2015 University of Massachusetts Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/24/2016

I. Report Overview

1. Executive Summary

In the 2015 Federal Fiscal Year, a significant transition in the evolution of The Center for Agriculture, Food and the Environment advanced in important ways. A search to fill the position of Director for the Center, commenced in the summer of 2014 and the position was structured so that this individual would serve as the Director of both UMass Extension and the Massachusetts Agricultural Experiment Station. The search process was ultimately successful in identifying, recruiting and retaining a new, permanent director, Jody L. Jellison, who had been serving as Associate Director for the Virginia Agricultural Experiment Station at Virginia Tech. Dr. Jellison accepted the position in August, 2015, although she did not officially start until January, 2016. During that prolonged period, Dr. Patricia Vittum continued in her role as Interim Director. Dr. Jellison nonetheless received and initiated communication with Center for Agriculture, Food and the Environment administrators and participated in various organizational conversations. Relevant aspects of those interactions are reflected both in this Annual Report and also in the 2017 Federal Plan of Work submission.

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.

Global 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 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.

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.

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. The Center also supports resources that reduce market barriers and accelerate the adoption of clean energy for Massachusetts cities and towns, businesses, institutions, farms, low income and multi-unit housing.

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.

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 help children develop more active lifestyles. Nutrition education programs are frequently delivered to families with limited resources through a state wide 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.

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.

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.

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.
Important Note Regarding Professional Extension FTEs in this Plan- The number of professional Extension FTEs in this report varies significantly in comparison to what was planned and reported in previous years. This does not reflect real changes in our organization, but rather changes in our approach to planning and reporting this information in response to recent guidance issued by NIFA. Specifically, we are planning for fewer Professional Extension FTEs under each of the Planned Programs because we are now including only those FTEs supported by Smith-Lever funds. The guidance we refer to is online at http://nifa.usda.gov/resource/how-report-ftes-plan-work-and-annual-report.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	104.0	0.0	29.0	0.0
Actual	95.2	0.0	30.1	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
Our new director has been briefed on the current procedures whereby research projects that apply to receive Massachusetts Experiment Station funding are proposed, reviewed and funded. The director agrees that significant changes are needed that will allow us to establish a more rigorous and objective peer review process. It is unclear what specific new procedures will be implemented, however progress in this area will be communicated through this Annual Report and related NIFA Plan of Work. Until then, our current procedures will remain in place as described below
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 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.

The Director of the Agricultural Experiment Station also solicits research initiatives in specific disciplinary areas or with other criteria, such as research experiences for undergraduates or integration with extension type work. For these opportunities, a brief pre-proposal is submitted and a committee composed of faculty and professional staff recommends the most promising ideas. Prospective investigators develop a detailed proposal and identify reviewers. The Associate Director ensures that changes recommended by reviewers are incorporated and funding is provided at the Director's discretion. Funded projects develop detailed assessment plans that will monitor and document the success of the project.

UMass Extension
University of Massachusetts Extension continues its formal agreement with Extension in Maine, Vermont, and New Hampshire to utilize a four-state, web-based planning and reporting system. Through the on-line system, program staff and administrators can access the content of plans in all four states at the organizational level, the team level and for individuals. Extension administrators from each the four states utilize the system to review work that is occurring across the region. Ongoing monthly telephone meetings with the four states are an 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 states have agreed to provide periodic formal and informal merit review and feedback for each state as a component of our partnership. The new system provides access to each state plan of work for all four states, 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 to review and advise UMass Extension and the Chancellor the UMass Amherst. Annual review of budgets, activities, outcomes and goals is a major function of this board.

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.

In Fiscal Year 2015, the Center for Agriculture, Food and the Environment devised a new strategy for routinely soliciting input from internal and external stakeholders to identify organizational priorities and help us to structure our organization in ways that better serve constituents. This plan has different components that are designed to obtain feedback at both broad organizational and more specific programmatic levels and will be implemented over a period of several years. A brief overview and timeline for the plan is as follows:
February 2016 - Conduct web-based survey with internal and external stakeholders. Survey will obtain 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 areas to be assessed are:

- Agriculture and Food Systems;

- Commercial Horticulture;
- Water Resources;
- Natural Resource Management;
- Energy Use;
- Youth Development;
- Nutrition

Information obtained from the survey will be used initially to guide internal discussions among Center administrators, staff and aligned faculty. Through these discussions we will establish the framework and parameters for subsequent Stakeholder Engagement. A consistent methodology will be developed to engage stakeholders, obtain feedback on our current programs and identify areas of future emphasis and involvement for both scientific research and Extension Education. The process will be implemented sequentially, so that over a defined period (e.g. 8 months), stakeholder engagement activities will focus on a single conceptual area/topic. Activities will include some combination of the following, conducted both with internal and external audiences:

- Open meetings
- Meeting with targeted groups or selected individuals
- Focus groups
- Structured and semi-structured interviews with key individuals or representatives of specific groups
- Additional surveys

In addition to developing the outline for organizational feedback described above, the Center continued its efforts to obtain more detailed and specific programmatic input from stakeholders. In these cases various programs solicited input from an array of formal advisory bodies and somewhat less collaborators and participant groups. 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 continued its close association with an Extension Board of Public Overseers. 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; Massachusetts Farm Bureau; UMass Donahue Institute; Massachusetts Audubon Society; Massachusetts Arborists Association; Massachusetts State Department of Agricultural Resources; Massachusetts Forest Land Owner Association; Massachusetts Nutrition Board; Massachusetts State 4-H Advisory 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
- Open Listening Sessions
- Needs Assessments

Brief explanation.

Approximately six hundred fifty individuals were identified as potential respondents for the initial stakeholder survey. Respondents 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

The stakeholder survey is a chance 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 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 more concrete expectations.

