- The use of portable Doppler radar microphone to assess honey bee colony size and health
- Testing Maine's wild and cultivated elderberries for Tomato Ringspot Virus (ToRSV)"
- Improving barley quality and yields for emerging high-value markets
- Investigation and Education on the Potential Food Allergenic Residues in Composts
- Identifying Profitable Vegetable and Small Fruit Varieties for Maine (Y1-3)
- Evaluation of Onion and Shallot Varieties for Maine Farmers
- "Elderberry Virus Survey:

Stakeholders have voiced the need for greater economic capacity research to support the industry. All segments of the agricultural community express the need to maintain the Experiment Station research farms and greenhouses. They are also concerned about maintaining research capacity for modern science to support the food and agriculture sectors.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	2956704	0	2228158	0
Actual Matching	2956704	0	4841834	0
Actual All Other	9283655	0	675372	0
Total Actual Expended	15197063	0	7745364	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

The Maine Food System

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	6%		8%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
202	Plant Genetic Resources	0%		1%	
205	Plant Management Systems	3%		8%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		1%	
213	Weeds Affecting Plants	4%		5%	
215	Biological Control of Pests Affecting Plants	5%		8%	
301	Reproductive Performance of Animals	5%		4%	
302	Nutrient Utilization in Animals	2%		3%	
305	Animal Physiological Processes	5%		2%	
311	Animal Diseases	5%		13%	
501	New and Improved Food Processing Technologies	5%		11%	
502	New and Improved Food Products	5%		6%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		2%	
601	Economics of Agricultural Production and Farm Management	10%		2%	
605	Natural Resource and Environmental Economics	6%		2%	
702	Requirements and Function of Nutrients and Other Food Components	0%		4%	
703	Nutrition Education and Behavior	39%		5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	40.9	0.0	19.0	0.0
Actual Paid	37.7	0.0	21.5	0.0
Actual Volunteer	35.8	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
2229120	0	1195841	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2229120	0	2664660	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
4636633	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct scientific research. Publish peer-reviewed journal articles and other publications. Present findings at professional and public meetings and at other venues, and provide training sessions for food producers and processors. Educate undergraduate and graduate students.

- Crop Production Activities - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Crop Production Activities - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Eat Well (Expanded Food and Nutrition Education Program) - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Eat Well (Expanded Food and Nutrition Education Program)- Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Farm Energy Activities - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Farm Energy Activities - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Food Safety - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Food Safety - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- General Activities in Support of the Maine Food System - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- General Activities in Support of the Maine Food System - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Home Horticulture Activities - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Home Hotriculture Activities - Direct (Club, Conference, Program, Consultation, Scholarship, or

Training)
- Livestock Activities - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Livestock Activities - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Nutrition Education - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Nutrition Education - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Specialty Food Products - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Specialty Food Products - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)

2. Brief description of the target audience

Maine crop and livestock farmers, aquaculture industry, food producers, processors and marketers, Cooperative Extension staff, other scientists, state policymakers, regulators, and legislators, classroom teachers

- 4-H Volunteers (Adult)
- 4-H Youth (Youth)
- Agricultural Producers (Adult)
- Agricultural Service Providers
- Agricultural Workers (Adult)
- Apple Growers (Adult)
- Beef Producers (Adult)
- Blueberry Growers (Adult)
- Business Assist Organization Staff (Adult)
- Community Leaders (Adult)
- Cranberry Growers (Adult)
- Dairy Producers (Adult)
- Elders or Seniors (Adult)
- Families (Adult)
- Families (Youth)
- Farmers (Adult)
- Food Processors (Adult)
- General Public (Adult)
- General Public (Youth)
- Home Gardeners (Adult)
- Home Gardeners (Youth)
- Low-Income Families (Adult)
- Low-Income Families (Youth)
- Master Gardener Volunteers (Adult)
- Ornamental Horticulture Industry (Adult)
- Parents (Adult)
- Pesticide Applicator Training Participants (Adult)
- Pesticide Applicators (Adult)
- Policy Makers (Adult)
- Potato Growers (Adult)
- Sweet Corn Growers (Adults)
- Teachers (Adult)
- Vegetable Growers (Adult)
- Volunteers (Adult)

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	41997	2562991	13117	454

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	94	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Direct; Club, Conference, Program, Consultation, Scholarship, or Training

Year	Actual
2017	12383

Output #2

Output Measure

- Indirect; Applied Research, Media, Internet, Publication, Resulting from Training

Year	Actual

2017 334636

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Pounds of food donated
2	Monetary value of food produced, gleaned, and donated
3	Number of agencies served
4	Implement practices that improve efficiency, reduce inputs and negative impacts on the environment, increase profitability, or reduce energy consumption
5	Adopt and maintain integrated pest management strategies
6	Demonstrate how to develop integrated farming systems (on farm composting? different enterprises on the same farm?)
7	Improve animal well-being
8	Establish new farm enterprises
9	New crops and markets developed
10	Implement techniques to reduce effects of variable climate
11	Adopt specific food safety plans and/or policies
12	Adopt healthy dietary practices (consume nutrient-rich foods, follow current Dietary Guidelines for Americans or DASH, etc)
13	Increase consumption and preservation of healthful, locally-grown and -produced food (farm to school program, food preservation, etc.)
14	Adopt techniques to improve soil quality
15	Adopt a water saving technique (rain barrels, soaker hoses, etc.)
16	Utilize Cooperative Extension to identify pest problems and determine research-based management strategies
17	Increase consumption of home-grown food

18	Enhance capacity of a sustainable global food system including new/improved plants, animals, technologies, and management systems
19	More sustainable, diverse, and resilient food systems in Maine
20	Improve food safety
21	Research & Outreach Support for ME's Crop-Based Agriculture - Blueberries
22	Research & Outreach Support for ME's Crop-Based Agriculture - General Support to the Agriculture Sector
23	Research & Outreach Support for Maine Aquaculture

Outcome #1

1. Outcome Measures

Pounds of food donated

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	213770

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Successful collaborative gardening initiatives are an important tool for enhancing public health and providing meaningful community engagement opportunities by increasing access to locally grown food, providing a safe space to connect with neighbors, and offering learning opportunities outside the classroom. Supports such as volunteer leaders, educational resources, and manual labor are key contributors to the success of these projects.

What has been done
The Master Gardener Volunteer (MGV) program provides participants with a minimum of 40 hours of in-depth training in the art and science of horticulture. Trainees receive current, research-based information from UMaine Extension educators and industry experts. Trained MGV gardeners, with all levels of experience, are connected with meaningful service projects in their community.

Coordinators facilitate relationships between MGV and community partners; assisting with needs assessment, planning, and problem solving.

Results
There are 1,030 active MGV, 139 of whom were trained in 2017. In total, they donated over 39,000 hours to a variety of educational and food security projects throughout the state including supporting 79 community gardens, 45 school gardens, 53 demonstration gardens, and 34 programs involving 7,054 youth in horticulture. Those involved with food security projects distributed 213,770 pounds of food to 165 food distribution agencies and countless neighbors in need as part of the Maine Harvest for Hunger program. Many volunteers enter the MGV program with the goal of improving their gardening skills for personal benefit and then become deeply involved and passionate about community projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products

Outcome #2

1. Outcome Measures

Monetary value of food produced, gleaned, and donated

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	361271

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maine has the highest rate of food insecurity in New England, and ranks 12th in the U.S. The USDA estimates over 15 percent of Maine households, or over 209,000 individuals, are food insecure. Twenty-four percent, or 64,200 children, are food insecure. Twenty-three percent of seniors have marginal, low, or very low food security. It is especially challenging for food insecure people to afford fresh, nutritious food, and donations of fresh produce to Maine's emergency food system has declined significantly in recent years.

What has been done
Since 2000, UMaine Extension's Maine Harvest for Hunger (MHH) program has mobilized gardeners, farmers, businesses, schools, and civic groups to grow, glean, and donate quality produce to distribution sites (pantries, shelters, community meals) and directly to neighbors in need, to mitigate hunger, improve nutrition and health, and help recipients develop lifelong positive nutritional habits. Over 2,000 county MHH educational programs have also focused on engaging food pantry recipients in growing more of their own produce and learning appropriate methods of cooking and using it.

Results
Since 2000, MHH participants have distributed over 2.6 million lbs. of food to citizens grappling with hunger. In 2017, donations of 213,770 lbs. of fresh produce from over 100 Maine farms went to 165 hunger alleviation distribution sites. Over 371 volunteers and 8 corporate partners logged over 5700 hours and the value of the produce was over $361,271. Recent innovations have included developing community gardens on the grounds of food pantries where Master Gardener Volunteers recruit and teach interested pantry recipients how to grow their own fresh produce. In a 2017 pilot program, volunteers were able to anonymously sponsor food insecure families to distribute fresh produce to the families, which has resulted in their increased consumption of fresh fruit and vegetables.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Number of agencies served

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Implement practices that improve efficiency, reduce inputs and negative impacts on the environment, increase profitability, or reduce energy consumption

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	68

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #5

1. Outcome Measures

Adopt and maintain integrated pest management strategies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	15400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The $500 million potato industry is the largest agricultural sector in Maine, encompassing over 500 businesses generating over $300 million in annual sales, employing over 2,600 people, and providing over $112 million in income to Maine citizens. The management of insects, diseases, weeds, and other pests is integral in sustaining a healthy Maine potato crop. Potato growers are increasingly relying on a multidisciplinary Integrated Pest Management (IPM) approach to ensure that Maine's potato crop is pest and damage free while attempting to minimize the amount of pesticides that are applied.

What has been done
UMaine Extension's Potato IPM Program impacts Maine's 300 commercial potato growers and 48,000 acres of potatoes and has become an integral part of the Maine Potato Industry. The program also broadly impacts national and international growers who rely on the state's seed crop. The project maintains nearly 100 specialized insect traps, coordinates a statewide network of electronic weather stations, and surveys 75 potato fields on a weekly basis for weeds, insects and diseases. IPM scientists track potential pest outbreaks to provide growers with current information on treatments to minimize the number of pesticide applications and maximize potato yield.

