2012 University of Vermont Combined Research and Extension Annual Report of Accomplishments and Results

Status: Submitted

Date Submitted: 04/01/2013

I. Report Overview

1. Executive Summary

The research and the outreach results described in this report are but a short list of the work ongoing each day that has impact on this nation. From the development of new leaders from 4-H programming, to helping adults become leaders in their communities, to becoming volunteers with knowledge impacted by the Master Gardener program, the research and outreach of the Land Grant Universities, including UVM, make continuing contributions to the strength of our individual state economies and communities.

Though our efforts, that of VT-AES and Extension, are divided in planned programs our efforts are integrated to best serve our citizens. Multidisciplinary work and integration of our research and outreach sometimes fall in different planned programs. For example in the planned program VT-AES Food Safety research results are taken by Extension to producers, reported to planned program Global Food, to enhance their business viability protecting the agriculture base.

Central to our mission are public service, civic engagement and outreach throughout Vermont to further economic development, health, civic life and environmental sustainability. This year VT-AES and Extension focused on the areas of agriculture, environment, nutrition, food safety, health, and community and economic development. Among our successes are UVM Extension and other organizations support of a coalition of Vermont farmers to keep Lake Champlain clean; Proctor Maple Research Center testing viability of birch syrup as an added crop to help maple producers during increasingly unreliable seasons; and UVM research and Extension outreach addressing issues surrounding the needs of Vermont dairy farmers, the workers they employ and the communities in which they live.

Tropical Storm Irene brought out the best in the citizens of Vermont. The University responded reaching out to affected communities. Extension efforts were focused on helping with the urgent issues related to the flooding of fields and crops. Farms of all types lost crops, animals, equipment and soil to the flood waters which deposited debris and silt as well as potential contaminants onto crops and fields. The UVM Agricultural Testing Lab provided free testing of flooded soils for nutrients and heavy metals. Support for recovery efforts provided sources of grants and loans, printed and electronic information about dealing with feeding animals and potential contaminants on crops and fields, and one on one technical and emotional support. Extension and AES personnel volunteered clearing debris, carrying feed across foot bridges and other things as they were needed.

Efforts continue to evolve to address issues of importance to Vermonters. Faculty and staff hires and grant funds are supporting some new and expanding other efforts. For example an engineering position is focusing in production and harvesting. Another position is focused on safe food handling and processing for meat and other food offering materials and workshops such as, "Food Safety for Farmers Markets Vendors," and HACCP for meat and poultry producers." GAP certification programming has reached those producers wishing for certification but others not wishing for certification want safe food handling information to protect consumers and their business. In June of this year the first meeting of the Vermont Food Safety Task Force was held following a Food Safety Summit. The task force is committing to increasing and maintaining collaboration among various food safety stakeholders to address food safety issues in Vermont

We are not just focusing on food safety. PROSPER, a grant funded effort to enhance the capacity of our faculty and staff in the 4-H and family program areas to create Vermont community partnerships that sustain the most effective programs for promoting positive youth development and strong families. Sea Grant funded efforts are working with other states sharing their Lawn to Lake initiative. eXtension has many from the University of Vermont Extension and Ag Experiment Station contributing their expertise in

many areas such as Diabetes, Evaluation, Organic production, Energy, and more.

Each year an annual report (http://www.uvm.edu/extension/?Page=annualreport.php) and event held for our legislators. A popular event where a few programs of Extension and the Ag Experiment Station are highlighted and local foods such as apple pie, ice cream, cheese and sugar on snow (maple syrup on snow) are served. It is also UVM Extension's centennial with a year of events including an oral history project, 4 publications distributed in local print media as an insert statewide and a printed history of Extension. Access to all these efforts is available at http://www.uvm.edu/extension/centennial/. Share in viewing our history

Total Actual Amount of professional FTEs/SYs for this State

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	53.0	0.0	19.8	0.0
Actual	55.4	0.0	11.9	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- Expert Peer Review
- Other (Regional and national peer discussions)

2. Brief Explanation

Extension key staff have monthly telephone meetings with the four states that cooperated to develop an on-line planning and reporting system. These are an opportunity for each of the states to provide feedback on specific programs and the statewide goals and initiatives. Discussions include regional programs, opportunities for multistate work, sharing staff resources and other programing strategies and issues. In addition, staff at the faculty and administrative level access the on-line system (lmprs.net) to view peers work. Program staff, faculty and administration is active in regional and national discussions around program success and challenges.

VT-AES provides the opportunity for seed project funding through a competitive proposal process. Project proposals are evaluated for scientific and technical merit through a peer review process. Projects are intended as seed funding to aid the PI in establishing a new research direction, or augment dimensions of their currently extramurally funded research program.

III. Stakeholder Input

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

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of the general public
- Other (see narrative for details)

Brief explanation.

Nearly all program efforts ask participants if the programming meets their expectations and asks them for input to be considered for future programming. Program structure and focus as well as delivery methods are considered for future programming including future research. Collaborations are initiated based on clients identified needs such as the Migrant Education program client workers who are challenged with receiving appropriate health care now have the UVM School of Medicine NOTCH program. Challenges with accessing food and food choices due to a lack of transportation identified a need so one county began a garden project for workers and their families to grow their own produce. In nutrition programming schools expressed a need for nutrition programs in schools so two Americorp were brought in to meet that need.

Partnerships with communities, public and private organizations and businesses are important in reaching and serving clients with appropriate programming. These relationships remain a critical part of identifying needs and gaps for programming.

The Director of VTAES has appointed an advisory board which meets twice a year to provide feedback and advice. They provide advice on future trends of agriculture and life sciences.

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

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Needs Assessments
- Use Surveys

Brief explanation.

Vermont has a population of under 600,000 adults. A statistically viable sample of the public is completed each year by phone survey accessing priorities, preference for access to programs and information, and familiarity with existing program efforts. The over 1000 events each year provide opportunity for feedback via post event evaluations. Some programs also use specific focus groups and advisors identified by staff as informed users.

VTAES Director looks at a wide range of expertise and appoints individuals in the advisory committee who have experience in the area of dairy farming, state legislation, scientists, finance, marketing, etc.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Survey of the general public
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

Extension completes an annual state wide population sample survey, focus groups, state advisor groups, post event and reflective data collection methods.

The individuals on the VT-AES advisory board meet twice a year and provide information on future trends of agriculture and life sciences.

3. A statement of how the input will be considered

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

Brief explanation.

As a small state close to its citizens at all levels, collected data is used to refine, remove or create new educational programs and delivery methods that will serve the needs of the state. Vermont Extension, also due to its size, has close relationships with state and local government an asset when seeking input and when sharing expertise and/or concerns of citizens.

The VTAES advisory board provides a source of counsel to the Director. The Director uses their input to help formulate a research direction.

Brief Explanation of what you learned from your Stakeholders

Increase support for local food systems research and extension.

Importance of formula funds in supporting infrastructure to support communities in disasters.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1803731	0	1822489	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1775979	0	1671094	0
Actual Matching	3667191	0	2119178	0
Actual All Other	3874142	0	62263	0
Total Actual Expended	9317312	0	3852535	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	104579	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
133	Pollution Prevention and Mitigation	20%		0%	
202	Plant Genetic Resources	0%		7%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		8%	
205	Plant Management Systems	6%		11%	
206	Basic Plant Biology	0%		6%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		7%	
216	Integrated Pest Management Systems	9%		5%	
311	Animal Diseases	0%		13%	
402	Engineering Systems and Equipment	4%		0%	
501	New and Improved Food Processing Technologies	0%		5%	
601	Economics of Agricultural Production and Farm Management	29%		10%	
602	Business Management, Finance, and Taxation	14%		0%	
604	Marketing and Distribution Practices	3%		9%	
605	Natural Resource and Environmental Economics	3%		5%	
607	Consumer Economics	0%		9%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	2%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	2%		0%	
723	Hazards to Human Health and Safety	8%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	25.0	0.0	5.7	0.0
Actual Paid Professional	28.5	0.0	3.7	0.0
Actual Volunteer	8.1	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**
903653	0	458542	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1865939	0	700236	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1971241	0	39471	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Project listed in bold followed by delivery methods:

- **Beginning Farmers**. Focus groups, learning circles, workshops, mini-courses and publications
- **Ag Business Management.** Conferences, courses, consultations and farm visits.
- **Agricultural safety**. Courses, consultations and farm visits
- **Engineering for food production, harvest, and storage**, Consultations, research and field visits.
- **Community Preparedness.** Workshops, discussion group
- **Dairy Management:** Consultation
- **Equine program.** Annual equine event, publications, workshops.
- **Farm and Forest Transfers.** Workshops, consultations, farm visits
- **Farm Viability.** Farm visits, consultations
- **Farming Alternatives**. Workshops, consultations, farm visits.
- **Farming Across Cultures:** Farm site visits
- **Food Production in Business**: Workshops, consultations, site visits
- **Forage and Pasture Management Education.** Conference, farm visits, consultations
- **GAP Good Agricultural Practices**: Presentations, consultations
- **Maple Program.** Conference, workshops, newsletter.
- **Nutrient Management Program**. Farm visits, consultations
- **Organic Grain Project**. Demonstrations, data gathering.
- **Pest Management Education.** IPM and Pesticide Education and Safety Program (PESP)
- **Private/Commercial Landowner and Industry Professional Education**: Tour and conference
- **Soil Health:** Demonstration, consultation
- **Sustainable Transportation Project:** certification, presentations, consultations
- **UVM Tax School.** conference, tax book
- **Vegetable and Berry Growers**. Consultations, farm visits, meetings, various media, presentations, website.
- **Vermont New Farmer Network**. Conference, networking, consultations
- **Vermont Pasture Network.** Pasture walks, demonstrations and trials, conference, consultations, various media.

- **Vermont Tourism and Recreation.** Research, conference.
- **Extension Master Gardener.** Course, train the trainer
- **Women's Agricultural Network.** Newsletters, website, classes, workshops, individual and small group consultations.

AES efforts.

