Massachusetts Agricultural Experiment Station & UMASS Extension

FY 2002 Annual Report

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2002 Plan of Work Addendum

Certification:

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Dr. Steve Goodwin, Associate Director Date
Massachusetts Agricultural Experiment Station

_____ _____

Mr. Steve Demski, Director Date
UMass Extension

Summary

The Massachusetts Agricultural Experiment Station at the University of Massachusetts in Amherst is currently administered through the College of Natural Resources and the Environment. The director is Dean of the College Cleve Willis and the Associate Director is Steve Goodwin who oversees the day to day management of the station. The Massachusetts Agricultural Experiment Station at the University of Massachusetts in Amherst is reporting on 21 Multistate Research Projects, which have an integrated component to Extension. Several other projects are not reported on in this annual report due to the fact that they have not yet reached a degree of maturity and will be reported on in subsequent years. The stakeholder input on research projects derives from integration with Extension and the past year has seen extensive efforts to more fully incorporate that input into the research efforts. Stakeholder issues include those elements such as land use, marketing and economic development use of chemicals, production and management technologies, labor, child and elder care, food safety, food sanitation, regulations and good manufacturing practices, poverty, hunger, agrochemicals, public knowledge and education, global markets and the environment, land vs. population, and children, youth and families at risk. While all of the projects presented have some impact on the needs of the under-served and under-represented populations of the Commonwealth, several projects, NE-185, NE-172, NE-9, MAS00807 and NC-223, specifically targeted the under-served and under-represented populations of the State.

*Please note that goals were chosen for projects using the crosswalk designed for CRIS.

UMass Extension is currently administered through the Vice Chancellor for Outreach, John Mullen, with faculty and staff in the School of Public Health and Health Sciences, and the College of Natural Resources and the Environment.

UMass Extension is reporting on selected programs, as described by Program Area Directors, team and project leaders. UMass Extension continues to be challenged by University-wide budget cuts, as a result of the overall Commonwealth budget situation. The UMass Extension Board of Public Overseers continues to give leadership to overall program direction. Appointed by the Governor, this Board meets every six-eight weeks.

The renewed efforts to improve coordination between research and extension efforts are reflected in a closer assimilation of the two areas in the FY2002 Annual Report as suggested by the team of National Program Leaders that reviewed the FY2001 Annual Report. In addition, while we have worked hard to insure the Short Impact/Accomplishment Statements are indeed impact statements and not simply reports of accomplishments or activities, we recognize that this is an aspect of our reporting that will benefit from continued improvement. Both the Massachusetts Agricultural Experiment Station and UMass Extension are committed to our reporting of impacts over the coming year.

Planned Programs

Programs and Project Impacts Listed by Goal

Goal 1
An agricultural system that is highly competitive in the global economy

Key Themes:

Adding Value to New and Old Agricultural Products
Agricultural Competitiveness
Agricultural Profitability
Animal Genomics
Animal Health
Animal Production Efficiency
Aquaculture
Biobased Products
Biofuels
Biotechnology
Bioterrorism
Diversified/Alternative Agriculture
Emerging Infectious Diseases
GIS/GPS
Grazing
Home Lawn and Gardening
Innovative Farming
Invasive Species
Managing Change in Agriculture
New Uses for Agricultural Products
Niche Market
Organic Agriculture
Ornamental/Green Agriculture
Plant Genomics
Plant Germplasm
Plant Health
Plant Production Efficiency
Precision Agriculture
Rangeland/Pasture Management
Risk Management
Small Farm Viability
Tropical Agriculture
Urban Gardening

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$706,122.5	41.8	15	$305,939.5
UMEXT	$744,080.0	12	--	--

Goal 1 Executive Summary

Much of the effort towards Goal 1 has gone into enhancing community supported agriculture. This is an extremely important niche market for the Commonwealth. In addition, these efforts provide benefits particularly to the under-served and under-represented populations, including rapidly growing ethnic groups within the Commonwealth. These efforts have resulted in several new opportunities for participation in farmers markets. Efforts have also gone into developing new technologies and best management practices to support sustainable agriculture. As reported in the impacts, these efforts have been well received by the agricultural community as reflected in both participation in the programs and actual changes in agricultural practices. On another front, the efforts to develop technologies to prevent oils and proteins in fish and other muscle foods have been very successful. These efforts are now moving from technology development to new product development.

Key Theme: Adding Value to New and Old Agriculture
Title of Program/Project: Efficacy of Producing Stable w-3 Fatty Acid-Enhanced Foods to Improve Human Health - MAS0020014526
Contact Person: Eric Decker
Brief Description of Program/Project: Strong evidence suggests that Americans could improve their health by eating more omega-3 fatty acids that are capable of decreasing the risk of heart disease. Omega-3 fatty acids are commonly found in fish. Incorporation of fish oils into commonly consumed food products is a way to increase dietary omega-3 fatty acids in the U.S. However, these fatty acids can decompose to form the off-flavors we often associate with cod-liver oil.
Short Impact: Our research has developed new antioxidant technologies that help prevent fish oils from developing off-flavors. This technology allows fish oils to be incorporated into foods without altering the original flavor of the product. Development of the antioxidant technology is essentially complete and research has now begun to develop food products with antioxidant stabilized fish oils.
FTE's: .8
Source of Funding: Grant
Scope of Impact: State Specific