Results
The economic impact from Extension's pest monitoring and educational programs for the 2017 season is estimated at over $8.8 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #6

1. Outcome Measures

Demonstrate how to develop integrated farming systems (on farm composting? different enterprises on the same farm?)

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Improve animal well-being

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	10000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Accurate and early detection of animal diseases is important in limiting or eradicating the impacts of disease. With Maine's continued growth in popularity of small farms and their expansion into areas where wildlife are common, getting animal health information into the hands of farmers is vitally important, as is having a state conduit for veterinarians to learn about livestock disease.

What has been done
The University of Maine Animal Health Lab serves the state's veterinarians, livestock producers, and animal owners. The lab performs diagnostic services including necropsy, microbiology, virology, pathology, and special research support. It offers diagnostic support to clinicians and assists in finding solutions for agricultural and aquacultural producers. Through Extension it links with industry to help control animal health related problems. A new Extension Plant, Animal, and Insect Diagnostic Lab will expand UMAHL's services to serve Maine's over 8,000 farms.

Results
In 2017, UMAHL tested over 10,000 samples, the great majority of which were from farm animals. It tested over 7,000 poultry samples and over 3,000 milk samples, thus allowing farms of all sizes to operate with more assurance of healthy animals and healthy products. Medium to large-sized

poultry farms were able to meet their FDA-requirements for salmonella testing locally, with quick turn-around time. Sheep and goat owners were able to find out whether their animals have enteric parasites, and what to do about it. Nearly 1,000 samples from sheep and goats were tested for contagious diseases, such as caseous lymphadenitis (CL), and information provided about preventing it on farms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
311	Animal Diseases

Outcome #8

1. Outcome Measures

Establish new farm enterprises

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	158

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Current farmers thinking about changing farm enterprises and new farmers interested in starting a farm often lack skill, knowledge and confidence in areas such as access to capital, rules and regulations affecting agriculture operations, and marketing.

What has been done
Since 2011, UMaine Extension has provided diverse educational outreach through its "So You Want to Farm in Maine" series to enhance the skills, business management knowledge, confidence of new and established farmers. Extension programs are live, live-streamed and archived, and reached 754 participants from all Maine counties and out-of-state. Topics included agriculture enterprise selection, business planning, record keeping, market research, regulations, and resource identification.

Results
The series trained people to pursue farming as a viable career option.

69 percent increased knowledge about the importance of developing a business plan and the items a farm business plan should include.
67 percent increased knowledge about where to look for resources and information about their farm enterprise of interest including web resources, government agencies, universities, and other organizations.
67 percent increased knowledge about production and financial recordkeeping and the different methods that can be used including paper and electronic records.
64 percent increased knowledge about market research techniques that they could implement to refine the knowledge of markets for their agriculture products.
56 percent increased knowledge about the rules and regulations affecting agriculture enterprises and the agencies that enforce them.

As a result of attending the program the number of farmers increased from 27% to 73% and 3-4 people worked on the farm. In the fourth year, when the training qualified as FSA borrower training, farmers with FSA loans were able to complete loan requirements and received nearly $313,000 in farm loans.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #9

1. Outcome Measures

New crops and markets developed

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	159

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The growing demand for locally grown and processed small grains, such as barley, oats, rye, and wheat, represents an economic opportunity for Maine's farmers. Current and aspiring small grain farmers face a continuing need to improve their skills and capacities with grains that meet the quality standards of high-value specialty markets such as baking, brewing, and distilling for human consumption, as well as organic feed for dairy and egg production.

What has been done
Over the last four years, UMaine Extension has conducted diverse research and educational programs for the grain industry. Fourteen research projects developed region-specific information on variety performance, fertility and weed management strategies, and new crops. Educational programs included farm demonstrations and tours, field days, the annual Maine Grain Conference, and a Grains & Oilseeds website and newsletter. Extension also provided over 300 consultations with grain farmers, buyers, and crop experts.

Results
Grain farmers, processors, and buyers improved their skills, markets, and business viability as a result of Extension's efforts. Thirty of the 36 farmers responding to a recent survey said they changed a practice based on what they learned from Extension?s Local Grains Program, including growing a new crop, changing a fertility, weed, or disease practice, and improving cleaning, drying and storage systems. These changes resulted in improved grain yields and quality, enhanced farm or grain business viability, and improved family quality of life. Of the 11 grain processors and buyers, two thirds reported having increased purchases and developed new sources and markets. For organic small grains, production, yields, and value have increased dramatically in Maine over the last 5 years. Maine grew 3.6 times more organic small grains in 2016 as compared with 2011 (1,423 vs. 498 tons), and did so on 2.5 times more acres. Overall, there was a 20% increase in yield of these crops, and the total value of organic small grains and pulses produced by Maine farmers increased three-fold from 2011, exceeding $800,000 in 2016.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management

Outcome #10

1. Outcome Measures

Implement techniques to reduce effects of variable climate

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

Adopt specific food safety plans and/or policies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	337

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
702	Requirements and Function of Nutrients and Other Food Components

Outcome #12

1. Outcome Measures

Adopt healthy dietary practices (consume nutrient-rich foods, follow current Dietary Guidelines for Americans or DASH, etc)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	6028

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior

Outcome #13

1. Outcome Measures

Increase consumption and preservation of healthful, locally-grown and -produced food (farm to school program, food preservation, etc.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	4094

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Economic sustainability of farms is a daily issue faced by farmers, who understand that profitable

farms are sustainable farms. Consumer purchasing power can significantly impact the profit base for farmers. Home food preservation education programs can increase consumer sales and ultimately profitability of farms by influencing point of purchase consumer behaviors to preserve (freeze, can, dry) fresh produce to use in the off-season to increase access to local foods.

What has been done
UMaine Extension adult and youth food preservation education efforts are extended through our Master Food Preservers program. Master Food Preservers serve as volunteers and a community resource to provide the public with research-based information from Extension and USDA. In 2017, 64 Master Food Preserver volunteers contributed over 760 hours of food preservation education and community projects, reaching over 2,190 people in 9 Maine counties. Volunteers taught 86 preserving workshops, staffed educational displays, and demonstrated at farmers? markets, harvest festivals, agricultural fairs, and local food events.

Results
The time volunteered by Master Food Preservers is the equivalent of over $18,000 in wages. When surveyed, participants in MF Preservers programs reported:

94 % plan to do something differently when preserving
100 % understand how to preserve foods better
96 % feel more confident about their food preservation skills
52 % plan to purchase food to preserve at farmers' markets
32 % plan to purchase food to preserve at farm stands
14 % plan to use food from their CSA to preserve

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior

Outcome #14

1. Outcome Measures

Adopt techniques to improve soil quality

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	226

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Protecting and improving soil health is a key goal for sustainable agriculture, yet many agricultural service providers feel ill-equipped to help farmers make informed decisions about adopting specific soil health strategies. Extension educators and NRCS staff cite a lack of region-specific information and concrete local examples of successful cover cropping, reduced tillage, and rotational practices.

What has been done
With funding from Northeast SARE, UMaine Extension in 2015 initiated a 3-year SARE Soil Health Professional Development Program to increase participants? knowledge, skills and confidence to provide education and recommendations to farmers about soil health strategies. Thirty Ag service providers from Extension, NRCS, Soil and Water Conservation Districts, non-profits, and industry joined one of three cropping systems-based teams led by Extension faculty: potato-grain, dairy cropping, and mixed vegetable. Training included winter workshops, on-farm demonstrations, case studies, and videos.

Results
As a result of this professional development program, trainees helped 91 farmers implement a soil health practice, provided 630 farmers with soil health consultations, and reached 313 farmers through 45 presentations. Among trainees:

90 percent reported having used the knowledge and skills gained through this project in their educational activities and services for farmers.

90% said they also benefitted from networking, learning about additional resources for soil health, and from technical assistance from the Coordinator.

61% said they benefitted from funds to conduct on-farm demonstrations.

65% reported that the farmers they work with had made a management change or adopted a practice as a result of what they learned from the ag service provider or project activities.

Among client farmers served by trainees:

Forty-four reported testing soil for soil health (5,070 acres).
Forty reported adopting a new cover crop practice or species, or modifying their current practice or species (3,445 acres).
Twenty-five reported adopting a new reduced tillage practice or modified their current practice (6,035 acres).

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
215	Biological Control of Pests Affecting Plants

Outcome #15

1. Outcome Measures

Adopt a water saving technique (rain barrels, soaker hoses, etc.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #16

1. Outcome Measures

Utilize Cooperative Extension to identify pest problems and determine research-based management strategies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	22489

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #17

1. Outcome Measures

Increase consumption of home-grown food

Not Reporting on this Outcome Measure

Outcome #18

1. Outcome Measures

Enhance capacity of a sustainable global food system including new/improved plants, animals, technologies, and management systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Efficient production of high quality potatoes is important for potato producers? economic viability. New varieties are also key for the eastern U.S. potato industry to enhance marketing opportunities for fresh consumption, as well as chip and fry processing. This research is also important to consumers due to the importance of potatoes as a source of vitamins, minerals, phytonutrients, and calories. The primary beneficiaries of this research are potato growers; however, potato processors and consumers benefit from more sustainably produced potatoes which can be purchased more economically and used in high quality products.

What has been done
This research is focused on improving the management of potato crops in Maine and the United States. Experiment Station researchers are playing an instrumental role in the development of attractive, productive, disease- and insect-resistant potato varieties that can be employed by small and large potato producers to enhance marketing opportunities, farm sustainability and profits. The information generated helps potato growers better manage their crops while conserving soils and optimizing purchased inputs. The project will result in new production practices and varieties that will provide higher yields, better processing quality, and fertilizer savings for potato growers.

