2008 University of Maine Research Annual Report of Accomplishments and Results

Status: Accepted
Date Accepted: 05/26/09

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I. Report Overview

1. Executive Summary

Merit Review Process

The Maine Agricultural & Forest Experiment Station (MAFES) continues to follow the external scientific peer-review process fully described in our 2000-2004 Plan of Work. A total of 18 Hatch and McIntire-Stennis Projects went through the process in FY2008.

Stakeholder Input

MAFES took several actions to seek stakeholder input including formal meetings with advisory groups, attending monthly meetings of the Agricultural Council of Maine, using the Maine Agricultural Center to facilitate communication between MAFES and University of Maine Cooperative Extension, faculty interaction with stakeholder groups and individuals in both formal and informal settings, and field days at our research facilities.

Stakeholder groups were identified through coordinating and advisory committees. Input was collected through formal organizational processes, feedback on research programs via stakeholder grant-review programs, and through informal conversations with groups and individuals by MAFES administrators. Input was used internally to evaluate research, outreach, and hiring priorities for MAFES and the Maine Agricultural Center.

MAFES stakeholders emphasized the value of research on specialty crops.

Expenditure Summary

In our original Plan of Work, MAFES estimated 33.0 SYs for FY2008; the actual number was 33.8 SYs in FY2008.For FY2008, MAFES expended $3,215,807 (Actual Formula Funds), $5,986,685 (Actual Matching Funds), $1,017,276 (Actual All Other Funds), expending a total of $10,219,768.

Planned Programs

MAFES research is grouped into seven program areas: natural resources, plant production, plant protection, animal production and protection, foods and nutrition, economics, marketing, policy, and community development, and forest resources. Research in the forest resources program area is funded by McIntire-Stennis and does not fall within the scope of this Plan of Work.

Natural Resources

In our original plan of work, we estimated that there would be 7.2 SYs in this program area; the actual amount of SYs expended for 2008 was 9.0. During FY2008, in this program area MAFES expended $967,022 (Hatch), and $1,152,157 (1862 Matching), $6,685 (1862 All Other) for a total of $2,125,864. In FY2008 there were 17 research projects in this program area, falling under 13 knowledge areas

MAFES research in this program area has resulted in a number of outputs for FY2008, including completed projects, publications, and presentations at professional meetings, workshops, and other venues.

There were several outcomes in this program area during FY2008, which are elucidated in the outcome section. To highlight a few: MAFES researchers documented a relatively steep decline in wetland occupancy for the Least Bitterns, which was a major factor in legal listing of this species as endangered by the Maine Department of Inland Fisheries and Wildlife and the State of Maine Legislature; MAFES biologists have implemented treatments to improve stream habitats for wild trout; and an interdisciplinary team of MAFES researchers are investigating low-cost methods to produce carbon nanotubes from renewable woody materials, which Maine has in abundance.

Plant Production

In our original plan of work, we estimated that there would be 5.0 SYs in this program area; the actual amount of SYs expended for 2008 was 5.5. During FY2009, in this program area MAFES expended $478,793 (Hatch), and $1,164,436 (1862 Matching), $392,968 (1862 All Other) for a total of $2,036,197. In FY2008 there were 18 research projects in this program area, falling under 13 knowledge areas.

MAFES research in this program area has resulted in a number of outputs for FY2008, including completed projects, publications, and presentations at professional meetings, workshops, and other venues.

There were several outcomes in this program area during FY2008, which are elucidated in the outcome section. To highlight a few: MAFES research on cover crops for potatoes shows that potato growers can reduce their fertilizer costs by $40/acre with the consistent use of white clover as a cover crop. Another potato-related study showed that growers can also save money by using wood ash as a liming and nutrient source when they grow scab-resistant potato varieties.

Plant Protection

In our original plan of work, we estimated that there would be 5.6 SYs in this program area; the actual amount of SYs expended for 2008 was 4.9. During FY2008, in this program area MAFES expended $583,689 (Hatch), and $1,307,016 (1862 Matching), $300,302 (1862 All Other) for a total of $2,191,007. In FY2007 there were 18 research projects in this program area, falling under 18 knowledge areas.

MAFES research in this program area has resulted in a number of outputs for FY2008, including completed projects, publications, and presentations at professional meetings, workshops, and other venues.

There were several outcomes in this program area during FY2008, which are elucidated in the outcome section. To highlight a few: MAFES research has led to more than 90% of Maine blueberry growers using perimeter treatments for control of blueberry maggot fly. The MAFES long-term potato ecosystem project has shown increased potato yield in amended soils vs nonamended soils despite the fact that the average N, P2O5, and K2O fertilizer rates have been reduced by 59%, 100%, and 87%, respectively, in the amended system.

Animal Production & Protection

In our original plan of work, we estimated that there would be 4.7 SYs in this program area; the actual amount of SYs expended for 2008 was 5.4. During FY2008, in this program area MAFES expended $369,278 (Hatch), $1,290,999 (1862 Matching), and $280,357 (1862 All Other) for a total of $1,940,634. In FY2008 there were 16 research projects in this program area, falling under 11 knowledge areas.

Research in this program area has resulted in a number of outputs for FY2008, including completed projects, publications, and presentations at professional meetings, workshops, and at other venues.

There were several outcomes in this program area during FY2007, which are elucidated in the outcome section. To highlight a few: MAFES scientists have been able to reduce the use of live food inputs in diets for larval marine fish by 65% and MAFES researchers are recommending ways to increase the clam harvest in eastern Maine.

Foods & Nutrition

In our original plan of work, we estimated that there would be 4.4 SYs in this program area; the actual amount of SYs expended for 2008 was 4.0. During FY2008, in this program area MAFES expended $433,587 (Hatch), and $467,258 (1862 Matching), $36,967 (1862 All Other) for a total of $937,812. In FY2007 there were 13 research projects in this program area, falling under eight knowledge areas.

MAFES research in this program area has resulted in a number of outputs for FY2008, including completed projects, publications, and presentations at professional meetings, workshops, and other venues.

There were several outcomes in this program area during FY2008, which are elucidated in the outcome section. To highlight a few: MAFES food scientists have shown that minced meat byproducts from Jonah crab can be used to create an acceptable crab appetizer and extruded snack product. Seafood processors and various government agencies are very interested in this research. Other MAFES food scientists have found a way to detect pathogenic E. coli in food with the naked eye, using nanotechnology.

Economics, Marketing, Policy and Community Development

In our original plan of work, we estimated that there would be 4.4 SYs in this program area; the actual amount of SYs expended for 2007 was 5.1. During FY2008, in this program area MAFES expended $383,438 (Hatch), and $604,821 (1862 Matching) for a total of $988,259. In FY2008 there were 11 research projects in this program area, falling under seven knowledge areas.

MAFES research in this program area has resulted in a number of outputs for FY2008, including completed projects, publications, and presentations at professional meetings, workshops, and at other venues.

There were several outcomes in this program area during FY2008, which are elucidated in the outcome section. To highlight: MAFES economists, as part of a feasibility study on the use of potatoes for bioplastics, estimated such a process would require roughly 6,600 acres of potatoes annually.

Total Actual Amount of professional FTEs/SYs for this State

Year:2008	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.0	33.0	0.0
Actual	0.0	0.0	33.8	0.0

II. Merit Review Process

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

- Internal University Panel
- External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The external scientific peer review process fully described in our 2000□2004 Plan of Work continues to be used to evaluate all MAFES projects, regardless of funding source. A total of 18 Hatch and McIntire□Stennis projects went through the process in FY2008.

III. Stakeholder Input

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

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public

Brief Explanation

MAFES encouraged stakeholder input by hosting (along with the college leadership) formal meetings with advisory groups including the Board of Agriculture (twice annually), the Forest Resources Advisory Committee (twice annually), theCoordinating Committee of the Maine Cooperative Fish and Wildlife Research Unit (annually). This year again, as a way to encourage more participation by state legislatures, one Board of Agriculture meeting was held in the state capitol building.

Other key stakeholders groups also provided input in direct or indirect ways. Three boards or committees (Wild Blueberry Commission of Maine Advisory Committee, Maine Potato Board, Cooperative Forestry Research Unit) held funding competitions where MAFES scientists submitted all or the majority of project proposals. Feedback from these committees provide information on research priorities and needs for these commodity groups.

The Associate Director of MAFES attended monthly meetings of the Agricultural Council of Maine as a way to maintain effective communication with the wide array of agricultural organizations in the state. As this group revises its long-range plan, these meetings provide MAFES administration with good information on issues important to Maine's agricultural community.

The Maine Agricultural Center continued to facilitate improved communication between MAFES and University of Maine Cooperative Extension and therefore between researchers and extension faculty. Extension educators are both stakeholders in research and good sources of information about the research needs of the groups they serve.

MAFES faculty, through their interaction with stakeholder groups and individuals in both formal and informal settings, also continued to encourage stakeholder participation.

At our research facilities, MAFES hosted field days held for apples, small fruits, and vegetables, potatoes, and wild blueberries and other interests of growers which allows researchers and administrators to learn more about the needs of the stakeholders in attendance.

Overall, the Station makes every effort to allow all groups and individuals to express their suggestions and concerns about station-sponsored research through the mechanisms discussed above.