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 Center engaged in ongoing activities designed to obtain input from stakeholders. Formal opportunities to obtain feedback occur when UMass Extension convenes the Extension Board of Public Overseers. While these interactions include programmatic presentations and organizational updates, they 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 used at various levels. In general, we use feedback for strategic planning and less formal organizational interactions that focus on ways to better serve our external constituents. The input we receive from our Extension Board of Public Overseers is typically used to inform organizational goals, programming priorities and advocacy strategies. The programmatic input we receive is more 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

Our stakeholders identified a consistent need for expert advice and consultation. They would prefer to receive this information in person, but acknowledge the increasing need and importance to access resources and information in different ways. They also increasingly understand and value the role of our center and the importance of ongoing scientific investigation and the important connection to and integration with educational programs, resources, tools or technologies that meet the needs of citizens, communities, organizations, businesses. They also support an increased role for the Center in informing public policy, environmental regulation and legislation.
In summary, we learned that our stakeholders have a multitude of significant needs and expectations and it seems unlikely we can respond equally and effectively to all of them. This underscores the importance of the feedback we receive on setting organizational priorities and the attendant need to communicate those effectively.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
2738175	0	2716801	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1931763	0	2906927	0
Actual Matching	2955311	0	3116797	0
Actual All Other	6084569	0	6395653	0
Total Actual Expended	10971643	0	12419377	0

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

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

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	11%		0%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		1%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		7%	
204	Plant Product Quality and Utility (Preharvest)	6%		0%	
205	Plant Management Systems	15%		6%	
206	Basic Plant Biology	0%		1%	
211	Insects, Mites, and Other Arthropods Affecting Plants	16%		7%	
212	Pathogens and Nematodes Affecting Plants	16%		15%	
216	Integrated Pest Management Systems	26%		1%	
301	Reproductive Performance of Animals	0%		17%	
304	Animal Genome	0%		2%	
307	Animal Management Systems	5%		2%	
311	Animal Diseases	0%		14%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		8%	
504	Home and Commercial Food Service	0%		1%	
601	Economics of Agricultural Production and Farm Management	0%		3%	
604	Marketing and Distribution Practices	5%		0%	
703	Nutrition Education and Behavior	0%		1%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		13%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		1%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	12.6	0.0

Actual Paid	3.0	0.0	14.7	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**
265231	0	1024955	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
410536	0	1239767	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
138963	0	2858868	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Demonstrations
- Diagnostic Services
- Facilitated Group Meetings and Conferences
- Grant Submission or Other Funding Proposal
- Individual Consultations and Site Visits
- Printed Material (newsletter, factsheet, field manual)
- Published Article (News, Profesional, Trade)
- Research Project (Applied Research)
- Research Project (Basic Research)
- Single day workshop, presentation or event
- Survey, Needs Assessment, or Other Data Collection
- Websites or Other Electronic Delivery
- Workshop series or educational course

2. Brief description of the target audience

The primary audience for this plan are Massachusetts growers and food production-related businesses. This includes established producers as well as new, immigrant, part-time, conventional and organic growers. Others audiences include 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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14158	465341	35	480

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	19	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Demonstrations

Year	Actual
2015	6

Output #2

Output Measure

- Diagnostic Services

Year	Actual
2015	18239

Output #3

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual

2015	13

Output #4

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2015	227

Output #5

Output Measure

- Printed Materials

Year	Actual
2015	61

Output #6

Output Measure

- Single day workshop, presentation or event

Year	Actual
2015	114

Output #7

Output Measure

- Websites or other computer-based delivery

Year	Actual
2015	351

Output #8

Output Measure

- Workshop series or educational course

Year	Actual
2015	12

Output #9

Output Measure

- Peer review publications

Year	Actual
2015	19

Output #10

Output Measure

- Applied Research Projects

Year	Actual
2015	11

Output #11

Output Measure

- Grant Submission or other Funding Proposal

Year	Actual
2015	7

Output #12

Output Measure

- Published Article (News, Professional, Trade)

Year	Actual
2015	1

Output #13

Output Measure

- Survey, Needs Assessment, or Other Data Collection

Year	Actual
2015	1

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	Vegetable production operations in Massachusetts are more diverse, environmentally sound and economically vibrant

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
2015	32600

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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
2015	4221

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
Growers attended the Annual Management Update meeting. We published 7 issues of the Cranberry Station newsletter. Diagnostic Lab reported 40 samples processed and 45 field visits made to diagnose issues. The UMass Cranberry Web site tallied nearly 12,000. We continued research on phosphorus use in cranberry systems and its impact on water quality and on the use of automated irrigation for frost protection and irrigation.

Results
Growers adopted canopy management strategies, such as sanding and pruning and irrigation management, to enhance crop production and pest management. Growers incorporated the use of reduced-risk compounds for pest management on the farm. Growers increased their use of best management practices regarding nitrogen and phosphorus use and water management.

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
216	Integrated Pest Management Systems

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
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	45626

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Fruit farms and vineyards provide open space and scenic vistas while 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. Research on pest ecology and management informs approaches that optimize control and reduce chemical use.

What has been done
Monitoring Invasive Pests; Disease/Insect Modeling using NEWA weather data; Multi-level Extension; studying Plum Curculio and Sustainable Disease Management in Northeastern Apples. Projects resulted in the publication of 17 journal articles/proceedings, 53 newsletter articles and were the subject of numerous field day presentations and on-farm tours. Our fruit program had primary responsibility for 3 websites and was key contributors to 8 additional sites or blogs. Members also delivered 25 practical presentations at twilight meetings and workshops to an audience of over 1,900.

