

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

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I. Report Overview

1. Executive Summary

The Center for Agriculture, Food and the Environment at the University of Massachusetts Amherst integrates research and applied research with public education and outreach in agriculture, food systems, natural resources and human development at the University of Massachusetts Amherst. The Center is the contemporary standard-bearer of the university's land-grant origins and links the university to communities, citizens and businesses throughout the state. The Center is the organizational home of both UMass Extension and the Massachusetts Agricultural Experiment Station. The Center serves as a portal through which individuals, industries, and agencies connect with university scientists and educators.

The Massachusetts Agricultural Experiment Station is the principal agricultural research unit at the University. The experiment station supports the scientific research of nearly 100 faculty members located primarily within the College of Natural Sciences and several other colleges. The Experiment Station receives significant support through federally appropriated formula funds with competitive research grants from federal and state agencies and private sources serving as important additional sources of revenue.

The mission of UMass Extension is to improve the health, well-being and security of youth, families and communities; conserve and enhance natural resources; and strengthen agriculture and food systems. We fulfill that mission by utilizing the research and teaching capacity of the University of Massachusetts Amherst to generate and communicate knowledge while creating approaches, methods, and tools for solving problems. UMass Extension links the Massachusetts land grant university with a larger community of people in collaborative partnerships to address issues of fundamental importance to the people of Massachusetts, New England, and the nation. UMass Extension addresses public concerns of high priority for the Commonwealth. Part of the national Cooperative Extension System, UMass Extension conducts workshops, conferences, distance education, training events, consultations, and applied research. For reporting purposes, the research and extension programs sponsored by the Center for Agriculture Food and the Environment are organized in eight separate areas: Global Food Security; Climate Change; Sustainable Energy; Food Safety and Functionality; Childhood Obesity; Agricultural Economic Development; Youth Development; and Environmental Stewardship.

Food Security - Massachusetts is a leader in creating sustainable, local food production capacity. Expanding demand for direct sales, organic production, specialty crops, value-added products and community-supported farms reflect an interest and increasing commitment to local agriculture. At the same time, many residents of the state, especially those with low incomes, have difficulty taking advantage of fresh foods. The Center addresses food security in Massachusetts and the region through research and public education focusing on new production techniques and marketing strategies that protect natural resource systems while ensuring a healthy, fresh and stable supply of food and by providing research-based nutrition education in communities with higher food insecurity.

The primary long-term outcome for our programs focused food on Food Security is that food production and food systems in Massachusetts are increasingly diverse, environmentally sound and economically vibrant. In the past year, we have implemented programs designed to help our audiences develop knowledge and skills, and subsequently adopt practices that ensure the environmental sustainability and economic viability of food production and food systems in Massachusetts.

Climate Change - Massachusetts citizens must anticipate and prepare for a variety of new challenges associated with persistent changes in climate and weather. Cities and towns must plan for and protect

critical infrastructure that is threatened by increasingly extreme and unpredictable weather-related events. In addition, Massachusetts growers must meet the formidable challenges posed by the increasing demand for locally produced food against the backdrop of a changing climate. The Center conducts research and education to support ecologically restorative flood prevention and remediation, and to sustain a vital agricultural sector that recognizes the emerging benefits, threats and opportunities related to climate change.

The primary long-term outcome for our programs focused on Climate Change is that Massachusetts landscapes, farms and natural system are managed in ways that reduce or mitigate the effects or risks associated with future changes in climate or weather. In the past year, we have implemented programs designed to help our audiences develop knowledge and skills, and subsequently adopt practices that reduce or mitigate the effects or risks associated with future changes in climate or weather

Sustainable Energy - The supply and demand for energy has significant implications for the vitality and the sustainability of our regional economy. The cost of energy influences industrial practices, agricultural production, small business and individual consumers. The Center is an important resource for stimulating innovation in energy conservation and alternative and renewable energy sources. Research and education programs enable consumers to save money and make environmentally sound choices, while minimizing the financial vulnerability of businesses.

Many activities and initiative focused on sustainable energy have become consolidated within a new program known as the UMass Clean Energy Extension Program. The program is a collaboration between UMass Extension and the Massachusetts Department of Energy Resources. The purpose of the program is to provide a resource to reduce market barriers and accelerate the adoption of clean energy for Massachusetts cities and towns, businesses, institutions, farms, low income and multi-unit housing, and others. The program works closely with businesses to assist them in entering or diversify into clean energy markets. The program also supports and contributes to applied research activities that advance technical, economic, and policy solutions that support clean energy advancement in Massachusetts.

The primary long-term outcome for our programs focused on Sustainable Energy is that Massachusetts businesses, towns and citizens adopt practices that conserve energy and increasingly utilize alternative, environmentally-friendly and renewable sources of energy. In the past year, we have implemented programs designed to help our audiences develop knowledge and skill for practices that increase energy efficiency and for utilizing renewable energy sources. Our programs are also designed and delivered to assist our audiences to adopt practices that increase energy efficiency and the use of renewable energy sources.

Food Safety and Functionality - Food borne pathogens account for millions of illnesses and thousands of deaths in the United States each year. The Center helps growers and businesses meet established guidelines for workers and managers in food retail establishments, residential facilities, schools and child care settings. The Center also supports research on the molecular and structural properties of food and the development of ingredients that improve food texture, appearance, taste and healthfulness. Through research and education we are helping to discover the health-promoting properties of food components and identifying new technologies and practices that can detect pathogens and limit the incidence of food borne illness.

The primary long-term outcome for our programs focused on Food Safety is that Massachusetts is to ensure the safety of food grown, processed, prepared and consumed in Massachusetts and to reduce the incidence of food borne illness. In the past year, we have implemented programs designed to help participants increase knowledge and skill and to subsequently adopt practices to avoid food borne illness and control other food safety risks and hazard. Our primary audiences include food producers, food processors and consumers.

Childhood Obesity - While childhood obesity rates may finally be declining, obesity remains a critical problem nationally and in Massachusetts. Many of the long-term health problems typically associated with obesity in childhood are reversible but can also lead to obesity in adults. The Center conducts research and community outreach to inform policies and deliver programs that increase access to local produce, promote breast-feeding, educate families about healthy foods choices, and the importance of regular physical activity. Nutrition education programs are delivered to families with limited resources through a

statewide network of community collaborators, so that healthy habits are established during childhood, reducing the most harmful effects of obesity and leading to healthier and more productive lives. The primary long-term outcome for our programs focused on Childhood Obesity is to help youth and families in Massachusetts to establish healthy eating habits and physically active lifestyles. Many activities are delivered through two federally sponsored programs, Expanded Food and Nutrition Education Program (EFNEP) and Supplemental Nutritional Assistance Program (Snap Ed). Guidelines for these programs ensure that they reach youth and families from communities at increased risk for obesity and poor nutrition. In the past year, we have implemented programs designed to help participants increase knowledge and skill to make healthier food choices, to eat better and become more physically active.

Agricultural Economic Development - Agricultural businesses provide employment opportunities, income, products and services that support our local economies and meet the diverse needs of our citizens. The long-term vitality of this sector of our economy relies on an educated and competent workforce. The Center supports agricultural economic development through applied research and educational programs that help individuals operate businesses and manage landscapes in ways that are economically sound and environmentally sustainable.

The primary long-term outcome for our programs focused on Agricultural Economic Development is to create an educated and reliable workforce that can operate agricultural businesses and manage landscapes in Massachusetts in a manner that is both economically profitable and environmentally sustainable, leading to the long-term vitality of this sector of our economy. In the past year, we have implemented programs designed to help participants acquire knowledge and skill related to practices that increase economic viability and the environmental sustainability of agricultural businesses and for participants to incorporate these practices into their operations.

Youth Development - Massachusetts citizens are concerned with preparing youth for the challenges of today and into the future. Young people can only reach their full potential in environments that offer safety, caring adults, and authentic experiences. A statewide network of more than 1,000 4-H volunteers provide leadership training, life-skills development, recreation, and community service opportunities for youth during out of school time that are engaging and educational. Longstanding clubs and camps are complemented by innovative program that respond to a national 4-H mandate for educational enrichment in science and technology.

The primary long-term outcome for our programs focused on Youth Development is to ensure that diverse youth cultivate a set of skills and experiences that are critical for future success and active citizenship. This is achieved through the support and active participation of adult volunteers. In the past year, we have implemented programs designed to help youth become effective team members, communicators, and leaders. Over time, these skills will help participating youth to be successful academically, in the workplace and as active members of their community.

Environmental Stewardship - There is a critical need to better understand current threats to water resources, biodiversity and ecosystem integrity. Land use policies that recognize the vulnerability of natural resources as well as our reliance upon them are also essential. The Center plays a critical role in the development and deployment of innovative approaches and tools that are based on our evolving understanding of ecological and human systems. Scientific investigations are closely interwoven with educational resources that advance disciplinary knowledge, inform policy decisions and promote management practices that protect terrestrial, wetland, aquatic and coastal ecosystems.

The primary long-term outcome for our programs focused on Environmental Stewardship is to develop programs and disseminate resources that enable Massachusetts citizens to make informed decisions and take actions to preserve or enhance the quality of our natural resources and ecosystems. In the past year, we have implemented programs designed to help participants acquire knowledge and skill adopt practices to protect and enhance natural resources and ecosystems.