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

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions

Brief Explanation

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

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

1. Methods for collecting Stakeholder Input

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

Brief Explanation

Input is collected through formal organization processes (Board of Agriculture, Forest Resources Advisory Committee, Maine Cooperative Fish and Wildlife Research Unit Coordinating Committee) and feedback on research programs of faculty via stakeholder grant review programs (Wild Blueberry Commission of Maine Advisory Committee, Maine Potato Board, Cooperative Forestry Research Unit). The Board of Agriculture and Forest Resources Advisory Committee reviews all MAFES project preproposals. The Board of Agriculture has updated a 1999 survey of all known agricultural stakeholders to collect information on their research and extension. This information will be used by the Board to advise MAFES and UMCE.

3. A statement of how the input was considered

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

Brief Explanation

Input was used internally to evaluate research, outreach and hiring priorities for MAFES and the Maine Agricultural Center (MAC). As noted above, some stakeholder groups provide direct input during project approval processes. Based on the input received and the priorities set by the Board of Agriculture and Forest Research Advisory Committee, critical areas were identified for emphasis and support. Since agriculture is a dynamic industry, MAC/MAFES needs to update long-range plans, and the strategic plan of the Agricultural Council of Maine, once completed, will be a key input to that process.

Brief Explanation of what you learned from your Stakeholders

Stakeholders emphasized that research on specialty crops was important to Maine.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1912350	0

2. Totaled Actual dollars from Planned Programs Inputs

	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	0	3215807	0
Actual Matching	0	0	5986685	0
Actual All Other	0	0	1017276	0
Total Actual Expended	0	0	10219768	0

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

Carryover	0	0	1568510	0

V. Planned Program Table of Content

Program #1

V(A). Planned Program (Summary)

1. Name of the Planned Program

Natural Resources

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources			5%	
102	Soil, Plant, Water, Nutrient Relationships			8%	
111	Conservation and Efficient Use of Water			3%	
112	Watershed Protection and Management			5%	
123	Management and Sustainability of Forest Resources			9%	
132	Weather and Climate			2%	
133	Pollution Prevention and Mitigation			5%	
135	Aquatic and Terrestrial Wildlife			43%	
136	Conservation of Biological Diversity			9%	
201	Plant Genome, Genetics, and Genetic Mechanisms			3%	
206	Basic Plant Biology			2%	
402	Engineering Systems and Equipment			4%	
511	New and Improved Non-Food Products and Processes			2%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.0	6.3	0.0
Actual	0.0	0.0	9.0	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	967022	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	1152157	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	6685	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAFES scientists conducted research on Maine's ground water and surface water resources. They studied Maine native animal and plant species and their habitats and investigated basic biology related to photosynthesis. They published peer-reviewed journal articles and other publications and presented findings at professional meetings, to state and federal resource managers, to schools and at other public venues.

2. Brief description of the target audience

Other scientists in plant biology, marine biology, animal biology, evolutionary biology, aquaculture, phycology, molecular biology; teachers at all levels; directors of aquariums and museums, exhibit halls, etc.; cancer biologists and pharmaceutical companies; endangered species biologists/managers; policy makers; state regulatory agencies; environmental consultants

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	16	
2008	0	25	25

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of other types of publications

Year	Target	Actual
2008	14	18

Output #2

Output Measure

- # of papers presented at professional meetings

Year	Target	Actual
2008	38	54

Output #3

Output Measure

- # of research projects completed

Year	Target	Actual
2008	1	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	# of complete chloroplast gene sequences submitted to GenBank for public use for Vaucheria litorea
2	# of people increasing their knowledge about the interactions between seals and Atlantic salmon, annually
3	# of people increasing their knowledge about the contribution of watershed nutrient exports to non-point pollution and nutrient cycling in Maine rivers and coastal waters
4	# of lakes from which data are used in a database to quantify statistical relationship and to develop empirical models
5	# of new software programs created to evaluate borehole flow profile data collected using borehole geophysics
6	# of new ground-water-modeling programs created to simulate ground-water flow
7	# of people improving their understanding of habitat requirements for marsh bird species of management concern in Maine, annually
8	# of people developing a better understanding of patterns of adaptive divergence in wild fish populations and the relevance of evolution in fish conservation management, annually
9	# of state and/or federal agencies using information on marsh bird species occurrence and habitat requirements in making assessments and recommendations on development proposals near wetlands
10	# of state agencies using information on marsh bird species occurrence and habitat requirements to develop recovery strategies for rare marsh bird species
11	# of new recommendations for maintaining water quality in Maine rivers and minimizing adverse impacts of non-point pollution
12	# of state agencies using information on watershed nutrient exports for developing new recommendations for maintaining water quality in Maine rivers and minimizing the impacts of non-point pollution
13	# of state agencies using information about the biology of rare wildlife species in Maine to help to create policies to protect species and habitats
14	Number of public school children and other visitors to the area using a checklist for birds for the Dwight B. Demeritt Forest in Orono/Old Town, Maine, and a checklist for birds for the Penobscot Experimental Forest in Bradley/Eddington, Maine
15	Number of Internet-accessible databases containing what may be the largest and most complete set of ecological and physiological data on a wide variety of songbirds from North America.
16	# of lake associations, such as Congress of Lake Associations, promoting maintenance of healthy lake foodwebs
17	# of management agencies using measurement of lake foodweb structure in their lake assessment and education programs
18	# of management agecies using information on seal behavior to create management plans
19	# of rare marsh bird species affected by changes in harvest regulations
20	% decrease in nutrient enrichment of Maine rivers and coastal waters
21	Conserving native fishes
22	Conservation of endangered sturgeon
23	New uses for Maine's abundant wood resource

Outcome #1

1. Outcome Measures

# of complete chloroplast gene sequences submitted to GenBank for public use for Vaucheria litorea

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	75	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Life on earth is dependent upon the oxygen produced by photosynthesis, a solar energy-driven process that also plays a fundamental role in plant growth, productivity, and biofuel production. Photosynthesis is the primary determinant of crop productivity. It is the process on earth that converts sunlight into biomass, sequesters atmospheric CO2 into carbohydrates, and liberates O2. Photosynthesis and the formation of food, fiber, and biomass are dramatically limited by environmental, biochemical, and genetic constraints. Alleviation of some or all of these constraints could lead to substantial increases in plant productivity.

What has been done

A MAFES researcher taking part in Multistate Project NC1168 has been using the 'solar-powered' sea slug, Elysia chlorotica, in groundbreaking research that offers insight into the potential for evolution of photosynthesis in an animal through symbiosis and gene transfer. The scientist and her team have identified a new secondary compound, loliolide, in the sea slug and deposited several DNA sequences in the public GenBank database.

Results

Research findings are leading to a new understanding of the evolution of photosynthesis in typically non-photosynthetic organisms. The new secondary compound, loliolide was identified in a photosynthetic sea slug and may lead to the discovery of other compounds with anti-biological activity. Many teachers are now using images, video, and research results from our studies of photosynthetic sea slugs to teach photosynthesis, evolution, marine biology, and other biological topics in their schools, at all levels.

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #2

1. Outcome Measures

# of people increasing their knowledge about the interactions between seals and Atlantic salmon, annually

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

# of people increasing their knowledge about the contribution of watershed nutrient exports to non-point pollution and nutrient cycling in Maine rivers and coastal waters

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Maine rivers represent one of the valuable natural resources that are important for recreation, tourism, habitat, and quality of life in the state. An ongoing challenge is to be able to monitor the health and integrity of these aquatic systems, to be able to detect adverse changes in these resources, and to prescribe effective management plans for sustaining these surface waters and their surrounding watersheds.

What has been done

MAFES environmental scientists continued sampling Maine rivers and streams in an effort to examine nutrient exports from upland watersheds to aquatic receptors.

Results

Results of the riverbank erosion study were shared with citizens in the lower Penobscot River at a town meeting. Presentations were made at professional meetings to describe new work we are completing looking at alternative future development scenarios in the lower Penobscot River Watershed and examining how these changes may influence the river system. Study results document the positive impact of the Clean Water Act and other state and federal regulations in contributing to improved water quality conditions in Maine rivers that were historically degraded by various human activities. Results have identified phosphorus as a key limiting nutrient in Maine rivers that must be the focus of ongoing watershed management activities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #4

1. Outcome Measures

# of lakes from which data are used in a database to quantify statistical relationship and to develop empirical models

Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

# of new software programs created to evaluate borehole flow profile data collected using borehole geophysics

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Domestic wells typically penetrate into the bedrock and extract ground water from fractures. These wells are threatened by a variety of human activities. Once contaminated, a detailed understanding the ground-water hydraulics of fractured bedrock aquifers is required to predict ground-water flow direction and identify potential receptors.

What has been done

Over the past year, the project has focused on using FiPy, a multiphysics finite volume package, to simulate ground-water flow and solute transport. The MAFES scientist collaborated with the FiPy developers to add the ability to simulate anisotropic materials to this software package. The investigator has also written a desaturation/rewetting routine using FiPy, a critical component when considering ground-water extraction and injection needed to evaluate borehole geophysical data.