Results
Research activities took place in seven states (including ME) during 2016 and involved collaborations with the USDA-ARS Potato Breeding Programs in MD, ID and WI, as well as the Potatoes USA National Chip and Fry Processor's Trials. Potato breeding for improved quality and pest resistance continued in ME, NY, NC, and USDA-ARS during 2016 and 2017. Advanced clones from our project were introduced to growers through field days, presentations, publications, web sites, and direct contact with stakeholders at state, regional and national potato industry meetings. The most promising advanced clones enter commercial trials to further explore their potential for important markets, such as chip processing, French fry production, fresh market, and specialty use. The project places special emphasis on breeding and selecting clones with resistance to late blight, early blight, scab, golden nematode races Ro1 and Ro2, and potato virus Y (PVY). Fifty-eight advanced breeding clones in the ME program showed high levels of late blight resistance during 2016

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #19

1. Outcome Measures

More sustainable, diverse, and resilient food systems in Maine

Not Reporting on this Outcome Measure

Outcome #20

1. Outcome Measures

Improve food safety

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #21

1. Outcome Measures

Research & Outreach Support for ME's Crop-Based Agriculture - Blueberries

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There are approximately 550 wild blueberry growers and 250 Maine beekeepers, both commercial and hobbyist. The purpose of researching beneficial and invasive pest insects in the wild blueberry agroecosystem is to develop more ecological and economic sustainable methods of pollination and insect pest management, especially for the spotted wing drosophila (SWD). An additional goal is studying pollination of wild blueberry by bees. Knowledge of pollinators and pollination of wild blueberry is of particular importance to Maine being a state that is 94% forested. Wild blueberry represents the largest aggregations of naturally occurring native flowering plant communities in Maine and therefore, its pollinator community is indicative of the pollinator community as a whole.

What has been done
An action threshold for growers affected by SWD infestation was developed. The action threshold is based upon perceived risk to the grower and enables the grower to assess the likelihood of larval infestation of fruit the following week based upon cumulative male SWD trap capture the preceding week. Experiment Station researchers also tested the use of boric acid as a repellent and adulticide. This insecticide has very low mammalian toxicity and no plant phytotoxicity was observed in 2017. The economics of pollination was assessed for four different blueberry production systems (organic, low input, medium input, and high input).

Results
One Extension factsheet was written to describe the use of the Action Threshold regarding the likelihood of SWD larval infestation of fruit the following week. The results of the pollination study were used to help growers determine how much capital to invest in for honey bee rental in 2017. This was very important information because the value of the Maine wild blueberry crop dropped to a historical low level.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
215	Biological Control of Pests Affecting Plants

Outcome #22

1. Outcome Measures

Research & Outreach Support for ME's Crop-Based Agriculture - General Support to the Agriculture Sector

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
An increasing number of Maine growers (60%) use hoop houses. One downside to this practice is growers tend to give little attention to maintaining soil health other than application of typically large volumes of compost or manures. Overtime there is a build-up of disease organisms, accumulation of salts and imbalances in plant nutrients resulting in reductions in yield and quality. In separate but complimentary research, an Experiment Station researcher studied biologically based soil fertility systems to provide multiple ecosystem and crop production services.

What has been done
The hoop house research featured presentations to more than 350 Maine vegetable growers through the Maine Vegetable and Small Fruit Growers Association annual meeting, The Maine Vegetable School, and three twilight meetings. Under the biologically based soil fertility systems work, the project developed management strategies for farmers who grow organic bread wheat, lowbush blueberry, and other crops to optimize nitrogen use efficiency, soil quality, crop yields, crop quality, and profitability for cropping systems that use biologically based nutrient sources.

Results
Growers applying the information shared from the hoop house research reported savings of $50 to 450 in production costs per tunnel by: adjusting compost or fertilizer application rates, irrigation frequency and amounts; plant populations; or changing practices to decrease labor costs. While, marketable yield increases resulting in increased revenues of $500 to 1000 per house. The

average economic benefit to growers with high tunnels amounted to $975 per house. The biologically based soil fertility systems research results were published in eight peer-reviewed journal articles and presented in eleven abstracts at professional meetings. The project produced two extension fact sheets and nine research reports, which were made available at grower events and on the UMaine Extension website, and featured in the UMaine Extension Grains and Oilseeds e-Newsletter. Project topics and results were presented in over twenty talks to farmers, processors, end-users, extension personnel, and crop advisors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #23

1. Outcome Measures

Research & Outreach Support for Maine Aquaculture

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The aquaculture industry in the US has the potential to alleviate the chronic stress being placed on wild fisheries by supplying the considerable demand for seafood within the US and beyond. The position and strength of the aquaculture industry within Maine indicates that it can be a significant player in this industry. There is a need to improve our understanding of the factors that impact on aquatic animal immunity and thus of the health of these animals when placed in commercial culture situations.

What has been done
Results have been disseminated to a number of meetings and conferences. Presentations were made at the Northeast Aquaculture Conference and Exposition which was held in Providence, Rhode Island and the World Aquaculture Society meeting in Las Vegas that was attended by around 3000 people from all over the world and representing all aspects of aquaculture including; growers, general public, researchers and commercial companies. This provided an opportunity to

present data to both scientists and the general public. Outreach also occurred with industry partners such as Pemaquid Oyster Company, Hollander & DeKoning Mussels, Arcadia Harvest and Southwatch Seahorse Farm to facilitate the flow of information and to learn what are the industry concerns and requirements.

Results

To support the diversification of the Maine aquaculture industry by responding to health issues of aquaculture species and pre-empting potential health issues by researching factors that impact on aquatic animal health, three vaccine formulations were developed, one for Aeromonas salmonicida, one for Piscirickettsia salmonis and one for Streptococcus iniae. At least one is to be taken forward for commercial development by a Maine-based aquaculture company.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Maine food system is a vital component of the Maine economy. It is a complex system comprised of all aspects of food including food production, Pest Management, processing, distribution, consumption, food safety and even food waste. The food system provides full time, part time and seasonal employment opportunities to over 15,000 people across all sectors and contributes an estimated $3.9 billion of dollars to the Maine economy each year. Currently, the Maine food system provides approximately 20 percent of the food consumed in the state. However, given the land area and market potential to consumers (70 million people live within a one-day drive), there is great potential to expand the depth and breadth of our food system. Extension specialists, educators, and other staff provide programming using research-based information to increase the efficiency, accessibility, safety, and sustainability of all aspects of the Maine food system. We work closely with the public to improve access to healthful food; and we promote USDA's Dietary Guidelines for Americans. We help farmers, fishermen, food processors, businesses, and individuals

ensure food safety through current production, harvest and post-harvest handling and processing practices, including appropriate-scale composting to reduce the waste stream and sanitize pathogens. Extension faculty have prioritized educational outreach concerning the implementation of the Food Safety Modernization Act. In addition to addressing commercial food-related efforts, Extension actively programs to improve the quality of food consumed by the general public while reducing issues of food security through the support of community and school gardens, home horticulture endeavors and the Expanded Food and Nutrition Education Program.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Positive Youth Development

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
724	Healthy Lifestyle	30%		0%	
802	Human Development and Family Well-Being	20%		0%	
806	Youth Development	50%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	24.9	0.0	0.0	0.0
Actual Paid	38.7	0.0	0.0	0.0
Actual Volunteer	119.6	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
427091	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
427091	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3793732	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

General Activities in Support of Youth - Direct

• General Activities in Support of Youth - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
• Youth Development Activities - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
• Youth Development Activities - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)

2. Brief description of the target audience

¨ 4-H Volunteers (Adult)
¨ 4-H Youth (Youth)
¨ Agricultural Workers (Adult)
¨ Business Assist Organization Staff (Adult)
¨ Community Leaders (Adult)
¨ County Executive Committee Members (Adult)
¨ Eat Well Participants (Youth)
¨ EFNEP Participants (Youth)
¨ Extension - staff (Adult)
¨ Extension Staff (Adult)
¨ Families (Adult)
¨ General Public (Adult)
¨ General Public (Youth)
¨ Home Gardeners (Adult)
¨ Parent Educators (Adult)
¨ Parents (Adult)
¨ Senior Companion Program Volunteers (Adult)
¨ Teachers (Adult)
¨ Volunteers (Adult)

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4353	749	23775	4478

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2017
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Direct; Club, Conference, Program, Consultation, Scholarship, or Training

Year	Actual
2017	1410

Output #2

Output Measure

- Indirect; Applied Research, Media, Internet, Publication, Resulting from Training

Year	Actual
2017	122

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Youth will demonstrate responsibility, critical thinking and problem solving skills through informed decision making
2	Youth will demonstrate flexibility and adaptability through decision-making
3	Youth will set goals and determine steps to reach them
4	Youth will demonstrate the ability to communicate through multiple methods and media
5	Youth will develop positive and sustained relationships
6	Youth will express interest and be engaged in science related activities
7	Youth will express positive attitudes about science
8	Youth will see science in their futures and recognize the relevance of science
9	Youth will demonstrate a capacity for science process skills (i.e. Designing a scientific procedure to answer a question, Explaining to others why things happen in an experiment, Using data to create a graph for a presentation to others)
10	Youth will participate in service learning/community service
11	Youth will demonstrate leadership
12	Youth have intentions for future civic engagement
13	Youth will demonstrate value and respect for other cultures
14	Youth will consume more healthy foods
15	Youth will consume less unhealthy foods
16	Youth will follow healthy eating patterns
17	Youth will understand the benefits of physical activity

18	Youth will engage in 60 minutes or more of physical activity per day
19	Youth will reduce sedentary activity
20	Youth will engage in safety practices
21	Youth will engage in prevention practices

Outcome #1

1. Outcome Measures

Youth will demonstrate responsibility, critical thinking and problem solving skills through informed decision making

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	4514

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #2

1. Outcome Measures

Youth will demonstrate flexibility and adaptability through decision-making

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3323

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #3

1. Outcome Measures

Youth will set goals and determine steps to reach them

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	4514

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Relevant, meaningful, and authentic experiences in science, technology, engineering and math (STEM) are important to developing positive attitudes, increasing knowledge, and preparing Maine youth for the estimated 9 million STEM-related occupations projected between 2012 and 2022. Developing Maine youth's STEM literacy is vital to ensuring that our state continues to thrive economically and socially. Given the remote and diverse communities to which Maine youth belong, informal education can help minimize inequities in rural youth STEM education and career pipelines.