An overarching goal for our planned programs is effective integration of basic and applied scientific research with extension outreach, public engagement and education. There is a unique opportunity afforded by having both UMass Extension and the Massachusetts Agricultural Experiment Station situated within the same larger unit. We expect the integration of research to become a guiding principle of the Center for Agriculture, Food and the Environment. We do recognize, however, that there will remain work

best conducted as traditional, scientific research, and outreach education that will have value even without integration with research activities. Nonetheless, the integration of research and extension outreach, in which those aspects of work in a particular area are tightly interwoven, and in which those aspects mutually inform and enrich one another, is a strong model and overarching goal for future programing.

Regarding comments received in response to last year's annual report submission related to the allocation of effort to extension and research for each Planned Program: Consistent with the report guidance, the amount of effort (FTEs/SYs) expended entered for each planned program is that which is funded by formula funds (Hatch, Smith Lever). In most cases, the actual effort is significantly greater because in addition to any formula funds, effort is funded by other sources as well (state funds, external grants, gifts, etc...).

Regarding comments received in response to last year's annual report submission related to impact evaluation: UMass Extension is cognizant of the importance of evaluation for accountability, for continuous programmatic improvement and to assist NIFA in their advocacy efforts. Significant investment was made in resources and professional development related to routine and systematic evaluation approximately ten years ago, including the appointment of a Director of Evaluation. Since then, we have experienced a significant reduction in administrative positions and there is currently no longer a Director of Evaluation, nor any administrator with significant responsibilities related to leadership for evaluation. There are currently three full time professionals serving as the administrators for all of UMass Extension and the MA Agricultural Experiment Station charged with managing a statewide program of well over 100 FTEs/SYs. Our professional program staff capacity has also been decreasing steadily over the past 10 years while the needs among our stakeholders are increasing. As a result, it has been difficult to sustain routine program evaluation as an organizational priority. Program evaluation does occur sporadically and most often when core programs are supplemented by other funds (not capacity funds) that specifically require it (e.g Snap Ed). The feedback we receive from the Annual Report review serves as a reminder for the need to conduct evaluation and we will continue to seek ways to elevate the importance of it within our organization.

Retirements among key senior staff prevented us from reporting evaluation results we are typically able to obtain for the Agricultural Economic Development program. We expect some evaluation will be conducted and reported for the program in 2018.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	90.0	0.0	30.0	0.0
Actual	85.9	0.0	21.1	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

2. Brief Explanation

Massachusetts Agricultural Experiment Station

Proposals for funded research projects proceed through different levels of review. In some cases, prospective faculty investigators collaborate with academic department chairs to propose project ideas. Brief descriptions are sent to the Associate Director of the Agricultural Experiment Station who reviews the basic concept to ensure that it is consistent with the priorities and goals of the Center and NIFA. Prospective investigators then develop a detailed research proposal that is reviewed and approved by the faculty member's academic department chair and three external (to UMass) disciplinary peers who comment on the scientific merit. Any necessary revisions are incorporated and final approval of projects is made by the Director of the Agricultural Experiment Station. In 2016, specific guidance was issued to improve the identification of external reviewers as follows. We expect additional changes may be made over the next several years with regard to the review of proposals and we will communicate those changes through this Annual Report.

To help ensure unbiased, objective reviews, individuals submitting proposals should NOT identify reviewers in the following categories:

- Anyone you have published with in the last 3 years
- Anyone you collaborated with on a competitive grant in the last 3 years
- Anyone for whom you recently served as a supervisor
- Anyone who recently served as your supervisor
- Your graduate program chair/advisor
- A person for whom you served as their graduate program chair/advisor
- A family member

The Director of the Agricultural Experiment Station also solicits research initiatives in specific disciplinary areas or as supplements to existing projects. A primary example is our Summer Scholars internship program that allows enrolled undergraduate student to participate on an active Experiment Station project. This is a competitive opportunity for which faculty submit proposals that are reviewed by an internal committee composed of faculty and professional staff. Successful faculty then select students to participate. The Assistant Director ensures that changes recommended by reviewers are incorporated into proposals, that there is fidelity to the work as it is described in the proposal and that all funded projects conform to NIFA standards for annual reporting.

UMass Extension

University of Massachusetts Extension continues its long-standing agreement with Extension in Maine, Vermont, and New Hampshire to utilize a four-state, web-based planning and reporting system. Extension in Colorado and Delaware are also users of the on-line system. Through system allows program staff and administrators to access the content of plans in all six states at the organizational level, the team level and for individuals. Extension administrators are able to use the system to review work that is occurring across the region. Regular telephone meetings with planning and reporting leaders offer the opportunity for each of the states to provide feedback on specific programs or on the statewide goals and initiatives. The process of developing this shared system has also resulted in discussions around regional programs, opportunities for multistate work, sharing staff resources and a much better understanding of how each of our unique programs are similar to, and different from, others programs in New England. The four original states have agreed to provide periodic formal and informal merit review and feedback for each state as a component of our partnership. The system provides access to each state plan of work as well as team/group plans, allowing for easy sharing of ideas and opportunities for further collaboration.

The Massachusetts legislature established a Board of Public Overseers to provide advice and oversight to UMass Extension. This 15-member board, comprised of representatives of constituent organizations,

meets quarterly. Annual review of budgets, activities, outcomes and goals is a major function of this board. The Board is composed of individuals from the following organizations:

- Massachusetts Farm Bureau Federation
- Massachusetts Arborist Association
- Massachusetts Audubon Society
- Massachusetts Forestry Association
- Massachusetts 4-H Foundation
- Massachusetts Nutrition Board
- Massachusetts Commissioner of Agricultural Resources
- University of Massachusetts President's Office
- University of Massachusetts Amherst Chancellor's Office
- UMass Extension Director's Office (ex-officio)

During the 2017 federal year, the 4-H State Advisory Council was decommissioned and therefore no longer has a seat on The Board. Existing members retired and new appointments to the Board were made for the Massachusetts Forestry Association and Massachusetts Audubon.

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

Brief explanation.

The Center for Agriculture, Food and the Environment routinely solicits input from internal and external stakeholders to identify organizational priorities and help us to structure our organization in ways that better serve constituents. Our plan has different components that are designed to obtain feedback at both broad organizational and more specific programmatic levels and will continue to be implemented over a period of several years.

We continue to rely on data obtained from a February 2016 web-based survey we conducted with internal and external stakeholders. The survey obtained information on stakeholder opinions and perceptions of the most significant public issues and concerns in seven areas that reflect the priorities and expertise within the Center. We will also ask respondents to suggest ways the Center could best address the identified issues and concerns. The seven assessed were:

- Agriculture and Food Systems;
- Commercial Horticulture;
- Water Resources;
- Natural Resource Management;
- Energy Use;
- Youth Development;
- Nutrition

These seven areas reflect the ways that center's programs are organized internally. This is distinct from, though there is significant conceptual and disciplinary overlap, the eight planned programs that form the foundation of this report and which more strongly reflect the ways we present information about our organization to external audiences. Ideally, we would seek to bring increased

consistency to these internal and external organizational frameworks, but with a host of more pressing needs, this has not yet been identified as an organizational priority.

In 2017, information obtained from the web-survey was used primarily to guide internal strategic discussions among our Agriculture Extension team whose programmatic focus is on both food and on commercial horticulture. During the spring of 2017, a committee was formed to guide these efforts. After significant deliberation, the committee designed and implemented a survey specifically for Agricultural Extension professional staff, which was followed by a facilitated meeting with a private consultant. The process was necessarily framed within boarder organizational challenges of diminishing internal resources in a time of increasing external needs. The survey obtained information on perceived stakeholder needs and priorities and the most appropriate roles and functions for extension educators. The facilitated discussion allowed the group to consider the survey results as well as hiring priorities, engaging stakeholders, and equity and fairness among staff. An overarching goal for the process is to envision ways the program should operate going forward. The process is ongoing and will encompass additional faculty and staff members associated with our center in 2018 and beyond.

Units within our center continue to obtain specific programmatic input from stakeholders in various additional ways Programs and teams that engaged in focused efforts to obtain feedback from stakeholders include: Turf Program, Cranberry Station, Fruit and Vegetable Production, Greenhouse Management, Landscape & Nursery, Natural Resources Conservation, Massachusetts 4-H Livestock and Equine.

Finally, UMass Extension continues its close association with an Extension Board of Public Overseers that was created in 1997 to give stakeholders in UMass Extension areas a formal advisory role. As directed by the enabling legislation. UMass Extension meets with the board several times per year and membership on the board is specifically defined in the enabling legislation and appointed by the governor. In the past year, individuals serving on the Extension Board of Public Overseers represented the following agencies, organizations and groups: Massachusetts Farm Bureau; MA 4-H Foundation; UMass Donahue Institute; Massachusetts Audubon Society; Massachusetts Arborists Association; Massachusetts State Department of Agricultural Resources; Massachusetts Forest Land Owner Association; Massachusetts Nutrition Board. The Massachusetts State 4-H Advisory Council disbanded during 2017 and is therefore no longer represented on the council.