Results

The development of computer models designed to simulate pumping (or injection) of water from an aquifer will aid in the characterization of aquifer systems. These data are critical for the prediction of solute migration through these aquifer systems and the assessment of sustainable well yields from production water wells.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

Outcome #6

1. Outcome Measures

# of new ground-water-modeling programs created to simulate ground-water flow

Not reporting on this Outcome for this Annual Report

Outcome #7

1. Outcome Measures

# of people improving their understanding of habitat requirements for marsh bird species of management concern in Maine, annually

Not reporting on this Outcome for this Annual Report

Outcome #8

1. Outcome Measures

# of people developing a better understanding of patterns of adaptive divergence in wild fish populations and the relevance of evolution in fish conservation management, annually

Not reporting on this Outcome for this Annual Report

Outcome #9

1. Outcome Measures

# of state and/or federal agencies using information on marsh bird species occurrence and habitat requirements in making assessments and recommendations on development proposals near wetlands
Not reporting on this Outcome for this Annual Report

Outcome #10

1. Outcome Measures

# of state agencies using information on marsh bird species occurrence and habitat requirements to develop recovery strategies for rare marsh bird species

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A number of marsh bird species are of management concern in Maine and the northeastern U.S. because of limited information on their population status and ecology.

What has been done

MAFES scientists are conducting a study to determine whether populations of these species are decreasing in Maine and to learn more about their habitat requirements. They analyzed data on habitat characteristics for the American Bitterns, Virginia Rails, Soras, Pied-billed Grebes, and Least Bitterns using data from 215 wetlands, focusing in the last year on estimating minimum threshold values for specific habitat types to explain marsh bird occurrence in wetlands.

Results

The analyses provided new knowledge on relative long-term and unknown population trends for American Bitterns, Virginia Rails, Least Bitterns, Soras, Pied-billed Grebes in Maine. Virginia Rails and Soras have increased in abundance and wetland occupancy; Least Bitterns have declined; and American Bitterns and Pied-billed Grebes have been relatively stable. The relatively steep decline in wetland occupancy for the Least Bitterns measured in this study was a major factor in legal listing of this species as endangered by the Maine Department of Inland Fisheries and Wildlife and the Maine Legislature.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #11

1. Outcome Measures

# of new recommendations for maintaining water quality in Maine rivers and minimizing adverse impacts of non-point pollution
Not reporting on this Outcome for this Annual Report

Outcome #12

1. Outcome Measures

# of state agencies using information on watershed nutrient exports for developing new recommendations for maintaining water quality in Maine rivers and minimizing the impacts of non-point pollution

Not reporting on this Outcome for this Annual Report

Outcome #13

1. Outcome Measures

# of state agencies using information about the biology of rare wildlife species in Maine to help to create policies to protect species and habitats

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #14

1. Outcome Measures

Number of public school children and other visitors to the area using a checklist for birds for the Dwight B. Demeritt Forest in Orono/Old Town, Maine, and a checklist for birds for the Penobscot Experimental Forest in Bradley/Eddington, Maine

Not reporting on this Outcome for this Annual Report

Outcome #15

1. Outcome Measures

Number of Internet-accessible databases containing what may be the largest and most complete set of ecological and physiological data on a wide variety of songbirds from North America.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #16

1. Outcome Measures
# of lake associations, such as Congress of Lake Associations, promoting maintenance of healthy lake foodwebs
Not reporting on this Outcome for this Annual Report

Outcome #17

1. Outcome Measures
# of management agencies using measurement of lake foodweb structure in their lake assessment and education programs
Not reporting on this Outcome for this Annual Report

Outcome #18

1. Outcome Measures
# of management agecies using information on seal behavior to create management plans

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	4	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Harbor seals are significant predators of farmed and wild fish. This project defines the boundaries, the numbers, and the mortality of the harbor seal population(s) in New England. This information is required prior to developing any measures to reduce predation.

What has been done

A cluster sample design has been completed to estimate numbers of harbor seals. It is in the process of being tested with previous data.

Results

The new survey design will allow a reduction in the flying time necessary to complete a survey with little loss in precision. This will save money, time, and decrease exposure of personnel to risk. The National Marine Fisheries Service plans to issue an RFP for seal population estimation in New England that incorporates this design.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #19

1. Outcome Measures

# of rare marsh bird species affected by changes in harvest regulations

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #20

1. Outcome Measures

% decrease in nutrient enrichment of Maine rivers and coastal waters

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #21

1. Outcome Measures
Conserving native fishes

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Native fishes, and salmonines in particular, are threatened throughout much of their respective ranges. In the United States, Maine is the largest stronghold for wild brook trout, and also contains the only remaining wild Atlantic salmon populations. The persistence of these, and other, fishes is threatened by many factors, including habitat alteration and competition from exotic species.

What has been done

A MAFES project is designed to provide fishery managers with the information required to improve native fisheries while balancing conflicting objectives of many groups of resource users. As one part of the project, the researchers have added large woody debris to stream channels to simulate the natural influx of dead trees from mature forests. These trees provide pool habitat, trap spawning gravel, reduce erosion, and lessen flood severity, which should benefit trout. They have treated 10 miles of headwater streams with wood, affecting 100,000 watershed acres.

Results

Wild trout production should improve for anglers, and downstream communities should benefit from erosion control. The before-and-after monitoring in treatment and control sites allows the researchers to quantify results and inform future projects, and permits managers to compare costs of wood addition (which at $3/ft is relatively cheap) with benefits of fishery improvement. Fishing participation and expenditures in Maine are substantial, providing $250 million in economic output, $18 million in state and local tax revenue, and 3,200 jobs. Brook trout fishing alone is valued at $114 million, and 279,000 people hold Maine fishing licenses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #22

1. Outcome Measures

Conservation of endangered sturgeon

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Preservation of adaptive variation within and among populations is an important element of many conservation and management programs. However, little is generally known about adaptive diversity in many species of practical concern or the best approaches to maintain such diversity. Indeed, the implications of most conservation and management schemes for adaptive variation are largely untested.

What has been done

MAFES biologists have continued collecting data on population abundance, movement, and habitat use of Atlantic sturgeon and endangered shortnose sturgeon in the Penobscot River.

Results

Their finding that shortnose sturgeon regularly migrate from the Penobscot River to the Kennebec River and back is now being used in designating evolutionarily significant units for conservation of this species under the Endangered Species Act. The researchers have been actively engaged with resource managers and policy makers in Maine (e.g., Maine Department of Inland Fisheries and Wildlife, Maine Department of Environmental Protection, Maine Department of Marine Resources, Bangor Water District); with resource managers and policy makers at national level (e.g., National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife service, Environmental Protection Agency, The Nature Conservancy); with the aquaculture industry and conservation hatcheries (e.g., Maine Aquaculture Association; Craig Brook National Fish Hatchery); and with the academic community and general public (through publications, news paper stories and magazine articles).

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #23

1. Outcome Measures

New uses for Maine's abundant wood resource

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wood is one of our most abundant natural resources, and with adequate basic and applied research, we can provide biobased solutions to issues such as the energy crisis and the need for 'home-grown' fuels, to the development of new products that will better protect homeowners as well as protecting our armed forces personnel.

What has been done

As part of new Multistate Project NE506, MAFES researchers investigated the use of wood as biofuel, in bioproducts, hybrid biomaterials composites, and traditional forest products.

Results

Their results on wood-ash modified wood-plastic composites (WPCs) indicate much improved mechanical properties compared to control boards. Co-extruded WPCs manufactured with a glass-filled cap layer resulted in improved stiffness properties of the resulting composite. Wollastonite filled cap layers had better slip resistant properties. Their findings from the nanomaterials research suggest possible low-cost methods for production of carbon nanotubes (CNTs) directly from renewable woody materials such as wood fiber, grass, and pine needles. A computer simulation of pilot-scale strand composite processing may permit evaluation of the rapid, cost-effective changes in process machinery.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #2

V(A). Planned Program (Summary)

1. Name of the Planned Program

Plant Production

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources			8%	
102	Soil, Plant, Water, Nutrient Relationships			26%	
201	Plant Genome, Genetics, and Genetic Mechanisms			6%	
202	Plant Genetic Resources			20%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			11%	
204	Plant Product Quality and Utility (Preharvest)			4%	
205	Plant Management Systems			11%	
206	Basic Plant Biology			9%	
211	Insects, Mites, and Other Arthropods Affecting Plants			1%	
212	Pathogens and Nematodes Affecting Plants			1%	
215	Biological Control of Pests Affecting Plants			1%	
503	Quality Maintenance in Storing and Marketing Food Products			1%	
701	Nutrient Composition of Food			1%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	5.3	0.0
Actual	0.0	0.0	5.5	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	478793	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1164436	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	392968	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAFES scientists looked for new ways to increase the productivity of potato, blueberry, apple, small fruit and vegetable crops. They developed and tested new potato, other vegetable, and horticultural plant varieties.They conducted research on basic plant biology and molecular biology issues and new soil management and cover crop techniques to increase yields and improve soil quality. They also conducted research on basic soil chemistry issues. They published peer-reviewed journal articles and other publications concerning research abd presented findings at professional meetings, at field days for growers, and at other venues.