Results
Participants learned about established and new methods for sprayer calibration, soil health improvement, recirculating spray equipment, solid set micro sprinkler technology. Participants learned about new crops or products to guard against crop or market failures. (e.g., Asian pears, wine or table grapes, frozen/processed products, wine). Participants learned about high-density planting, native pollinator conservation, soil health assessment, season extension, value added production, food safety). Participants learn about safer handling practices when mixing, loading and applying pesticides and fertilizers.

4. Associated Knowledge Areas

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

211 Insects, Mites, and Other Arthropods Affecting Plants

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
2015	24830

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Vegetable farming in Massachusetts and New England has remained vital in recent decades through constant and creative change: more direct marketing, diversification, selection of high value crops, and adoption of new technologies. The twenty thousand Massachusetts acres used to produce vegetables are a resource for food, open space, environmental quality, economic vitality, and quality of life. Vegetable farmers are essential to our national leadership role in wholesale local food distribution systems.

What has been done
We continue to provide advanced IPM training through mentor farm relationships and have expanded our outreach to beginning farmers regionally through on-farm IPM scouting and monitoring training. Work continued on development of the ?New England Fruit and Vegetable Scouting Network? and on a Sprayer Calibration Training program. A Hot Water Seed Treatment Service was created and we continued to edit and publish and distribute the New England Vegetable Management guide and the Vegetable Notes newsletter.

Results
Growers implemented research-based practices to increase environmental sustainability of crop and pest management. Over 300 specific management practices were recommended to address pests and problems. Interviews with growers determined that 83% of the practices were adopted by growers as recommended; an additional 10% were adopted with some modification For those practices that were adopted, 96% were rated by growers as either ?moderately? or ?largely? successful (79% - largely successful, 17% moderately successful)

4. Associated Knowledge Areas

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

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

Vegetable production operations in Massachusetts are more diverse, environmentally sound and economically vibrant

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	2628

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

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

Growers identified a total of 99 pests or problems they wanted to address using IPM, each associated with a specific crop. A total of 313 specific management practices were recommended to address these 99 pests and problems. We interviewed growers to evaluate the extent to which recommended practices were adopted and how successful they were in helping farmers achieve their goals. Results indicated that 83% of the practices were adopted by growers as recommended; an additional 10% were adopted with some modification. For those practices that were adopted, 96% were rated by growers as either "moderately" or "largely" successful.
As a result of working with our team and implementing recommend IPM management practices, growers reported on whether 3 specific goals were attained for the 99 separate crop-problem combinations. Growers responded according to a 4-point scale (1 = not at all, 2 = minimally, 3 = moderately, 4 = largely).

- 74% of our recommendations resulted in changes in pesticide use consistent with IPM practices
- 86% of our recommendations resulted in reductions in crop loss
- 81% of our recommendations resulted in improvements in crop quality

Proportions reported above are the extent to which each result was attained either "moderately" or "largely"

Key Items of Evaluation

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%		0%	
112	Watershed Protection and Management	50%		0%	
131	Alternative Uses of Land	0%		26%	
132	Weather and Climate	40%		45%	
213	Weeds Affecting Plants	0%		29%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.9	0.0	1.6	0.0
Actual Paid	1.4	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**
47475	0	41343	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
127865	0	94679	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	39004	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

2. Brief description of the target audience

General public, land owners, food producers, community organizations, municipal officials, state agencies and regulators

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	894	3856	150	0

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	2	0	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Output #2

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2015	45

Output #3

Output Measure

- Printed Materials

Year	Actual
2015	9

Output #4

Output Measure

- Single day workshop, presentation or event

Year	Actual
2015	11

Output #5

Output Measure

- Websites or Other Computer-based Delivery

Year	Actual
2015	2

Output #6

Output Measure

- Peer review publications

Year	Actual
2015	2

Output #7

Output Measure

- Analytic Tools and Technique

Year	Actual
2015	4

Output #8

Output Measure

- Research, Grant or Policy Report

Year	Actual
2015	2

Output #9

Output Measure

- Workshop Series of Educational Course

Year	Actual
2015	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

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	8040

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Despite the fact that the anthropogenic causes of climate change are global in nature and require solutions derived from grand scale international cooperative efforts, many of the effects are felt locally. A microcosm of the climate change problem can be found on the watershed scale as well, in the form of upstream causes and downstream effects. Understanding of the issues at hand can help forge good management decisions that help bolster resilience on the local level and alleviate damage to the watershed as a whole.

What has been done
We made progress toward establishing a Fluvial Geomorphological Assessment (FGM) protocol in Massachusetts. We conducted research delineating river corridors and also on developing tools to assess erosion and deposition hazards. This assessment takes the form of a GIS model and delineates fluvial hazard levels from one reach to the next across the watershed. This map is currently being used as an educational tool for agricultural service providers, producers, and other riverfront stakeholders and planners.

Results
Participants increased their understanding of the full range of fluvial geomorphological assessment methods, as well as their individual costs and benefits. Participants increased their understanding of ecologically restorative flood prevention and remediation in New England. Participants increased in their understanding of how water resources are affected by changes in climate in the Northeast.

4. Associated Knowledge Areas

KA Code	Knowledge Area

111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	353

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Despite the fact that the anthropogenic causes of climate change are global in nature and require solutions derived from grand scale international cooperative efforts, many of the effects are felt locally. A microcosm of the climate change problem can be found on the watershed scale as well, in the form of upstream causes and downstream effects. Understanding of the issues at hand can help forge good management decisions that help bolster resilience on the local level and alleviate damage to the watershed as a whole.