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
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Approximately six hundred fifty individuals were identified as potential respondents for the 2016 stakeholder survey. The survey was an opportunity to obtain feedback from individuals with some pre-existing connection to the Center, as well as those whose knowledge and connection to our work is less well established. In contrast, we also continue to gather specific programmatic feedback through our formal advisory bodies, and less formally through interactions with our many collaborators and participant groups. These groups are composed primarily of existing stakeholders

with whom we have long-standing or and well-established relationships. These individuals and groups already possess clear knowledge and understanding of our organization and programs and frequently have expectations that are more concrete. A follow up, internal survey was conducted in 2017 with approximately 25 professional educators from our Agriculture Extension team whose programmatic focus includes both food and commercial horticulture. Respondents to the large stakeholder survey were identified through a review of contact lists maintained by the Center communications office. The list of survey respondents includes approximately 450 internal (UMass campus-based) stakeholders and approximately 200 external stakeholders. A more specific breakdown of the identified respondents is as follow:

- (38) UMass Dean, Department Head or Administrator
- (302) Center Staff and Aligned Faculty
- (119) Other UMass Staff and Faculty
- (203) External Stakeholder

Information obtained from the survey continues to guide a strategic planning process for our organization. The initial focus has been on the Food and Agriculture Extension programs. That effort is facilitated by the Assistant Director of the Center for Agriculture, Food and the Environment who, along with the Food and Agriculture Program Leader convened a leadership group selected to represent individuals from different program areas as well as a balance of both long-term and newer professional staff.

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
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

The web-based stakeholder survey, internal strategic planning efforts, a recent survey and facilitated discussion among our extension professional staff are all mechanisms for engaging stakeholders both internally and externally. Additional formal opportunities to obtain feedback occur when UMass Extension convenes the Extension Board of Public Overseers. Our interactions with the Board, while they include programmatic presentations and organizational updates, are designed largely as opportunities for listening to our stakeholder representatives who provide feedback on budgets, activities, outcomes and goals, and future directions. Significant input is also routinely collected at the level of individual projects and specific programs. These include formal opportunities for collecting feedback on specific programs through focus groups, interviews, stakeholder meetings, written or web-based surveys as well as many informal opportunities that transpire during the course of regular meetings, conferences events and presentations.

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 Action Plans

Brief explanation.

The input we obtain from stakeholders is considered in a variety of ways. Our current strategy is to continue to use results obtained from our 2106 organizational stakeholder survey to inform subsequent stakeholder engagement efforts at various levels and to inform strategic planning for our organization more generally. An overarching theme for these discussions has been, and will continue to be, how to use limited resources to most effectively address our mission and meet our programmatic goals. It is in this context that the Extension Agriculture and Commercial Horticulture Programs are working to identify strategies and plan ways to sustain and improve organizational functions. A major topic identified for these discussions involves engaging our stakeholders to understand their evolving needs and maintain their support. Some questions identified for further discussion and planning are:

- How do we best engage our existing stakeholders while continuing to engage new stakeholders, partners and collaborators?
- How can we best communicate the value and impacts of our work?
- How can staff place appropriate limits on the range of activities areas they work in?

These questions will continue to be explored, in the context of results obtained from our stakeholder survey and in future strategic conversations among different units in our organization. We continue to use less formal methods to consider stakeholder input and better serve our external constituents. The input we receive from our Extension Board of Public Overseers is typically used to inform broad organizational goals, programming priorities and advocacy strategies. More specific programmatic input we receive is typically directed towards helping us to refine existing programs and identify topics for future efforts that better serve our audiences and constituents. This input is combined with internal feedback we gather from staff, program leaders, department heads and aligned faculty. Center administrators meet two times a month and a major focus of these meetings is to consider this input in ways that allow us to effectively integrate research and applied research with public education, outreach and extension.

Brief Explanation of what you learned from your Stakeholders

A primary theme that emerged from our internal stakeholder deliberations in the past year was the need to reconsider and potentially reorganize how we operate as an organization. This theme was in direct response to data obtained from external stakeholders, which point to increasing expectations and needs from our external audiences in the context of decreasing internal programmatic resources.

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	2693803	0	2486927	0
Actual Matching	2784874	0	2864709	0
Actual All Other	6440017	0	4869076	0
Total Actual Expended	11918694	0	10220712	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

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Climate Change
3	Sustainable Energy
4	Food Safety and Functionality
5	Childhood Obesity
6	Economic Development
7	Youth Development
8	Environmental Stewardship
9	Administration - Massachusetts Center for Agriculture, Food and the Environment

V(A). Planned Program (Summary)**Program # 1****1. Name of the Planned Program**

Global Food Security and Hunger

 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	13%		7%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		17%	
202	Plant Genetic Resources	0%		2%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		8%	
204	Plant Product Quality and Utility (Preharvest)	5%		0%	
205	Plant Management Systems	15%		4%	
211	Insects, Mites, and Other Arthropods Affecting Plants	14%		6%	
212	Pathogens and Nematodes Affecting Plants	16%		2%	
216	Integrated Pest Management Systems	28%		0%	
301	Reproductive Performance of Animals	0%		23%	
304	Animal Genome	0%		4%	
307	Animal Management Systems	4%		0%	
311	Animal Diseases	0%		8%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		8%	
603	Market Economics	0%		1%	
604	Marketing and Distribution Practices	5%		0%	
701	Nutrient Composition of Food	0%		8%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		2%	
	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	3.0	0.0	14.7	0.0
Actual Paid	2.5	0.0	9.7	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
366613	0	982125	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
41321	0	1264265	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
401495	0	2275224	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Demonstrations
- Facilitated Group Meetings and Conferences
- Grant Submission or Other Funding Proposal
- Individual Consultations and Site Visits
- Printed Material (newsletter, factsheet, field manual)
- Published Article, Book or Chapter (Academic)
- Research Project (Applied Research)
- Research Grant or Policy Report
- Single day workshop, presentation or event
- Student Supervision/Support/Advising (Graduate)
- Websites or Other Electronic Delivery
- Workshop series or educational course
- Displays and Exhibit

We also wish to highlight the following multistate and integrated Extension activities:

The UMass Extension Sustainable Tree Fruit Production and Marketing Project partners across the region to engage faculty and staff from other states in the planning and implementation of the New England Vegetable & Berry Growers' Association meetings, New England Vegetable & Fruit Conference, updating and distributing the New England Small Fruit Management Guide, New England Tree Fruit Guide and the dissemination of various newsletters targeting tree fruit, berry and grape growers throughout New England. Associated efforts in which research and extension activities are integrated are regional working groups (e.g., Spotted Wing Drosophila and Brown Marmorated Stink Bug), rootstock research and outreach; a multi-state evaluation of wine grape cultivars and clones; apple variety evaluation and demonstration; and disease management in northeastern apples using risk forecasts and cultural controls. Throughout New England, the Extension Sustainable Vegetable Production is assisting new farmers to carry on the knowledge and culture of farming. Key initiatives that engage faculty and staff from other

states include the development and dissemination of the New England Vegetable Management Guide; planning the New England Vegetable and Fruit Conference; hosting multistate workshops and preparing pest alerts for the New England Pest Scouting Network. Integrated research and extension efforts for the year focused on soil health, food safety, organic farming, and integrated pest management.

It should be noted that current Extension programming in Sustainable Vegetable Production would be enhanced significantly by investments in infrastructure that would extend our ability to grow vegetables year round.

2. Brief description of the target audience

A primary audience for this plan are Massachusetts growers. There are nearly 8,000 farms in Massachusetts spread over more than half a million acres and producing nearly half a billion dollars annually in agricultural products. This includes established producers as well as new, immigrant, part-time, conventional and organic growers. Other audiences include food production-related businesses, government agencies, non-profit and community-based organizations, including food banks and pantries that serve low-income families. The broader scientific community involved in basic and applied research related to all aspects of food production is another key audience.

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	26983	248434	61453	27178

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	2	57	59

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Demonstrations

Year	Actual
2017	0

Output #2

Output Measure

- Facilitated Group Meetings and Conferences
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Individual Consultations and Site Visits
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Printed Materials

Year	Actual
2017	39

Output #5

Output Measure

- Single day workshop, presentation or event

Year	Actual
2017	31

Output #6

Output Measure

- Websites or other computer-based delivery

Year	Actual
2017	44

Output #7

Output Measure

- Workshop series or educational course

Year	Actual
2017	2

Output #8

Output Measure

- Peer review publications
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Applied Research Projects
Not reporting on this Output for this Annual Report

Output #10

Output Measure

- Research, Grant or Policy Report
Not reporting on this Output for this Annual Report

Output #11

Output Measure

- Survey, Needs Assessment or Other Data Collection
Not reporting on this Output for this Annual Report

Output #12

Output Measure

- Published News, Professional or Trade Article

Year	Actual
2017	0

Output #13

Output Measure

- Diagnostic Services

Year	Actual
2017	1

Output #14

Output Measure

- Grant Submission or Other Funding Proposal

Year	Actual
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2017 8

Output #15

Output Measure

- Displays and Exhibits

Year	Actual
2017	17

Output #16

Output Measure

- Published Article, Book or Chapter (Academic)

Year	Actual
2017	8

Output #17

Output Measure

- Student supervision, Support or Advising (Graduate)

Year	Actual
2017	7

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants acquire knowledge and skills for practices that ensure economically viable food production.
2	Participants adopt practices that ensure economically viable food production
3	Participants acquire knowledge and skills for practices that ensure the environmentally sustainable food production
4	Participants adopt practices that ensure environmentally sustainable food production
5	Creation and synthesis of knowledge related to Global Food Security and Hunger
6	Food production enterprises in Massachusetts are more robust, diverse and economically viable
7	Participants acquire knowledge and skill for environmentally sustainable practices for soil fertility and nutrient management
8	Participants adopt environmentally sustainable practices for soil fertility and nutrient management
9	Participants adopt practices that protect and enhance natural resources and ecosystems

Outcome #1

1. Outcome Measures

Participants acquire knowledge and skills for practices that ensure economically viable food production.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	247

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cranberry Growers in Massachusetts struggle to remain economically competitive and environmentally sustainable. The additional pressure of marketing fruit for export (foreign) markets that mandate restrictive thresholds for pesticide residues present yet another challenge. Growers must understand the biology of cranberry pests to properly utilize new management tactics. Additionally, they must contend with increasing urban pressure on the farm's margin as many parties compete for resources.