- **Animal Manure Treatment Systems**
- **Evaluation sustainability of soil health through management of plant-parasitic nematodes; field trials, experiments being done**
- **Study of consumer preference drivers for Vermont Artisan Cheese**
- **Storm and Wastewater Management Systems**
- **Perturbation of soil ecosystems by anthropomorphic interventions**
- **Soil nutrient effect on forest ecosystem productivity and lake water quality**
- **Soil fertility/chemistry/physical problems associated with waste disposal and bioremod faction**
- **Economics of organic dairy, crop management and alternative energy**
- **Heifer nutrition, rearing and management**
- **Dairy nutritional immunology**
- **Small ruminant production and management systems**
- **Development of strategies to address applied equine issues**
- **identification of genetic traits that make species invasive**
- **Surveillance and prevention of spread of Asian Longhorned Beetle**
- **Management of thrips pests in forests and greenhouses**
- **Identification/control of fungal propagation**
- **Fungal biological plant protection, collection and management**
- **Explore microbial pesticides and fungal components as IPM strategies**
- **Innate immunity, DNA-based vaccines and mastitis prevention**
- **Hormonal regulation of glucose synthesis and milk production**
- **Functional genomics and photoperiod effects on hormonal cycles/milk production**
- **Explore ruminant lipid metabolism**
- **Impact of global climate**
- **Threat posed by foreign or exotic diseases on livestock in this country**
- **Advance current techniques of producing lifesaving medicine with much reduced costs**
- **Help to create new ways for sustainable agriculture**
- **Identify a maple crop management system which optimizes productivity and that will enable maple producers to increase profitability of maple production operations**
- **Develop indicators of food systems engagement and measure their impact on dietary choices**. Stu

E

2. Brief description of the target audience

- 4-H: Camp Counselors
- Adults
- Age 25 - Senior
- Agriculture/Natural Resources: Watershed Based Organizations
- Agriculture: Apple Growers
- Agriculture: Beef Producers

- Agriculture: CCA & Crop Consultants
- Agriculture: Crop Producers
- Agriculture: Dairy Producers
- Agriculture: Equine Producers/Owners
- Agriculture: Farm Employees
- Agriculture: Farm Families
- Agriculture: Farm Managers
- Agriculture: Farmers
- Agriculture: Goat & Sheep Producers
- Agriculture: Greenhouse Ornamental Growers
- Agriculture: Home Gardeners
- Agriculture: Industry Professionals
- Agriculture: Livestock producers
- Agriculture: Maple Industry
- Agriculture: Maple Sugar Producers
- Agriculture: Non-Dairy Producers
- Agriculture: Nursery operators
- Agriculture: Ornamentals Industry Professionals
- Agriculture: Service Providers
- Agriculture: Small Fruit & Vegetable Growers
- Agriculture: Veterinarians
- Agriculture:Dairy Goat, Meat Goat and Dairy Sheep Producers

3. How was eXtension used?

Leadership and expertise in CoPs.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24162	440000	260	0

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

Patent Applications Submitted

Year:	2012
Actual:	1

Patents listed
Plantation Maple Sap Collection

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	6	16	22

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Class/course

Year	Actual
2012	8

Output #2

Output Measure

- Conference

Year	Actual
2012	10

Output #3

Output Measure

- Consultation

Year	Actual
2012	2944

Output #4

Output Measure

- Consumer Publication

Year	Actual
2012	60

Output #5

Output Measure

- Demonstration

Year	Actual
2012	57

Output #6

Output Measure

- Discussion group

Year	Actual
2012	69

Output #7

Output Measure

- Educational/evaluation instrument
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Electronic Communication/phone

Year	Actual
2012	1068

Output #9

Output Measure

- Field day/fair

Year	Actual
2012	6

Output #10

Output Measure

- Field site visit

Year	Actual
2012	88

Output #11

Output Measure

- Funding request
  Not reporting on this Output for this Annual Report

Output #12

Output Measure

- Presentation

Year	Actual
2012	162

Output #13

Output Measure

- Publication - Peer Reviewed

Year	Actual
2012	6

Output #14

Output Measure

- Publication - curriculum

Year	Actual
2012	1

Output #15

Output Measure

- Publication - fact sheet

Year	Actual
2012	34

Output #16

Output Measure

- Publication - magazine article

Year	Actual
2012	5

Output #17

Output Measure

- Publication - manual

Year	Actual
2012	3

Output #18

Output Measure

- Publication - newsletter

Year	Actual
2012	66

Output #19

Output Measure

- Publication - newsprint article

Year	Actual
2012	88

Output #20

Output Measure

- Research project

Year	Actual
2012	10

Output #21

Output Measure

- TV segment/ATF

Year	Actual
2012	23

Output #22

Output Measure

- Technical Publication
  Not reporting on this Output for this Annual Report

Output #23

Output Measure

- Tour(s)

Year	Actual
2012	2

Output #24

Output Measure

- Train the Trainer trainings
  Not reporting on this Output for this Annual Report

Output #25

Output Measure

- Website development and updates

Year	Actual
2012	178

Output #26

Output Measure

- Workshop - series

Year	Actual
2012	19

Output #27

Output Measure

- Workshop - single session

Year	Actual
2012	222

Output #28

Output Measure

- Scientific meetings

  Not reporting on this Output for this Annual Report

Output #29

Output Measure

- Trainee Delivered programs

Year	Actual
2012	92

Output #30

Output Measure

- Survey instruments

Year	Actual
2012	3

V(G). State Defined Outcomes

O. No.	OUTCOME NAME
1	Increase the number of farmers who implement at least one cropping practice to improve crop and soil productivity and water quality
2	Increase in collaboration with agency and industry personnel to address farm safety and emergency preparedness
3	Increase in number of tax school participants stating improved accuracy of tax reporting for their clients
4	Increase in number of tax schools participants understanding federal and state tax laws and requirements
5	Increase in number of farmers that develop a nutrient management plan for their farm
6	Increase the number of farmers who implement at least one change in nutrient management plan practices
7	Increase the number of legislators and key decision makers who increase understanding of current local agricultural issues
8	Increased delivery of organic dairy information to dairy farmers across the nation that is accessible, reliable, credible and up-to-date.
9	Increase in number of Master Gardener participants earning certification
10	increase in the number of farmers who improve pasture management practices
11	Number of enterprises (already using recommended practices)that use Extension consultation to assess/inform business decisions
12	Number of clientele who have adopted one or more IPM practices that increase environmental sustainability
13	Number of enterprises that adopt a recommended practice resulting in increased revenues and/or reduced costs
14	Participants will have gained knowledge on how to grow organic crops (e.g. apples, grains)
15	A greater variety of produce available at home.
16	Number of farms that plan for and incorporate biosecurity, safety and preventative measures
17	Farmers will implement safety measures, i.e., ROPS on tractors
18	Farmers who implement a new practice to begin production of or improve current oilseed production yield and quality
19	Growers adopting new varieties

20	Number of individuals who change their gardening practices to reduce gardening inputs
21	Number of participants who go on to start a business within 18 months of course completion
22	Number of participants who make an informed decision to not start a business after completing the course
23	Number of farmers who will grow and market soybeans for local feed, oil production or export market to increase farm income
24	Number of farmers who will grow and produce energy crops and transform into energy products
25	Number simulation models developed to protect the economic viability of livestock and tourism.
26	Number of research trials to manage insects in greenhouse ornamentals (plants).
27	Number of legislative actions taken based on research study data.
28	Number of maple producers who use a maple crop management system that optimizes productivity and increases profitability.
29	Number of food system indicators that measure impact on dietary choices
30	Number of research results which increase the understanding of a plants response to their environment.
31	Number passing the USDA GAPs audit to gain or maintain a market for their locally grown crop(s)
32	Number of growers growing organic crops increase revenues improving business sustainability

Outcome #1

1. **Outcome Measures**

   Increase the number of farmers who implement at least one cropping practice to improve crop and soil productivity and water quality

2. **Associated Institution Types**

   - 1862 Extension
   - 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2012 51

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The agriculture industry is critical to Vermont's economy but dairy farms are struggling because of high input costs and low and volatile milk prices. Regulations and farmers interest in protecting the environment push farmers to look for solutions that do not threaten business viability. A major expense for farmers is crop production.

What has been done
One Extension educational effort this year has focused on pre-sidedress nitrate tests (PSNT). Outreach has included newsletters, consultations, workshops and meetings in 9 counties reaching 328 farmers and industry professionals. Data is then collected to understand if the information is being used and the resulting impact on the business and the environment.

Results
One farm, used as a case study at four winter meetings in Vermont and New Hampshire, called Extension after reading an article about PSNT. He then tested 13 fields, followed the recommendations resulting in increased corn silage yield and savings on fertilizer costs. He estimates a savings of over $30,000 and the environmental benefits are noteworthy. Over 300 farmers accessed information on PSNT with data collected to date showing 25 farmers are using PSNT. Effort will continue to understand the economic and environmental impact as the program matures.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Increase in collaboration with agency and industry personnel to address farm safety and emergency preparedness

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Increase in number of tax school participants stating improved accuracy of tax reporting for their clients

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Increase in number of tax schools participants understanding federal and state tax laws and requirements

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	326

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tax laws change each year and can be very complex. Tax practitioners who are not enrolled agents or CPAs must pass the new IRS Registered Tax Practitioners (RTP) test. Anyone who sees a tax preparer needs to feel confident that they are being given the expertise necessary and having a certified tax practitioner is assuring.

What has been done
388 CPAs, attorneys, and tax practitioners attended the annual UVM Tax School this year. Highest rated topics are legislation, retirement and foreign taxation. Besides bringing in tax experts as speakers, participants are given tools and materials to aid them in preparing tax forms. Certificates are given to those who pass the IRS RTP test, which the school prepares them for.

Results
Participants selected strongly agree or agree (94%) indicating the Tax School will improve accuracy when preparing tax forms. Participants were asked, how many hours in a tax season they estimated were saved by having the tools/book provided and the knowledge they gained at the tax school. Given hour ranges 50% chose <20 hours, 38% 20-40 hours, and 4% >70 hours. On average, tax practitioners charge $75-100/hour. Training is saving time and money while providing an important, valued service to clients/citizens.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Increase in number of farmers that develop a nutrient management plan for their farm

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many waters of the state are impaired from agricultural loss of nutrients and sediments. Impaired water reduces the quality for drinking, recreation, wildlife, and livestock. The reduced quality can impair human and ecosystem health. Impairment from agricultural runoff can be reduced through implementation of reduced tillage practices on farm fields.

What has been done
UVM Extension implemented a reduced tillage project in 2010 in 4 counties. This program allows farmers to use UVM owned equipment to "try" the practice at a low cost or the farmer can modify their own planter to be reduced tillage ready. Lastly, outreach and education is provided training farmers on how to use the equipment so they can try reduced tillage on their farm.

Results
The project has seen reduced tillage on 4500 acres. Based on current tillage costs this can translate into a cost savings of roughly $44 per acre or $200,000. It has significant impact on erosion rates with average reductions of 2 tons of soil loss per acre or 9000 tons of soil and its accompanying nutrients and sediments prevented from further impairing our waters. This program continues for farmers for corn, soybeans, and new seedings of perennial forage and cover crops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
601	Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

Increase the number of farmers who implement at least one change in nutrient management plan practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	130

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agricultural nutrient management planning (NMP) and implementation of the plan prevents water pollution, but some farmers have not adopted this process. Cost, time and lack of knowledge about a new practice can be barriers. Educational outreach, including working directly with farmers is very effective in helping farms implement NMPs.

What has been done
One faculty member has increased outreach programming, hired a team, with funding from USDA NRCS, VT Agency of Natural Resources and VT Agency of Agriculture as well as additional funding for Livestock Fencing and No-Till planting of crops to promote conservation practices with farmers. The team is working with farmers one-on-one, in classroom settings and via printed news releases and electronic mailings. Over 150 farmers attended workshops to update their farm nutrient plans or develop pasture and crop management plans for this year.