2. Brief description of the target audience

Plant geneticists, biologists, and molecular biologists, soil scientists, extension specialists, plant breeders, Maine' s horticultural industry, Maine fruit and vegetable producers, greens managers

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	10	
2008	0	25	25

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of field days/research tours

Not reporting on this Output for this Annual Report

Output #2

Output Measure

- # of research projects completed

Year	Target	Actual
2008	1	4

Output #3

Output Measure

- # of papers presented at professional meetings

Year	Target	Actual
2008	26	30

Output #4

Output Measure

- # of other types of publications

Year	Target	Actual
2008	8	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	# of improved analytical methods developed to study dissolved organic matter in soils
2	# of candidate stress-related genes or alleles that are functionally characterized
3	% of Maine apple growers who increase their knowledge about most suitable rootstocks for Maine conditions
4	# of gene-based marker systems used for targeted introgression in potato-variety-improvement program
5	# of new potato varieties released from Eastern potato-breeding program
6	# of potato clones with the best characteristics that will be selected annually for commercial-scale testing on experiment station and commercial farms
7	% of Maine potato growers adopting new recommendations (i.e., fertility programs, tissue-testing tools, crop rotation recommendations)
8	% of Maine apple growers planting winter-hardy, early-bearing rootstocks
9	# of small Maine farms that will diversify
10	# of Maine farmers implementing sustainable agricultural practices
11	# of Maine farms developing new agricultural products
12	# of new potato varieties adopted by Maine potato farmers
13	% decrease in blueberry leaf samples showing nutrient deficiencies
14	% increase in productivity of blueberry fields (lbs/acre) through better fertility management
15	Increase in profitability for Maine apple industry from a quicker return on investment and reduction in catastrophic tree losses ($)
16	New methods for propagating Teaoil Camellia
17	Potential savings on nitrogen fertilizer costs using alternative rotation crops for potatoes
18	Savings for potato growers using wood ash as an alternative to limestone and fertilizer materials

Outcome #1

1. Outcome Measures

# of improved analytical methods developed to study dissolved organic matter in soils

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources

Outcome #2

1. Outcome Measures

# of candidate stress-related genes or alleles that are functionally characterized

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

% of Maine apple growers who increase their knowledge about most suitable rootstocks for Maine conditions

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	40	40

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

# of gene-based marker systems used for targeted introgression in potato-variety-improvement program

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #5

1. Outcome Measures

# of new potato varieties released from Eastern potato-breeding program

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

Peter Wilcox, a purple-skinned yellow-fleshed specialty variety from the USDA-ARS program, and Lehigh, a yellow-fleshed dual-purpose variety from NY, are the more recent releases from the eastern programs. Because seed multiplication and commercial adoption are a slow process, only time will tell whether these varieties and other advanced clones being developed within the region will be commercially adopted. To facilitate the adoption process, MAFES potato breeding project staff coordinated small-scale commercial trials with both Peter Wilcox and Lehigh during 2008. They also distributed seed of these varieties for testing by 25 home gardeners.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
202	Plant Genetic Resources
212	Pathogens and Nematodes Affecting Plants
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

Outcome #6

1. Outcome Measures
# of potato clones with the best characteristics that will be selected annually for commercial-scale testing on experiment station and commercial farms

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2	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
211	Insects, Mites, and Other Arthropods Affecting Plants
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
212	Pathogens and Nematodes Affecting Plants
205	Plant Management Systems

Outcome #7

1. Outcome Measures

% of Maine potato growers adopting new recommendations (i.e., fertility programs, tissue-testing tools, crop rotation recommendations)

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
503	Quality Maintenance in Storing and Marketing Food Products
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
102	Soil, Plant, Water, Nutrient Relationships

Outcome #8

1. Outcome Measures

% of Maine apple growers planting winter-hardy, early-bearing rootstocks

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures
# of small Maine farms that will diversify

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Maine vegetable growers face several difficult challenges to economically viable vegetable production, not least of which is Maine's short growing season. Vegetable growers are also confronted with declining numbers of vegetable varieties developed for short cool growing seasons.

What has been done

MAFES scientists have completed a three-year project evaluating a hybrid mulched perennial bed system and fall beds system for growing vegetable crops. Results of this project were presented regionally and nationally in multiple venues, with more than 100 Maine mixed vegetable growers learning about this production practice.

Results

The hybrid mulched perennial bed and fall bed systems research conducted at Highmoor Farm has had direct impact and benefit for Maine mixed vegetable farm businesses. Farms that have implemented this production practice in the 2008 growing season were able to plant earlier resulting in earlier more profitable harvests. In 2008, more than 25 farm businesses sought information about fall made beds and intended to implement this practice on a small scale.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #10

1. Outcome Measures

# of Maine farmers implementing sustainable agricultural practices

Not reporting on this Outcome for this Annual Report

Outcome #11

1. Outcome Measures

# of Maine farms developing new agricultural products

Not reporting on this Outcome for this Annual Report

Outcome #12

1. Outcome Measures

# of new potato varieties adopted by Maine potato farmers

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
202	Plant Genetic Resources
212	Pathogens and Nematodes Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
204	Plant Product Quality and Utility (Preharvest)

Outcome #13

1. Outcome Measures

% decrease in blueberry leaf samples showing nutrient deficiencies

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology
102	Soil, Plant, Water, Nutrient Relationships

Outcome #14

1. Outcome Measures

% increase in productivity of blueberry fields (lbs/acre) through better fertility management

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
206	Basic Plant Biology

Outcome #15

1. Outcome Measures

Increase in profitability for Maine apple industry from a quicker return on investment and reduction in catastrophic tree losses ($)

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

New methods for propagating Teaoil Camellia

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Teaoil Camellia (Camellia oleifera Abel.) is a promising horticultural crop that has been cultivated for various purposes in China for more than 1000 years. As cooking oil, it compares favorably with olive oil, stores well at room temperature, and has a high smoke temperature. Although edible tea oil production covers about 40,000 km2 in China, other countries know little about this species. To share this valued crop to the world, selecting promising clones for targeted habitats is the key to success.

What has been done

As part of Multistate Project NE-9, MAFES plant scientists conducted experiments on cloning propagation of Camellia oleifera using hypocotyl grafting and stem cuttings. They also carried out studies on the genetic improvement of tea oil.

Results

Teaoil camellia is not a low-yield and low-valued crop, and the average yield has the potential to improve 6-7 times per hectare with selected clones and proper management. Both management practices and clone selection are key components in reaching this level of production. High percentage of clonal reproduction for elite teaoil camellia cultivars could be achieved using hypocotyle grafting and rooting of stem cuttings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #17

1. Outcome Measures

Potential savings on nitrogen fertilizer costs using alternative rotation crops for potatoes

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Potato producers in the Northeast require management pracitices that will provide a high-quality product for new and expanding markets, while also optimizing yields under the region's variable soil and climatic conditions. Additionally, fertilizer and pesticide input costs have increased by approximately twofold over the past two years due to volatile energy markets. As a result, potato growers are increasingly focusing on ways to decrease their input costs and improve the sustainability of their farming operations.

What has been done

In a long-term study of the effects of green manures on potato N nutrition, yield, and quality, MAFES researchers compared a two-year potato-oat rotation (the standard) with three alternative two-year rotations: potatoes-oat/pea/vetch; potatoes-peas undersown with white clover; and potatoes-oats undersown with Italian ryegrass. They followed each rotation crop with Shepody potatoes using at-planting N rates of 0, 60, 120, 180 and 240 lbs/A. The researchers measured soil properties, crop vigor, incidence of selected potato diseases, yield, quality, and N uptake.

Results

The pea/clover rotation had the best late-season crop vigor and least leaf browning. It also produced good yields without N fertilizer and contributed up to 100 lbs/A more N to the potato crop than the potato-oat rotation. Pea/oat/vetch contributed 20 to 30 lbs/A more N than standard rotation, while oats/ryegrass contributed only 4 to 10 lbs/A. At reduced rates of N, the potato-pea/clover was superior to the other rotations in N contribution, yields, quality, and net revenue. Overall, this research shows that consistent use of white clover as a rotation crop can reduce N fertilizer costs for growers, while maintaining soil cover and providing high yields and good tuber quality. At 100 lbs/A reduction in N needs and $0.40 per lb of N growers can reduce the fertilizer costs by $40/A.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
102	Soil, Plant, Water, Nutrient Relationships

503	Quality Maintenance in Storing and Marketing Food Products
205	Plant Management Systems

Outcome #18

1. Outcome Measures

Savings for potato growers using wood ash as an alternative to limestone and fertilizer materials

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Potato producers in the Northeast require management pracitices that will provide a high-quality product for new and expanding markets, while also optimizing yields under the region's variable soil and climatic conditions. Additionally, fertilizer and pesticide input costs have increased by approximately twofold over the past two years due to volatile energy markets. As a result, potato growers are increasingly focusing on ways to decrease their input costs and improve the sustainability of their farming operations.

What has been done

With the idea that wood ash may be beneficial as an alternative to limestone and fertilizer materials, MAFES researchers began experiments to study the effects of wood ash on soil fertility and pH and determine the effects of wood ash on yield, quality, and nutrient uptake of potatoes.