What has been done

We published 5 issues of the Cranberry Station newsletter. Maintained the UMass Cranberry Web sit. We concluded our research on the use and implementation of tile drains for improved water management on cranberry farms and published a fact sheet and a Best Management Practices related to that work. We published fact sheets on pollinator biology and habitat enhancement. The impact of old and new chemistries on bee activity were monitored. Our diagnostic lab processed 50 disease samples. More than 30 grower site visits were made related to disease issues.

Results

Growers reported increased knowledge and skills in the following areas: changing patterns in weed management, herbicide use, frost and sun scald, water treatments with alum, nutrient management, fruit rot management, scale and cranberry fruit-worm management, native bee conservation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)

503	Quality Maintenance in Storing and Marketing Food Products
604	Marketing and Distribution Practices
701	Nutrient Composition of Food

Outcome #2

1. Outcome Measures

Participants adopt practices that ensure economically viable food production

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1012

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
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
503	Quality Maintenance in Storing and Marketing Food Products
603	Market Economics
604	Marketing and Distribution Practices
701	Nutrient Composition of Food

Outcome #3

1. Outcome Measures

Participants acquire knowledge and skills for practices that ensure the environmentally sustainable food production

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	640

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fruit farms and vineyards provide open space and scenic vistas that enhance the quality of life in Massachusetts. The lands surrounding agricultural production provide buffer zones for native species of plants and animals and corridors for their movement or expansion. To remain a vital part of the Massachusetts economy, both new and established growers must learn to produce crops sustainably and to adapt production systems to market opportunities.

What has been done

The fruit team designed and delivered activities that included: Printed materials, demonstration projects, websites, workshops on-farm meetings, phone and email consultations, presentations at professional conferences and meetings and site visits.

Results

Participants indicated increased adoption of practices that help them grow fruit crops in environmentally sustainable ways.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

Participants adopt practices that ensure environmentally sustainable food production

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	271

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
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #5

1. Outcome Measures

Creation and synthesis of knowledge related to Global Food Security and Hunger

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Food production enterprises in Massachusetts are more robust, diverse and economically viable

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Participants acquire knowledge and skill for environmentally sustainable practices for soil fertility and nutrient management

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1501

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
204	Plant Product Quality and Utility (Preharvest)

Outcome #8

1. Outcome Measures

Participants adopt environmentally sustainable practices for soil fertility and nutrient management

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	86

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable farming systems should be based on natural soil fertility and minimum off-farm inputs. The key to natural soil fertility is providing ample foods for soil micro organisms through increasing soil organic matter. Management of all natural nutrients sources including animal manure and cover crops within the constraints of the production system is fundamental to both economic viability and environmental quality. Poor management of plant nutrients can lead to economic losses and environmental degradation of soil, air, and water quality.

What has been done

We have introduced an applied method to integrate winter grain cover crops which not only increases resiliency and sustainability of dairy operation but also by producing more quality forage, the viability of dairy farms and other livestock operations will be improved. Our research project also introduced new crops and cover crops to the region thus farmers have more crop choices to select from that fits better with their rotation system.

Results

We were successful in promoting transitioning from conventional tillage system to no-till systems that greatly improves soil health and natural fertility.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
204	Plant Product Quality and Utility (Preharvest)

205 Plant Management Systems

Outcome #9

1. Outcome Measures

Participants adopt practices that protect and enhance natural resources and ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	230

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
216	Integrated Pest Management Systems

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

In 2017, our vegetable extension team made 130 visits to over 30 farms representing over 1,000 acres. With these farmers, the team developed 70 integrated crop and pest management goals that lead to 492 specific recommendations to address these goals through biweekly farm visits, scouting and technical assistance. Of the recommended we made, 76% were adopted by growers; another 11% were adopted with minor modification.

Based on preliminary data, our fruit extension team estimates that in 2017, 800 participants increased their adoption of practices that helped them grow fruit crops in a more profitable or sustainable way as a result of engagement with program activities.

Key Items of Evaluation

Of the nearly 500 pest management recommendations we made for 30 farms, 76% were adopted by growers

Eight hundred fruit growers increased their adoption of practices that helped them grow fruit crops in a more profitable or sustainable way as a result of engagement with program activities.

V(A). Planned Program (Summary)

Program # 2

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
111	Conservation and Efficient Use of Water	10%		22%	
112	Watershed Protection and Management	40%		20%	
131	Alternative Uses of Land	10%		0%	
132	Weather and Climate	40%		0%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		58%	
	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	1.4	0.0	0.7	0.0
Actual Paid	0.0	0.0	0.2	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	14795	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
129046	0	32134	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	40085	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Analytic Tools and Techniques
- Facilitated Group Meetings and Conferences
- Printed Material (newsletter, factsheet, field manual)
- Published Article, Book or Chapter (Academic)
- Research, Grant, or Policy Report
- Single day workshop, presentation or event
- Websites or Other Electronic Delivery
- Workshop series or educational course

We also wish to highlight the following multistate and integrated Extension activities:

RiverSmart Communities is an integrated research and extension project to study and disseminate flood mitigation and protection options that work with, rather than against, natural fluvial and geomorphological processes. Scientific investigations link fluvial geomorphology to New England-specific climate, landscape, ecology, population, and infrastructure to develop, codify and evaluate best management practices for flood prevention and post-flood restoration. We have also worked to uncover challenges and constraints caused by distinct jurisdictional and institutional fragmentation, highlighting successful strategies for overcoming these.

2. Brief description of the target audience

Our extension work synthesizes much-needed scientific and institutional knowledge into a series of products disseminated to towns, government officials, landowners, businesses, environmental organizations and road work crews.

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	229	102	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	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Facilitated Group Meetings and Conferences
Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Printed Materials
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Single day workshop, presentation or event
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Websites or Other Computer-based Delivery

Year	Actual
2017	2

Output #5

Output Measure

- Peer review publications
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Analytic Tools and Techniques

Year	Actual
2017	3

Output #7

Output Measure

- Workshop series or educational course
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Research, Grant, or Policy Report
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Published Article, Book or Chapter (Academic)

Year	Actual
2017	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants acquire knowledge and skill to reduce or mitigate the effects or risks associated with future changes in climate or weather
2	Participants implement practices to reduce or mitigate the effects or risks associated with future changes in climate or weather
3	Creation and synthesis of knowledge related to future changes in climate or weather
4	Massachusetts Ecosystems are managed in ways that reduce or mitigate the effects or risks associated with future changes in climate or weather

Outcome #1

1. Outcome Measures

Participants acquire knowledge and skill to reduce or mitigate the effects or risks associated with future changes in climate or weather

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Participants implement practices to reduce or mitigate the effects or risks associated with future changes in climate or weather

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Creation and synthesis of knowledge related to future changes in climate or weather

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Massachusetts Ecosystems are managed in ways that reduce or mitigate the effects or risks associated with future changes in climate or weather

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

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
131	Alternative Uses of Land	0%		15%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		23%	
402	Engineering Systems and Equipment	50%		10%	
403	Waste Disposal, Recycling, and Reuse	0%		18%	
511	New and Improved Non-Food Products and Processes	0%		24%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	50%		10%	
	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	0.3	0.0	1.3	0.0
Actual Paid	0.0	0.0	0.8	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
707	0	166774	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
49275	0	121148	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
324207	0	229304	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Committee or Board Service
- Diagnostic Services
- Facilitated Group Meetings and Conferences
- Grant Submission or Other Funding Proposal
- Individual Consultations and Site Visits
- Research Project (Applied Research)
- Websites or Other Electronic Delivery

We also wish to highlight the following integrated Extension activities:

UMass Clean Energy Extension is committed to expanding the public knowledge-base that supports the advancement and adoption of energy efficiency and renewable energy in Massachusetts and society at-large. We are actively engaged in fostering applied clean energy research and development activities in three key areas:

- UMass Faculty Seed Grants - UMass Clean Energy Extension provides seed grants to UMass faculty across all campuses through a periodic Calls for Proposals. We seek faculty collaborators on research topics that are important and timely for clean energy market and policy support, and are open to suggestions for topics from faculty.
- University Research Partnerships - UMass Clean Energy Extension partners with university researchers to collaborate on external research proposals and activities. Working across University disciplines of engineering, policy, economic development, and entrepreneurship, we are able to draw partners from programs throughout the UMass system to meet research, development, and commercialization needs and opportunities.
- Industry Research Partnerships- UMass Clean Energy Extension is developing opportunities to foster clean energy industry partnerships, opportunities for applied research, demonstration or pilot projects, student internships and field research. We welcome industry research inquiries and ideas that have the potential to benefit the Massachusetts business sector, the clean energy market, and the Commonwealth as a whole.