Results
The team worked with 130 farms in 2012 implementing conservation practices on 23,000 acres. Accomplishments include five miles of fence to exclude livestock from streams and $96,000 of incentive payments resulting in 830 tons of soil saved. 11,000 acres have reduced phosphorous loss by a much as 30% by using aerator machines in manure application. 1200 acres were planted with cover crops conserving approximately 36,000 lbs of Nitrogen, 12,000 lbs of Phosphorous, and 60,000 lbs of Potassium as well as preventing almost 1,000 tons of soil erosion. With a skilled, energetic team of Extension professionals to support farmers, farmers continue to contribute to a vibrant Vermont economy while being good land stewards and protecting our water.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. **Outcome Measures**

   Increase the number of legislators and key decision makers who increase understanding of current local agricultural issues

   Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

   Increased delivery of organic dairy information to dairy farmers across the nation that is accessible, reliable, credible and up-to-date.

   Not Reporting on this Outcome Measure

Outcome #9

1. **Outcome Measures**

   Increase in number of Master Gardener participants earning certification

2. **Associated Institution Types**

   - 1862 Extension

3a. **Outcome Type:**

   Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2012	248

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

Outcome #10

1. **Outcome Measures**

   increase in the number of farmers who improve pasture management practices

2. **Associated Institution Types**

   - 1862 Extension

3a. **Outcome Type:**

   Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2012	6

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
601	Economics of Agricultural Production and Farm Management

Outcome #11

1. **Outcome Measures**

   Number of enterprises (already using recommended practices)that use Extension consultation to assess/inform business decisions

   Not Reporting on this Outcome Measure

Outcome #12

1. **Outcome Measures**

   Number of clientele who have adopted one or more IPM practices that increase environmental sustainability

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	144

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
This program depends on a trained volunteer base to educate other Vermont gardeners in the value of Integrated Pest Management (IPM) practices. The intent of this course is to educate gardening enthusiasts about the importance of IPM practices to reduce or eliminate chemical usage from their gardening habits.

What has been done
The 2012 course trained 187 Vermonters in the basics of plant and soil science and best practices for applying the IPM method to their home and community gardens. Master Gardeners man a Garden Helpline and complete volunteer hours for certification.

Results
Results from a yearly phone survey of a sampling of Vermonters who received gardening advice from the MG Garden Helpline regularly demonstrates that over 90% have implemented one or more IPM practices based on MG advice. Additionally, all MG project leaders reported that their projects had focused on IPM education and demonstration. These projects engaged 390 volunteers in education outreach to citizens statewide and accounted for over 13,000 volunteer hours devoted to the promotion of best IPM practices for home and community gardeners in Vermont.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #13

1. Outcome Measures

Number of enterprises that adopt a recommended practice resulting in increased revenues and/or reduced costs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	708

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Vermont's major industries are agriculture and tourism. Maple production, agro-tourism, and farming have narrow profit margins and many variables beyond control of the farm/business operator. A complicating factor for these industries is their potential for negatively impacting the water, air and soil. Staying informed of new and/or tested best practices that protect the environment while not threatening the business viability is critical to their and Vermont's economic health.

What has been done
2.7 Extension FTEs reported education and research activities focused on "individuals and business owners taking actions that improve their economic sustainability while minimizing their impact on the environment." Efforts from base/grant funded faculty and staff have expanded the capacity and flexibility of UVM Extension to conduct programs that inform, demonstrate and evaluate best practices. Post event data was collected through survey, observation or interview.

Results
Staff reported 708 business owners adopting a recommended practice resulting in increased revenues and/or reduced costs. The range of Extension education, clients, and practices adopted is extensive. Reporting return on investment (ROI) can be challenging due to clients record keeping and comfort in reporting economic information. One faculty member evaluated ROI by using data from one client who is in the upper range of his time commitment. Using his salary, hours worked with the client, the clients reported financial benefit resulting from following his recommendations a returned an ROI of $60 for each $1 Extension invested. While every client does not experience this gain or Extension investment, even half, a $30 ROI for each $1 is significant. Efforts will continue to assist with best practices and evaluate for ROI.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

Outcome #14

1. Outcome Measures

Participants will have gained knowledge on how to grow organic crops (e.g. apples, grains)

Not Reporting on this Outcome Measure

Outcome #15

1. Outcome Measures

A greater variety of produce available at home.

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

Number of farms that plan for and incorporate biosecurity, safety and preventative measures

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	56

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farmers are eight time more likely to die on the job then the average worker. The leading cause of their death is the tractor roll over. Seven of 10 farms where a fatal tractor roll over occurs are out of business within a year. Roll-Over Protective Structures (ROPS=Roll bar and seat belt kit) provide 99% protection to tractor drivers in the event of a tractor rollover, but studies show that farmers are reluctant to install ROPS due to money and the time it takes to find roll bars for their tractor. It is estimated that half of Vermont tractors do not have rollover protective structures.

What has been done
The Vermont ROPs Program launched a campaign in September 2010 to provide rebates and an informational hotline to Vermont tractor owners wishing to protect themselves by installing ROPS on their tractors. To fund rebates to tractor owners for ROPS, the Vermont ROPs Program raised cash from 24 separate corporate and non-profit donors and with additional financial commitment supported installation of roll over protective structures on tractors for fifty-six Vermont tractor owners in FY 2012. A total of 105 tractors have now been retrofitted in the first two years of the program.

Results
Studies show that one fatal rollover costs the family and society $910,000. In NY, 10 out of 400 farmers surveyed, who installed ROPS in the past 6 years subsequently had rollovers that would have been fatal. Using the same ratio in Vermont, the 105 tractor owners who installed ROPS in VT prevented two tragic deaths and saved nearly two million dollars. An investment of $660 UVM Extension's Vermont Rebates for Roll Bars Program per ROPs prevents a tremendous amount of

suffering and loss, financial and other.

4. **Associated Knowledge Areas**

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

Outcome #17

1. **Outcome Measures**

Farmers will implement safety measures, i.e., ROPS on tractors

Not Reporting on this Outcome Measure

Outcome #18

1. **Outcome Measures**

Farmers who implement a new practice to begin production of or improve current oilseed production yield and quality

Not Reporting on this Outcome Measure

Outcome #19

1. **Outcome Measures**

Growers adopting new varieties

Not Reporting on this Outcome Measure

Outcome #20

1. **Outcome Measures**

Number of individuals who change their gardening practices to reduce gardening inputs

Not Reporting on this Outcome Measure

Outcome #21

1. **Outcome Measures**

Number of participants who go on to start a business within 18 months of course completion

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	160

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Vermont is enjoying a resurgence of interest in farming and we have strong consumer support for locally produced farm goods. Despite the resurgence, research has documented serious obstacles for new farmers and Vermont's farming population is "graying." Success of new farmers is imperative for growing the agricultural sector. Agriculture and tourism are critical to the state's economic health.

What has been done
UVM Extension in collaboration with other nonprofit organizations, state and federal agencies is working to provide a new farmer training and education that accelerates new farm establishment, improves decision-making skills related to scope and scale of the farm business, and helps post-startup new farmers increase farm profitability and farm family income. Growing Places is an 18-hour class designed to assist aspiring and start-up farmers determine if agriculture is a feasible option for them.

Results
Almost 400 individuals have completed the class since 1995, and follow-up evaluations indicate that approximately 40% of graduates start a farm business within 24 months. According to the 2007 Census of Agriculture the average farm sales in Vermont is over $96,000. Using this data, this program is securing over $850,000 annually adding to the state's economy, providing access to local food, preserving a way of life, and a landscape that in important to tourists and Vermonters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

Outcome #22

1. Outcome Measures

Number of participants who make an informed decision to not start a business after completing the course

Not Reporting on this Outcome Measure

Outcome #23

1. **Outcome Measures**

Number of farmers who will grow and market soybeans for local feed, oil production or export market to increase farm income

Not Reporting on this Outcome Measure

Outcome #24

1. **Outcome Measures**

Number of farmers who will grow and produce energy crops and transform into energy products

Not Reporting on this Outcome Measure

Outcome #25

1. **Outcome Measures**

Number simulation models developed to protect the economic viability of livestock and tourism.

2. **Associated Institution Types**

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Milk price fluctuations pose an obvious threat to the sustainability of the dairy industry in Vermont and nationwide; less obvious is the threat posed by foreign or exotic diseases that persist in other parts of the world and could accidentally or intentionally infect livestock in this country, resulting in the devastation of agricultural communities. Knowledge of baseline Vermont-specific contact rates among farms and how these might change in the face of a highly contagious disease epidemic can inform more accurate modeling of the potential spread of disease and effectiveness of control measures.

What has been done
Rates from this model are being utilized in a simulation of disease spread in New England using the North American Animal Disease Spread Models. A survey instrument to characterize the rate of direct and indirect contacts among dairy farms was developed and distributed to Vermont dairy farmers. From this model a manuscript is in preparation. Data has been presented in a poster at

the American Association of Bovine Practitioners and to the New England States Agricultural Animal Security Alliance.

Results
As a result of this project, a study is being utilized in a simulation of disease spread in New England using the North American Animal Disease Spread Model. Simulations can support preparedness activities by state animal health authorities and industry stakeholders.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #26

1. Outcome Measures

Number of research trials to manage insects in greenhouse ornamentals (plants).

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The greenhouse industry is a vital and dynamic component of New England's changing agricultural economy. Pest control strategies are heavily reliant on chemical pesticides, a situation that is neither sustainable nor desirable, and novel approaches that increase opportunities to utilize biological controls are badly needed. This project seeks to generate information and novel technologies that will provide growers with the tools they need to increase their use of natural enemies, and enhance the activity of biological and reduced-risk pesticides.

What has been done
Marigolds are highly attractive to thrips and can be used for early detection and because they produce pollen can serve as habitat for mites by providing an alternative food source. Six treatments were tested in caged trials. The goal of the experiment was to see what plants attract mites and thrips. As a result of this project, a publication on plant protection was written.

Results
The results were found that at all locations, there was more damage on the marigolds than on the crops. On many occasions, marigolds had ratings exceeding 50 percent foliar damage whereas nearby crop plants had less than 10 percent damage. When averaged over the entire experimental period, in general more thrips were found on marigolds with no mites or fungal treatment than on those treated with mites and/or fungi. Two of the five sites had very low overall

numbers of thrips making it difficult to make conclusions on treatment efficacy. Thrips numbers increased rapidly on some of the marigolds without the fungal or mite treatments and had to be removed 2-4 wks before the end of the experiment to avoid reinfesting the crop. On these plants foliar damage of over 75 percent was observed. No significant differences in the number of thrips on marigolds with or without the lures.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #27

1. Outcome Measures

Number of legislative actions taken based on research study data.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the past decade Hispanic workers have arrived in Vermont and become a significant portion of the Vermont dairy labor force. Concerns about the health of migrant workers in Vermont entered the public consciousness in 2009 when a Mexican worker was killed on a dairy farm. Concerns about how Vermont's Hispanic migrants have been faring have been brought to the attention of farmer's and Vermont legislators.

What has been done
Existing data and key informant interviews with health care providers was collected and analyzed to better understand the trends and issues faced by health care providers in their efforts to service the Hispanic farmworker. Interview questions were designed from the scientist's research. The make-up of participants includes farmers, farmworkers, migrant service agencies and advocacy organizations. The scientist provided testimony to the Vermont House Agricultural results were reported. As a result, Vermont state legislators approved a bill establishing a study committee on migrant labor.