What has been done
We made progress toward establishing a Fluvial Geomorphological Assessment (FGM) protocol in Massachusetts. We conducted research delineating river corridors and also on developing tools to assess erosion and deposition hazards. This assessment takes the form of a GIS model and delineates fluvial hazard levels from one reach to the next across the watershed. This map is currently being used as an educational tool for agricultural service providers, producers, and other riverfront stakeholders and planners.

Results
Participants adhere more closely to regulations and practices that protect aquatic, riparian and floodplain ecologies. Regulators, municipal officials or other professionals implemented Fluvial Geomorphology-based protocols for stream assessment and management in Massachusetts. As a result there has also been an increase in the kind and number of relationships between institutions and collaborations across jurisdictions, agencies and purposes and in the number of

New England rivers subject to ecologically restorative flood prevention and remediation

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate

Outcome #3

1. Outcome Measures

Creation and synthesis of knowledge related to 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

{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 # 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%		4%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		48%	
402	Engineering Systems and Equipment	50%		40%	
504	Home and Commercial Food Service	0%		1%	
511	New and Improved Non-Food Products and Processes	0%		7%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	50%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.8	0.0	2.0	0.0
Actual Paid	0.0	0.0	1.3	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	403803	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
8326	0	75279	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
134844	0	437918	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

2. Brief description of the target audience

Growers, agricultural businesses, real estate developers, building managers, municipalities, 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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1291	15	12	0

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Applied Research Projects

Year	Actual
2015	4

Output #2

Output Measure

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

Output #3

Output Measure

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

Output #4

Output Measure

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

Output #5

Output Measure

- Websites or Other Computer-based Delivery

Year	Actual
2015	1

Output #6

Output Measure

- Peer review publications

Year	Actual
2015	3

Output #7

Output Measure

- Diagnostic Services

Year	Actual
2015	1

Output #8

Output Measure

- Grant Submission or Other Funding Proposal

Year	Actual
2015	1

Output #9

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2015	7

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

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Target audiences adopt practices that increase energy efficiency

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Businesses, government officials and individuals make decisions that impact energy use. UMass Extension conveys current energy efficiency, renewable energy, and building science information to stakeholders including those in the building trades, design professionals, agencies, building owners and occupants through workshops, web publication, and consulting. We seek to establish long-term and recurring energy savings statewide through information transfer to stakeholders and through consultations and integrated extension research projects.

What has been done
Projects addressed high performance enclosures. Public education targeted businesses and municipal audiences. We provided diagnostic testing of air barriers and educated volunteers and project managers on air tightness, air sealing techniques, and measurement. We worked with an HVAC company in the town of Rowe, MA to design a system that could satisfy the heating load of municipal buildings. We also worked within the local food system by focusing on low energy refrigeration and heat recovery systems for conventional refrigeration technologies.

Results

Participants adopted evaporative refrigeration while reducing compression refrigeration. They also adopted storage practices that increased energy efficiency and improved the quality of produce. Target audiences adopted specific building and design practices that increased energy efficiency as well as the use of renewable energy sources.

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
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	550

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

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
2015	50

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
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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
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

☑ 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
311	Animal Diseases	0%		6%	
501	New and Improved Food Processing Technologies	20%		0%	
701	Nutrient Composition of Food	0%		30%	
702	Requirements and Function of Nutrients and Other Food Components	0%		2%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	20%		2%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	60%		24%	
723	Hazards to Human Health and Safety	0%		5%	
724	Healthy Lifestyle	0%		31%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	1.2	0.0	6.0	0.0
Actual Paid	0.9	0.0	3.6	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**
56684	0	164637	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
90713	0	356232	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	612104	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Analytic Tools and Techniques
- Demonstrations
- Single day workshop, presentation or event
- Workshop series or educational course

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
Cosmetic and Pharmaceutical industries
Farmers Markets

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	361	55	0	0

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	11	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshop series or educational course

Year	Actual
2015	2

Output #2

Output Measure

- Displays and Exhibits
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

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

Output #4

Output Measure

- Peer review publications

Year	Actual
2015	11

Output #5

Output Measure

- Analytic Tools and Techniques

Year	Actual
2015	1

Output #6

Output Measure

- Demonstrations

Year	Actual
2015	4

Output #7

Output Measure

- Single day workshop, presentation or event

Year	Actual
2015	2

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

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	41

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
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

Six hundred forty-one EFNEP participants showed improvement in one or more safe food handling practices related to storing meat and dairy foods and thawing frozen foods (data from EFNEP Behavior Checklist Summary Report).

Key Items of Evaluation

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
502	New and Improved Food Products	0%		5%	
703	Nutrition Education and Behavior	50%		81%	
704	Nutrition and Hunger in the Population	15%		1%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		0%	
724	Healthy Lifestyle	25%		13%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	34.0	0.0	1.3	0.0
Actual Paid	1.5	0.0	1.2	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**
15817	0	98195	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
178060	0	121030	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
4069935	0	21227	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

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); school teachers, social service organizations

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14910	112211	60660	20877

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	4	4	8

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Demonstrations

Year	Actual
2015	125

Output #2

Output Measure

- Displays and Exhibits

Year	Actual
2015	532

Output #3

Output Measure

- Printed Materials

Year	Actual
2015	10

Output #4

Output Measure

- Single day workshop, presentation or event

Year	Actual
2015	763

Output #5

Output Measure

- Workshop series or educational course

Year	Actual
2015	5954

Output #6

Output Measure

- Peer review publications

Year	Actual
2015	8

Output #7

Output Measure

- Committee or Board Service

Year	Actual
2015	5

Output #8

Output Measure

- Curricula/Instructional materials

Year	Actual
2015	2

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
2015	276

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

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
2015	43

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.