What has been done
In 2015, with the support of the UMaine System, UMaine Extension created the 4-H STEM Ambassador program, which trains college students as caring mentors to youth, and who facilitate STEM activities with them, and help them learn about college and careers. In 2015-2016, 121 ambassadors reached over 1200 youth with at least six hours of hands-on STEM activities. The program often engages in underserved communities. In 2017, the program reached 1,026 youth at 63 community sites, including schools and afterschool partners, participated with teachers and administrators reporting high levels of satisfaction. This year, 105 college students trained in the development and delivery of informal STEM-based educational experiences, committed 2100 hours of time.

Results
Through this program, youth ages 8-14 come to view these Ambassadors as mentors and leaders in their community while also developing skills in STEM through hands-on activities. The program increases student leaders? knowledge, and ability with facilitating STEM activities. It also increases university engagement in local communities that UMaine has not traditionally reached. Youth were excited that someone from UMaine came to share STEM activities. Student participants reported that without this program their instructional time with STEM would be reduced. As a result of this program participating youth have demonstrated positive attitudes, increased knowledge, and expanded interest in STEM and STEM careers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being

806 Youth Development

Outcome #4

1. Outcome Measures

Youth will demonstrate the ability to communicate through multiple methods and media

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3098

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #5

1. Outcome Measures

Youth will develop positive and sustained relationships

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3374

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #6

1. Outcome Measures

Youth will express interest and be engaged in science related activities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3703

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maine needs to graduate an increasing number of science literate and proficient students to meet the growing demands of our workforce and society. Studies show youth may have an interest in science, but dislike science class, lowering their intentions to pursue STEM-related career fields. This has been linked to a lack of authentic and actively engaging learning experiences in STEM. Outreach between land grant University STEM researchers and youth traditionally involves campus visits and tours. Barriers such as scheduling, distance from a campus, and dwindling school transportation budgets negatively impact youth participation.

What has been done
UMaine Extension and collaborators created Follow a Researcher® to increase youth understanding of the research process by engaging them directly with UMaine researchers in the field. Follow a Researcher® is a UMaine 4-H program using technology and social media to facilitate real-time conversations between youth and graduate student researchers working in remote locations around the world. The program is now a proven model that utilizes technology to engage new audiences with authentic scientific research, humanize the researcher, and make the research process personally relevant.

Results
Since 2015, 4,200 youth ages 7 to 18 and over 120 educators have engaged with three different researchers during expeditions to Peru, the Falkland Islands, and Antarctica. The program audience grows annually, and is attracting local and national media attention including being highlighted on the social media accounts of the National Public Broadcasting radio show and podcast "Science Friday". Educators are developing curricula units around the research expeditions. In development is the Follow a Researcher® network, which will enable us to manage expeditions from multiple sites from our new website (followaresearcher.org) and engage 4-H programs and researchers from other universities to share expeditions with youth and educators from around the country and beyond.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #7

1. Outcome Measures

Youth will express positive attitudes about science

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3703

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Family life in the military can be challenging, especially for teens. At least one parent may be gone for long periods of time, there may be constant, underlying worry about the parent that is deployed, and there may be additional stress related to relocations. Research shows that while many military children and families manage well, for some these challenges can have a detrimental effect on their health and wellbeing, and that teens may benefit from provide residential, experiential learning programs where they develop life skills through STEAM-based programming.

What has been done
UMaine Extension 4-H Camp and Learning Centers offer Military Teen Adventure Camps to provide outdoor adventure, STEAM, and leadership camp for teens of youth with parents who are deployed or about to be deployed. Extension partnered with NIFA, National 4-H, and U.S. military youth programs in 2017 to bring 73 teens to 8 weeks of camp. For example, Tanglewood 4-H Camp and Learning Center delivered a 10-day camp for 17 teens from Naval bases in Virginia and Washington to explore concepts of energy and motion, and alternative energy. The teens visited UMaine where they learned about wind turbine design. At camp they built windmills and solar cars and engaged in creative arts and outdoors adventures.

Results
By bringing together teens with families from military backgrounds, Military Teen Adventure Camps provide meaningful experiences where they are able to connect with a new peer group. Through living and adventuring with others they have unique connections to, teens report feeling greater sense of support and camaraderie than in their home communities. The camps provide military teens with summer camp experiences that promoted positive life skills, new friendships and physical activity. Since 2011, the three Camp and Learning Centers have provided camp experiences to over 555 military teens.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being

806 Youth Development

Outcome #8

1. Outcome Measures

Youth will see science in their futures and recognize the relevance of science

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2732

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Schools have struggled to adapt to the changing needs of the "digital generation" in which many students are disengaged from traditional educational settings. When disengagement is combined with a lack of social-emotional support, behavioral and academic risk factors increase. In Maine, one in five Oxford County 9th graders fails a major core academic subject adding those students to the large list of those who will struggle to graduate. In SAD 44, the community recognized a need for a new educational model to support incoming freshmen experiencing low self-confidence, challenges with public speaking, writing and problem solving, and low impulse control.

What has been done
In 2014 the UMaine 4-H Center at Bryant Pond and SAD 44 created the Telstar Freshmen Academy, a yearlong, experiential program designed to engage students, build communities of learning, resilience and high aspiration for the high school years. The program is based on a rigorous small-group learning model that includes integrated academics, service learning, 21st Century Skills, and community mentoring. TFA creates an engaging school experience for the entire ninth grade class, with students attending outdoor programming at Bryant Pond every morning of the school year. Curriculums include Habits of Mind, Food Systems, Exploration and Discovery, Energy Systems, and Focusing on the Future.

Results
2017 marked the 3rd full year of Telstar Freshman Academy. This year's 9th graders are the first class in the district that will receive standards-based diplomas. TFA students test scores are above the national average and improvements in aspiration toward college and careers. Parents of students report dramatic, positive changes in their children?s behavior, including improvements in self-confidence, impulse control, speaking, writing, and problem-solving abilities. The

community benefits from TFA service learning projects such as installing solar panels at the 4-H Center, designing and installing interpretive signs on a local hiking trail, volunteering at an assisted living home, and designing a school snack program and planting and harvesting crops for those snacks. A positive, supportive culture was created in the freshmen class, high school culture was improved, and the bond among the students, TFA staff, and community was strengthened.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #9

1. Outcome Measures

Youth will demonstrate a capacity for science process skills (i.e. Designing a scientific procedure to answer a question, Explaining to others why things happen in an experiment, Using data to create a graph for a presentation to others)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3085

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Documentation reveals that low-income students have less than average access to science education. The achievement gap is perpetuated during summer months for low-income students, who lose more grade equivalency due to lack of out-of-school and summer learning opportunities. In addition an increase in STEM education can lead to better employment opportunities and increase the likelihood of youth furthering their education. In an effort to increase science proficiencies in local communities and prevent summer learning loss, UMaine Extension created and delivered science curricula at community sites, chosen based on existing programs for youth in the area.

What has been done

In 2017 Maine 4-H Summer of Science was at 35 unique sites in 7 counties, including free-or-reduced lunch sites, libraries, summer school programs and summer camp sites. Community partners included Boys and Girls Clubs, YMCAs, schools, public housing authorities, and local recreation camps. Summer of Science activities were based on ?Innovation Engineering?, and included animal adaptation, bioremediation, chromatography, and engineering design. Adult volunteers and 20 teens facilitated activities with over 2,000 youth.

Results
4-H staff use summer of science experiential learning activities to assist with summer learning loss and work towards engagement and interest in science. The program focuses on programming where youth already are, and uses positive 4-H youth development programs to reduce barriers to involvement in STEM. By engaging in summer of science activities, these youth are well poised to return to their academic school year with reduced summer learning loss and an increased interest in science. In addition it has been documented that youth involved in 4-H are more likely to pursue future courses or a career in science, engineering or computer technology, which can lead to improved employment opportunities. Not only does this program help Maine youth in elementary school during summer months, it also fosters career development, leadership and responsibility for the Maine teens that are trained to deliver educational content in their neighborhoods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #10

1. Outcome Measures

Youth will participate in service learning/community service

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3209

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Students from Captain Albert Stevens Elementary School in Belfast have been working with local naturalists, biologists and a drone pilot to survey and map their local watershed to gather and share data about the health of Wescott Stream, where they will release classroom-raised salmon in 2018. Found in a handful of rivers in central and eastern Maine, the native Atlantic salmon population has been declining for several years due to changing environmental conditions. Native salmon are currently listed as endangered under the Endangered Species Act.

What has been done
Through the Tech Wizards 4-H program, UMaine Extension mentored the students in how to collect and record their data on the Gulf of Maine Research Institute?s Vital Signs website, where fellow researchers will evaluate and integrate their data into broader watershed studies. mentoring program that uses STEM education and service learning to help youth learn life and workforce skills, improve academic performance, and aspire to post-secondary education, productive careers, and community engagement.

Results
Students learned invaluable STEM skills, became engaged in community service, and built relationships in their community. They became discerning observers and recorders of plant and animal physiology and experienced being reflective stewards of riparian habitats. Statewide in 2017, Maine?s Tech Wizards program matched 275 students with community mentors in 7 schools. Students participated in ongoing fieldwork, citizen science initiatives, and service learning and were empowered to engage with their communities and contribute their time and skills to address important scientific questions, and to recognize that environmental stewardship is both the platform for their learning and an overarching life ethic.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #11

1. Outcome Measures

Youth will demonstrate leadership

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3387

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Increasing student retention and building strong connections with surrounding communities are two goals that all institutions of higher learning throughout Maine have in common. Food insecurity can have a direct impact on student retention. Students who are engaged in community service can greatly enhance the positive connections schools can have in their community. Until now, there has been no organized effort among Maine?s colleges to address hunger on their campuses or in their communities.

What has been done
Since 2014, UMaine Extension has collaborated with the Maine Campus Compact to hold annual Maine Hunger Dialogues (MHD), inviting all Maine colleges and universities to send students and staff to learn about hunger on local, national, and global scales, and to leave with ideas and action plans for ending hunger in their regions. The events promote inter and intra-campus networking to capitalize on the diverse group.