Results
Statewide survey found support for migrant dairy labor remains strong and awareness is high. In 2012 65% of respondents said they had personally spoke with a farmer or family member and 86% said they agreed that undocumented workers help Vermont farms stay in business. 72% said they favored the adoption of bias free policies in Vermont. 83% favored development of a 3-

year guest worker program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #28

1. Outcome Measures

Number of maple producers who use a maple crop management system that optimizes productivity and increases profitability.

Not Reporting on this Outcome Measure

Outcome #29

1. Outcome Measures

Number of food system indicators that measure impact on dietary choices

Not Reporting on this Outcome Measure

Outcome #30

1. Outcome Measures

Number of research results which increase the understanding of a plants response to their environment.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Plants are rooted to one spot for their entire life. In order to survive, plants must sense even the smallest environmental change, and respond rapidly, changing their physiology and modifying further development. Cold, drought, high light, UV, high salt, wounding, pathogen attack and heavy metals are all environmental stresses. Understanding what triggers plants development would benefit farmers, plant biologists, and consumers.

What has been done
The scientist studied the production of reactive oxygen species (ROS) in response to environmental stresses. The project focuses on the role of the heme oxygenase enzyme and the hormone abscisic acid in the production of ROS and the response to ROS signals during root growth. Scientists have presented this work at scientific meetings.

Results
The scientists have found that the heme oxygenase gene alters the expression of certain enzymes that are required for oxidative stress signaling. This research helps to extend the understanding of how reactive oxygen molecules signal during normal development.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology

Outcome #31

1. Outcome Measures

Number passing the USDA GAPs audit to gain or maintain a market for their locally grown crop(s)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	19

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #32

1. Outcome Measures

Number of growers growing organic crops increase revenues improving business sustainability

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	66

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Outcome measures in this report outline mid-level changes occurring due to the latest research and education in the field. Staff are employing varying techniques to gather data post-event to determine changes made and the impact of those changes on the business viability, value and goals of the individuals.

Narratives with the outcome measures highlight some of those results and explain the value of those changes.

Stakeholder input continues to inform program efforts direction and content, format and accessibility.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Community Development and the Personal and Intellectual Development of Youth and Adults

☑ 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
124	Urban Forestry	3%		0%	
608	Community Resource Planning and Development	17%		0%	
723	Hazards to Human Health and Safety	4%		0%	
802	Human Development and Family Well-Being	9%		0%	
805	Community Institutions, Health, and Social Services	11%		0%	
806	Youth Development	56%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	26.3	0.0	0.0	0.0
Actual Paid Professional	22.6	0.0	0.0	0.0
Actual Volunteer	12.2	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**
716196	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1478861	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1562318	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

•4-H Positive Youth Development Program: Help youth acquire Life Skills in the following areas: Decision Making; Critical Thinking; Problem-Solving; Communication; Goal-Setting; and Skills for Everyday Living to succeed as adults. Delivery Methods: 6-8 sequential learning hours using experiential learning techniques for in- school, afterschool, or out-of-school settings.

•Operation Military Kids (OMK) exists to educate Vermont communities on the unique experiences and challenges of military life and its impact on families, while providing positive opportunities for youth. Ready, Set, Go! Operation: Military Kids Vermont OMK-VT aims to establish community partnerships that will connect and educate people by: Creating community support, delivering opportunities to youth and families, supporting military kids, collaborating with community partners, educating the public, including the education community, and incorporating military families into existing community resources.

•S.E.T. Activities: 4-H SET will begin to show how science and engineering issues affect youths' lives and prepare a future generation of scientists and engineers. The 4-H SET program will present 4-H with a new opportunity to connect to the LGU's SET research community and integrate with current youth workforce development initiatives.

•Downtown Business District Analysis: This program provides the community with analytical techniques that can be put to work immediately in economic revitalization efforts. The process requires input from local residents so that recommendations reflect both market conditions as well as the preferences of the community. Delivery Methods: Group meetings and discussion groups in community.

•Community Leadership: Assessing, addressing and expanding community capacity through leadership and public policy education efforts including building--and education members and clientele of--coalitions and collaboratives.

•Coping with Separation and Divorce (COPE): Parent education for parents of minor children who have filed for separation, divorce, dissolving of a civil union, parentage, changes in rights and responsibilities concerning their children. This is a court mandated program.

•Migrant Education Recruitment Program (MEP): To ensure that children of migrant farm workers, and qualifying youth under age 22, are aware of the educational support services available to them. English as Second language and life skill classes via on-site weekly sessions. Delivery Methods: Outreach to schools, agricultural employers, and social service agencies throughout the state, on-site farm visits.

•Vermont AgrAbility Project: To make recommendations that can be used by farmers with disabilities to maintain employment, through development of accommodations. Delivery Methods: Process involves recruitment of eligible individuals through referrals. Intake information is recorded on farms provided by the National AgrAbility Project. Site visits are the primary means of contact.

•Rural and Agricultural VocRehab Program: To assist individuals with disabilities living in rural areas and those in agricultural professions or self-employment by providing them with a variety of services tailored to their needs in order to maintain or obtain their selected employment outcome. Delivery Methods: Process involves recruitment of eligible individuals through referrals, assessment, writing up a plan of action, and providing services for eligible individuals. Printed materials and individual technical assistance are offered to strengthen the capacity of individuals to maintain or to prepare for meaningful work. Program was ended in FY12 program year.

•Take Charge (TC/RC): Helping community adult members to gain the skills necesary to be confident enough to take part in town government by ultimately competing for town government leadership positions. Delivery Methods: Meetings, discussion groups.

•Town Officers Education Conference & Municipal Officers Management (TOEC/MOMS): Local town officers, decision makers and officials receive education and tools to improve job performance and mangement, addressing topics from new legislation to handling difficult customers. Delivery methods: Each one-day conference is held annually, at multiple sites.

•Vermont Urban and Community Forestry program :A joint initiative between the University of Vermont Extension and the Department of Forests, Parks and Recreation. The mission of the program is to promote the stewardship of the urban and rural landscapes to enhance the quality of life in Vermont communities. The program provides educational, technical and financial assistance in the management of trees and forests, in and around the built landscape. First Pest Detector program has been added. Delivery Methods: Classes, meetings, various media, community volunteer projects.

•Foster, Adoptive and Kin Care Partnership: Enhance outcomes for children in foster, adoptive and kin care homes. Delivery Methods: Curriculum and workshop series

•PROSPER: PROSPER is a delivery system of evidence-based programs for the purpose of improved Child and Family Outcomes. This is accomplished through developing a sustaining well-functioning Community Team with a Team Leader from UVM Extension and Co-Leader from the local school, as well as sustaining growth and quality of programming for the target audiences. Target audiences include 6th grade youth and their families for the family-based program and 7th grade youth for the school-based program. Support for PROSPER at the community level is supported by a State Management Team, Prevention Coordinator Team and State Agency Partnerships

2. Brief description of the target audience

- 4-H: Adult Volunteers
- 4-H: Camp Counselors
- 4-H: Youth
- 4-H: Youth Volunteers
- Age 1 - 5 Pre-School
- Age 13 - 18 Youth
- Age 19 - 24 Young Adult
- Age 25 - 45 Adult
- Age 25 - 60 Adult
- Age 6 - 12 School Age
- Age 8 - 18 Youth
- Agriculture/Natural Resources: Watershed Based Organizations
- Agriculture: Dairy Processors
- Agriculture: Farm Families
- Agriculture: Farmers
- Agriculture: Farmers w/disabilities
- Agriculture: Feed retailers
- Agriculture: Livestock producers
- Agriculture: Service Providers
- Agriculture:Government Agency Personnel
- Communities: Community Action Agencies
- Communities: Educators
- Communities: Local Officials/Leaders
- Communities: Non-Governmental Organizations
- Communities: Schools
- Communities: Town Health Officers
- Community leaders and citizens
- Community: Military families

- Extension: Advisors
- Extension: Faculty/Staff
- Family Court personnel
- Forestry: Government Agency Personnel
- Forestry: Trained First Detectors
- Forestry: Woodland Managers/Foresters
- Forestry: Woodland Owners
- Public: Adult Caregivers
- Public: Adults
- Public: College Students
- Public: General
- Public: Homeowners
- Public: Migrant Out of School Youth
- Public: Military families
- Public: Military youth
- Public: Nonprofit Organizations
- Public: Parents
- Public: People with Limited Resources
- Public: Small Business Owners/Entreprenuers
- Public: Volunteers
- Public: VT SOUL Tree Stewards
- Public: Youth
- School Grade: K-12
- Train-the-Trainer recipients: adults
- USDA personnel

3. How was eXtension used?

CoP evaluation leadership and contribution of resources to CoP

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5000	21000	6600	4700

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 4-H Afterschool

Year	Actual
2012	4

Output #2

Output Measure

- 4-H Club

Year	Actual
2012	248

Output #3

Output Measure

- 4-H Day Camp

Year	Actual
2012	22

Output #4

Output Measure

- 4-H Overnight camp

Year	Actual
2012	9

Output #5

Output Measure

- 4-H School enrichment

Year	Actual
2012	108

Output #6

Output Measure

- 4-H Short-term/special interest

Year	Actual
2012	213

Output #7

Output Measure

- Class/course

Year	Actual
2012	9

Output #8

Output Measure

- Conference

Year	Actual
2012	3

Output #9

Output Measure

- Consultations

Year	Actual
2012	379

Output #10

Output Measure

- Discussion group

Year	Actual
2012	90

Output #11

Output Measure

- Field site visit

Year	Actual
2012	1112

Output #12

Output Measure

- Funding request
  Not reporting on this Output for this Annual Report

Output #13

Output Measure

- Presentations

Year	Actual
2012	14

Output #14

Output Measure

- Publication - fact sheet

Year	Actual
2012	1

Output #15

Output Measure

- Publication - newsletter

Year	Actual
2012	82

Output #16

Output Measure

- Publication - newsprint article

Year	Actual
2012	2

Output #17

Output Measure

- Radio Spots/program (educational

Year	Actual
2012	1

Output #18

Output Measure

- TV segment/ATF

Year	Actual
2012	11

Output #19

Output Measure

- Train the Trainer sessions
  Not reporting on this Output for this Annual Report

Output #20

Output Measure

- Web Page

Year	Actual
2012	3

Output #21

Output Measure

- Workshop - series

Year	Actual
2012	1

Output #22

Output Measure

- Workshop - single session

Year	Actual
2012	119

Output #23

Output Measure

- Trainee delivered programming

Year	Actual
2012	118

Output #24

Output Measure

- Display or Exhibit

Year	Actual
2012	61

Output #25

Output Measure

- Research

Year	Actual
2012	5

V(G). State Defined Outcomes

O. No.	OUTCOME NAME
1	Increase number of communities establishing or expanding community tree program
2	increase in number of farm and rural residents with disabilities successfully served (ie case is closed) which is defined as having increased satisfaction with actual or potential employment and maintained or increased income
3	Increase number of 4-H staff self-reporting an increase in their ability to work with youth and adults to implement 4-H lifeskill development opportunities
4	Number of Migrant Education eligible students enrolled
5	Increase the number of program participants serving as leaders on Committees
6	Increase the number of youth who set and reach goals identified at the beginning of the 4-H year
7	Increase the number of clubs doing at least 6 hours of community service
8	Number of individuals (youth and volunteers) increasing knowledge and/or skills in content and careers (across subject areas ranging from animal science to environmental science to technology)
9	Increase the number of participants who plan and implement a program evaluation.
10	Increase the number of participants who report the results of their program evaluation.
11	increasing number of elected/appointed village, town or city officials that use information gained at TOEC in leadership and decision making
12	Increase the number of parents understanding family transition through parentage, divorce or separation who understand the impact of these changes on their children.
13	Number of participants report using skills learned in community setting
14	Number of farmers with disabilities maintaining employment
15	increase in number of youth reached with positive youth development programming demonstrate mastery for targeted life skills, including: Decision making; wise use of resources; communication; accepting differences; leadership; useful/marketable skills; healthy lifestyle choices; and/or self-responsibility
16	Number of volunteers demonstrating new techniques/activities in clubs and programs learned through 4-H training and developmemnt
17	Number of English language learners will increase their level of English proficiency