Results

Their results show that wood ash can be used effectively as a liming and nutrient source in potato systems that use a scab-resistant potato variety. Field personnel indicate that growers have rapidly adopted wood ash applications as a result of the positive results obtained in these experiments. They indicate that 4,000 acres of land in northern Maine potato production systems were treated during 2008 at a savings of $30 to $60 per acre in lime and fertilizer application.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
503	Quality Maintenance in Storing and Marketing Food Products
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)
102	Soil, Plant, Water, Nutrient Relationships

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- During (during program)
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #3

V(A). Planned Program (Summary)

1. Name of the Planned Program

Plant Protection

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			1%	
136	Conservation of Biological Diversity			3%	
201	Plant Genome, Genetics, and Genetic Mechanisms			1%	
202	Plant Genetic Resources			1%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			1%	
204	Plant Product Quality and Utility (Preharvest)			1%	
205	Plant Management Systems			2%	
206	Basic Plant Biology			1%	
211	Insects, Mites, and Other Arthropods Affecting Plants			12%	
212	Pathogens and Nematodes Affecting Plants			15%	
213	Weeds Affecting Plants			23%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants			1%	
215	Biological Control of Pests Affecting Plants			12%	
216	Integrated Pest Management Systems			17%	
601	Economics of Agricultural Production and Farm Management			1%	
605	Natural Resource and Environmental Economics			1%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.			1%	
721	Insects and Other Pests Affecting Humans			6%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.0	6.3	0.0
Actual	0.0	0.0	4.9	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	583689	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	1307016	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	300302	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAFES scientists searched for new ways to control diseases of potato and blueberry. They investigated new soil management techniques to control weeds and biological control of pests of potato, blueberry, other crops, and invasive ant species. They publish peer-reviewed journal articles and other publications concerning research and presented findings at professional meetings and at field days for growers and other venues.

2. Brief description of the target audience

Scientists, extension specialists, pest management professionals, potato, blueberry, and other crop producers in Maine

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	12	
2008	0	20	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of other types of publications

Year	Target	Actual
2008	10	7

Output #2

Output Measure

- # of papers presented at professional meetings

Year	Target	Actual
2008	30	33

Output #3

Output Measure

- # of research projects completed on ways to protect valuable plant/crop species

Year	Target	Actual
2008	1	3

Output #4

Output Measure

- # of field days/research tours

Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	% of potato growers familiar with effects of soil management on populations of insect
2	# of Rhizoctania solani genes identified that express differentially under conditions of quinate-induced hypovirulence
3	# of Rhizoctonia solani genes identified that express differentially under conditions of genetically stable hypovirulence
4	# of Rhizoctonia solani genes identified that express differentially under conditions of virulence
5	# of Maine blueberry growers using University of Maine's diagnostic services, annually
6	# of Maine potato growers developing a better understanding of how the use of manure soil amendments and longer crop rotations affect potato insect and weed pests, and diseases and well as potato yield, quality, and profitability
7	# of Maine potato growers learning how to integrate animal-based production systems with their potato operations
8	# of Maine bluberry growers adopting and maintaining integrated pest management strategies
9	% of Maine blueberry acreage treated with perimeter tactics for control of blueberry maggot fly
10	# of alternative pest and soil management systems for potato that are ready for commercial-scale evaluation
11	% of organic and diversified vegetable farmers surveyed who have adopted weed seedbank management practices
12	% reduction in the amount of damage from blueberry maggot fly in treated fields vs nontreated fields
13	% reduction in the amount of organophosphate insecticides used to treat blueberry maggot fly in Maine
14	# of commercial-scale demonstrations with significant reductions in pesticide and fertilizer use and improvements in soil quality
15	Average density of germinable weed seedbank found by Maine growers adopting ecologically based weed management practices (# of germinable seeds per square meter, 10 cm deep). Weed populations surviving cultivation will not reduce crop yield or quality and
16	Increase in potato yield with soil amendments
17	Reducing the presence of invasive plants in Maine
18	New treatment for weeds in wild blueberries
19	Increase in organic blueberry acreage
20	Keeping honey bees healthy

Outcome #1

1. Outcome Measures

% of potato growers familiar with effects of soil management on populations of insect

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #2

1. Outcome Measures

# of Rhizoctania solani genes identified that express differentially under conditions of quinate-induced hypovirulence

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

# of Rhizoctonia solani genes identified that express differentially under conditions of genetically stable hypovirulence

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
215	Biological Control of Pests Affecting Plants

Outcome #4

1. Outcome Measures

# of Rhizoctonia solani genes identified that express differentially under conditions of virulence

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
215	Biological Control of Pests Affecting Plants

Outcome #5

1. Outcome Measures

# of Maine blueberry growers using University of Maine's diagnostic services, annually

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
216	Integrated Pest Management Systems
213	Weeds Affecting Plants

Outcome #6

1. Outcome Measures
# of Maine potato growers developing a better understanding of how the use of manure soil amendments and longer crop rotations affect potato insect and weed pests, and diseases and well as potato yield, quality, and profitability

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
204	Plant Product Quality and Utility (Preharvest)

601	Economics of Agricultural Production and Farm Management
212	Pathogens and Nematodes Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
102	Soil, Plant, Water, Nutrient Relationships

Outcome #7

1. Outcome Measures

# of Maine potato growers learning how to integrate animal-based production systems with their potato operations

Not reporting on this Outcome for this Annual Report

Outcome #8

1. Outcome Measures

# of Maine bluberry growers adopting and maintaining integrated pest management strategies

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #9

1. Outcome Measures

% of Maine blueberry acreage treated with perimeter tactics for control of blueberry maggot fly

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	5	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Outcome measure should be reworded to percentage of Maine blueberry growers using perimeter tactics to control of blueberry maggot fly.

What has been done

Results

Approximately 90-95% of the more than 600 growers now only treat the field edges to control this insect pest instead of the entire field.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #10

1. Outcome Measures
# of alternative pest and soil management systems for potato that are ready for commercial-scale evaluation

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
204	Plant Product Quality and Utility (Preharvest)

102	Soil, Plant, Water, Nutrient Relationships
216	Integrated Pest Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #11

1. Outcome Measures

% of organic and diversified vegetable farmers surveyed who have adopted weed seedbank management practices

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants

Outcome #12

1. Outcome Measures

% reduction in the amount of damage from blueberry maggot fly in treated fields vs nontreated fields

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	5	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Survey will be conducted in summer of 2009.

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #13

1. Outcome Measures

% reduction in the amount of organophosphate insecticides used to treat blueberry maggot fly in Maine

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Data on use of organophosphate insecticides will be obtained through a survey of blueberry growers in the summer of 2009.

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #14

1. Outcome Measures

# of commercial-scale demonstrations with significant reductions in pesticide and fertilizer use and improvements in soil quality

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
102	Soil, Plant, Water, Nutrient Relationships
601	Economics of Agricultural Production and Farm Management
213	Weeds Affecting Plants
204	Plant Product Quality and Utility (Preharvest)

Outcome #15

1. Outcome Measures

Average density of germinable weed seedbank found by Maine growers adopting ecologically based weed management practices (# of germinable seeds per square meter, 10 cm deep). Weed populations surviving cultivation will not reduce crop yield or quality and

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants

Outcome #16

1. Outcome Measures

Increase in potato yield with soil amendments

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Economic and environmental pressures weigh heavily on present potato production systems, which also face difficult challenges in terms of pest and soil management.

What has been done

MAFES researchers have continued research on the long-term, interdisciplinary project that focuses on integration of animal manure use, forage and feed rotation crops, and alternative pest management practices into potato production systems.

Results

The seven-year (2001-2007) average potato yield was 33 cwt A-1 higher for amended than nonamended despite the fact that little or no yield improvement in amended is generally observed during relatively wet growing seasons. This yield differential has been observed despite the fact that the average N, P2O5, and K2O fertilizer rates have been reduced by 59%, 100%, and 87% in the amended system as a result of current year and residual soil nutrients from the amendments. The researchers also found reduced insect pressure on plants grown in manure-amended soils decreases both the costs of purchasing insecticides and the negative environmental effects of using toxic chemicals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
102	Soil, Plant, Water, Nutrient Relationships
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
213	Weeds Affecting Plants
212	Pathogens and Nematodes Affecting Plants

Outcome #17

1. Outcome Measures

Reducing the presence of invasive plants in Maine

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Invasive plants displace native plants, reduce biological diversity, alter ecosystem function and cause huge economical losses. As part of Multistate Project NE504, MAFES researchers are gathering scientific data to formulate a plan on how to prevent or at least slow the migration of invasive plants (especially Japanese barberry and burning bush) throughout the state of Maine and develop alternatives to invasive landscape plants.

What has been done

Studies were carried out to begin to assess, document and develop a management plan for the invasive plant Berberis thunbergii (Japanese barberry) in Wells Reserve and Acadia National Park, Maine. Field research was carried out at these sites, and greenhouse studies and laboratory experiments on the UMaine campus. Articles were printed in the Maine Master Gardener (MG) Newsletter and the Small Woodlot Owners of Maine (SWOAM) Newsletter, and emails were sent to Josselyn Botanical Society members, to solicit sightings of Euonymus alatus (burningbush) in Maine.

Results

Preliminary surveys demonstrated that more than one barberry species exists in Wells Reserve and Acadia National Park and their hybrids and clones may increase their degree of invasiveness. Twelve sightings reported as a result of this outreach effort have been visited to develop a GPS map of E. alatus populations throughout the state and monitor the spread on an annual basis.