2. Brief description of the target audience

There are 351 municipalities (towns and cities) in Massachusetts. An important audience for this program are the municipal officials in these cities and towns. We work primarily with those municipalities who are seeking to better understand, describe, and benefit from their clean energy options and opportunities, and access potential funding sources and programs that can help get clean energy projects designed and

implemented. Additional audiences include growers, agricultural businesses, real estate developers, building managers, public utilities, homeowners, institutional leaders and decision-makers.

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	914	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	10	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Applied Research Projects

Year	Actual
2017	0

Output #2

Output Measure

- Analytic Tools and Techniques

Year	Actual
2017	1

Output #3

Output Measure

- Diagnostic Services

Year	Actual
2017	0

Output #4

Output Measure

- Grant Submission or Other Funding Proposal

Year	Actual
2017	1

Output #5

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2017	68

Output #6

Output Measure

- Academic Article, Book or Chapter

Year	Actual
2017	12

Output #7

Output Measure

- Committee or Board Service

Year	Actual
2017	0

Output #8

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2017	26

Output #9

Output Measure

- Workshop Series or educational course

Year	Actual
2017	5

Output #10

Output Measure

- Single day workshop, presentation or event

Year	Actual
2017	3

Output #11

Output Measure

- Theses/Dissertations

Year	Actual
2017	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Creation and synthesis of knowledge related to environmentally sustainable energy resources
2	Target audiences adopt practices that increase energy efficiency
3	Target audiences increase knowledge and skill for practices that increase energy efficiency
4	Target audiences increase use of energy from renewable sources
5	Target audiences increase knowledge and skill for utilizing energy from renewable sources

Outcome #1

1. Outcome Measures

Creation and synthesis of knowledge related to environmentally sustainable energy 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)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #2

1. Outcome Measures

Target audiences adopt practices that increase energy efficiency

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The transition to clean energy is critical for Massachusetts to meet its greenhouse gas reduction commitments and provides an opportunity to foster new economic development in the Commonwealth. The UMass Clean Energy Extension provides a resource dedicated to reducing market barriers and accelerating the adoption of clean energy for Massachusetts cities, towns and businesses

What has been done

We provided direct assistance to MA municipalities in assessing and reporting on their energy use and targeting specific buildings for energy efficiency measures and opportunities for renewable energy installations. We worked with business and community groups across clean energy technologies ? hydropower, energy storage, microgrids, air source heat pumps, combined heat and power, modern wood heating. We have provided technical assistance, connections with industry, and review of state policies and grant programs.

Results

Municipal officials from target communities submitted applications to the state's Green Communities Program which requires them to manage their energy accounts, commits them to 20% energy reduction plans over 5 years, and provides state support.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #3

1. Outcome Measures

Target audiences increase knowledge and skill for practices that increase energy efficiency

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The transition to clean energy is critical for Massachusetts to meet its greenhouse gas reduction commitments and provides an opportunity to foster new economic development in the Commonwealth. The UMass Clean Energy Extension provides a resource dedicated to reducing market barriers and accelerating the adoption of clean energy for Massachusetts cities, towns and businesses

What has been done

We provided direct assistance to MA municipalities in assessing and reporting on their energy use and targeting specific buildings for energy efficiency measures and opportunities for renewable energy installations. We worked with business and community groups across clean energy technologies, hydropower, energy storage, microgrids, air source heat pumps, combined heat and power, modern wood heating. We have provided technical assistance, connections with industry, and review of state policies and grant programs.

Results

Target audience increased knowledge of state energy incentives and eligibility and development steps

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #4

1. Outcome Measures

Target audiences increase use of energy from renewable sources

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #5

1. Outcome Measures

Target audiences increase knowledge and skill for utilizing energy from renewable sources

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	140

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food Safety and Functionality

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
501	New and Improved Food Processing Technologies	20%		10%	
502	New and Improved Food Products	0%		29%	
511	New and Improved Non-Food Products and Processes	0%		3%	
702	Requirements and Function of Nutrients and Other Food Components	0%		31%	
703	Nutrition Education and Behavior	0%		2%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	35%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	45%		15%	
	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	0.8	0.0	6.0	0.0
Actual Paid	0.2	0.0	3.7	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
360	0	236367	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
92172	0	506314	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
8974	0	795610	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Workshop series or educational course
- Websites or Other Computer-based delivery
- Peer review publications
- Analytic Tools and Techniques
- Grant Submission or Other Funding Proposal
- Individual Consultations and Site Visits
- Printed Materials
- Published News, Professional or Trade Article
- Single day Workshop, Presentation or Event

We also wish to highlight the following integrated Extension activities:

The Food Safety Extension program focuses on applied research and food safety education to support the food industry and a safe and sustainable food system. The program conducts and supports research to help businesses address technical challenges and create innovative products and processes from farm to fork. Our group also identifies public needs, conducts applied research and educational programming and offers other outreach opportunities that address the food safety needs of individuals and groups through short courses, on-line training and other outreach venues.

2. Brief description of the target audience

- Food growers/producers
- Food Processors
- Food Retailers
- Food Service Managers
- Residential care facility staff
- School cafeteria workers
- General public
- Farmers Markets operators, vendors and clients

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	523	23	15	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	51	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshop series or educational course

Year	Actual
2017	6

Output #2

Output Measure

- Websites or Other Computer-based delivery
- Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Peer review publications

Year	Actual
2017	51

Output #4

Output Measure

- Analytic Tools and Techniques

Year	Actual
2017	10

Output #5

Output Measure

- Grant Submission or Other Funding Proposal

Year	Actual
2017	0

Output #6

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2017	35

Output #7

Output Measure

- Printed Materials

Year	Actual
2017	0

Output #8

Output Measure

- Published News, Professional or Trade Article

Year	Actual
2017	0

Output #9

Output Measure

- Single day Workshop, Presentation or Event

Year	Actual
2017	10

Output #10

Output Measure

- Demonstrations

Year	Actual
2017	2

Output #11

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2017	5

Output #12

Output Measure

- Curricula/Instructional Materials

Year	Actual
2017	13

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Creation and synthesis of knowledge related to the safety, and the functional and bioactive properties of food.
2	Participants acquire knowledge and skill to avoid food borne illness and control other food safety risks and hazards
3	Participants adopt practices to avoid food borne illness and control other food safety risks and hazards
4	Food industry professionals acquire skills and knowledge for making safe decisions regarding their food products (Learning)
5	Food processors and producers acquire the knowledge, skills and tools to create food safety management plans (HACCP, PC, PSA)
6	Participants implement practices that ensure the safe and healthy production of value-added products from specialty crops
7	Preventive Control participants create food safety risk assessment and support food safety management plans.

Outcome #1

1. Outcome Measures

Creation and synthesis of knowledge related to the safety, and the functional and bioactive properties of food.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Participants acquire knowledge and skill to avoid food borne illness and control other food safety risks and hazards

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Participants adopt practices to avoid food borne illness and control other food safety risks and hazards

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Food industry professionals acquire skills and knowledge for making safe decisions regarding their food products (Learning)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food borne pathogens account for millions of illnesses and thousands of deaths in the United States each year. Growers and businesses need assistance in meeting established guidelines for workers and managers in food retail establishments, residential facilities, schools and childcare settings. Research and education can serve to identify and disseminate new technologies and practices that can detect pathogens and limit the incidence of food borne illness and discover the health-promoting properties of food components

What has been done

Addressing food safety issues related to the Food Safety Modernization Act. Better Process Control School, Product Development Short Courses, Hazard Analysis and Critical Control points and Produce Safety Workshops. Preventive Controls Qualified Individual Training and programs. We have worked with over 35 businesses to improve food safety practices.

Results

Food industry professionals acquired skills and knowledge for making safe decisions regarding their food products

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #5

1. Outcome Measures

Food processors and producers acquire the knowledge, skills and tools to create food safety management plans (HACCP, PC, PSA)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #6

1. Outcome Measures

Participants implement practices that ensure the safe and healthy production of value-added products from specialty crops

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #7

1. Outcome Measures

Preventive Control participants create food safety risk assessment and support food safety management plans.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

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

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

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
702	Requirements and Function of Nutrients and Other Food Components	0%		42%	
703	Nutrition Education and Behavior	50%		36%	
704	Nutrition and Hunger in the Population	20%		5%	
724	Healthy Lifestyle	30%		17%	
	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	1.5	0.0	1.0	0.0
Actual Paid	0.4	0.0	0.7	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	125402	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
188725	0	111404	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
3860968	0	143305	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Committee or Board Service
- Curricula/Instructional materials
- Demonstrations
- Displays and Exhibits
- Printed Material (newsletter, factsheet, field manual)
- Published Article, Book or Chapter (Academic)
- Single day workshop, presentation or event
- Workshop series or educational course

We also wish to highlight the following integrated Extension activities:

Community Health and Nutrition Extension addresses the nutritional health issues of low income and racial and ethnic minorities who are at high risk of food insecurity and poor health outcomes, including overweight and obesity. Extension education activities and research are advanced by partnerships in the community to provide effective nutrition education and to motivate behavior changes that will increase dietary quality for target populations and strengthen collaboration with community organizations to increase availability and access to affordable and healthy food.

2. Brief description of the target audience

Youth and families from limited-resource communities, specifically those who are eligible for federal food assistance (Supplemental Nutrition Assistance Program) are a primary audience. In 2017, there were approximately 440,000 eligible individuals in Massachusetts. School teachers and staff of social service organizations are also key audiences for this program.