What has been done
Our Expanded Food and Nutrition Education Program assisted limited-resource families to acquire the knowledge, skills, attitudes, and changed behaviors necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being. Four professional staff and 15 paraprofessionals provided nutrition education programming to low-income adults and youth. A total of 1,522 adults and 2,809 youth were reached in FY 2015.

Results
Nationally standardized youth EFNEP evaluation tools showed the following program impacts from pre- to post- measurement:
?76% of youth improved their abilities to choose foods according to Federal Dietary Recommendations or gained knowledge in this area.
?34% of youth improved their physical activity practices or gained knowledge in this area.
?60% of youth used safe food handling practices more often or gained knowledge in this area.
?38% of youth improved their ability to prepare simple, nutritious, affordable food or gained knowledge in this area.

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
2015	14482

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Massachusetts, the medical cost for obesity is estimated at 1 billion dollars per year and affects nearly 1 out of every 3 individuals ages 10 - 17. Obesity is associated with increased long-term risk for many chronic diseases, yet many of the most dangerous health problems associated with obesity are largely preventable. UMass Extension SNAP-Ed is part of a national nutrition education effort funded to provide nutrition education programs and activities that help adults and youth establish healthy eating habits.

What has been done
Nutrition education programs and activities assisted participants to establish healthy eating habits and physically active lifestyles. Staff in six field offices reached 60,213 adult and youth participants with direct education, making a total of 219,094 direct nutrition education contacts in FY 2015. A total of 227,951 individuals were reached through indirect nutrition education methods (displays, farmers' market food demonstrations, leave-behind enrichment activities for school staff, newsletters, blog, and telephone Tip Line) in FY 2015.

Results
Evaluation measures showed that SNAP-Ed programming resulted in statistically significant change from pre to post with:
?Adults eating 2 or more cups of fruit daily more often
?Adults drinking sugar sweetened beverages less often
?Grade 3-5 and grade 6-8 youth eating vegetables more often
?Grade 3-5 and grade 6-8 youth eating fruits more often

?Grade 3-5 and grade 6-8 youth being physically active more often
?Grade 6-8 youth drinking sugar sweetened beverages less often
?Grade 6-8 youth choosing whole grains more 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
2015	884

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
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

Participants increase use of effective nutrition education resources and materials

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	3586

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Our Expanded Food and Nutrition Education Program's (EFNEP) reached a total of 1,522 adults and 2,809 youth in FY 2015. Nationally standardized youth EFNEP evaluation tools showed the following program impacts from pre- to post- measurement:

- 76% of youth improved their abilities to choose foods according to Federal Dietary Recommendations or gained knowledge in this area.
- 34% of youth improved their physical activity practices or gained knowledge in this area.
- 38% of youth improved their ability to prepare simple, nutritious, affordable food or gained knowledge in this area.

Our Supplemental Nutrition Assistance Program Education (SNAP-Ed) reached 60,213 adult and youth participants with direct education, making a total of 219,094 direct nutrition education contacts in FY 2015. Pre and post evaluation measures showed that SNAP-Ed programming resulted in statistically significant changes with regard to:

- Adults eating 2 or more cups of fruit daily more often
- Adults drinking sugar sweetened beverages less often
- Grade 3-5 and grade 6-8 youth eating vegetables more often
- Grade 3-5 and grade 6-8 youth eating fruits more often
- Grade 3-5 and grade 6-8 youth being physically active more often
- Grade 6-8 youth drinking sugar sweetened beverages less often
- Grade 6-8 youth choosing whole grains more often

Key Items of Evaluation

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%		0%	
111	Conservation and Efficient Use of Water	15%		14%	
133	Pollution Prevention and Mitigation	10%		0%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		20%	
204	Plant Product Quality and Utility (Preharvest)	6%		0%	
205	Plant Management Systems	22%		0%	
211	Insects, Mites, and Other Arthropods Affecting Plants	11%		20%	
212	Pathogens and Nematodes Affecting Plants	11%		0%	
311	Animal Diseases	0%		45%	
601	Economics of Agricultural Production and Farm Management	10%		0%	
723	Hazards to Human Health and Safety	5%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		1%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	10.3	0.0	3.6	0.0
Actual Paid	5.1	0.0	1.2	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**
329758	0	350278	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
692144	0	321532	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
711149	0	475295	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Committee or Board Service
- Community Service Project
- Demonstrations
- Direct - Other
- Facilitated Group Meetings and Conferences
- Individual Consultations and Site Visits
- Printed Material (newsletter, factsheet, field manual)
- Research Project (Applied Research)
- Single day workshop, presentation or event
- Websites or Other Electronic Delivery
- Workshop series or educational course

2. Brief description of the target audience

Farmers
Landowners
Resource Managers
Horticultural Green Industry businesses and personnel
Professional Organizations and Industry Groups
Natural Resource Agencies
Municipalities

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12094	414450	20	0

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Demonstrations

Year	Actual
2015	3

Output #2

Output Measure

- Displays and Exhibits

Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2015	839

Output #4

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2015	872

Output #5

Output Measure

- Printed Materials

Year	Actual
2015	11

Output #6

Output Measure

- Published Articles (New, Professional and Trade)
  Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Single day workshop, presentation or event

Year	Actual
2015	11

Output #8

Output Measure

- Websites or other computer-based delivery

Year	Actual
2015	25

Output #9

Output Measure

- Workshop series or educational course

Year	Actual
2015	33

Output #10

Output Measure

- Applied Research Projects

Year	Actual
2015	4

Output #11

Output Measure

- Diagnostic Services
  Not reporting on this Output for this Annual Report

Output #12

Output Measure

- Academic Presentation/Poster
  Not reporting on this Output for this Annual Report

Output #13

Output Measure

- Peer review publications

Year	Actual
2015	4

Output #14

Output Measure

- Research, grant or policy report
  Not reporting on this Output for this Annual Report

Output #15

Output Measure

- Committee or Board Service

Year	Actual
2015	150

Output #16

Output Measure

- Community Service Project

Year	Actual

2015 2

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 viabilty agricultural businesses

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
2015	17749

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As Massachusetts communities face expanding development, increasing pressure on water resources and tightening fiscal resources, professional turf and grounds managers are challenged to manage the public and private lands under their purview in an environmentally responsible manner. How urban, suburban and rural land resources are managed has broad implications for water resources, property values, energy consumption, greenhouse gas mitigation, the safety of youth and adults, and the economic viability of businesses and communities.