Results
In 2017, 80 student and staff from 14 campuses attended the MHD where they developed new partnerships, assessed community needs and assets, and set goals. MHD granted funds to eleven teams to develop food recovery networks, initiate food pantries and resource hubs, donate fresh produce to food insecure students, conduct food drives and hunger awareness initiatives, host cooking on a budget and nutrition courses to food insecure adults and children, supported income refugee and immigrant residents with a healthy cooking workshop series, and helped build capacity between students and local Native American residents through providing a nutrition and food preservation workshop series. "Meal food pack-outs" (packaging healthy nonperishable meals) held at UMaine packed 107,562 meals that were distributed to food insecure students and community members. Through the Maine Hunger Dialogue, Extension has strengthened partnerships with Maine Campus Compact, Good Shepherd Food Bank, Maine Corporations, UMaine System campuses, and other Maine Institutions of Higher Education.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #12

1. Outcome Measures

Youth have intentions for future civic engagement

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #13

1. Outcome Measures

Youth will demonstrate value and respect for other cultures

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2769

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #14

1. Outcome Measures

Youth will consume more healthy foods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7318

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Maine, 28 percent of youth are overweight or obese and 17 percent of children under age 19 live in poverty. One of the most common and preventable risk factors for premature death is consuming too few fruits and vegetables. In 2009, 72 percent of Maine adults consumed less than five servings of fruits or vegetables per day, while only 20 percent of Maine middle school students and 15 percent of Maine high school students consumed five servings of fruits or vegetables per day. In 2015, only 19 percent of Maine adults were meeting minimum recommendations for physical activity.

What has been done
UMaine Extension implemented the national 4-H Youth Voice: Youth Choice program to mobilize underserved youth to take action around nutritional deficiencies, healthy food choices, and physical activity. Maine's program seeks to train 50 teen teachers to educate 2,000 underserved youth about nutrition and physical activity, to change knowledge, attitudes and behavior so youth will make healthy food, physical activity and lifestyle choices to reduce the risk of obesity and chronic disease later in life. A second goal is to create supportive community environments where healthy lifestyles are the norm.

Results
Of teen teachers participating in Maine YVYC:
88 percent reported eating more fruits and vegetables.
66 percent reported eating less junk food.
71 percent reported drinking less soda.
88 percent reported drinking more water.
93 percent reported learning cooking skills to prepare healthy foods at home.

Of youth participating in Maine YVYC:
91 percent reported eating more fruits and vegetables.
81 percent reported eating less junk food.
88 percent reported drinking more water.
70 percent of youth participants reported being physically active for 60 minutes every day.
90 percent agreed that being active is fun and will help them stay healthy.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #15

1. Outcome Measures

Youth will consume less unhealthy foods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	6976

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #16

1. Outcome Measures

Youth will follow healthy eating patterns

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7318

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
More than 13 percent of Mainers (173,030 people) live in poverty. Food insecurity in the state has increased dramatically in the past 10 years to 16.4 percent (218,284 people) of the Maine population. With food insecurity comes greater health risks. Overweight/obesity, sedentary lifestyles, and poor diet quality are associated with many chronic diseases. In Maine, 30 percent of adults are obese (up from 11 percent in 1990), and high school obesity rates are increasing.

What has been done
UMaine Extension's EFNEP paraprofessionals educate Maine?s limited-income families and youth to help them make better lifestyle choices and improve their nutritional wellbeing. EFNEP participants learn how to eat well on a budget and apply what they learn in their daily lives. These positive changes will help reduce the incidence of obesity and chronic disease of limited income families in Maine.

Results
In 2017, of 388 adult participants surveyed:
74 percent showed improvement in one or more food resource management practice (plan meals, compare prices, uses grocery lists, not run out of food).
83 percent showed improvement in one or more nutrition practice (plans meals, makes healthy food choices, prepares food without adding salt, reads nutrition labels or has children eat breakfast).
68 percent showed improvement in one or more food safety practice (thawing and storing foods correctly).

Eat Well graduates reported increasing fruit and vegetable intake by one-third cup per day, and increasing whole grains and dairy. Thirty eight percent of Eat Well graduates reported increasing physical activity. Graduates decreased intake of sodium, oils, solid fats, and added sugars (SoFAs) that if continued for a year would result in a 10 lb. weight loss.

In 2017, 3,120 youth participated in Eat Well through an average of six classes with Eat Well staff over two months. As a result:

73 percent improved their abilities to choose foods according to current Dietary Guidelines.
47 percent used safe food handling practices more often.
29 percent improved their physical activity practices.
34 percent improved their ability to prepare simple, nutritious, affordable food.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #17

1. Outcome Measures

Youth will understand the benefits of physical activity

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7239

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #18

1. Outcome Measures

Youth will engage in 60 minutes or more of physical activity per day

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	4329

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #19

1. Outcome Measures

Youth will reduce sedentary activity

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7360

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #20

1. Outcome Measures

Youth will engage in safety practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3101

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Every 3 days, 100 children are injured and one dies in an ag-related incident in the U.S. For working youth, tractors were the leading source of fatalities. In addition to the devastation brought on by the loss of a life, farm accidents result in negative emotional, community, and economic impacts felt across the entire agricultural community. Access to tractor and farm safety knowledge and interactive trainings increases adoption of safety practices and results in fewer farm accidents.

What has been done
UMaine Extension taught 14 skills based tractor safety courses for Maine youth. Farm and tractor safety information was shared to the general public, to raise awareness on the importance of farm safety, through newsletters, video production, social media, and interactive displays at 9 events. To support this programming, Extension collaborated with legislators, Maine Farm Bureau, the New York Center for Agricultural Health and Medicine, tractor dealerships, and local farms.

Results
In 2017, 278 youth and farmers took part in Extension's farm safety trainings. Of these, 172 were trained in tractor safety. One hundred and nine individuals completed the 5 week, 20 hour, National Safe Tractor and Machinery Operation Program curriculum. Each class focused on practical skills learning and the final exam included written and driving tests. Sixty-three people took the abridged Tractor Safety Short Course. A miniature tractor and tilt table is used in statewide demonstrations to show the need for roll over protection, and educational videos were posted on YouTube.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #21

1. Outcome Measures

Youth will engage in prevention practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2864

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Public Policy changes
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Maine has a population of about 1.25 million people, but we live in a large, rural state. Within our borders there are 16 counties that contain over 498 diverse communities, each governed by a collection of citizen councils, boards, and committees that are challenged to address a broad range of issues unique to their communities.
Maine is home to over 191,000 youth between the ages of 5 and 17 and we reach nearly 15% of the state's youth through our 4-H Youth Development programs. Maine has made a commitment to proficiency-based education, which helps to ensure that students acquire the knowledge and skills that are deemed to be essential to success in school, higher education, careers and adult life. When Extension's educational initiatives in youth development are supported, youth learn skills that help build positive relationships, increase knowledge, promote career aspirations and encourage community engagement. As a result, the public benefits by a more informed

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Community & Economic Development

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		5%	
112	Watershed Protection and Management	0%		2%	
123	Management and Sustainability of Forest Resources	0%		5%	
134	Outdoor Recreation	0%		5%	
202	Plant Genetic Resources	0%		5%	
311	Animal Diseases	0%		5%	
315	Animal Welfare/Well-Being and Protection	0%		5%	
511	New and Improved Non-Food Products and Processes	0%		9%	
601	Economics of Agricultural Production and Farm Management	0%		15%	
602	Business Management, Finance, and Taxation	25%		0%	
604	Marketing and Distribution Practices	20%		0%	
605	Natural Resource and Environmental Economics	0%		13%	
607	Consumer Economics	15%		4%	
608	Community Resource Planning and Development	15%		10%	
609	Economic Theory and Methods	0%		8%	
610	Domestic Policy Analysis	0%		2%	
801	Individual and Family Resource Management	20%		2%	
802	Human Development and Family Well-Being	0%		5%	
805	Community Institutions, Health, and Social Services	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	6.5	0.0	6.2	0.0
Actual Paid	2.5	0.0	11.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
300493	0	287967	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
300493	0	601080	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
853290	0	138410	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Community Development - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Community Development - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Economic Development - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Economic Development - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- General Community and Economic Development Activities - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- General Community and Economic Development Activities - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)
- Small and home based business education - Direct (Club, Conference, Program, Consultation, Scholarship, or Training)
- Small and home based business education - Indirect (Applied Research, Media, Internet, Publication, Resulting from Training)

Conduct scientific research. Publish peer-reviewed journal articles and other publications. Present findings at professional and public meetings and at other venues. Educate undergraduate and graduate students.

2. Brief description of the target audience

Scientists, economists, state and local policymakers, extension specialists, green/horticulture industry, tourism planners, land use commissions, and commercial fishermen

Business Assist Organization Staff (Adult)

Community Leaders (Adult)
County Executive Committee Members (Adult)
Elders or Seniors (Adult)
Extension - staff (Adult)
Families (Adult)
Families (Youth)
General Public (Adult)
General Public (Youth)
Small or Home-Based Business Owners - Current (Adult)
Small or Home-Based Business Owners - Potential (Adult)
Teachers (Adult)
Volunteers (Adult)

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5161	1631	303	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2017
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	38	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Direct; Club, Conference, Program, Consultation, Scholarship, or Training

Year	Actual
2017	1688

Output #2

Output Measure

- Indirect; Applied Research, Media, Internet, Publication, Resulting from Training

Year	Actual
2017	55

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Adopt sound business management practices
2	Increase profitability
3	Jobs created
4	Make more effective business decisions
5	Increase sales
6	Improve efficiency
7	Hire employees
8	Reduce business management risks
9	Start a business
10	Stay in business
11	Expand a business
12	Reconsider business plan
13	Join a business association
14	Join a local chamber of commerce
15	Increase partnerships
16	Increase career aspirations and goal setting
17	Demonstrate applications of life skills

18	Assess community needs and assets
19	Adopt effective community strategies
20	Mobilize community capacities, assets, or resources
21	Demonstrate leadership skills
22	Assess current and projected impacts of climate change and adopt effective strategies to respond to and mitigate such training
23	Identify household priority needs and aspirations
24	Assess alternate choices for managing household resources
25	Adopt sustainable living practices
26	Engage positively in their community
27	Train, support and mentor others in leadership roles
28	Demonstrate application of leadership skills
29	Demonstrate civic engagement
30	Strengthen human capacities, human capital, building partnerships
31	Improve knowledge of, or strategies and tools for, sustaining Maine's rural economies and communities
32	Adoption of strategies/tools for sustaining Maine's rural economies and communities
33	Enhance sustainability, diversity, and resiliency of Maine's rural economies and communities

Outcome #1

1. **Outcome Measures**

   Adopt sound business management practices

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	514

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #2

1. Outcome Measures

Increase profitability

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

U.S. organic agriculture operations are rising, with USDA data showing a 13 percent increase in certified organic farms and businesses between 2015 and 2016. With this growth, organic dairy processors and farmers are expanding into what used to be a niche market. A UMaine Extension assessment of organic dairy farmers in the Northeast conducted via surveys (n=250) and focus group interviews (n=70), revealed that to meet the demands of new and emerging markets these farmers need to extend the grazing season and implement practices consistent with entering the value-added milk market.