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	222	28	52	200

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	7	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Demonstrations

Year	Actual
2017	175

Output #2

Output Measure

- Displays and Exhibits

Year	Actual
2017	200

Output #3

Output Measure

- Single day workshop, presentation or event

Year	Actual
2017	417

Output #4

Output Measure

- Workshop series or educational course

Year	Actual
2017	3201

Output #5

Output Measure

- Peer review publications

Year	Actual
2017	0

Output #6

Output Measure

- Academic Poster or Presentation

Year	Actual
2017	0

Output #7

Output Measure

- Curricula/Instructional Materials

Year	Actual
2017	0

Output #8

Output Measure

- Committee or Board Service

Year	Actual
2017	5

Output #9

Output Measure

- Printed Material

Year	Actual
2017	0

Output #10

Output Measure

- Analytic Tools and Techniques

Year	Actual
2017	3

Output #11

Output Measure

- Thesis or Dissertation

Year	Actual
2017	1

Output #12

Output Measure

- Published Article, Book or Chapter

Year	Actual
2017	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants gain knowledge and skill to improve physical activity behaviors
2	Participants improve physical activity behaviors
3	Participants gain knowledge and skill to improve dietary behaviors
4	Participants improve dietary behaviors
5	Creation and synthesis of knowledge related to childhood obesity
6	Participants improve food resource management behaviors
7	Participants increase use of effective nutrition education resources and materials

Outcome #1

1. Outcome Measures

Participants gain knowledge and skill to improve physical activity behaviors

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Participants improve physical activity behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	346

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rates of obesity and poor nutrition continue to increase for both adults and children in the United States. This is especially prevalent among low-income populations, as parents frequently turn to calorie-dense but low-nutrient foods when family food resources are limited. Eating habits that are formed during childhood are critically important as they lay the groundwork for future patterns that can affect lifelong health. Families need guidance to get the most nutrition from their limited resources in order for their children to grow and thrive.

What has been done

Our EFNEP program identifies individuals from target communities who are recruited and trained to deliver nutrition education to small groups of families for 2 to 4 months. Four professional staff (1.22 FTE) and 14 paraprofessional staff (10.94 FTE) provided nutrition education programming to low-income adults and youth. A total of 1,704 adults and 2,530 youth were reached in FY2017.

Results

Program entry and exit measures with both adults and youth measured change in the five core EFNEP areas: dietary quality, food resource management, food safety, physical activity, and food security for both adult and youth participants. Improvements after participating in EFNEP included 33% of adults and 26% of youth showed improved physical activity behaviors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Participants gain knowledge and skill to improve dietary behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge 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
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

Outcome #4

1. Outcome Measures

Participants improve dietary behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7640

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rates of obesity and poor nutrition continue to increase for both adults and children in the United States. This is especially prevalent among low-income populations, as parents frequently turn to calorie-dense but low-nutrient foods when family food resources are limited. Eating habits that are formed during childhood are critically important as they lay the groundwork for future patterns that can affect lifelong health. Families need guidance to get the most nutrition from their limited resources in order for their children to grow and thrive.

What has been done

UMass Extension improves the nutrition and health of low-income families with young children. Our Snap-Ed education staff, based at UMass Amherst and in five field offices are providing nutrition education to SNAP participants in five Massachusetts regions (West, Central, Northeast, East, and Southeast.) in partnership with over 50 collaborators throughout the Commonwealth.

Results

Evaluation measures showed that SNAP-Ed programming resulted in statistically significant change (p<.001) from pre to post with: Grade 3-5 and grade 6-8 youth eating vegetables more often; Grade 3-5 and grade 6-8 youth eating fruit more often; Grade 6-8 youth drinking high sugar beverages less often.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

Outcome #5

1. Outcome Measures

Creation and synthesis of knowledge related to childhood obesity

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Participants improve food resource management behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	920

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rates of obesity and poor nutrition continue to increase for both adults and children in the United States. This is especially prevalent among low-income populations, as parents frequently turn to calorie-dense but low-nutrient foods when family food resources are limited. Eating habits that are formed during childhood are critically important as they lay the groundwork for future patterns that can affect lifelong health. Families need guidance to get the most nutrition from their limited resources in order for their children to grow and thrive.

What has been done

Our EFNEP program identifies individuals from target communities who are recruited and trained to deliver nutrition education to small groups of families for 2 to 4 months. Four professional staff (1.22 FTE) and 14 paraprofessional staff (10.94 FTE) provided nutrition education programming to low-income adults and youth. A total of 1,704 adults and 2,530 youth were reached in FY2017.

Results

Program entry and exit measures with both adults and youth measured change in the five core EFNEP areas: dietary quality, food resource management, food safety, physical activity, and food security for both adult and youth participants. Improvements after participating in EFNEP included 83% of adults and 38% of youth showed improved in Food Resource Management

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

Outcome #7

1. Outcome Measures

Participants increase use of effective nutrition education resources and materials

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation measures showed that SNAP-Ed programming resulted in statistically significant change ($p < .001$) from pre to post with:

- Grade 3-5 and grade 6-8 youth eating vegetables more often
- Grade 3-5 and grade 6-8 youth eating fruit more often
- Grade 3-5 youth being physically active more often
- Grade 6-8 youth drinking high sugar beverages less often
- Grade 6-8 youth spending less time watching TV or movies, playing electronic games, or using a computer for something that is not school work

In addition, statistically significant change ($p < .05$) from pre to post was also found with:

- Grade 6-8 youth being so physically active that their heart beat fast and they breathed hard more often

Program entry and exit measures with both adults and youth measured change in the five core EFNEP areas: dietary quality, food resource management, food safety, physical activity, and food security for both adult and youth participants. Improvements after participating in EFNEP included:
Adult Participants

- 95% Showed a positive change in consumption of at least one food group
- 83% Improved in Food Resource Management
- 90% Improved in Nutrition Practices
- 69% Improved in Food Safety

- 33% Improved in Physical Activity

Youth Participants

- 70% improved in Diet Quality
- 47% improved in Food Safety
- 38% improved in Food Resource Management
- 26% improved in Physical Activity
- 20% improved in Food Security

Key Items of Evaluation

Not included in the above results is the following anecdote obtained during our EFNEP evaluation: A 26 year old female with a 4 year old child stated, when asked "what was the biggest change you made as a result of the ENFEP program" stated, "Buying more vegetables and fruits, using less oil and salt. I now make a shopping list before going to buy groceries. Not drinking soda."

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

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	10%		5%	
111	Conservation and Efficient Use of Water	15%		0%	
133	Pollution Prevention and Mitigation	10%		0%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		42%	
204	Plant Product Quality and Utility (Preharvest)	6%		4%	
205	Plant Management Systems	22%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	11%		18%	
212	Diseases and Nematodes Affecting Plants	21%		26%	
723	Hazards to Human Health and Safety	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	5.0	0.0	1.2	0.0
Actual Paid	5.5	0.0	1.0	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
632726	0	24693	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
992749	0	160970	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1182543	0	269232	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Facilitated Group Meetings and Conferences
 Individual Consultations and Site Visits
 Printed Materials
 Single day workshop, presentation or event
 Websites or other computer-based delivery
 Workshop series or educational course
 Applied Research Projects
 Diagnostic Services
 Peer review publications

We also wish to highlight the following multistate and integrated Extension activities:

Research and extension for Greenhouse Management assists growers of greenhouse crops, supports industries, non-profit organizations and other horticultural service providers throughout the state and region in ways that help manage production costs and promote environmentally sound practices. Specific multistate efforts for FY 16 are Greenhouse pest message via email (New England Greenhouse Update), webinars and other multistate educational programs conducted in collaboration among New England Sates (CT, NH, VT, RI, ME, NY). Integrated research and extension in FY 17 considered the use of organic fertilizers for spring greenhouse crops.

2. Brief description of the target audience

The commercial horticulture Industry is the main target audience for this program. The industry constitutes a major sector of agriculture in Massachusetts. There are more than 5,000 firms involved in production (nurseries, greenhouses, herbs, cut flowers, turfgrass) retail, (garden center florists), and landscape services (landscape design, installation, maintenance, lawn care, tree care) with an estimated value of over \$2.6 billion in gross income. Over 60,000 people are employees in these industries in Massachusetts and more are needed to serve the current demand.

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	11129	130566	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	8	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2017	16

Output #2

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2017	1491

Output #3

Output Measure

- Printed Materials

Year	Actual
------	--------

2017 142

Output #4

Output Measure

- Single day workshop, presentation or event

Year	Actual
2017	19

Output #5

Output Measure

- Websites or other computer-based delivery

Year	Actual
2017	63

Output #6

Output Measure

- Workshop series or educational course

Year	Actual
2017	12

Output #7

Output Measure

- Applied Research Projects

Year	Actual
2017	16

Output #8

Output Measure

- Diagnostic Services

Year	Actual
2017	1250

Output #9

Output Measure

- Peer review publications

Year	Actual
2017	0

Output #10

Output Measure

- Committee or Board Service

Year	Actual
2017	0

Output #11

Output Measure

- Community Service Project

Year	Actual
2017	0

Output #12

Output Measure

- Demonstrations

Year	Actual
2017	23

Output #13

Output Measure

- Printed Material

Year	Actual
2017	144

Output #14

Output Measure

- Student Supervision/Support/Advising (Undergraduate)

Year	Actual
2017	1

Output #15

Output Measure

- Published Article (News, Professional, Trade)

Year	Actual
2017	0

Output #16

Output Measure

- Presentation/Poster (Academic)

Year	Actual
2017	17

Output #17

Output Measure

- Published Article (refereed publications)

Year	Actual
2017	33

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants acquire knowledge and skills that enhance the environmental sustainability of agricultural businesses.
2	Participants adopt practices that enhance the environmental sustainability of agricultural businesses.
3	Participants acquire knowledge and skills that enhance the economic viability of agricultural businesses
4	Participants adopt practices that enhance the economic viability of agricultural businesses
5	Creation and synthesis of knowledge related to the environmentally sustainable and economic viability agricultural businesses
6	Participants adopt new practices that enhance their ability to grow fruit crops in a profitable and sustainable way.
7	Participants learn new information, skills, practices that enhance their ability to grow fruit crops in a profitable and sustainable way.