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
201	Plant Genome, Genetics, and Genetic Mechanisms
136	Conservation of Biological Diversity

Outcome #18

1. Outcome Measures

New treatment for weeds in wild blueberries

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Weeds, diseases and vertebrate depredation reduce the yield and quality of wild blueberries. By developing new chemical and cultural weed management techniques and determining the most effective methods for disease control, wild blueberry producers can maintain production efficiency.

What has been done

MAFES scientists worked to identify new herbicides for effective weed control for the wild blueberry industry. Of particular concern to blueberry growers is bunchberry, so the researchers evaluated a herbicide's effectiveness in controlling bunchberry and potential injury to wild blueberry.

Results

A State of Maine 24 C label for the Express TotalSol formulation was given in September 2008 for application in the crop year after harvest. This herbicide will provide a means of control for bunchberry, which has consistently been listed as a major weed problem by wild blueberry growers for years. It also improves the competitiveness of Maine growers, as this treatment has been available to Canadian wild blueberry growers for years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants

Outcome #19

1. Outcome Measures

Increase in organic blueberry acreage

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pesticides used in lowbush blueberry cultivation may be detrimental to the environment adjacent to and within lowbush blueberry fields. An organic pest management system for lowbush blueberries may reduce the risk of pesticides to the environment.

What has been done

An interdisciplinary team of MAFES researchers have developed and implemented comprehensive season-long pest management programs to key blueberry pest complexes. They shared their results at annual summer field day extension meetings with organic lowbush blueberry growers from Maine and Canada. The number of growers attending the meetings has increased from 22 in 2005 t0 48 growers in 2008.

Results

The project has been fostered a working relationship with growers that enabled the researachers to conduct on-farm research leading to registration of IPM materials approved for organic use, such as the blueberry maggot insecticide GF-120, Naturalyte and Entrust, the organic formulation of spinosyn. Additionally this project most likely contributed in part to the increase in organic lowbush blueberry acreage in Maine from just over 400 acres at the start of the project to 750 acres in 2008.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
216	Integrated Pest Management Systems

Outcome #20

1. Outcome Measures

Keeping honey bees healthy

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The heavy reliance on insecticides for insect pest management may put honey bees at risk to exposure of harmful residues that compromise their health.

What has been done

A MAFES entomologist, taking part in Multistate Project NC508, has designed field experiments to assess the potential of exposure to insecticide residues to honey bees for newly registered reduced risk insecticides that have low toxic effects on humans.

Results

The results of this research have been the basis for a temporary hold on recommending the insecticide imidacloprid for the management of several insect pests in Maine.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- During (during program)
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #4

V(A). Planned Program (Summary)

1. Name of the Planned Program

Animal Production and Protection

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals			17%	
302	Nutrient Utilization in Animals			9%	
303	Genetic Improvement of Animals			7%	
304	Animal Genome			7%	
307	Animal Management Systems			1%	
308	Improved Animal Products (Before Harvest)			1%	
311	Animal Diseases			29%	
312	External Parasites and Pests of Animals			7%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals			7%	
315	Animal Welfare/Well-Being and Protection			8%	
402	Engineering Systems and Equipment			7%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.0	5.9	0.0
Actual	0.0	0.0	5.4	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	369278	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	1290999	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	280354	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAFES researchers looked for new ways to increase the reproductive success of dairy cows and to develop new stocks of mussels and oysters. They tested new fish diets and new rearing techniques for cod and halibut. They researched the efficacy of vaccines for infectious pancreatic necrosis virus. MAFES investigators also studied the effects of toxicants on fish and shellfish and the relationship between green crab and softshell clam populations. They published peer-reviewed journal articles and other publications concerning research. Present findings at professional meetings, at workshops for livestock producers, and at other venues.

2. Brief description of the target audience

Scientists, extension specialists, state fisheries managers, dairy farmers, Maine's aquaculture and shellfish industries

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	10	
2008	0	19	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of research projects completed, annually

Year	Target	Actual
2008	1	1

Output #2

Output Measure

- # of papers presented at professional meetings, annually

Year	Target	Actual
2008	26	36

Output #3

Output Measure

- # of other types of publications, annually

Year	Target	Actual
2008	8	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	# of zebrafish models validated for use in toxicology studies and for testing new pesticides
2	# of new lab-scale protocols that accurately reflects farm-scale ensilage
3	# of new cost-benefit models for establishing mussel hatcheries for new mussel lines
4	# of DNA vaccines against infectious pancreatice necrosis virus developed and tested
5	# of thematic maps regarding incidence of lobster shell disease and other environmental factors
6	# of state agencies using findings on effects of contaminants in rivers on maturation of Maine salmon to develop BMPs for pesticide use
7	% of Maine dairy farmers sending samples to be measured for bovine placental lactogen (bPL) and using the results of samples to make management decisions involving their animals
8	# of crab-monitoring programs undertaken by coastal communities
9	# of Maine mussel growers using new submersible raft
10	# of new oyster lines with superior cold-water growth and disease resistance
11	% increase in Maine's clam catch levels
12	% increase in oyster seed from new lines being used by industry
13	% increase in mussel seed used for grow-out on commercial mussel farms
14	% increase in the fertility of marine broodfish (Atlantic cod and halibut)
15	% increase in the hatching rate of marine larval fish (Atlantic cod and halibut)
16	% increase in the viability of juvenile marine fish raised in captivity (Atlantic cod and halibut)
17	% reduction in the use of live food inputs in diets for larval marine fish
18	Unlocking disease-fighting secrets
19	Feed costs and organic dairy
20	Ways to increase Maine's clam catch

Outcome #1

1. Outcome Measures

# of zebrafish models validated for use in toxicology studies and for testing new pesticides

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
304	Animal Genome

Outcome #2

1. Outcome Measures

# of new lab-scale protocols that accurately reflects farm-scale ensilage

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals

Outcome #3

1. Outcome Measures

# of new cost-benefit models for establishing mussel hatcheries for new mussel lines

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

Outcome #4

1. Outcome Measures

# of DNA vaccines against infectious pancreatice necrosis virus developed and tested

Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

# of thematic maps regarding incidence of lobster shell disease and other environmental factors

Not reporting on this Outcome for this Annual Report

Outcome #6

1. Outcome Measures

# of state agencies using findings on effects of contaminants in rivers on maturation of Maine salmon to develop BMPs for pesticide use

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
304	Animal Genome

Outcome #7

1. Outcome Measures
% of Maine dairy farmers sending samples to be measured for bovine placental lactogen (bPL) and using the results of samples to make management decisions involving their animals

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

Outcome #8

1. Outcome Measures

# of crab-monitoring programs undertaken by coastal communities

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
312	External Parasites and Pests of Animals

Outcome #9

1. Outcome Measures

# of Maine mussel growers using new submersible raft

Not reporting on this Outcome for this Annual Report

Outcome #10

1. Outcome Measures

# of new oyster lines with superior cold-water growth and disease resistance

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

Outcome #11

1. Outcome Measures

% increase in Maine's clam catch levels

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
312	External Parasites and Pests of Animals

Outcome #12

1. Outcome Measures

% increase in oyster seed from new lines being used by industry

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

Outcome #13

1. Outcome Measures

% increase in mussel seed used for grow-out on commercial mussel farms

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

Outcome #14

1. Outcome Measures

% increase in the fertility of marine broodfish (Atlantic cod and halibut)

Not reporting on this Outcome for this Annual Report

Outcome #15

1. Outcome Measures

% increase in the hatching rate of marine larval fish (Atlantic cod and halibut)

Not reporting on this Outcome for this Annual Report

Outcome #16

1. Outcome Measures

% increase in the viability of juvenile marine fish raised in captivity (Atlantic cod and halibut)

Not reporting on this Outcome for this Annual Report

Outcome #17

1. Outcome Measures

% reduction in the use of live food inputs in diets for larval marine fish

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	65

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
301	Reproductive Performance of Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

Outcome #18

1. Outcome Measures

Unlocking disease-fighting secrets

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In biomedical research, the zebrafish is used as a model organism because it has many biological traits that mimic those of humans. However, a greater understanding of the differences in their immunity systems could one day lead to therapies to better fight human disease.

What has been done

A MAFES microbiologist is conducting a study to shed light on the distinctions that evolved in the innate immunity systems of zebrafish and mammals, such as mice and humans. The researcher predicts that identifying those unique disease-fighting molecular processes in the zebrafish will provide researchers with clues to finding similar defense mechanisms as yet unidentified in humans. Unidentified components may be masked or maintain minor roles in the complex structure of mammals' innate immunity. But if their contributions to the body's immunity system were boosted, the result could be a complementary approach to fighting infectious disease.

Results

The research could open the possibilities for new vaccines. Unlocking the secrets of the innate immune response is so promising that companies are now trying to use Toll-like receptor (TLR) signal pathways (proteins found on the surface of certain cells) and receptors as adjuvants for vaccines, all in an effort to achieve a more robust immune response. While adaptive immunity remains essential to the existences of many species, researchers now know that the stronger the innate immune response, the more vigorous the adapted immune response.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #19

1. Outcome Measures

Feed costs and organic dairy

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Feed is the single largest expense for organic dairy farmers in the Northeast, averaging 44% of the annual operating expenses. Imported grains account for a large portion of the expense; organic grain costs 1.7 to 2.3 times the cost of conventional grains. Farmers are interested in cropping systems that can reduce their feed costs, either by increasing the quality of their forage or by including grains in their rotation. With many suitable cropping options, it can be difficult to decide which cropping system and crop mix is most appropriate for an individual farm.