Outcome #1

1. Outcome Measures

Increase number of communities establishing or expanding community tree program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
124	Urban Forestry

Outcome #2

1. Outcome Measures

increase in number of farm and rural residents with disabilities successfully served (ie case is closed) which is defined as having increased satisfaction with actual or potential employment and maintained or increased income

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2012	77

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services

Outcome #3

1. Outcome Measures

Increase number of 4-H staff self-reporting an increase in their ability to work with youth and adults to implement 4-H lifeskill development opportunities

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of Migrant Education eligible students enrolled

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	413

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #5

1. Outcome Measures

Increase the number of program participants serving as leaders on Committees

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For the last three decades, small cities (population of less than 100,000) all across our country have seen continued economic leakage from downtown to outlying edge locations. Small rural communities often lack the tools to assess the changing needs as well as to develop strategic plans to meet those needs. Citizens can be apathetic, lack confidence to participate or the skills to identify and pursue goals working with others.

What has been done
Take Charge/Recharge program works with communities by helping to identify current town issues/needs and to build the capacity of its citizens to become both active in the community and good leaders with the ability to bring people together to accomplish goals. Each year a few communities are supported through this program.

Results
One community identified that a park purchased in the 70s, be used as a means to draw the lake into the village, verses a barrier between the two. A committee worked with the local Chamber of Commerce. As a result the community has seen an increase in revenue for local business. In one year, meal revenues increased by 7% and room revenues by 2.5%. The success has encouraged the participants to continue their work to revitalize the community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #6

1. Outcome Measures

Increase the number of youth who set and reach goals identified at the beginning of the 4-H year

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	686

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 #7

1. Outcome Measures

Increase the number of clubs doing at least 6 hours of community service

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	76

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 #8

1. Outcome Measures

Number of individuals (youth and volunteers) increasing knowledge and/or skills in content and careers (across subject areas ranging from animal science to environmental science to technology)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3520

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The United States is falling dangerously behind other nations in developing its future workforce of scientists, engineers, and technology experts. It faces a crisis in its ability to keep up with increasing demand for professionals trained in these fields. In Vermont, standardized test scores in science grow increasingly worse as students' age. Over 70% of intermediary and secondary students rank partially or below proficient on the 2009 NECAP test.

What has been done

UVM 4-H has embarked upon a 5-year plan of action to enhance professional development opportunities for educators conducting workshops, training educators plus our volunteers representing public schools, after school programs, school educators, etc. on how to deliver quality, non-formal science, technology, engineering and math (STEM) programming with a positive youth development framework. This year 255 trained individuals implemented 245 after school, special interest, school enrichment, and day camp science based programs.

Results

Trained volunteers and staff demonstrated new learned techniques and activities for over 3500 youth, increasing their knowledge and/or skills in subject areas ranging from animal science to environmental science to technology. According to The YEAK report, 4-H Science has a positive

impact on youth interest and engagement in future STEM-related programs. The survey indicates that fifty-nine percent would like to have a job related to science when they graduate from school. That is 2065 Vermont young people likely to enter the science field.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

Increase the number of participants who plan and implement a program evaluation.

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Increase the number of participants who report the results of their program evaluation.

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

increasing number of elected/appointed village, town or city officials that use information gained at TOEC in leadership and decision making

Not Reporting on this Outcome Measure

Outcome #12

1. Outcome Measures

Increase the number of parents understanding family transition through parentage, divorce or separation who understand the impact of these changes on their children.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1654

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Number of participants report using skills learned in community setting

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	171

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Forests face a threat of unprecedented proportions. Three highly invasive forest pests threaten Vermont's forests and will have a major impact on the wood products, maple sugaring and tourism industry. Collectively about two-thirds of the trees in Vermont's woods are susceptible to these pests and the potential economic aspect totals for just the maple industry is over $30 million.

What has been done

First Detector program included workshops, e-newsletters and a new website www.vtinvasives.org, which had over 4000 hits in its first 4 months, and has trained 127 Forest First Detectors. They represent 68 communities throughout Vermont. They have been trained to increase the public's awareness about the tree pests; assist government partners in responding to inquiries about suspect bugs; and help their community prepare for and respond to a pest infestation.

Results

Forest First Detectors were the first to detect Hemlock Woolly Adelgid (HWA)in two towns that were previously thought to be free of HWA. A growing body of research strongly suggests that early detection and rapid response efforts are critical to forest health protection efforts. Furthermore, the program is increasing the protection efforts of VT Dept of Forests, Parks and

Recreation, VT Agency of Agriculture and USDA APHIS. As Emilie Inoue with the Agency of Agriculture notes, "this program is working seamlessly. The inter-agency collaboration is a key highlight." The U.S. Forest Service estimates the national loss of 1.2 billion urban trees and a value loss of $669 billion if ALB, one of the three forest pests, were left to its' own devices (Nowak et al. 2001).

4. Associated Knowledge Areas

KA Code	Knowledge Area
124	Urban Forestry
608	Community Resource Planning and Development

Outcome #14

1. Outcome Measures

Number of farmers with disabilities maintaining employment

Not Reporting on this Outcome Measure

Outcome #15

1. Outcome Measures

increase in number of youth reached with positive youth development programming demonstrate mastery for targeted life skills, including: Decision making; wise use of resources; communication; accepting differences; leadership; useful/marketable skills; healthy lifestyle choices; and/or self-responsibility

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1126

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 #16

1. Outcome Measures

Number of volunteers demonstrating new techniques/activities in clubs and programs learned through 4-H training and developmemnt

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	255

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 #17

1. Outcome Measures

Number of English language learners will increase their level of English proficiency

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2012 24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Migrant Ed Program (MEP) recognizes that positive relationships between parents, students and schools are essential to the success of every child's academic life. When we educate our youth, all of society benefits but without an efficient, comprehensive and multi-tiered statewide recruitment and service delivery plan, necessary educational services will not reach eligible migratory students.

What has been done

In its 3rd year of funding the out of school youth (OSY) program has matured establishing an outcome oriented educational service program and has become a leader in services for the nation's OSY addressing the academic and social challenges our migrant student population faces. Over 600 farm visits and almost 500 school visits were completed including the weekly 1.5 hour English and life skill classes to migrant workers.

Results

In almost 3 years, 103 students have increased their English proficiency. Through learning English, we create an educational opportunity that empowers migrant students. When young farm workers who come to Vermont access education and gain academic and life skills, their ability to make more informed and positive life choices for themselves increases. Vermont MEP youth sustain our farms, enrich our community and support their families back home. According to the Bureau of Labor Statistics the weekly earnings of an individual without a high school diploma is $471 and with is $652. Unemployment rates go from 8.3 to 12.4% for those without a diploma. This seriously affects their ability to provide for themselves and their families, as well as the amount of support they might need from society.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services
806	Youth Development

V(H). Planned Program (External Factors)

- 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

Outcome measures in this report outline mid-level changes occurring due to the latest research and education in the field. Staff employ varying techniques to gather data post-event to determine changes made.

Narratives with the outcome measures highlight some of those results and explain the value of those changes.

Stakeholder input continues to inform program efforts direction and content, format and accessibility.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		33%	
123	Management and Sustainability of Forest Resources	0%		19%	
132	Weather and Climate	0%		14%	
136	Conservation of Biological Diversity	0%		19%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		6%	
302	Nutrient Utilization in Animals	0%		8%	
601	Economics of Agricultural Production and Farm Management	0%		1%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	5.9	0.0
Actual Paid Professional	0.0	0.0	3.4	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	592008	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	490467	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	17095	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension:
Extension efforts share the research and how it can be applied with appropriate audiences ensuring the viability of agriculture based business who produce food and interact with the environment. No effort for Extension is reported to this planned program, but rather reflected in Global Foods.

VT-AES:

- **Measure earthworm mediated losses of N from Dairy and Maple Production Systems in Vermont.**
- **Develop models to show that invasive populations possess smaller genomes and harbor greater evolutionary potential than native populations of this species**
- **Develop models to show that invasive genotypes have the ability to maintain their phenotype in response to an moisture gradient while native genotypes cannot**
- **Develop modes to show an evolution change in C:N ratio in the leaves of invastive genotypes can be responsible for making red canary grass more agressive in wetlands**
- **Use global vegetation models to project the responses of forests across New England to regional climate change.**
- **Identify if different breeds of dairy cows are likely to produce less methane per kilogram of fluid milk or milk solids as ruminant livestock are the major single source of potent greenhouse gas (contribution to climate change).**
- **Determine the effect of sustainable harvesting practices on soil carbon and nutrient pools.**
- **Determine the effect of crop rotation systems on carbon and nutrient pools.**
- **Conduct soil fertility testing on samples from ongoing trials with new crops.**
- **Determine the effect of geographic variation among beetle populations in their ability to survive northern winters.**
- **Determine if preadaptation's or rapid evolution contributed to the success of Colorado Potato Beetle (CPB)**
- **Determine the effect from various cold acclimation times on subsequent regrowth of perennials**

2. Brief description of the target audience

Research:
Sugar maple producers
Foresters
Environmental scientists and planners
Horticulturists
Ecologists
Farmers
Livestock producers
Wholesale nurseries
Policy decision makers

3. How was eXtension used?

Extension was not used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	60	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	6	6

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Manuscripts

Year	Actual
2012	2

Output #2

Output Measure

- Workshops

Year	Actual
2012	1

Output #3

Output Measure

- Scientific journals

Year	Actual
2012	1

Output #4

Output Measure

- Regional meetings

Year	Actual
2012	4

Output #5

Output Measure

- Program symposium

Year	Actual
2012	1

V(G). State Defined Outcomes

O. No.	OUTCOME NAME
1	identify mitigate the invasive species threat to the environment
2	research regarding the generation of greenhouse gas emissions from farm animals and through soil processes
3	Number of factors identified effecting carbon storage in the soil.
4	Number of habitats that have changed due to congregation of earthworms.
5	Genetic data for the Colorado Potato Beetle identified.

Outcome #1

1. Outcome Measures

identify mitigate the invasive species threat to the environment

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With the extensive spread of invasive species (invasive plants) throughout North America and Europe there is an urgent need to better understand the characteristics of successful invasive plants. Invasive plants can have a significant threat to many native plants and be a significant cost to agriculture, forestry, and recreation. UVM AES is determining why a species that is not invasive in its native range becomes invasive in the introduced range.