What has been done

To extend the grazing season while improving the nutritional quality and content of omega-3 fatty acids in forage-based diets, Extension developed and assessed multi-cultivar mixtures of cool season perennial grass and legume species, and evaluated cool and warm season annual forages through agronomic research. We also assessed the utility of supplemental ground flaxseed to further bolster health-beneficial fatty acids (omega-3 and conjugated linoleic acid - CLA) and enhance the marketability of organic milk. Our findings were shared with farmers.

Results

Over 100 northeastern organic dairy farmers transitioned their milking cows to high-forage or forage-only diets. Over 200 northeastern organic dairies adopted or fine-tuned the use of annual forage crops to extend the grazing season.

Fifty of the dairy farmers interviewed reported increased milk production and milk quality and reduced grain/feed purchases, with farmers saying improved forage yield and quality were the major contributors to these outcomes. Over 6,000 acres of organic summer annuals have been planted in NH, ME, VT, PA, and NY.

Milk content of omega-3 fatty acids and CLA increased an average of 76 and 42%, respectively, in cows fed ground flaxseed compared with those not receiving flax supplementation.

"Working closely with this program helped me reduce grain purchases by 25% and helped put more money back in my pocket?"

"Help from this program allowed us to apply soil amendments that boosted yield and quality. We went from a deficit of feed to a surplus of hay in just one year?"

"Information on high forage programs and soil fertility helped me increase milk production by 5 lbs. per cow?"

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
607	Consumer Economics
609	Economic Theory and Methods

Outcome #3

1. Outcome Measures

Jobs created

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	67

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Aspiring and existing entrepreneurs need capital to start, improve and expand their businesses to create good paying jobs for Maine people. Many business owners are challenged to secure adequate funding from traditional lenders to start or expand a business. However, by partnering with a regional economic development organization, traditional lenders like banks are able to increase access to capital for Maine businesses that otherwise would not be eligible for financing.

What has been done
UMaine Cooperative Extension supports improved access to financing for Maine business through its collaboration with a regional economic development agency that provides SBA loan guarantees for prospective borrowers. As an active member of the Loan Review Committee, Extension provides guidance and oversight on credit and lending strategies, reviews loan applications and along with other business and community leaders arrives at a loan recommendation.

Results
In fiscal year 2017 the Loan review Committee approved 33 loans of over $3.2 million to 29 businesses. Over $4.9 million was leveraged bringing the total investment to over $8 million. Forty-eight jobs were created or retained, and seven of Maine's 16 counties benefited from the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area

607 Consumer Economics

Outcome #4

1. Outcome Measures

Make more effective business decisions

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	62

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Cruise Ship tourism is one of the fastest growing segments of Maine?s tourism industry. In 2016, 377 cruise ships, carrying 283,000 passengers were scheduled to visit Maine?s twelve ports, up 6 percent from 2015. Maine?s busiest port, Bar Harbor, has experienced remarkable growth, hosting 117 cruise ships carrying 163,000 passengers in 2016, a 36 percent increase since 2002. While the cruise ship industry is growing rapidly, little is known about the current demographic characteristics of these passengers or what their economic impact is on the Bar Harbor area economy.

What has been done
The UMaine School of Economics and UMaine Extension examined the economic impacts of cruise ship passengers visiting Bar Harbor. A survey was distributed to 4,768 passengers from 31 ships visiting Bar Harbor between May and October 2016. The survey included questions about activities while in port, spending on goods and services, and selected passenger information. An input-output model was used to estimate the economic impact of passenger expenditures on the local economy.

Results
The study found that cruise ship passengers spent an average of $108.21 on goods and services in the town of Bar Harbor during 2016. The total annual economic impact of cruise ship passenger spending, including multiplier effects, was over $20 million in sales revenue throughout the Bar Harbor area. Economic activity associated with this spending supported 379 full- and part-time jobs, and provided $5.4 million in wages and salaries. The results of this research was presented to the Bar Harbor Town Council, posted to the town?s website, and widely disseminated through television, radio, newspaper, Internet, and town meetings. Small business merchants in Bar Harbor have found the report very useful to their cruise ship passenger

marketing efforts and local policymakers have used it to educate the public about the economic importance of cruise ship tourism to the Bar Harbor economy, especially during the shoulder seasons.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
609	Economic Theory and Methods

Outcome #5

1. Outcome Measures

Increase sales

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	21

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
607	Consumer Economics
609	Economic Theory and Methods

Outcome #6

1. Outcome Measures

Improve efficiency

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	42

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
607	Consumer Economics
609	Economic Theory and Methods

Outcome #7

1. Outcome Measures

Hire employees

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #8

1. Outcome Measures

Reduce business management risks

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	196

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #9

1. Outcome Measures

Start a business

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	104

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
609	Economic Theory and Methods

Outcome #10

1. Outcome Measures

Stay in business

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	34

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maine has an aging population of dairy farmers. Dairy farming is an occupation that is both physically demanding occupation and difficult to enter without significant capital. Dairy is important to the state since it serves as a major supporter of many agricultural support businesses, especially in Central Maine. Maine has lost nearly 800 dairy farms since the mid 1980s.

What has been done
Many organizations have partnered to find ways to help this industry, including Maine Farmland Trust, MOFGA, Dairy Industry Association, Land for Good, and UMaine Extension. In 2016, supported by a grant from Stonyfield Yogurt, Wolfe's Neck Farm (WNF) initiated the organic dairy training program to try to train a new generation of dairy farmers. WNF partnered with the Dairy Grazing Apprenticeship (DGA) to provide a 2-year training program with education coordination from Extension.

Results
Currently there are 6 Master Farmers in Maine, and 5 apprentices and WNF apprentices who are completing a 2 year, 4,000 hour training program. As an example of the utility of the program, a small organic dairy farmer recently was severely injured in a farming accident. WNF was able to work with Organic Valley, Extension, and the DGA program to provide trained apprentices to the farm to enable the it to stay in business during the farmer's 4-week recovery. Without DGA support they likely would have had to sell the cows.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

801 Individual and Family Resource Management

Outcome #11

1. Outcome Measures

Expand a business

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	36

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The goal of UMaine Extension's Food Safety programs is to ensure a safe food supply while reducing foodborne illness risks by teaching proper sanitation, food preservation, and food-handling practices. To that end Extension educators, specialists, and professionals conduct a variety of programs for Maine citizens and food businesses. In 2014, a gourmet gelato business, Gelato Fiasco, was operating out of a small commercial facility producing about 2000 units a day, with 10 full time employees. The business? sales had increased and they required an expansion of their current facility.

What has been done
From 2014 to 2017 Extension staff provided technical and educational support to assist with general food safety, quality, sanitation, facility design, and regulations. UMaine Extension assisted the business with designing a new 10,000 sq. ft. facility, including scale-up and sourcing processing equipment. Extension is also assisting this company with Food Safety Modernization Act (FSMA) plan development and a Listeria monitoring program.

Results
Gelato Fiasco is now safely producing and selling over 13,000 units per day out of their newly expanded facility and employing 24 full-time employees.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
607	Consumer Economics

609 Economic Theory and Methods

Outcome #12

1. Outcome Measures

Reconsider business plan

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	58

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
609	Economic Theory and Methods

Outcome #13

1. Outcome Measures

Join a business association

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Join a local chamber of commerce

Not Reporting on this Outcome Measure

Outcome #15

1. Outcome Measures

Increase partnerships

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	40

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
610	Domestic Policy Analysis

Outcome #16

1. Outcome Measures

Increase career aspirations and goal setting

Not Reporting on this Outcome Measure

Outcome #17

1. Outcome Measures

Demonstrate applications of life skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	48

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The first three years of a child's life are a critical time for growth and development. Few investments have a rate of return of early childhood programs. Investing in children, starting with the earliest years, produces significant long-term impacts for individuals and communities. Benefits to the children, families and communities can range from reduced child abuse and neglect, lower health care costs to school success and better employment.

What has been done
UMaine Extension Parenting Education Professionals are part of a statewide network of Maine Families Home Visiting Programs. In 2017 ten certified Parent Education Professionals provided 2414 home visits to 271 families living in four counties. Using the Parents As Teachers model parent educators met with families in their homes and 1) Provided families with current information on child development and parenting, 2) Shared activity ideas and ways to engage and nurture their child?s optimal development, and 3) Provided connections and linkages to community resources.

Results
Families from the 4 counties receive services including home visits, group connections, child screening and connections to community resources, knowledge and resources to prepare their

children for a stronger start in life and greater success in school. Our results included:
79 percent of infants were breastfed at 6 months.
93 percent of primary caregivers were screened for depression.
91 percent of caregivers who used tobacco at enrollment received tobacco cessation referrals.
100 percent of children with positive screens for developmental delays received services in a timely manner.
All enrolled families were assessed for basic needs and referred to services as appropriate.