What has been done
UMass Extension conducted research and shared knowledge related to economically viable and environmentally sound turf management. In FY 2015, through a combination of seminars, workshops, courses, educational presentations and site consultations, complemented by online content and communications, thousands of professionals and businesses in related to turf and grounds management gained knowledge and skills that will result in protection and enhancement of water resources and environmental quality.

Results
More than three thousand participants implemented or planned to implement environmentally sound turf management practices. In addition, 230 individuals, many of whom are responsible for making land and grounds management purchasing decisions in publicly funded as well as private business situations, learned information that will enable them to make better purchasing decisions.

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
212	Pathogens and Nematodes 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
2015	3441

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Pesticides are vital tools for controlling pests and maintaining an adequate food supply. If used improperly, pesticides can also threaten human health and the natural environment. Inexperienced applicators, accidents, inadequate protection and equipment continue to be areas of concern that increase the potential for negative personal and environmental impacts from pesticide exposure.

What has been done
Approximately 3000 pesticide exam study manuals were distributed by the UMass Extension to approximately 1000 individuals preparing for the state administered pesticide exams. The Pesticide Education program conducted sixteen workshops to help individuals prepared for the Massachusetts state pesticide license exams. The program also offered 15 pesticide re-certification training workshops to individuals that have pesticide licenses and certifications.

Results
The program used exam results provided by the Massachusetts Department of Agricultural Resources to determine the exam passing rate for our workshop participants. Individuals who took the workshop continue to pass at a higher rate than those who did not take the workshop. Seventy-five percent of the individuals who took the workshop passed the exam compared to a passing rate of 61% for nonparticipants.

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
212	Pathogens and Nematodes Affecting Plants

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	455

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As Massachusetts undergoes cultural, economic and climatic changes, both new and established growers will need to learn to use practices that are economically, environmentally and socially sustainable. The greenhouse industry consists of wholesale growers and retailers, as well diversified farms that are adding greenhouse crops. Plant production is also the basis for many associated horticultural industries. These companies have significant economic and environmental impacts for Massachusetts.

What has been done
Grower consultations; face to face educational workshops and conferences; articles, publications and newsletters (Extension Floral Notes - 300 subscribers); and updated information on websites (www.negreenhouseupdate.info - 109,000 visits per year; http://ag.umass.edu/greenhouse-floriculture - 290,000 visits), facebook (282 likes) and email ?(600 on mailing list). Created two new web-based applications on pest and disease management. YouTube videos on a variety of greenhouse production topics were viewed by 78,662.

Results
Growers of greenhouse crops gained knowledge and skills to improve their cultural practices such as fertilizing and watering. Growers increased their knowledge about exotic diseases and insects and invasive species. Growers learned to identify plant insects, diseases and cultural problems

associated with growing crops in greenhouses.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Participants adopt practices that enhance the economic viability of agricultural businesses

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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

Sustainable greenhouse production programs were delivered through a wide variety of educational opportunities including: Grower consultations; face to face educational workshops and conferences; articles, publications and newsletters and websites. Evaluation of the program showed:

- 79 growers plan to use learned practices that will result in economically benefiting

their business

- 4 growers intend to use organic fertilizers on greenhouse crops
- 42 will better use biofungicides over this next year
- 45 are better able to evaluate their biological control program
- 46 are better able to conserve natural enemies
- 37 adopted a new pest management practice such as better identification and scouting of pests
- 30 are planning to use information learned at the pollinator conference such as providing advice to customers, reducing pesticide use, creating bee gardens and other bee habitats

The UMass Extension Pesticide Education provided initial and continuing education to approximately 1000 individuals in Massachusetts, assisting them to become licensed and certified pesticide applicators. Workshop covers a variety of topics including, pest identification, pesticide types and formulations, toxicity of pesticides, first aid for pesticide poisoning, pesticide label comprehension, personal protective equipment, environmental fate of pesticides, integrated pest management, and state and federal laws and regulations. Individuals who took the workshop continue to pass at a higher rate than those who did not take the workshop. Seventy-five percent of the individuals who took the workshop passed the exam compared to a passing rate of 61% for nonparticipants. This represents a percentage difference of 20% between the two groups.

The program also offered 15 pesticide recertification training workshops to individuals that have pesticide licenses and certifications. Topics covered in the series included: Massachusetts Pesticide Laws and Regulations, Pesticides and Environmental Fate, Pesticide Exposure Studies, Pesticides and Impacts on Wildlife, Impacts of Pest Management on Pollinators, EPA Worker Protection Standard, Integrated Pest Management and Regulations for Schools, Pesticides and Pest Resistance and Special Topics for Pesticide Applicators. A total of 1,791 individuals participated in the workshops. All participants were given an opportunity to evaluate the workshops. Of the 1212 individuals who completed evaluations, 67% indicated that they increased their knowledge, "very much" and 59% indicated that they would "very much" use the information/techniques that they learned.