What has been done
UVM AES studied a weed, Phalaris arundinacea, taken from its native European range and from invasive genetic variants from North America. Using a combination of population genomics, manipulative crossing experiment(s), and field studies they were able to determine traits that led the plant to transition into a native community. Farmers use this information for better crop management. The results were published in a scientific journal.

Results
UVM AES results show that invasive populations possess smaller genomes and harbor greater evolutionary potential than native populations. In addition, scientists have shown that invasive genotypes have the ability to maintain their phenotype in response to a moisture gradient while native genotypes cannot.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity

Outcome #2

1. Outcome Measures

research regarding the generation of greenhouse gas emissions from farm animals and through soil processes

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of factors identified effecting carbon storage in the soil.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Change is occurring in the Northern Forest because of human activities. These activities include regional and global influences of continued acidic deposition, mercury deposition, and climate change. In addition, local forest management practices create an impact, the extent of which may accelerate as increasing pressures are put on local communities to seek alternative energy sources from forests. Science is now showing the positive role forest ecosystems can play in removing and storing excess carbon from the air.

What has been done
Six subplots were established and soils sampled by depth. Soils were analyzed for carbon, nitrogen, and total mercury. Additional vegetation and physical site characteristics were measured and plots were permanently monumented for future use. Results have been presented at regional meetings and to forestry professionals.

Results
Results from pre-harvest sampling showed that more carbon was stored in the soil. Carbon storage in the soil is dependent on multiple factors, including soil depth, elevation, wetness and time since disturbance and land-use change.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

Outcome #4

1. Outcome Measures

Number of habitats that have changed due to congregation of earthworms.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Earthworms play a key role in recycling nutrients in the soil but may also be altering habitat for plants and wildlife. All earthworms in Vermont are invasive species. Where earthworms congregate the soil is exposed to predators and harsh weather. Increased losses of nutrients as a function of earthworms may be financial losses to farmers who have to replace nutrients.

What has been done
After 90 days of incubation the scientists found a number of results. The earthworms contained calcium. Greenhouse gases were greater in soils that have earthworms. The scientists disseminated these findings at a professional workshop, with woodlot owners, and at meetings.

Results
The forests soil makeup could be explained by the action of earthworms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Genetic data for the Colorado Potato Beetle identified.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Humans have strongly influenced insect pest evolution and ecology through host shifts, crop domestication, change in cultivation practices, and human-mediated translocations. The research studies these themes to determine how we can use ecological and evolutionary information to improve sustainable pest management such as the Colorado Potato beetle.

What has been done
The scientists collected beetles from several Mexican states (Jalisco, Oaxaca, Texcoco) along with two states (Kansas and Vermont). After the beetles experience the shortening days during fall, they were buried in PVC (Polyvinyl Chloride) tubes at 15 cm below the surface to see what was the survival rate during the winter. The research was presented at a program symposium and several manuscripts are currently underway.

Results
As a result, the scientists have found that pest beetles appear to be most similar in feeding performance and cold tolerance to beetles from Texcoco, Mexico. About 6% of beetles from Texcoco survived the Vermont winter, but no beetles from other populations survived. The scientists have found preliminary genetic data that suggests that the Texcoco populations are the most genetically similar to the Colorado Potato Beetle.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate

V(H). Planned Program (External Factors)

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

Brief Explanation

Invasive Plants - research will continue on the genetic and physiological basis for "invasiveness" of problem plant species and introductions.

Greenhouse Gas Emissions - research has been initiated to evaluate microbial population dynamics in ruminant farm animals in an effort to control/minimize the production of methane and other greenhouse gases. Parallel efforts are underway to understand soil processes that affect the carbon cycle, and that may sequester carbon in soil sinks.

On-site demonstrations at fields days, development of a guide on forest management recommendations.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- On-site demonstrations at field days, development of a guide on forest management recommendations.
- Disseminated findings at the Forest Health meetings reaching forest professions, at a vermicomposting workshop for Master Composter, at a gathering of woodlot owners, and at the Annual Meeting of the SSSA.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

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
402	Engineering Systems and Equipment	20%		0%	
601	Economics of Agricultural Production and Farm Management	80%		59%	
604	Marketing and Distribution Practices	0%		26%	
607	Consumer Economics	0%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.3	0.0	1.0	0.0
Actual Paid Professional	0.4	0.0	0.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
11600	0	227500	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
23954	0	20053	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
25305	0	2052	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research - Consumer and farmer surveys indicate there is a strong support for electricity for solar panels, windmills and cow manure and the variations in the level of support and willingness to pay are

associated with certain demographic factors.

Regionally-specific agronomic information on seeding rates and planting dates for canola and sunflower(s) are being developed. Farmers struggle with fuel, feed, and fertilizer prices and look for new crops to fit into rotations. Primary beneficiaries of this project are farmers interested in producing oilseed crops for their farms. Data collected will be invaluable to growers and agricultural service providers as they pursue on-farm biofuel production.

Extension - Education and outreach has been through Energy Crop Research Projects and Renewable energy workshops. Efforts continue working with greenhouse growers on alternative fuel and structures for efficient and effective production. A comprehensive manual is being completed. Significant effort is invested into eXtension.

One grant funded project focused in one county this year, planting 100 new acres of oilseed sun flowers. An unexpected outcome has been the community interest drawing many tourists and locals to stop and photograph the fields of sunflowers to the pleasure of some farmers and others not so much. Farmers involved want to continue with this project this year and other farming communities want to look into oilseed production.

2. Brief description of the target audience

- Agriculture: Crop Producers
- Agriculture: Farmers
- Agriculture: Service providers
- Small businesses
- Policymakers
- Consumers

3. How was eXtension used?

Contributing expertise by adding content and providing leadership. Staff have taken leadership roles in CoP.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	60	0	0	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	5	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research Projects

Year	Actual
2012	19

Output #2

Output Measure

- Workshop - single session

Year	Actual
2012	2

Output #3

Output Measure

- Comprehensive manual

Year	Actual
2012	1

Output #4

Output Measure

- Economic feasibility study

Year	Actual
2012	1

V(G). State Defined Outcomes

O. No.	OUTCOME NAME
1	Number of farmers who implement a new practice to begin production or to improve current oilseed production yield and quality
2	Identify key factors of economic performance of biofuels in Vermont and across the U.S.

Outcome #1

1. Outcome Measures

Number of farmers who implement a new practice to begin production or to improve current oilseed production yield and quality

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	21

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
High fuel costs and fuel security can challenge the sustainability of farm business. Growing one's own oilseed for fuel is an option in most areas but growing oilseed crops is new to many Vermont farmers.

What has been done
With funding assistance from the Vermont Sustainable Jobs Fund a project focused on one county where some experience, cropping equipment, a biodiesel processing facility and technical assistance existed. Ten growers participated and over 69 acres were planted with oilseed sunflowers producing oil and meal for biodiesel. Farm Fresh Fuel signs were posted providing information on "producing our own fuel, food, and animal feed."

Results
One notable aspect of the project was the amount of tourist attention the sunflower fields attracted prompting numerous inquiries and interest. Oil and meal produced from this project is estimated to displace 2,400-3,000 gallons of fossil fuel. Plans are underway for year 2 with most growers wanting to be involved again as well as inspiring other farming communities to look into oilseed production for their own fuel security.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. **Outcome Measures**

Identify key factors of economic performance of biofuels in Vermont and across the U.S.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations

Brief Explanation

Research-
Financial supports from government agencies is a key factor of economic performance of oilseed and farm-scale biodiesel production in Vermont. Economic returns depend upon market factors.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Two studies;

- Feasible for Vermont farmers to grow certain oilseeds and produce biofuels
- Large farms can convert oilseeds into electricity

Key Items of Evaluation

Rapid growing interest in biofuels in Vermont and the potential of biofuels providing renewable energy.

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
607	Consumer Economics	0%		4%	
609	Economic Theory and Methods	0%		4%	
703	Nutrition Education and Behavior	100%		39%	
704	Nutrition and Hunger in the Population	0%		5%	
724	Healthy Lifestyle	0%		48%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.3	0.0	1.6	0.0
Actual Paid Professional	1.5	0.0	1.5	0.0
Actual Volunteer	0.2	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**
54586	0	125120	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
112714	0	494640	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
119074	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- **Diabetes Education: eXtension leadership role in Diabetes CoP; fact sheets and web access**

- **Healthy Eating: Nutrition classes designed for a wide range of people, with an emphasis on national dietary guidance. Participants learn the latest information about how to choose a healthy diet, practice food safety and to incorporate physical activity into their day. Classes range from one to six sessions, with the topics tailored for the group requesting the program.**

- **Farm to School: strategy to increase children's fruit and vegetable consumption. New state regulation requires children to add (2) fruit/vegetables to their school lunches.**

- **Around the table with local food exposes participants to some of the many benefits of producing and consuming locally produced food. A cooperative effort of the Center for Sustainable Ag and the EFNEP program.**

- **Develop a better understanding of the mechanisms by which traits influence healthy diet behavior through a comparison of Chinese and U.S. college students.**

- **Develop a feasible, reliable and valid methodology to measure children's fruit and vegetable consumption in the school setting.**

2. Brief description of the target audience

- Age 13 - 18 Youth
- Age 25 - 60 Adult
- Age 46 - 65 Adult
- Age 60 - Senior
- Age 8 - 18 Youth
- Extension: Faculty/Staff
- Food Industry: Food Service Workers
- Public: Adults
- Public: Age 6-12 (Children)
- Public: Daycare Providers
- Public: Families with Limited Resources
- Public: General
- 4-H: Youth
- Pediatricians
- Clinicians
- College Students
- Researchers

3. How was eXtension used?

Faculty member is serving as a leader in eXtension Diabetes CoP

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	200	20	215	0

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	8	4	12

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Conference

Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Consultation

Year	Actual
2012	48

Output #3

Output Measure

- Consumer Publication

Year	Actual
2012	15

Output #4

Output Measure

- Curriculum
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Fact Sheets

Year	Actual
2012	10

Output #6

Output Measure

- Publication - Newprint

Year	Actual
2012	16

Output #7

Output Measure

- Train the trainer program
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Workshop Series

Year	Actual
2012	8

Output #9

Output Measure

- Workshop - single session

Year	Actual
2012	8

Output #10

Output Measure

- Webpage (new and updated)

Year	Actual
2012	18

Output #11

Output Measure

- Research studies

Year	Actual
2012	2

V(G). State Defined Outcomes

O. No.	OUTCOME NAME
1	Number of people who have an increased preference for at least one fruit or vegetable.
2	Number of youth or adults who self report an increase in mastery of the life skills Healthy Lifestyle Choices and Decision Making.
3	Number the people that show an improvement in healthful eating practices
4	Number of methodologies that measure children's fruit and vegetable consumption in the school setting.
5	Number of research results that increase the understanding on the effect of food venue choice
6	Number of proven strategies that encourage exercise in first year college students.
7	Number of individuals who select and prepare a variety of produce to help prevent/manage disease and/or obesity.