4. Associated Knowledge Areas

KA Code	Knowledge Area
610	Domestic Policy Analysis

Outcome #18

1. Outcome Measures

Assess community needs and assets

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
805	Community Institutions, Health, and Social Services

Outcome #19

1. Outcome Measures

Adopt effective community strategies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Housing costs in southern Maine coastal communities are largely unaffordable to the local community's workforce, with the majority of residents spending more than 30% of their income on housing.

What has been done
UMaine Sea Grant and UMaine Extension facilitated a planning process with the Workforce Housing Coalition of the Greater Seacoast, the Town of Berwick, and community members. Charrette design workshops engaged the community in conversations about this disconnect between income and housing costs and the need to plan for the housing needs of the community's workforce.

Results
The charrette held in Berwick, Maine immediately generated actions from the town officials as well as community members. The planning board began the process of amending the language of their village overlay district in order to facilitate development. Sea Grant and Extension worked with partners from the Workforce Housing Coalition, NH Housing, local developers and others to hold a ?feasibility? workshop. The resulting recommendations in combination with the charrette report formed the basis of the community?s redevelopment plans. Community planning and actions provided the town with new resource and ideas, and a vision for the future that has attracted significant funding and investors. The Town applied for a U.S. EPA Brownfield Program grant, and was awarded $600,000, the largest single site grant in the history of the Brownfields grant program nationwide. At this time, demolition and hazardous waste removal have begun and housing developers have initiated proposals to the Town.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
805	Community Institutions, Health, and Social Services

Outcome #20

1. Outcome Measures

Mobilize community capacities, assets, or resources

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
805	Community Institutions, Health, and Social Services

Outcome #21

1. Outcome Measures

Demonstrate leadership skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	48

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #22

1. Outcome Measures

Assess current and projected impacts of climate change and adopt effective strategies to respond to and mitigate such training

Not Reporting on this Outcome Measure

Outcome #23

1. Outcome Measures

Identify household priority needs and aspirations

Not Reporting on this Outcome Measure

Outcome #24

1. Outcome Measures

Assess alternate choices for managing household resources

Not Reporting on this Outcome Measure

Outcome #25

1. Outcome Measures

Adopt sustainable living practices

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Eleven (of 16) counties in the State of Maine have poverty levels that exceed the national average, with the highest being among children in rural counties. The International Energy Agency and World Health Organization have linked energy and poverty, claiming that equitable access to affordable energy is a crucial step toward economic development in rural areas. Maine spends approximately $4 billion per year on imported energy, and approximately 55% of Maine?s energy demands are met with imported fossil fuels, which make the State particularly susceptible to price fluctuations.

What has been done
An Experiment Station economist worked with 10 students to plan & implement a community window insert build & conduct research on the grassroots movement in Maine & associated costs & benefits. The researcher and students surveyed participants in community builds across the state (17 locations) about their experiences with the inserts & builds.

Results
A growing grassroots community-based window insert movement serves 17 communities in Maine & has the potential to reduce Maine residents? expenditures on fuel oil. This program is crucial to homeowners throughout rural & urban Maine, & especially to low-income residents who

only have to pay $1/insert. An analysis of the program estimates annual energy savings for window inserts at $104/yr, & up to $329/yr, with a simple payback period of less than one month for low-income customers (special discount pricing) & 2.6 years for regular customers. A review of historic energy bills from existing customers supports these projections.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
605	Natural Resource and Environmental Economics
607	Consumer Economics

Outcome #26

1. Outcome Measures

Engage positively in their community

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	600

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maine Extension Homemakers Council is a volunteer group that develops leadership skills, supports community causes, and promotes UMaine Extension's educational programs in 9 Maine counties. These organized programs are part of the statewide network of Extension Homemakers. Local group members meet throughout the year to participate in educational programs, and identify community projects, such as providing assistance to local food pantries or nursing homes or veterans groups, funding educational scholarships or youth camp programs.

What has been done
In 2017, over 600 Maine Extension Homemakers Council members took the opportunity to learn with others, make friends, contribute to their community and county, donating their time, money, and materials to numerous community agencies and projects. Homemakers from over 40 Local Extension Homemaker Groups met and delivered or engaged in Extension programming

involving over 3,100 participants and 321 programs including food, personal and community; nutrition and health; gardening and environmental, financial planning and consumer; personal growth; and cultural and creative arts.

Results
In many Maine counties Extension Homemakers remain a traditional and vital part of the community fabric. They also provide direct and indirect benefits in terms of volunteer hours, fundraising, and material donations. In 2017, the total estimated monetary value of the Extension Homemaker program to their communities was over $541,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #27

1. Outcome Measures

Train, support and mentor others in leadership roles

Not Reporting on this Outcome Measure

Outcome #28

1. Outcome Measures

Demonstrate application of leadership skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	48

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #29

1. Outcome Measures

Demonstrate civic engagement

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #30

1. Outcome Measures

Strengthen human capacities, human capital, building partnerships

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	245

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The average U.S. farmer is 58 years old, and farming is the sixth most dangerous job in America. An estimated 5,700 farmers, farm family members, or farm workers in Maine have a chronic health condition or disability, such as post-traumatic stress disorder, traumatic brain injury, or aging-related issues, such as arthritis or hearing loss. In addition to farmers, fishermen, forest workers, and migrant workers face similar challenges for remaining successful in production agriculture.

What has been done
Maine AgrAbility helps Maine farmers, loggers and fishermen facing physical or cognitive challenges, to enhance their ability to farm and live independently, which improves their quality of life and economic sustainability. AgrAbility specialists assess issues and offer adaptive recommendations. They provide education about safe work methods and connect people with other resources through this nonprofit partnership between the UMaine Cooperative Extension, Goodwill Northern New England, and Alpha One.

Results
Since the project began in 2010, AgrAbility has provided technical information to 394 farmers and conducted on-site assessments for 91 agricultural workers. The diverse agricultural operations include dairy and livestock operations, Christmas tree farms, fruit orchards, agritourism, vegetable and maple syrup production, hay sales, managing woodlots and lobstering.
Clients reported increased knowledge of their conditions and increased accessibility for their daily work. They reported ways that the assessment and suggested changes helped them decrease physical pain, stress, and strain through modifications to equipment, the work or home environment, and farm operations or chores. One participant shared this success story about the recommendations made by Maine AgrAbility. "I am using the power assisted wheelbarrow to feed hay to my horses. The power assist allows me to easily move a load instead of having to go back

and forth to the hay pile 7 or more times each feeding. It makes life much easier and tasks are doable with it."

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #31

1. Outcome Measures

Improve knowledge of, or strategies and tools for, sustaining Maine's rural economies and communities

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
311	Animal Diseases

315	Animal Welfare/Well-Being and Protection
605	Natural Resource and Environmental Economics
607	Consumer Economics
609	Economic Theory and Methods

Outcome #32

1. Outcome Measures

Adoption of strategies/tools for sustaining Maine's rural economies and communities

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Coastal and marine resources are important to Maine's economy. The value of the goods and services generated from the state's coastal waters (e.g. commercial fishing, aquaculture, tourism, recreation activities and ecosystem services) depends on the quality of these natural resources and thereby management actions. These resources also play a critical role, economically and culturally, to numerous rural, coastal communities. Resource-dependent communities often lack alternate sources of income leaving them vulnerable to environmental change and resource management decisions (Hall-Arbor, 2001).

What has been done
An Experiment Station economist has been engaging with stakeholders (Maine Department of Marine Resources, Maine Department of Environmental Protection, and shellfishermen) to explore the behavior and adaptation strategies of clammers to environmental closures (from pollution or biotoxins) of harvest areas.

Results
This research found that over the nine-year sample period (2001-2009), temporary pollution closures contributed to an estimated loss of $3.6 million in forgone revenue (2014 dollars), approximately 27.4% of total revenue. Closures linked to combined sewer overflows from the Machias wastewater system produced the majority of these losses ($2.0 million) with the largest occurring during the peak clamming season (May-August). These results highlight the variability of the impacts of closures and the information burden for efficient management of shellfish areas

and coastal waters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #33

1. Outcome Measures

Enhance sustainability, diversity, and resiliency of Maine's rural economies and communities

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection
605	Natural Resource and Environmental Economics
607	Consumer Economics
609	Economic Theory and Methods

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Community Development - Maine communities are faced with complex issues and economic challenges. Local groups are engaged in change: resisting change, adapting to change, or creating change. Those who benefit from UMaine Extension's educational initiatives in community development learn how to be effectively engaged in their communities through volunteerism, public service, becoming involved in and improving their skills with public organizations, and group process skills. This contributes to more effective public organizations, and more effective use of limited public resources as trained citizens are increasingly involved in process and decision-making.
Economic Development - Those who benefit from UMaine Extension's educational initiatives in economic development learn how to effectively manage and sustain small and home-based businesses, household resources and community assets. This contributes to viable businesses, households, and communities that will benefit other community members by contributing to gainful employment, quality of place, and municipal tax revenues that support community services.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		15%	
112	Watershed Protection and Management	0%		11%	
123	Management and Sustainability of Forest Resources	0%		8%	
132	Weather and Climate	0%		13%	
135	Aquatic and Terrestrial Wildlife	0%		12%	
136	Conservation of Biological Diversity	0%		7%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		9%	
205	Plant Management Systems	0%		7%	
215	Biological Control of Pests Affecting Plants	0%		3%	
216	Integrated Pest Management Systems	0%		3%	
305	Animal Physiological Processes	0%		1%	
306	Environmental Stress in Animals	0%		3%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		8%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.4	0.0
Actual Paid	0.0	0.0	2.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	167131	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	404405	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	22929	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct scientific research. Publish peer-reviewed journal articles and other publications. Present findings at professional and public meetings and at other venues. Educate undergraduate and graduate students.