Key Items of Evaluation

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%		100%	
806	Youth Development	80%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	14.0	0.0	0.0	0.0
Actual Paid	7.5	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**
544570	0	5857	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
239313	0	51666	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
367116	0	5857	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

2. Brief description of the target audience

- Youth from all backgrounds
- 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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1933	363129	28023	1170

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total

Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 4-H Clubs

Year	Actual
2015	219

Output #2

Output Measure

- Community Service Projects

Year	Actual
2015	87

Output #3

Output Measure

- Curricula/Instructional Materials

Year	Actual
2015	4

Output #4

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2015	70

Output #5

Output Measure

- Printed Materials

Year	Actual
2015	28

Output #6

Output Measure

- Single day workshop, presentation or event

Year	Actual
2015	79

Output #7

Output Measure

- Websites or other computer-based delivery

Year	Actual
2015	2

Output #8

Output Measure

- Workshop series or educational course

Year	Actual
2015	900

Output #9

Output Measure

- Displays and Exhibits

Year	Actual
2015	224

Output #10

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2015	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

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
2015	50

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	595

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
About one quarter of the population of Massachusetts is under age 18. These young people are the future workforce and leaders of our state and our nation. The healthy development of these youth cannot be left to chance. Since 1919, the Massachusetts 4-H Program has provided support, resources and educational opportunities to Massachusetts youth. The mission of Massachusetts 4-H is to prepare youth to become independent and contributing members of society by providing them with the tools they need to be successful.

What has been done
The 4-H club system offered activities that allow members to develop and practice critical life skills. Thirty-six percent of enrolled club members participated in the Visual Presentation Program. Twenty-three percent of enrolled club members completed written 4-H records and turned them into the local county office for evaluation. Twenty-two percent served in leadership roles in the 4-H program (e.g. club officers, Advisory and Program Councils). Seventy-eight percent participated in a community service project.

Results
Youth demonstrated increased communication skills. Youth demonstrated increased decision-making skills. Youth demonstrate increased record keeping skills. Youth will participated in community service activities

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

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
2015	2895

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 #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
2015	2752

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 Mass 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 2014-15, 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. This diversity was again enhanced by a recruiting effort in Environmental Justice communities made possible by a grant from the National Conservation Foundation.

Results
Youth increased their understanding of current issues related to environment and land development in Massachusetts communities. Youth reported an increase in their knowledge and skills related to natural resource management.

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
2015	3863

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

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

The Massachusetts Envirothon program continued to provide a rich, positive youth development experience in natural resource and environmental affairs, and also in teamwork, presentation skills, and community research, The 2015 survey of Massachusetts Envirothon participants once again focused on the team members' learning experience over the Envirothon year, but also looked at coaches' experience through the year and experience of the day of the Envirothon.
Knowledge of the Climate Crisis in their communities. The 2015 Current Issue - "Climate Crisis: Taking Action in Massachusetts Communities" - was a natural for community research. 88% of team members reported that their Envirothon experience had increased their knowledge of the climate crisis to a moderate or great extent. Fully 95% of coaches saw an increase "to a moderate or great extent" in their teams' knowledge of the crisis.
Knowledge of Ecosystems and Natural Resources. . 81% of team members reported that their "familiarity with outdoor places and ecosystems in their communities" had increased by a moderate or great extent. Overall, approximately two thirds of team members reported a small or moderate increase in their knowledge of water, forest, and wildlife, and soil resources. Over 80% of responding coaches reported that their teams had increased their knowledge and skill in these areas to at least a moderate extent.
Teamwork and Presentation Skills. 87% of team members believed that their Envirothon

preparation had increased their ability to work with others as a team to a moderate or great extent. Coaches concurred, with 100% reporting that they had seen an increase to a moderate or great extent in their students' teamwork. 73% of team members believed that their ability to make an effective team presentation had increased to a moderate or great extent.

Navigating Community Issues. Approximately half of the competing teams (14 of 30) completed the requirements to receive the Community Research Award. 77% of all team members felt that their "understanding of how decisions about the environment and natural resources are made in your community" had increased to a moderate or great extent. 78% reported an increase to a moderate or great extent in their "ability to find and talk to people with knowledge about the environment".

Community Service. About 83% of team members reported a moderate or great increase in their interest in "taking action for the environment in your community". 70% of responding coaches saw a moderate to great increase in their teams' "engagement with their community".

Environmental Stewardship. 83% of participating youth reported that their interest in reducing their environmental impact (ecological footprint) had increased to a moderate or great extent as a result of their Envirothon participation. 87% of team members reported that their Envirothon involvement had increased their interest in spending time outdoors. 95% of coaches completing the survey agreed that their teams' sense of environmental stewardship had increased to a moderate or great extent.

Key Items of Evaluation

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	10%		9%	
111	Conservation and Efficient Use of Water	0%		11%	
112	Watershed Protection and Management	5%		46%	
123	Management and Sustainability of Forest Resources	24%		0%	
124	Urban Forestry	10%		0%	
131	Alternative Uses of Land	2%		0%	
133	Pollution Prevention and Mitigation	2%		2%	
135	Aquatic and Terrestrial Wildlife	10%		3%	
136	Conservation of Biological Diversity	14%		0%	
211	Insects, Mites, and Other Arthropods Affecting Plants	8%		8%	
212	Pathogens and Nematodes Affecting Plants	8%		3%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	0%		7%	
216	Integrated Pest Management Systems	2%		2%	
302	Nutrient Utilization in Animals	0%		5%	
605	Natural Resource and Environmental Economics	0%		4%	
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: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	12.4	0.0	3.2	0.0

Actual Paid	4.3	0.0	4.3	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**
84516	0	399403	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
658429	0	605183	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
592850	0	1945380	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
- 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

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10279	165115	100	0

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Analytic Tools and Techniques