Outcome #1

1. Outcome Measures

Number of people who have an increased preference for at least one fruit or vegetable.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	126

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows that consuming locally produced food is beneficial to individuals, the environment and the local economy. Individuals often perceive that fresh, local food is more expensive and the fresh food may be and/or look unfamiliar. They also may not know how to prepare the produce. Many limited resource families do not access or use family coupons that can be used at farmers markets though they can be provided up to $60 in family coupons.

What has been done
The University of Vermont Ctr for Sustainable Agriculture with Extension's EFNEP program delivered three series called Around the Table with Local Food. The program is a series of seven 2 1/2 hour lessons designed to teach families the benefits of including locally produced foods in their diets. Each class had a local farm partner, were provided an assortment of produce each week utilized in a cooking activity. Focus groups were asked for input on the series, the input was used in developing the current EFNEP curriculum.

Results
Responses from participants showed that the classes exposed them to some of the many benefits of producing and consuming locally produced foods. One participant from the Hardwick class stated, "I never knew that the vegetables at the farmer's market could be cheaper than (at) the grocery store." And from the Newport class, "I'll get farm to family coupons from WIC next year now that I know one of the farmers that sells at the farmer's market" and "I never thought to use zucchini for anything other than sweet bread." Each family that takes the $60 in family coupons is increasing the families consumption of healthy local foods and up to $60/family goes into the local economy directly to the farmers. Some materials developed in this pilot project are used in the current EFNEP curriculum.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Number of youth or adults who self report an increase in mastery of the life skills Healthy Lifestyle Choices and Decision Making.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number the people that show an improvement in healthful eating practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	210

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Obese children are more likely to grow to be obese adults. Obesity is hitting youth so hard that health experts warn that this generation of children will be the first to have a shorter life expectancy than their parents. Prevention programs are valuable and can reduce costs associated with obesity and chronic disease management. 4-H Afterschool offers a wealth of research-based, ready-to-use curricula including the healthy living nutrition-based programs.

What has been done
4-H Afterschool engages youth in long-term, structured learning in partnership with adults. By recruiting a 4-H Afterschool program educator from the Vermont Youth Development Corps AmeriCorps State program, UVM Extension has been able to offer more programs to schools. Afterschool coordinators who offered programs in the past two years were surveyed.

Results
Afterschool coordinators observed the following changes with their students: 100% were willing to try new foods and able to identify healthy foods; 60% now take part in daily physical activity, eats fruit and vegetables when served; and 33% of the students eat fewer high fat snack foods. If preventative measures are effectively implemented, and if obese or would-be obese children instead grow into healthy adults, the U.S. could see a return on investment of almost $200 billion ($1226/adult in Vermont) in adult healthcare costs saved in 2018. (1) (1)?The Future Costs of Obesity: National and State Estimates of the Impact of Obesity on Direct Health Care Expenses,? America?s Health Rankings (Nov. 2009), http://www.nccor.org/downloads/CostofObesityReport-FINAL.pdf.

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

Number of methodologies that measure children's fruit and vegetable consumption in the school setting.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
USDA regulations made significant changes to school meals in 2012. Children are now required to take a fruit or vegetable with their school lunches. The study is to see if the new regulations were effective and look at what children are eating.

What has been done
The study is examining the feasibility and validity of measuring school children's fruit and vegetable consumption, as estimated by direct observation and digital photography, against the gold standard of actual food weight in a variety of elementary school cafeteria environments. The aim is to develop a reliable, feasible and valid tool to measure children's fruit and vegetable consumption in a variety of school cafeteria settings.

Results
The investigators have completed the first phase of data collection and data analysis is underway. Peer reviewed papers are under review from this project.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #5

1. Outcome Measures

Number of research results that increase the understanding on the effect of food venue choice

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The amount of time spent preparing food and cleaning up since the 1960s has dropped by nearly 50%. This had led to more people eating unhealthy, such as processed foods. The primary research interest is the effect of food venue choice on BMI for health weight, overweight, and obese individuals.

What has been done
The project investigates the effects of food venue choice and time use on obesity in men and women using structural equation modeling (SEM) techniques. The scientist used a cross-sectional study linking the American Time Use Survey(ATUS) and the Consumer Expenditure survey (CE) using structural equation modeling (SEM).

Results
Food venue and time use choices impact men and women differently. Estimates indicate that decreasing television screen time by 30 minutes per day, and replacing it with food preparation, activity, and mindful eating can save the health care industry one half billion dollars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
609	Economic Theory and Methods
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #6

1. Outcome Measures

Number of proven strategies that encourage exercise in first year college students.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The results of this study can be used by insurance companies or employers who may be interested in providing financial incentives for health behavior change.

What has been done
Students were randomly assigned to one of three groups; control group (no incentives); continued incentives (received incentives in the fall and spring semesters) and discontinued incentives (only received incentives in the fall semester). Students were given goals for fitness center use and the goals progressively increased over the semester as did the incentives. Measurements (weight, height, exercise enjoyment and internal and external motivation) were measured at baseline, end of fall semester, beginning of spring semester and end of spring semester. The results of this study can be used by insurance companies or employers who may be interested in providing financial incentives for health behavior change.

Results
Incentives significantly increased the number of students who met fitness center goals. When incentives were removed for the discontinued group, they stopped attending the fitness center. Attendance at the fitness center did not help to prevent weight gain seen in first year students. Incentives did help to improve attendance to the fitness center for first year students. Incentives need to be sustained in order to be effective.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

Number of individuals who select and prepare a variety of produce to help prevent/manage disease and/or obesity.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	78

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Latino farm workers are critical to the viability of our Agriculture industry providing a willing labor force. But life is not easy for the migrant workers. 98% of the approximate 140 Latino farm workers in Franklin County do not have access to transportation, relying on others to provide even the most basic of needs. The majority depend on their employers to purchase all food items. Almost half of workers surveyed reported that they do not know what food items are available in local grocery stores.

What has been done
In collaboration with the Migrant Education Program, the VT Migrant Farmworker Solidarity Project, and local vegetable farmers a garden project loosely organized last year was organized more thoroughly. As a result 65 farm workers, 21 farms had home gardens with over 40 different types of produce being grown and harvested.

Results
Participants have more autonomy over some of their food choices and have access to fresh produce that they themselves care for. Almost 80 individuals, by access to their home gardens selects and prepares a variety of produce, a proven practice for improving health and in the prevention and care of chronic illness. It is estimated that health care costs for chronic disease treatment account for over 75% of national health expenditures. [1] Centers for Disease Control and Prevention. Rising Health Care Costs Are Unsustainable. April 2011.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
703	Nutrition Education and Behavior
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

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

Brief Explanation

Research; Increase cost of food lead to consumer changes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- Incentives significantly increased the number of students who met fitness center goals.
- USDA regulations made significant changes to school meals in 2012. Children are required to take a fruit or vegetable with their lunch.

Outcome measures in this report outline mid-level changes occurring due to the latest research and education in the field. Staff are employing varying techniques to gather data post-event to determine changes made.

Narratives with the outcome measures highlight some of those results and explain the value of those changes.

Stakeholder input continues to inform program efforts direction and content, format and accessibility.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

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%		79%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	30%		21%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	70%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.6	0.0	4.3	0.0
Actual Paid Professional	0.1	0.0	2.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
2384	0	233974	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
4922	0	327190	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
5200	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research - experiments are being conducted to evaluate genetic differences between dairy animals in their innate response to infection and are being conducted with mammary epithelial cells and dermal fibroblast cells to evaluate differential responses to various pathogens and pathogen associated molecular patterns (PAMPS) in vitro. Other research involved the study of mastitis resistance to enhance dairy food safety. Development of a coating material containing polymerized whey protein which has good flexibility and is waterproof for several days. This type of material would be suitable for disposable food containers.

Extension - Food Safety and Sanitation, Food Production in Business and GAP - Work with small scale producers on best practices that enable them to provide a safe food product. Good Agricultural Practice (GAP) certification work will occur with producers and collaborative efforts with Agencies, local government and farmers markets are pursued. Evaluation efforts are focusing on producers and processors adopting best management practices (BMP) for production, processing and handling of food. Adoption of these BMP will contribute to the long term goal of a sustainable agriculture industry therefore best captured within the Global Food planned program.

A few radio programs were conducted on general food safety topics and in reaction to the recent flooding from Tropical Storm Sandy a number of materials were produced and disseminated widely to food hubs.

2. Brief description of the target audience

- Dairy farmers
- Research scientists
- Consumers
- Environmentalists
- Public: General
- Small scale meat and produce farmers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	5000	0	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Consultations
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Field day/Fair
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Newsprint Article
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Workshop Series
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Workshop - single session
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Radio Program

Year	Actual
2012	2

V(G). State Defined Outcomes

O. No.	OUTCOME NAME
1	Increase and maintain collaboration on events with agency and industry personnel to address safety (farm, food, etc.) and emergency preparedness
2	Increase in number of fair, field days or event attendees who demonstrate an increased understanding of the health risks associated with the failure to wash hands
3	Number of people who show improvement in food safety and preservation practices
4	Number of farms that pass the USDA GAP audit
5	Number of models that study genetic differences between dairy cows that impact their ability to resist mastitis.
6	Number of cell culture models that investigate animal differences in their response to mastitis causing pathogens.
7	Number of new technologies that improve food packaging.

Outcome #1

1. **Outcome Measures**

   Increase and maintain collaboration on events with agency and industry personnel to address safety (farm, food, etc.) and emergency preparedness

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

   Increase in number of fair, field days or event attendees who demonstrate an increased understanding of the health risks associated with the failure to wash hands

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

   Number of people who show improvement in food safety and preservation practices

   Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

   Number of farms that pass the USDA GAP audit

   Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

   Number of models that study genetic differences between dairy cows that impact their ability to resist mastitis.

2. **Associated Institution Types**

   - 1862 Research

3a. **Outcome Type:**

   Change in Knowledge Outcome Measure

3b. **Quantitative Outcome**

Year	Actual

2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Knowledge of these genes will lead to more accurate selection of disease resistance characteristics of cows. This will further research in the mastitis field.

What has been done
The model evaluates the ability of dermal fibroblasts (cells) to respond to mastitis-causing bacteria. The scientist is now evaluating differential responses between animals from their unique herds being maintained at the University of Minnesota.

Results
As a result, the scientist found substantial variation between cows. The scientist found a lack of differences in fibroblasts (cells) obtained from animals that were selected based on genetic estimation. Key findings are that the fibroblast (cell) model is very responsive to stimulation with mastitis causing pathogens.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #6

1. Outcome Measures

Number of cell culture models that investigate animal differences in their response to mastitis causing pathogens.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Studying how cows are susceptible to mastitis is a concern of Dairy farmers and scientists. Differences in invasion potentially could highlight pathogens of particular concern, whereas differences between cells of different cows would be suggestive of a specific host.

What has been done
Experiments have been conducted with mammary epithelial cells and dermal fibroblast cells to evaluate differential responses to various pathogens and pathogen associated molecular patterns

(AMPS) in vitro. The model will be used to determine if differences exist between strains of bacteria in their ability to invade and survive within the bovine cells.