2. Brief description of the target audience

Maine natural-resource-based industries, Cooperative Extension staff, other scientists, state and federal policymakers, regulators, and legislators, classroom teachers

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	29	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- An Experiment Station researcher collaborated with the Gulf of Maine Research Institute's Vital Signs program to enhance inquiry based field learning for middle school science classes. Vital Signs partners Maine students with scientists and citizen scientists to investigate what impact invasive species are having on Maine?s iconic flora and fauna. A particular focus is how will climate change impact invasive and native species. Students and citizen scientist contribute valuable data to real environmental research. The researcher developed two Vital Signs missions focusing on the links between stream invertebrates and detritus breakdown, and the influence of climate change on the distribution of caddisflies in Maine.

Year	Actual
2017	0

Output #2

Output Measure

- An Experiment Station researcher developed a field experiment unit with the 7th grade class at Dedham Middle School measuring the contribution of stream macroinvertebrates to leaf decomposition. The researcher assisted by graduate students visited the school and assisted the Middle School students to deploy the leaf bags. The students collected the bags one month later, and visited the researcher?s teaching lab at UMaine to process the samples and discuss the results.

Year	Actual
2017	0

Output #3

Output Measure

- Perhaps the greatest pragmatic challenge for monitoring increases in the range of invasive species, reductions of range in indigenous species, or the success of stocking cultured fish, is simply our ability to efficiently detect and quantify aquatic species. Advances in sensitive DNA polymerase chain reaction (PCR) amplification technologies are emerging as tools to address these detection challenges by targeting the trace amounts of DNA, called environmental DNA (eDNA), shed by fish and other organisms in their aquatic environments. An Experiment Station researcher developed or refined eDNA assays (qPCR-based) for multiple indigenous and exotic fish species in Maine and validated them through lab and pilot field testing. This year the researcher and his team developed, tested and refined assays for Rainbow Smelt, Atlantic

Salmon, Arctic Charr and Brook Trout. For Rainbow Smelt, the researcher collaborated with Wells National Estuarine Reserve to test detection of Rainbow Smelt in two tributaries of the York River where netting surveys were also underway. For Atlantic Salmon, the research team conducted a caged fish trial in a stream where the species is naturally absent to evaluate the field sensitivity and quantitative capacity of the assay with numbers of fish ranging from 1-20 individuals and at distances up to a km from the cage. For Arctic Charr, a collaboration with the Maine Department of Inland Fisheries and Wildlife (MDIFW) and the Kennebec Valley Chapter of Trout Unlimited occurred to test eDNA detection in most of the state's remaining charr waters, and also tested for Rainbow Smelt presence given that illegal introductions of this species has resulted in catastrophic collapses of three Arctic Charr populations. Two of those populations underwent rotenone reclamation and the Experiment Station research team validated the success of those efforts in removing the invasive smelt. Finally, for Brook Trout, the researcher collaborated with MDIFW's trout stocking program to test the ability of eDNA to detect/quantify known changes in trout abundances.

Year	Actual
2017	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Develop new knowledge and technologies to address the effects of climate variability and change
2	Enhance adaptive capacity of production and natural systems to reduce exposure and vulnerability to climate change

Outcome #1

1. Outcome Measures

Develop new knowledge and technologies to address the effects of climate variability and change

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Forests provide many critical ecosystem services (ES), including production of fiber resources, carbon sequestration, climate change mitigation, protection of freshwater, and preservation of cultural values. In Maine, the economy depends heavily on its forest as it accounts for over 6% of the total GDP and has an estimated annual economic impact of $8 billion. In order to better assess Maine's current and future inventory and risks for FES, various stakeholders and policymakers would value an integrated assessment model to estimate the potential impacts of climate change and land use policy on Maine's FESs.

What has been done
A prototype of the Maine Integrated Forest Ecosystem Service (MIFES) has been developed.

Results
The model is currently functioning and capable of estimating trends in growing forest stocks, the provision of harvested biomass and industrial roundwood, and forest carbon sequestration in both standing forests and harvested wood products for 8 forest types in the state of Maine.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #2

1. Outcome Measures

Enhance adaptive capacity of production and natural systems to reduce exposure and vulnerability to climate change

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluations in the experiment station are currently conducted at the project and program levels. At the project level, all projects are reviewed by an internal research council and external peer reviewers when initiated and again at completion by the research council. During the research council final evaluation, the focus is on determining if terminating projects met their stated objectives, secured extramural funding, and produced peer-reviewed publications. As for other measures of successful research programs, research faculty in this program area published 29 peer-reviewed articles.

Researchers use a variety of methods to evaluate their own research projects including evaluations retrospectively, before-after, and during the life of the project; case studies; and comparisons between treatment/intervention and nontreatment/nonintervention.

At the program level, external NIFA review teams are asked to review the research programs of

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Sustainable Natural Resources

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		5%	
112	Watershed Protection and Management	0%		7%	
123	Management and Sustainability of Forest Resources	0%		14%	
135	Aquatic and Terrestrial Wildlife	0%		22%	
136	Conservation of Biological Diversity	0%		13%	
202	Plant Genetic Resources	0%		3%	
215	Biological Control of Pests Affecting Plants	0%		3%	
305	Animal Physiological Processes	0%		1%	
306	Environmental Stress in Animals	0%		1%	
311	Animal Diseases	0%		6%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%		3%	
601	Economics of Agricultural Production and Farm Management	0%		3%	
605	Natural Resource and Environmental Economics	0%		7%	
607	Consumer Economics	0%		2%	
608	Community Resource Planning and Development	0%		6%	
609	Economic Theory and Methods	0%		1%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		3%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890

Plan	0.0	0.0	10.8	0.0
Actual Paid	0.0	0.0	11.4	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	577219	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	1171689	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	514033	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct scientific research. Publish peer-reviewed journal articles and other publications. Present findings at professional and public meetings and at other venues. Educate undergraduate and graduate students.

2. Brief description of the target audience

Other scientists; teachers at all levels; directors of aquariums and museums, exhibit halls, etc.; endangered species biologists/managers; state and local policymakers; state regulatory agencies; environmental consultants; landowners

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year:	2017
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	86	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A website "Of Pools & People" was constructed (http://www.vernalpools.me/) to further vernal pool research and the understanding of the vital connections between landowner concerns, municipal planning, conservation activities, and the ecology of vernal pools. The Experiment Station research team maintains an active social media presence on Facebook, Twitter, and YouTube. For example, during the period of April 3, 2016 - April 3, 2017, material posted on the team's Facebook page reached 2,060 people. The Of Pools and People Facebook account currently has 203 subscribers (i.e., "likes") and the Twitter account has 83 subscribers (i.e., "followers").

Year	Actual
2017	0

Output #2

Output Measure

- An Experiment Station researcher developed a curriculum for a short course on stream restoration and design under a contract with the Maine Department of Transportation (DOT). The multi-day course, Maine Department of Transportation Stream Restoration and Culvert Design Workshop, was attended by 45 government staff and consulting engineers from the region.

Year	Actual
2017	0

Output #3

Output Measure

- An Experiment Station researcher co-chaired the International Conference and Workshop on Lobster Biology and Management (ICWL), Portland, Maine, June 4-9, 2017. Two-hundred fifty people attended from 14 countries. The event received excellent media coverage by print, TV, radio and on-line media. Conference proceedings will be published in the Bulletin of Marine

Science in 2018; there are some 60 prospective submissions. The ICWL happens somewhere in the world every 3-4 years. The 12th ICWL will be in Perth, Australia, in 2020.

Year	Actual
2017	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improve knowledge of, or strategies and tools for, sustaining Maine's natural resources
2	Enhance sustainability, diversity, and resiliency of Maine's natural resource-based industries
3	Improve health, distribution, and/or abundance of crucial plant and animal species

Outcome #1

1. Outcome Measures

Improve knowledge of, or strategies and tools for, sustaining Maine's natural resources

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Surface water runoff has implications for research and management efforts focused on land planning, storm water mitigation, erosion control, nonpoint source pollutant prediction, land-sea connections, climate change, ocean acidification and aquatic habitat. The organization and interpretation of Maine's physiography, the relation between physiography and drainage condition and understanding of the processes influencing those relations is essential to development of watershed management and sustainability plans.

What has been done
Completion of a cluster analysis that identifies nine statistically distinct watershed settings with varied patterns of surface flow generation and downstream movement. The outcome provides a basis to assess the vulnerability of Maine's landscape to flooding, erosion, and nonpoint source pollution by recognizing similar groupings of conditions linked to those problems. This new form of information can guide future assessments of locations most (and least) sensitive to human activities directly and indirectly affecting water resources. It can also serve as part of a strategy to monitor the effects of land use and climate changes over time. For example, surface water monitoring strategies in the state can be framed around the statistically-determined clusters, limiting the required number of observation sites from one for over one thousand small watersheds in the state to less than twenty representative watershed settings.

Results
The cluster analysis provides a basis for a cost efficient surface water and headwater observatory network. Knowledge derived from the evaluation of watershed metrics used in the cluster analysis can help guide the types of parameters necessary to track surface water trends linked to land use and climate changes in the region, and more broadly in deglaciated landscapes. The overlap of the reference watersheds established as part of this research with several of the identified clusters provides an opportunity to assemble detailed information relating watershed settings to

surface hydrology and hydraulics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #2

1. Outcome Measures

Enhance sustainability, diversity, and resiliency of Maine's natural resource-based industries

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
215	Biological Control of Pests Affecting Plants

306	Environmental Stress in Animals
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Improve health, distribution, and/or abundance of crucial plant and animal species

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
215	Biological Control of Pests Affecting Plants
306	Environmental Stress in Animals
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (new invasive species)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluations in the experiment station are currently conducted at the project and program levels. At the project level, all projects are reviewed by an internal research council and external peer reviewers when initiated and again at completion by the research council. During the research council final evaluation, the focus is on determining if terminating projects met their stated objectives, secured extramural funding, and produced peer-reviewed publications. As for other measures of successful research programs, research faculty in this program area published 86 peer-reviewed articles.

Researchers use a variety of methods to evaluate their own research projects including evaluations retrospectively, before-after, and during the life of the project; case studies; and comparisons between treatment/intervention and nontreatment/nonintervention.

At the program level, external NIFA review teams are asked to review the research programs of

Key Items of Evaluation

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.