Year	Actual
2015	2

Output #2

Output Measure

- Diagnostic Services

Year	Actual
2015	960

Output #3

Output Measure

- Facilitated Group Meetings and Conferences

Year	Actual
2015	87

Output #4

Output Measure

- Printed Materials

Year	Actual
2015	47

Output #5

Output Measure

- Published Articles (News, Professional and Trade)

Year	Actual
2015	0

Output #6

Output Measure

- Single day workshop, presentation or event

Year	Actual
2015	92

Output #7

Output Measure

- Survey or needs assessment

Year	Actual
2015	7

Output #8

Output Measure

- Websites or other computer-based delivery

Year	Actual
2015	24

Output #9

Output Measure

- Workshop series or educational course

Year	Actual
2015	11

Output #10

Output Measure

- Applied Research Projects

Year	Actual
2015	31

Output #11

Output Measure

- Displays and Exhibits

Year	Actual
2015	0

Output #12

Output Measure

- Peer review publications

Year	Actual
2015	1

Output #13

Output Measure

- Research, Grant or Policy Report

Year	Actual
2015	3

Output #14

Output Measure

- Community Service Project

Year	Actual
2015	1

Output #15

Output Measure

- Demonstrations

Year	Actual
2015	32

Output #16

Output Measure

- Individual Consultations and Site Visits

Year	Actual
2015	238

Output #17

Output Measure

- Academic Presentation/Poster

Year	Actual
2015	8

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

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
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	71858

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Massachusetts currently features a relatively large proportion of canopy cover in its three largest cities with plans to increase urban tree populations in the near. The value of trees planted in residential settings has been well-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 little scientific data related to their survival and growth in urban environments.

What has been done
Key activities for the past year focused on conducting outreach via the web and other media outlets (TV/Radio). Increasingly targeted efforts were also focused on collaborating directly with key individuals in various communities throughout Massachusetts who serve as Tree Wardens. Research activities for the past year focused on measuring the growth responses of trees in the urban environment and on developing pest-resistant tree species suitable for establishment in the urban landscape

Results
Participants developed skills to maximize tree survival and health in urban settings. Participants increased their understanding of the importance of the community forests and the benefits associated with trees in urban settings. Participants will increase their understanding of urban and community forestry-related resources.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	23483

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Massachusetts is the third most densely populated state in the nation. The rate of land consumption for residential development is steadily increasing. Haphazard growth has impacted water resources, natural resource-based enterprises, open space, wildlife habitat, and community character. Nearly half the state's communities lack professional planning staff, while volunteer boards struggle with increasing levels of responsibility, liability, time demands and public mistrust.

What has been done
A major focus this past year was development of a web-based MA Wildlife Climate Action Tool. We continued to serve as a general resource on fish, wildlife and biodiversity conservation with emphasis on the impact of roads and highways on wildlife and ecosystems. We continued to play a leadership role in Massachusetts and the region for wetlands assessment and wetlands protection. Expansion of the River and Stream Continuity Project, now called the North Atlantic Aquatic Connectivity Collaborative and covers 13 states in the northeastern U.S.

Results
The MA River and Stream Crossing Standards continue to inform policy at both the state and federal level. Multiple references to the Massachusetts River and Stream Crossing Standards and Road-Stream Crossing Assessment protocols were included in the Massachusetts Department of

Transportation?s handbook ?Design of Bridges and Culverts for Wildlife Passages at Freshwater Streams.? The Standards are referenced in the U.S. Army Corps of Engineers Programmatic General Permit (PGP) for Massachusetts. New crossings of rivers and streams must meet these standards in order to qualify for non-reporting status under the General Permit. MassDEP has revised Wetland Protection Act regulations making direct reference to the Crossing Standards

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 #3

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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

Urbanizing watersheds often face water shortages due to increased water use for residential landscaping and decreased base flow as impervious land cover limits aquifer recharge. Low-impact development (LID) practices, specifically those that infiltrate runoff, have the potential to keep more water in the watershed, and increase base flows in the river. This study explored the barriers and motivations that exist to LID adoption by local residents in the Ipswich River watershed north of Boston, Massachusetts that experiences

seasonal water shortages. The study used a postal and on-line survey with images of different low-impact development practices including rain gardens and native plantings and items about homeowners' watering practices, likelihood of adopting innovative residential landscape practices to save water, and attitudes towards environmental issues in the region. The results found that local residents (n=265) were aware of existing water shortages and supportive of water policies to restrict use. In addition, their willingness to adopt innovative landscape practices were influenced by their aesthetic response with more support for those practices that appeared neat and cared for rather than those that were more rough and unkempt appearing. Barriers to residential adoption of these landscape practices included concern about disease-carrying pests and the perceived cost of landscape change. Knowledge about the environment, as operationalized by membership in a local watershed association, as well as educational attainment and income were significant variables in predicting aesthetic preferences and willingness to adopt LID practices. While survey response rates were highest among watershed members, membership in a watershed association did not correlate with a stronger willingness to adopt these landscape practices or an increase in the number of existing features on homeowners' property. Those with higher income and education were, however, more willing to adopt these practices. Some discrepancies exist among groups between stated willingness and aesthetic acceptance of these landscape, where respondents indicated they were less interested in adopting the practice, but when shown a photo, were much more interested. The findings emphasize alternate strategies for land use planners, landscape professionals and environmental organizations to promote behavioral changes in the way residential landscapes are managed, and policies municipalities could adopt to implement more widespread use of LID practices.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Massachusetts Center for Agriculture Administration

☑ 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: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	8.6	0.0	0.2	0.0
Actual Paid	3.0	0.0	1.2	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**
587712	0	418456	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
549925	0	251429	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
69712	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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	150	150	0	0

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	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
2015	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

Not Reporting on this Outcome Measure

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)	
3462	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
8	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.