Results
As a result, the scientist finds that mammary cells can be isolated from milk and respond with production of chemokine, a protein that prompts white cells to move so they can carry out their immune system function. The scientist has observed consistency of response between three separate occasions from one cow.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #7

1. Outcome Measures

Number of new technologies that improve food packaging.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The project addresses the issue of development of commercially-viable, environmentally-safe alternatives to packaging materials currently on the market. The majority of packaging which provides good quality barriers is made from synthetic plastics and these have a substantial impact on the environment when disposed of as waste. The consumer will benefit from the project outcome as there is a decreased risk of chemical intake from this type of product.

What has been done
Nanoclays such as smectite clays are relatively inexpensive, widely available and have low environmental impact. The scientist experiment was adding nanoclays to whey protein solution(s). Laboratory trials were completed including coating procedures, optimum depth of layers, flexibility and appearance, water/oil resistance, shelf life, microbial resistance and oxygen permeability.

Results
As a result, the scientist developed a coating material which has good flexibility and is waterproof for several days. This type of material would be suitable for disposable food containers. This new product will provide another healthy food choice for health conscious consumers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

V(H). Planned Program (External Factors)

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Other (Food safety requirements of food)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Improve mastitis control practices and food safety
New technology of making safe nano material for food packing from natural raw materials.

Key Items of Evaluation

The majority of packaging which provides good quality barriers is made from synthetic plastics thus when disposed has an environmental impact and in addition, might have an effect on human health. The project defined gives an alternative to plastic wrapping.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Urban Non Point Source Pollution

☑ 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
112	Watershed Protection and Management	100%		50%	
132	Weather and Climate	0%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	0.4	0.0
Actual Paid Professional	2.4	0.0	0.7	0.0
Actual Volunteer	0.3	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
87560	0	33950	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
180801	0	86592	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
191004	0	3645	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- **Urban Watershed and Water Quality**: work with towns, municipalities, community organizations with consultations, demonstrations, workshops, newsprint, presentation, youth camps
- **Watershed & Water Quality Programs**:Watershed education for educators and students, and community members with consultation, train the trainer, demonstration, field site visits

• **Design, testing and implementation** of materials and technologies for the removal of phosphorus from agricultural run-off and suburban wastewater non-point sources

2. Brief description of the target audience

- Adults
- Age 19 - 24 Young Adult
- Age 25 - 60 Adult
- Agriculture/Natural Resources: Watershed Based Organizations
- Agriculture: Service Providers
- Communities: Cities and Towns
- Communities: Educators
- Communities: Local Officials/Leaders
- Communities: Schools
- Community leaders and citizens
- Environmental Professionals: Environmental Managers
- Public: College Students
- Public: Families
- Public: General
- Public: Homeowners
- Public: Master Gardeners
- Public: Small Business Owners/Entreprenuers
- Age 13 - 18 Youth
- Age 8 - 18 Youth
- Public: Age 13-18 (Youth)
- Train-the-Trainer recipients:youth
- Youth

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1872	80600	1583	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Consultation

Year	Actual
2012	16

Output #2

Output Measure

- Demonstration

Year	Actual
2012	3

Output #3

Output Measure

- Field day/Fair

Year	Actual
2012	1

Output #4

Output Measure

- Presentation

Year	Actual
2012	28

Output #5

Output Measure

- Fact Sheet

Year	Actual
2012	8

Output #6

Output Measure

- Tour

Year	Actual
2012	2

Output #7

Output Measure

- Train the Trainer

Year	Actual
2012	8

Output #8

Output Measure

- Web page updating

Year	Actual
2012	10

Output #9

Output Measure

- Workshop series

Year	Actual
2012	28

Output #10

Output Measure

- Workshop - single session

Year	Actual
2012	20

Output #11

Output Measure

- Display

Year	Actual
2012	5

Output #12

Output Measure

- Research

Year	Actual
2012	3

V(G). State Defined Outcomes

O. No.	OUTCOME NAME
1	Number of educators increasing knowledge of watersheds and new teaching tools and techniques
2	Number of lakeshore residential properties planting buffer strips or maintaining native vegetation as a buffer to decrease erosion and sedimentation
3	Number of middle and high school youth demonstrating an increase in knowledge of watersheds and their role as watershed stewards
4	Number of municipal officials have an increased understanding of and need for natural resource based planning and stormwater management at the municipal level
5	Number of municipalities integrating natural resource protection and Low Impact Development strategies in town plans and ordinances
6	Number of properties under one or more low input/ no phosphorous lawn care practices
7	Number of participant hours restoring riparian habitat through stewardship activities.
8	Number of residencial households adopting low input/no phosphorous lawn care practices
9	Number of retail lawn and garden centers providing information on low input/no phosphorous lawn care options to customers
10	Number of schools that demonstrate an increase in, or institutionalization of, integrated watershed education into returning educators curriculum
11	Number of service learning high school or undergraduate college students conducting or participating in watershed stewardship projects
12	Number of sites where Low Impact Development practices are being used to decrease stormwater runoff
13	Number of towns/municipalities and watershed organizations conducting outreach activities and participating in outcome oriented water quality education
14	Number of On-Farm Climate Change Adaptation and Mitigation Best Practices in the Lake Champlain Basin of Vermont.

Outcome #1

1. Outcome Measures

Number of educators increasing knowledge of watersheds and new teaching tools and techniques

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	76

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #2

1. Outcome Measures

Number of lakeshore residential properties planting buffer strips or maintaining native vegetation as a buffer to decrease erosion and sedimentation

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	27

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #3

1. Outcome Measures

Number of middle and high school youth demonstrating an increase in knowledge of watersheds and their role as watershed stewards

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	650

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As Vermont begins to experience frequent storm events and droughts in the summer it becomes more important that teachers and students are educated about the difference between weather, climate, climate change and climate science.

What has been done
UVM Watershed Alliance is a partner of CBEI, Champlain Basin Education Initiative, a consortium of environmental and place-based education groups. CBEI partners coordinate professional development workshops for educators. Educators learn the technology and tools to teach climate science and climate change. 76 educators, some returning, overwhelmingly responded positively about the training. One saying, "..useful information, stimulus for exciting educational opportunities for the classroom."

Results
This year approximately 650 students demonstrated knowledge of watersheds and their role as watershed stewards, many participating in restoration projects. Vermont has the ability to adapt to changes in our landscape if future generations have the knowledge and understand what needs to be done. For more information about Climate Change Resources - http://watershedmatters.edublogs.org/files/2012/03/Climate-Change-Resources-for-Teachers-

2fedhpe.docx

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #4

1. Outcome Measures

Number of municipal officials have an increased understanding of and need for natural resource based planning and stormwater management at the municipal level

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	26

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Improperly managed storm water can lead to erosion and sedimentation, increased pollutant loads, and compromises to aquatic habitat. In Vermont, at least seventeen waters are listed as impaired due to storm water with the majority of these being located in the Lake Champlain Basin.

What has been done
The Green Infrastructure Roundtable, a collaboration of over ten organizations and agencies, developed a strategic plan and Executive Summary. Lake Champlain Sea Grant has been a participant in the Green Infrastructure Roundtable for the past two years.

Results
Based on the roundtable's strategic plan and executive order, on March 7th, Governor Shumlin signed the Green Infrastructure Executive Order, establishing an Inter-agency Green Infrastructure Council. The Council includes the Secretaries of Natural Resources, Transportation and Commerce, and the Commissioner of the Department of Buildings and General Services or their designee. It is charged with supporting the research, development, funding, integration and monitoring of green infrastructure projects throughout the state. This state level, inter-agency body will influence the storm-water management and other threats to the Lake Champlain Basin.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #5

1. **Outcome Measures**

   Number of municipalities integrating natural resource protection and Low Impact Development strategies in town plans and ordinances

2. **Associated Institution Types**

   - 1862 Extension

3a. **Outcome Type:**

Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2012	2

3c. **Qualitative Outcome or Impact Statement**

Issue (Who cares and Why)

What has been done

Results

4. **Associated Knowledge Areas**

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #6

1. **Outcome Measures**

Number of properties under one or more low input/ no phosphorous lawn care practices

2. **Associated Institution Types**

   - 1862 Extension

3a. **Outcome Type:**

Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2012	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #7

1. Outcome Measures

Number of participant hours restoring riparian habitat through stewardship activities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	260

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #8

1. Outcome Measures

Number of residencial households adopting low input/no phosphorous lawn care practices

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Number of retail lawn and garden centers providing information on low input/no phosphorous lawn care options to customers

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	158

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Phosphorus is one of the leading contributors to toxic blue-green algae blooms in Lake Champlain, affecting water quality, lake tourism and recreation and public health. A major source of phosphorous input to the lake is via urban storm-water, and overuse or misapplication of phosphorous fertilizer.

What has been done
Lake Champlain Sea Grant is a founding member of the Green Lawn Coalition. The Coalition organized the "Don't P on your lawn" campaign used to dissuade homeowners from using phosphorous fertilizers on their lawns. This campaign inspired a legislative act.

Results
A legislative act (Title 10, Chapter 47, Section 1266b) passed in 2011, which took effect Jan. 1, 2012, outlawed the application of phosphorus fertilizers on lawns, with a few exceptions. In 2007 161.2 tons of phosphorous, contained in domestic lawn care products, was sold in Vermont. Eliminating overuse will reduce phosphorous use by at least 75%, removing over 120 Tons of phosphorous from Vermont watersheds (based on 2007 state-wide application data).

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #10

1. **Outcome Measures**

   Number of schools that demonstrate an increase in, or institutionalization of, integrated watershed education into returning educators curriculum

2. **Associated Institution Types**

   - 1862 Extension

3a. **Outcome Type:**

   Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2012	5

3c. **Qualitative Outcome or Impact Statement**

Issue (Who cares and Why)

What has been done

Results

4. **Associated Knowledge Areas**

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #11

1. **Outcome Measures**

   Number of service learning high school or undergraduate college students conducting or participating in watershed stewardship projects

   Not Reporting on this Outcome Measure

Outcome #12

1. **Outcome Measures**

   Number of sites where Low Impact Development practices are being used to decrease stormwater runoff

2. **Associated Institution Types**

● 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Advances have been made in methods of treating storm-water pollution; it remains the fastest growing threat to Vermont's water quality. Rain and snow melt pick up sediment that can impair surface waters. Rain gardens and buffer strips provide one simple solution to manage runoff onsite.

What has been done
Sea Grant staff worked with two communities to address runoff providing on-site guidance and technical assistance building 5 roadside rain gardens in one community and the other a infiltration trench and rain garden addressing runoff from an impervious tennis court surface.

Results
The community with the 5 roadside rain gardens had 8.49 inches of rain last year and treated 25,308 square feet of impervious surface. This displaced 120,379 gallons of storm water. The tennis court produces 7,200 gallons of water in every one-inch rain event.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #13

1. Outcome Measures

Number of towns/municipalities and watershed organizations conducting outreach activities and participating in outcome oriented water quality education

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Number of On-Farm Climate Change Adaptation and Mitigation Best Practices in the Lake Champlain Basin of Vermont.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Outcome measures in this report outline mid-level changes occurring due to the latest research and education in the field. Staff are employing varying techniques to gather data post-event to determine changes made.

Narratives with the outcome measures highlight some of those results and explain the value of those changes.

Stakeholder input continues to inform program efforts direction and content, format and accessibility.

Key Items of Evaluation