Outcome #1

1. Outcome Measures

Participants acquire knowledge and skills that enhance the environmental sustainability of agricultural businesses.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	160

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #2

1. Outcome Measures

Participants adopt practices that enhance the environmental sustainability of agricultural businesses.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #3

1. Outcome Measures

Participants acquire knowledge and skills that enhance the economic viability of agricultural businesses

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Participants adopt practices that enhance the economic viability of agricultural businesses

2. Associated Institution Types

- 1862 Extension

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
205	Plant Management Systems

Outcome #5

1. Outcome Measures

Creation and synthesis of knowledge related to the environmentally sustainable and economic viability agricultural businesses

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
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #6

1. Outcome Measures

Participants adopt new practices that enhance their ability to grow fruit crops in a profitable and sustainable way.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	150

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
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants

Outcome #7

1. Outcome Measures

Participants learn new information, skills, practices that enhance their ability to grow fruit crops in a profitable and sustainable way.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	500

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
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

- 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

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

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
802	Human Development and Family Well-Being	20%		0%	
806	Youth Development	80%		100%	
	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	7.5	0.0	0.3	0.0
Actual Paid	5.9	0.0	0.4	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
1026893	0	8993	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
266567	0	56640	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
359520	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 4-H Clubs
- Community Service Project
- Curricula/Instructional materials
- Direct - Other
- Displays and Exhibits
- Facilitated Group Meetings and Conferences
- Individual Consultations and Site Visits
- Printed Material (newsletter, factsheet, field manual)
- Single day workshop, presentation or event
- Websites or Other Electronic Delivery
- Workshop series or educational course

We wish to highlight the following multistate Extension activities:

The 4-H Military Project creates opportunities and provide support to military connected youth whether they live on or near an installation, in our communities, or on overseas installations. 4-H clubs and opportunities provide consistency in belonging and an opportunity to develop life skills through a positive youth development framework. As military families move frequently and experience the difficulties surrounding deployment and reintegration, 4-H provides predictable programming and a safe and nurturing environment for military connected children and youth. Multistate coordination for FY 16 was accomplished through conference calls; planning for annual meeting; liaison training. A Massachusetts 4-H staff member served as the Liaison to regional partner states and served as chair of committee planning workshops for annual meeting.

We also wish to highlight the following Extension-community partnership:

The aim of the Massachusetts Envirothon collaboration is to encourage high school age young people to develop the science literacy, citizen skills, and knowledge of routes to further education and careers that will allow them to participate responsibly and effectively in natural resource conservation and land use decisions in Massachusetts communities. Through the collaboration, UMass is able to provide access to applied science and youth development expertise to communities across the Commonwealth. The Mass Envirothon network includes local officials and citizens serving on municipal boards, scientists and policy staff in state environmental agencies, and environmental advocates in nongovernmental organizations, all of whom are interested in helping to prepare youth who will be active citizens in Massachusetts communities in decades to come. The primary focus of the program is work with the school teachers and youth leaders who guide the high school age youth in their community-based learning. With our help, these teachers can offer a multiplier effect in reaching youth, and they may also choose to serve as volunteers on local boards. The goal is to enable young people to grow into caring, capable, scientifically literate, well-informed, engaged citizens who are prepared to contribute to their communities in the 21st century. The collaboration develops well-designed challenges for youth teams and provides adult coaches with background information and community connections that will help them be effective in their work with youth on community issues.

2. Brief description of the target audience

The approximately 3,200 youth in Massachusetts who are active 4H club members are a primary target audience for this program. Many of our programs reach more general audiences as well, including:

- Youth from all backgrounds (including non-4H members)
- Adults from all backgrounds (volunteers, parents, collaborating organization staff)
- Youth Serving Organizations and Programs from diverse communities (including K-12, Home Schooled youth, and Camps)
- Community Coalitions

- UMass Amherst Faculty
- Faculty from other colleges and universities

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	4647	19200	25741	1076

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	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 4-H Clubs

Year	Actual
2017	228

Output #2

Output Measure

- Community Service Projects

Year	Actual
2017	16

Output #3

Output Measure

- Curricula/Instructional Materials

Year	Actual
2017	2

Output #4

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2017	97

Output #5

Output Measure

- Printed Materials

Year	Actual
2017	20

Output #6

Output Measure

- Single day workshop, presentation or event

Year	Actual
2017	67

Output #7

Output Measure

- Websites or other computer-based delivery

Year	Actual
2017	24

Output #8

Output Measure

- Workshop series or educational course

Year	Actual
2017	1438

Output #9

Output Measure

- Displays and Exhibits

Year	Actual
2017	185

Output #10

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2017	11

Output #11

Output Measure

- Program Planning

Year	Actual
2017	8

Output #12

Output Measure

- Youth and Adult leader training

Year	Actual
2017	8

Output #13

Output Measure

- Volunteer mentoring

Year	Actual
2017	11

Output #14

Output Measure

- 4-H records

Year	Actual
2017	11

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Youth acquire skills that will help them succeed academically and in the workplace
2	Youth demonstrate skills that will help them succeed academically and in the workplace
3	Youth are effective team members, communicators, and leaders
4	Youth increase knowledge and skill and interest in science, engineering and technology
5	Youth engage in community service
6	Youth acquire citizenship skills
7	Adults acquire knowledge of the effects of deployment on military youth
8	Military youth feel supported
9	Children and youth increase life skills

Outcome #1

1. Outcome Measures

Youth acquire skills that will help them succeed academically and in the workplace

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	99

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Youth demonstrate skills that will help them succeed academically and in the workplace

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Youth are effective team members, communicators, and leaders

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	348

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth benefit from access to applied science and youth development expertise across the Commonwealth as well as on the UMass campus. The UMass Envirothon network includes local officials and citizens who are interested in helping to prepare youth who will be active citizens in Massachusetts communities in decades to come. A primary focus of the program is work with the school teachers and youth leaders who guide the high school age youth in their community-based learning.

What has been done

In 2017, the Massachusetts Envirothon program provided a rich, positive youth development experience in natural resource and environmental affairs, and also in teamwork, presentation skills, and community research. Program participation represents significant geographic diversity, including rural, suburban, and urban teams from across Massachusetts. The Issue focus for this year was Agricultural Soil & Water Conservation.

Results

85% of youth reported their skills and knowledge regarding their ability to work as member of a team increased to either "a moderate extent or "a great extent." 71 of youth reported their skills and knowledge regarding their ability to make an effective presentation increased to either "a moderate extent or "a great extent."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Youth increase knowledge and skill and interest in science, engineering and technology

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	632

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Youth engage in community service

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	202

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

Youth acquire citizenship skills

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Adults acquire knowledge of the effects of deployment on military youth

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	479

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Military youth feel supported

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	66

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Children and youth increase life skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

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

For three decades, the Massachusetts Envirothon has been engaging young people and adult coaches in hands-on exploration and investigation of the important environmental issues affecting themselves, their families and their communities.

Youth Self-Assessment: Youth participants were asked to think back over the past year and reflect on how their involvement with the Envirothon had affected their knowledge, skills, and interest in different areas. The percentages are the number of youth who reported their skills and knowledge had increased to either "a moderate extent or "a great extent" for each area

Massachusetts FOREST resources 67%

Massachusetts WATER resources - 70%

Massachusetts WILDLIFE resources - 66%

Massachusetts SOIL resources - 64%

AGRICULTURAL SOIL & WATER CONSERVATION - 76%

82% of youth said they were interested in taking action for the environment in their community to either "a moderate extent or "a great extent"

Coach Self-Assessment: Coaches were asked if preparation/participation in the Mass Envirothon increased their team's knowledge, skills, and interests in the following areas this year? The percentages are the number of coaches who reported their team's skills and knowledge had increased to either "a moderate extent or "a great extent" for each area

FOREST, WATER, WILDLIFE, AND resources in Massachusetts - 86%

AGRICULTURAL SOIL & WATER CONSERVATION - 81%

Key Items of Evaluation

82% of youth said they were interested in taking action for the environment in their community to either "a moderate extent or "a great extent"