What has been done

A MAFES study has been evaluating milk yield and forage quality of four contrasting cropping systems and to identify the level of grain importation needed for each system and identifying systems that reduce the importation of grain, prevent the accumulation of nutrient excesses and enhance the sustainability of organic dairies. The researchers have also been quantifying the efficacy of direct weed control tactics in cropping systems, the effect of weeds on total yield, quality and net return and quantifying the net return and exposure to risk and identify the economies of scale for each system.

Results

Results from the feeding trials in Maine indicate that based on the current value of organic milk in New England, ($26.00/cwt base price) the corn/pellet ration resulted in the highest daily milk income and the grass/commodity was the lowest. The grass/commodity diet was the most profitable, followed, respectively, by corn/pellet, corn/commodity, and grass pellet diets. The results from this study indicate that feeding commodity grains has an economic advantage over feeding a commercial pellet, and that feeding a grass silage-based diet may have a greater economic benefit to New England dairy producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #20

1. Outcome Measures

Ways to increase Maine's clam catch

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Clam landings in eastern Maine have decreased whereas in southern Maine, clam landings have not decreased.

What has been done

MAFES scientists studied clam spat counts of juvenile clams both from sieved mudflat core samples and from collector pots placed on the flats in Washington and Cumberland counties. Spat counts from both clams and mussels setting in spat bags suspended in the water column were higher in southern Maine than eastern Maine.

Results

Based on the results of this study, the researchers concluded the persistent difference in Mya arenaria recruitment between Cumberland and Washington counties is due to failure of larvae to reach the tidal flats in Washington County. Small clam populations as indicated from low landings of legal sized clams (> 50 mm) in eastern Maine are not producing sufficient spat to repopulate local clam flats. As natural settlement is presently inadequate to repopulate the clam flats in eastern Maine, the researchers recommend that these flats should be stocked with hatchery-reared seed, managed to limit predation, and closed to harvest until the seed reaches market size. Loss of sublegal clams from spearing with a clam hoe and exposure to predation after digging would be minimized. Probably, digging all flats in rotation with the time between harvests determined by local growth rates would be the most affective approach to reestablishing breeding stocks and increasing harvests in Eastern Maine.

4. Associated Knowledge Areas

KA Code	Knowledge Area
312	External Parasites and Pests of Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #5

V(A). Planned Program (Summary)

1. Name of the Planned Program

Foods and Nutrition

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies			9%	
502	New and Improved Food Products			8%	
503	Quality Maintenance in Storing and Marketing Food Products			16%	
701	Nutrient Composition of Food			5%	
702	Requirements and Function of Nutrients and Other Food Components			31%	
703	Nutrition Education and Behavior			17%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.			5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			9%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.0	4.6	0.0
Actual	0.0	0.0	4.0	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	433587	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	467256	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	36967	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAFES scientists conducted research experiments on new food processing technologies and new and improved food products. They also investigated ways to improve food storage for apples and potatoes. Nutrition researchers investigated ways to increase consumption of fruits, vegetables, and whole grains and the effectsof manganese on cardiovascular health. They published peer-reviewed articles and other types of publications and presented their findins at scientific meetings and other venues.

2. Brief description of the target audience

Scientists; extension educators; policy makers; specialty food producers; seafood processors; fruit and vegetable farmers; students; nutritionists; consumers

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	9	
2008	0	26	26

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of other publications

Year	Target	Actual
2008	7	17

Output #2

Output Measure

- # of professional presentations

Year	Target	Actual
2008	20	33

Output #3

Output Measure

- # of websites on phytonutrients

Not reporting on this Output for this Annual Report

Output #4

Output Measure

- # of completed research projects

Year	Target	Actual
2008	3	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	# of new crab-protein-based products developed
2	# of new natural antimicrobials developed from fruits and/or vegetables
3	% of Maine food processors learning about principles of food safety programs
4	# of new analytical methods for detecting phytocompounds in foods
5	# of Maine food processors learning about new methods to detect pesticide residues
6	% of Maine food processors establishing their own HACCP plans
7	% of Maine food processors adopting new technologies to reduce microbial contamination of food products
8	% of acreage planted of acreage planted to new apples varieties that have greater consumer appeal
9	Increase in fruit and vegetable consumption by Maine seniors
10	Increase in consumption of fruits and vegetables by targeted young adults
11	Decrease in obesity among young adults taking part in nutrition education program
12	Reduction in incidence of type 2 diabetes in Maine
13	New method to detect E. coli in food
14	Combating microorganisms on fresh fruit
15	New methods for monitoring organic chemicals
16	Detection of melamine in food products

Outcome #1

1. Outcome Measures

# of new crab-protein-based products developed

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Each year, the lobster, shrimp, and crab fisheries in Maine produce millions of pounds of post-processing discards that are usually dumped in the ocean or sent to landfills. These discards include whole legs and shells with adhering meat that is not cost-effective for the processors to remove.

What has been done

MAFES research is trying to develop new food products and/or food ingredients from crab processing by-products. New food products developed included a frozen appetizer containing crab mince and an extruded snack food product, both of which were evaluated for composition, shelf life stability and consumer acceptance.

Results

These studies indicate that crab mince obtained through mechanical separation techniques retains sufficient gelation properties for further utilization as a primary ingredient in a value-added food product. The researchers showed that minced meat by-products from Jonah crab can be used to create a crab appetizer product acceptable to consumers as well as an extruded snack food product. The main impact of this project will be the increased use of crustacean processing resources and a decrease in the generation of seafood processing 'waste'. In addition to the benefits of recycling secondary processing resources, the development and production of a new seafood based snacks and other value-added products will allow processors to make use of vacant or underutilized processing infrastructure and decrease unemployment of coastal residents. This crab by-product research has stirred the interest of a number of seafood processors as well as various government agencies in Maine, Quebec, and New Brunswick. The Canadian government is particularly interested in product development research with Jonah crab, and its applicability to green crab by-catch and snow crab processing by-products. Within Maine, in the last few years there has been a move away from composting seafood processing by-products toward more value-added product development, which represents an important change in perspective.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products
502	New and Improved Food Products

Outcome #2

1. Outcome Measures

# of new natural antimicrobials developed from fruits and/or vegetables

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food safety and pathogen control have become a central concern in modern food science due to outbreaks of foodborne infections/intoxications and potential of bioterrorism attacks. Foodborne illnesses account for billions of dollars of economic losses annually.

What has been done

A MAFES food scientist is one of only a handful of scientists worldwide studying cranberries from a food-safety standpoint. Cranberries have long been known for their ability to fight urinary tract infections and combat the bacterium Helicobacter pylori that causes certain stomach ulcers. But, cranberries also have the power to fight food poisoning, eliminating or inhibiting several important food-borne pathogens. The researcher has recently published several studies that show the preservative and preventative powers of cranberry concentrate. In ground beef and in the petri dish, the compound slowed the growth of -- and in some cases, reduced to untraceable levels -- listeria, salmonella, staph infection and E. coli 0157:H7, the form of the microorganism responsible for the 2006 spinach contamination.

Results

In a sensory study at UMaine, researchers found that consumers would accept a burger that included up to 5 percent cranberry or blueberry extract by weight; a mixture of the two berry extracts scored highest. It looks and tastes like a regular hamburger, but it fights pathogenic E. coli like a superburger.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

% of Maine food processors learning about principles of food safety programs

Not reporting on this Outcome for this Annual Report

Outcome #4

1. Outcome Measures

# of new analytical methods for detecting phytocompounds in foods

Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

# of Maine food processors learning about new methods to detect pesticide residues

Not reporting on this Outcome for this Annual Report

Outcome #6

1. Outcome Measures

% of Maine food processors establishing their own HACCP plans

Not reporting on this Outcome for this Annual Report

Outcome #7

1. Outcome Measures

% of Maine food processors adopting new technologies to reduce microbial contamination of food products

Not reporting on this Outcome for this Annual Report

Outcome #8

1. Outcome Measures

% of acreage planted of acreage planted to new apples varieties that have greater consumer appeal

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products

Outcome #9

1. Outcome Measures

Increase in fruit and vegetable consumption by Maine seniors

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fruit, vegetables, and whole grains contain numerous bioactive compounds that are involved in reducing oxidative damage in tissues, improving gastrointestinal function, and other physiological processes, but are consumed at low levels among older adults. Considerable integrated research needs to be conducted in order to improve fruit, vegetable and whole grain intake to reduce diet-related disability, obesity and chronic disease rates among rapidly growing numbers of older Americans.

What has been done

Following the Maine FarmShare programs carried out from 2002-2005, MAFES nutritionists sent surveys to each of the 18,412 participants. Of those seniors receiving the survey, 10,481 were returned and 4,087 included comments about the program following the survey proper.

Results

Based on individual comments from this survey, participants suffering from health-related problems found the program to be very beneficial. Many seniors chose to freeze or can some of the produce to eat off season. These low-income seniors appreciated what the program had to offer but were frustrated with its limitations. For three years those covered by the survey received $100 allotments per person per summer. However, that changed to $50 allotments by federal decree in the fourth year to severely limit what seniors could obtain for summer produce.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Increase in consumption of fruits and vegetables by targeted young adults

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #11

1. Outcome Measures

Decrease in obesity among young adults taking part in nutrition education program

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #12

1. Outcome Measures

Reduction in incidence of type 2 diabetes in Maine

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

New method to detect E. coli in food

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Because the industry has a zero-tolerance policy for E. coli O157:H7, meat suppliers routinely examine their products to detect the bacteria using USDA microbiological examination methods. These methods are considered the gold standard, but it takes a long time to get results.

What has been done

A MAFES food scientist, in collaboration with a researcher at the National Chiao Tung University in Taiwan, has found a way to detect pathogenic E. coli in food with the naked eye, using nanotechnology.

Results

The quick, easy and affordable method developed by this team of researchers could allow consumers and producers to know immediately whether their food is safe to eat, because the presence of pathogenic E. coli causes the nanoparticles to change color. The implications for the industry are revolutionary. According to the MAFES scientists, 'There's potential to develop something very simple, maybe even something a consumer could use -- as simple as a strip of paper that you dip into your food. If you see the right color, you know your food is safe.'

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

Combating microorganisms on fresh fruit

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Blueberries from the field typically have at least 1,000 and up to 10,000 microorganisms on them -- pathogens that must be eliminated. Traditional disinfectant practices include washing fresh fruit with plain or chlorinated water, but neither is particularly effective at eliminating harmful organisms. And when you add chlorine to the mix, concern over carcinogens arises.

What has been done

A MAFES food scientist, with the Maine Wild Blueberry Commission, is working to develop an affordable, efficient method to combat microorganisms on fresh fruit. Chlorine dioxide, which eventually turns into water, is a safe but often expensive alternative. Until recently, large, complex, costly equipment was required to create gaseous or aqueous applications of chlorine dioxide, which limited its use to large-scale agricultural operations.

Results

The MAFES research has found a cost-effective way of producing chlorine dioxide by mixing several compounds in a 'sachet,' which looks like a giant plastic tea bag. Though the research is still in its early stages, it has the potential to be a viable alternative for Maine farmers.

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

New methods for monitoring organic chemicals

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Volatile organic compounds (VOCs) are organic chemicals that easily vaporize at room temperature. They have no color or smell, and some are quite harmful. The oriented stand board (OSB) industry in Maine needs new processes to reduce its VOC emissions.

What has been done

MAFES research, in collaboration with the University of Maine Advanced Wood Engineering Center, has lead to a change in manufacturing process of OSB, which reduces hazardous emission of volatile organic compounds, phenol, methanol, acetaldehyde and formaldehyde into the atmosphere.

Results

The major manufacturers of OSB have already adopted this new manufacturing process.

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

Detection of melamine in food products

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Melamine contamination of food has become a major global issue over the past year. Found in infant formula, chocolates, tea, and even crackers, the presence of melamine has lead to the recall of products all over the world.

What has been done

MAFES researchers, collaborating with Beacon Analytical Systems, a Maine biotechnology company, have developed a commercial kit (EIA) for the rapid quantification of melamine residues in food.

Results

Beacon is currently the only manufacturer of melamine EIA kits in the world. MAFES collaboration with Beacon was instrumental in helping this small Maine company grow substantially. In addition to their work on melamine contamination, MAFES scientists are working with Beacon on new ways to detect paralytic shellfish poison (PSP) in seafood.

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)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals,group,organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #6

V(A). Planned Program (Summary)

1. Name of the Planned Program

Economics, Marketing, Policy and Community Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management			12%	
603	Market Economics			26%	
604	Marketing and Distribution Practices			18%	
605	Natural Resource and Environmental Economics			12%	
606	International Trade and Development			7%	
607	Consumer Economics			9%	
608	Community Resource Planning and Development			14%	
610	Domestic Policy Analysis			2%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	4.7	0.0
Actual	0.0	0.0	5.1	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	383438	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	604821	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAFES economists researched new ways to increase profitability of the agricultural sector and developed tools for modeling consequences of land-use change. They analyzed rural labor markets and consumer response to environmental and food safety issues. They published peer-reviewed journal articles and other publications concerning research and presented findings at professional meetings, at field days for growers or producers, and at other venues.

2. Brief description of the target audience

Scientists, economists, state and local policymakers, extension specialists, Maine farmers and food producers, seafood processors, and commercial fishermen

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	9	
2008	0	25	25

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of other types of publications

Year	Target	Actual
2008	8	10

Output #2

Output Measure

- # of papers presented at professional meetings

Year	Target	Actual
2008	24	30

Output #3

Output Measure

- # of research projects completed

Year	Target	Actual
2008	4	5

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	# of people increasing their understanding of ongoing changes in the food system, annually
2	# of people increasing their understanding of factors affecting the profitability of Maine farming, annually
3	# of Maine specialty and value-added food producers increasing their knowledge of marketing alternatives, annually
4	# of Maine fruit and vegetable growers or seafood producers learning about sources of competitiveness and market challenges, annually
5	# of policies or programs adopted by state that promote local agricultural production
6	# of state-level committees, task forces, or commissions that integrate economic information into agricultural regulatory activities
7	% of land manager surveyed who will recognize or use land-use change data
8	% of land managers surveyed who will recognize or use forecasting tool to predict future land-use change
9	% of Maine cruise ship passengers who will visit www.freestaymaine.com Web site, annually
10	# of "freestayMaine" vouchers that are redeemed per year by cruise ship passengers who are returning to Maine for a land-based vacation
11	# of Maine growers involved in cooperative horse hay-marketing system
12	% of Maine food producers who regularly place products with Maine food retailers
13	% of Maine food producers who have developed new markets
14	# of Maine farms joining networks of local food producers and food-buying institutions
15	Economic analysis of new uses for potatoes
16	Consumer reactions to, and valuation of, changes in product quality

Outcome #1

1. Outcome Measures

# of people increasing their understanding of ongoing changes in the food system, annually

Not reporting on this Outcome for this Annual Report

Outcome #2

1. Outcome Measures

# of people increasing their understanding of factors affecting the profitability of Maine farming, annually

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

# of Maine specialty and value-added food producers increasing their knowledge of marketing alternatives, annually

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #4

1. Outcome Measures

# of Maine fruit and vegetable growers or seafood producers learning about sources of competitiveness and market challenges, annually

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics

Outcome #5

1. Outcome Measures
# of policies or programs adopted by state that promote local agricultural production

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
606	International Trade and Development

Outcome #6

1. Outcome Measures

# of state-level committees, task forces, or commissions that integrate economic information into agricultural regulatory activities

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
606	International Trade and Development
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. Outcome Measures

% of land manager surveyed who will recognize or use land-use change data

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #8

1. Outcome Measures

% of land managers surveyed who will recognize or use forecasting tool to predict future land-use change

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
610	Domestic Policy Analysis
605	Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

% of Maine cruise ship passengers who will visit www.freestaymaine.com Web site, annually

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #10

1. Outcome Measures

of "freestayMaine" vouchers that are redeemed per year by cruise ship passengers who are returning to Maine for a land-based vacation

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	5000	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #11

1. Outcome Measures

# of Maine growers involved in cooperative horse hay-marketing system

Not reporting on this Outcome for this Annual Report

Outcome #12

1. Outcome Measures

% of Maine food producers who regularly place products with Maine food retailers

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #13

1. Outcome Measures
% of Maine food producers who have developed new markets

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #14

1. Outcome Measures
# of Maine farms joining networks of local food producers and food-buying institutions

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
606	International Trade and Development
604	Marketing and Distribution Practices

Outcome #15

1. Outcome Measures

Economic analysis of new uses for potatoes

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Mid-sized farms in the U.S. that are not competitive in national commodity markets and are not structured to sell directly to consumers are declining in numbers. This project investigates the efficacy of mid-scaled values-based business approaches to support mid-sized and mid-market farms.

What has been done

MAFES economists are taking part in a project to develop a process that uses potatoes as a feedstock to produce a type of bioplastic, PLA. This project involves MAFES researchers, the Maine Potato Board, five businesses interested in using PLA, and other organizations.

Results

Based on conservative estimates of demand in their feasibility study, the economists estimated that a PLA-from-potatoes process would require roughly 6,600 acres of potatoes annually. Building demand from more businesses in Maine and looking at markets outside of Maine could increase that estimate substantially.

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

Consumer reactions to, and valuation of, changes in product quality

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To appropriately prioritize alternative food quality policies it is necessary to understand how consumers would value stricter food quality standards and alternative food labeling approaches.

What has been done

MAFES economists used and tested stated-preference approaches to elicit consumers' willingness to pay for improvements in food safety. The statistical results worked extremely well, showing that current estimates of the benefits of food safety improvements are grossly understated and give undue priority to foodborne illnesses that result in mortality.

Results

Using four non-monetary incentives since little is known about how non-monetary incentives affect survey and item non-response, speed of response, data quality and cost effectiveness, the economists found significant differences in response rates, data quality, and per-observation costs. Examining consumers' reaction to foods treated with pathogen-reducing technologies, because consumer reactions may be critical to technology adoption by firms, the economists found that introducing a new food-safety technology may lead to aggregate losses in sales. This may explain firms' reluctance to adopt these technologies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals,group,organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}