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Environmental Stewardship

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	5%		0%	
111	Conservation and Efficient Use of Water	6%		5%	
112	Watershed Protection and Management	5%		11%	
123	Management and Sustainability of Forest Resources	24%		0%	
124	Urban Forestry	10%		2%	
133	Pollution Prevention and Mitigation	2%		3%	
135	Aquatic and Terrestrial Wildlife	15%		15%	
136	Conservation of Biological Diversity	16%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		2%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		13%	
212	Pathogens and Nematodes Affecting Plants	4%		2%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	0%		19%	
216	Integrated Pest Management Systems	4%		3%	
302	Nutrient Utilization in Animals	0%		12%	
605	Natural Resource and Environmental Economics	0%		2%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	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	4.0	0.0	3.5	0.0
Actual Paid	0.3	0.0	3.2	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
109165	0	438754	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
393861	0	463504	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
241865	0	1116316	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Analytic Tools and Techniques
- Community Service Project
- Demonstrations
- Diagnostic Services
- Direct - Other
- Facilitated Group Meetings and Conferences
- Indirect - Other
- Individual Consultations and Site Visits
- Peer Reviewed Journal Articles
- Presentation/Poster (Academic)
- Printed Material (newsletter, factsheet, field manual)
- Research Project (Applied Research)
- Research, Grant, or Policy Report
- Single day workshop, presentation or event
- Survey, Needs Assessment, or Other Data Collection
- Websites or Other Electronic Delivery
- Workshop series or educational course

We also wish to highlight the following multistate and integrated Extension activities:

Significant elements of the Fish, Wildlife and Biodiversity Conservation Extension Program are now active in many states in the Northeastern U.S. The Conservation Assessment and Prioritization System (CAPS) and the Critical Linkages assessment system are now active in all 13 states of the North Atlantic Region. The River and Stream Continuity Project has also expanded to cover this same region and is now referred to as the North Atlantic Aquatic Connectivity Collaborative. Research and the development of methods for wetlands assessment and monitoring has expanded to the 6-state New England region. The following program is currently being disseminated as a model to additional states:

The Keystone Project trains people who have direct control of over forested land. Participants in the annual 3-day training program are chosen competitively from a pool of applicants that includes forest landowners, and members of land trusts, town conservation commissions, and other conservation organizations. The program offers participants information about forest ecology, sustainable forest management, wildlife habitat enhancement, and land protection through a combination of lectures, field trips, discussions and take home resources. In return for participating in the program, Keystone Cooperators agree to return to their respective communities and serve as spokespersons or advocates for forest conservation.

2. Brief description of the target audience

- Natural Resource Agencies
- Regional Planning Authorities
- Development and Planning Agencies
- Municipalities
- Conservation Organizations
- Landowners and Land Managers
- Business/Industry

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	2107	135916	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	2	4	6

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Analytic Tools and Techniques

Year	Actual
2017	7

Output #2

Output Measure

- Diagnostic Services

Year	Actual
2017	0

Output #3

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2017	23

Output #4

Output Measure

- Printed Materials

Year	Actual
2017	21165

Output #5

Output Measure

- Published Articles (News, Professional and Trade)

Year	Actual
2017	14

Output #6

Output Measure

- Single day workshop, presentation or event

Year	Actual
2017	34

Output #7

Output Measure

- Survey or needs assessment

Year	Actual
2017	4

Output #8

Output Measure

- Websites or other computer-based delivery

Year	Actual
2017	35

Output #9

Output Measure

- Workshop series or educational course

Year	Actual
2017	30

Output #10

Output Measure

- Applied Research Projects

Year	Actual
2017	2

Output #11

Output Measure

- Peer review publications

Year	Actual
2017	4

Output #12

Output Measure

- Research, Grant or Policy Report

Year	Actual
2017	4

Output #13

Output Measure

- Curricula/Instructional Materials

Year	Actual
2017	0

Output #14

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2017	3980

Output #15

Output Measure

- Community Service Project

Year	Actual
2017	16

Output #16

Output Measure

- Demonstrations

Year	Actual
2017	0

Output #17

Output Measure

- Diagnostic Services

Year	Actual
2017	0

Output #18

Output Measure

- Diagnostic Service

Year	Actual
2017	20539

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants acquire knowledge and skill to promote, implement or participate in practices or programs that protect natural resources and ecosystems
2	Participants promote, implement or participate in practices or programs that protect natural resources and ecosystems
3	Creation and synthesis of knowledge related to the protection of natural resources and ecosystems
4	Foresters understand ways to help forest landowners with conservation-based estate planning.
5	Participants acquire knowledge and skill to protect and enhance community resources and urban ecosystems
6	Participants adopt practices to protect and enhance community resources and urban ecosystems
7	Participants acquire knowledge and skill for strategic land conservation programs that protect natural resources and ecosystems
8	Participants acquire knowledge and skill to protect and enhance natural resources and ecosystems
9	Participants adopt practices that protect and enhance natural resources and ecosystems

Outcome #1

1. Outcome Measures

Participants acquire knowledge and skill to promote, implement or participate in practices or programs that protect natural resources and ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	5860

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sixty-two percent of Massachusetts is forested and most forests are privately owned. When something triggers a decision about forest management or future, decisions may be made without the benefit of knowing their full range of options. The goal of the Forest Conservation project is to put into place in each community the people that can deliver accurate information at crucial decision making times.

What has been done

Our initiatives for 2017 included: Enhancement of social networks to inform landowner decisions: Utilizing the internet and other technologies to reach landowners and to facilitate their information sharing; Conservation-based Estate Planning Outreach for Landowners; Training influential community opinion leaders to inform landowner decisions with regard to forest management.

Results

Forest land owners and community leaders acquire a greater understanding of the options for beginning the estate planning process and conserving land. Many of these same participants also learned how to access information from private forester or a Forest Conservation program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

Outcome #2

1. Outcome Measures

Participants promote, implement or participate in practices or programs that protect natural resources and ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1601

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With more 1 million street trees, Massachusetts features a relatively large proportion of canopy cover in cities and towns with plans to increase urban tree populations and existing canopy cover. The value of trees planted in residential settings has been documented, and citizens are often passionate about maintaining urban trees and community green space. Community trees, however, are frequently presented with very challenging growing conditions and there is very little scientific data related to their survival and growth in urban environments.

What has been done

We continued to conduct direct and web-based outreach to inform target audiences and the public about the importance of urban forests. A foundation for collaboration was work with urban forest managers and tree care professionals through the Massachusetts Tree Wardens and Foresters Association and the New England Chapter of the International Society of Arboriculture. Increasingly targeted efforts were also focused on collaborating directly with Tree Wardens in nearly 50 communities throughout Massachusetts.

Results

Participants made decisions, implemented programs and initiated practices to maximize tree survival in urban settings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources

133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

Outcome #3

1. Outcome Measures

Creation and synthesis of knowledge related to the protection of natural resources and ecosystems

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Foresters understand ways to help forest landowners with conservation-based estate planning.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #5

1. Outcome Measures

Participants acquire knowledge and skill to protect and enhance community resources and urban ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1327962

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #6

1. Outcome Measures

Participants adopt practices to protect and enhance community resources and urban ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	66150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
124	Urban Forestry
605	Natural Resource and Environmental Economics
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #7

1. Outcome Measures

Participants acquire knowledge and skill for strategic land conservation programs that protect natural resources and ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
-------------	---------------

2017 5860

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
605	Natural Resource and Environmental Economics
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #8

1. Outcome Measures

Participants acquire knowledge and skill to protect and enhance natural resources and ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2735

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
136	Conservation of Biological Diversity
605	Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

Participants adopt practices that protect and enhance natural resources and ecosystems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	7000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Every other year, The Keystone project is evaluated through a mail survey to approximately 500 Keystone Cooperators using the Dillman Total Survey Design Method (approximately 20 hours of time). The survey seeks to quantify the total impact that Cooperators made in the previous 12-month period. Below are some of the key results from the most recent evaluation

- Keystone Cooperators contributed **24,759 hours** to conservation-related activities, **56% of which were volunteer hours**.
- Keystone Cooperator activity is equivalent to **>12 full-time** conservation positions, of which **7 positions were volunteer**.
- Keystone Cooperators own or are involved with the management decisions on **170,725 total acres** of land.
- Keystone Cooperators made contact with **17,391** people about forest conservation.
- Keystone Cooperators made **12,919** referrals to conservation information resources. Referrals to land trusts, government programs, private foresters, and public foresters were most common.

Key Items of Evaluation

Keystone Cooperators made contact with **17,391** people about forest conservation. Keystone Cooperators made **12,919** referrals to conservation information resources. Referrals to land trusts, government programs, private foresters, and public foresters were most common.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Administration - Massachusetts Center for Agriculture, Food and the Environment

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
901	Program and Project Design, and Statistics	20%		0%	
902	Administration of Projects and Programs	60%		50%	
903	Communication, Education, and Information Delivery	20%		50%	
	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	3.2	0.0	0.4	0.0
Actual Paid	0.3	0.0	0.0	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
557339	0	489024	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
631158	0	148330	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
60445	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Administration of Extension and Experiment Station Projects and Programs
 Administration and oversight at UMass farms facilities
 Website and Other Computer-based delivery
 Printed Material
 Program planning and assessment
 Strategic Planning and communication

2. Brief description of the target audience

citizens
 communities
 organizations
 businesses
 government agencies
 policy-makers

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: {No Data Entered}

Patents listed

{No Data Entered}

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

- Administrative Initiatives, Systems and Procedures

Year	Actual
2017	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Massachusetts Center for Agriculture projects and initiatives are sustained and advanced, consistent with organizational expectations and stakeholder needs

Outcome #1

1. Outcome Measures

Massachusetts Center for Agriculture projects and initiatives are sustained and advanced, consistent with organizational expectations and stakeholder needs

2. Associated Institution Types

- 1862 Extension
- 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
902	Administration of Projects and Programs

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

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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 with 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.