Key Theme: Adding Value to New and Old Agricultural Procedures
Title of Program/Project: The Role of Nitric Oxide Synthese and Peroxynitrite on Oxidative Stability of Muscle Foods - MAS00200101667 - NRI Competitive Grant
Contact Person: Eric Decker
Brief Description of Program/Project: The development of novel muscle food products is often limited by the development of rancidity. A potential promoter of rancidity in muscle foods is nitric oxide. Nitric oxide is a radical that has little prooxidant potential. Nitric oxide can react with superoxide anion, to produce peroxynitrite. Peroxynitrite is a strong oxidizing agent that can promote rancidity by decomposing fatty acids & antioxidants. Peroxynitrite could be an important initiator & promoter of rancidity since nitric oxide & superoxide anion are both found in the skeletal muscle from which muscle foods are derived. The first obj. of this research is to determine the potential for nitric oxide by measuring the activity of the enzyme responsible for its production in muscle foods. Enzyme activity will be evaluated in different animal species & muscle types under conditions typical to muscle foods. The second objective will be to measure the formation of specific peroxynitrite oxidation biomarkers in raw, salted and cooked muscle foods to directly assess the role of peroxynitrite in muscle food quality. Formation of rancidity products will also be determined in these meat systems to evaluate how peroxynitrite contributes to the oxidation of fatty acids. Peroxynitrite represents a potential factor that could limit the production, utilization and shelf-life of muscle foods through its ability to promote rancidity. Therefore, understanding the properties of peroxynitrite could provide new information that could be used to increase the shelf-life and utilization of muscle foods.
Short Impact: Formation of off-flavors and colors is a common defect in muscle foods. The cause of off-flavor and discoloration of muscle foods is not clearly understood. Peroxynitrite is a newly discovered compound that could cause quality degradation in meat and poultry. This research shows that peroxynitrite can accelerate the decomposition of flavor and color in muscle foods. Understanding how peroxynitrite works could lead to new strategies to increase the value of muscle food products.

FTE's: .2
Source of Funding: Grant
Scope of Impact: State Specific

Key Theme: Agricultural Profitability, Plant Germplasm, IPM, Sustainable Agriculture
Title of Program/Project: Enhancing Adoption of New Apple and Stone Fruit Cultivars in Massachusetts
Contact Person: Duane Greene
Brief Description of Program/Project: Numerous apple and stone fruit (peach and cherry) cultivars are currently under trial at the University of Massachusetts Cold Spring Orchard Research & Education Center. The intent of this research is to identify cultivars particularly suited to Massachusetts climatic conditions and to farm-stand sales. Information and recommendations have been transmitted to fruit growers through educational programs, the periodical *Fruit Notes of New England*, the newsletter *Healthy Fruit*, and the *UMass Fruit* Advisor website.
Short Impact: Approximately 60 acres of new apple and/or stone fruit cultivars are being planted annually by commercial orchardists. It is estimated that new apple and/or stone fruit cultivars resulted in increase sales at roadside stands of 20%.
FTE's: 0.5
Source of Funding: Smith-Lever, RRF NE-183, Massachusetts Fruit Growers' Association
Scope of Impact: Multistate Integrated Research and Extension (MA RI, CT, MA, ME, NJ, NH, NY, VT)

Key Theme: Agricultural Profitability, Nutrient Management, IPM
Title of Program/Project: Adopting the Use of PH and EC Meters in Greenhouse Ornamental Crop Production
Contact Person: Doug Cox, Tina Smith, Paul Lopes
Brief Description of Program/Project: Growers of ornamental crops in greenhouses have had problems growing their spring crops due to nutrient problems associated with pH and soluble salts. Changes in the growth media, crops being grown and the fertilizers grower used have combined to result in low pH and Fe toxicity in geraniums and marigolds throughout the state. Two hands-on workshops were held to teach growers about choosing media, water testing, nutrient requirements and how to use EC meters and pH meters effectively. In addition, information was disseminated to growers through the floriculture newsletter, Floral Notes (350), through the Floriculture Website and through the Massachusetts Flower Growers Association Newsletter, the Mayflower (300).
Short Impact: Seventy five growers adopted the practice of using pH and EC meters to monitor their growing media. There was a 30% reduction in the number of growers having Fe toxicity in Geraniums and Marigolds over the past 4 years.
FTE's: .25
Source of Funding: Smith-Lever, State, Fees, Donations.
Scope of Impact: State Specific

Key Theme: Agricultural Profitability, Sustainable Agriculture
Title of Program/Project: Commodities, Consumers and Communities: Local Food Systems in a Globalizing Environment
Contact Person: Frank Mangan
Brief Description of Program/Project: Research and Extension activities benefited farmers who are interested in producing new crops for the growing immigrant communities in the Northeast. A focus of this work has been with growers who sell at farmers' markets. There are over 100 farmers' markets in the state and many are located in urban areas where large immigrant communities live. Research identified cultivars of crops that can be successfully grown and marketed in New England. Research activities included evaluating management systems for clubroot (*Plasmodiophora brassicae* Woron), which is a significant disease of *Brassica* crops. Information was transmitted to growers and agricultural professionals at educational and professional meetings, and through Extension and professional publications. Much of this information was made available in languages other than English.
Short Impact: At least five new crops were grown and marketed by at least 40 farmers that they had not grown in the past, thus increasing their profitability. Fact sheets on several new crops for New England are available at our Extension website (www.umassvegetable.org) Three new-entry growers sold products at two farmers' markets allowing them to increase their overall sales from the previous year by 20%
FTE's: 0.25
Source of Funding: Smith-Lever, NE-185, Grant, USDA Risk Management Program
Scope of Impact: Multistate Integrated Research and Extension (MA, RI, NY,VT, NH, ME, CA, KS, WI, MS,)

Key Theme: Agricultural Profitability, Ornamentals/Green Agriculture, IPM
Title of Program/Project: Annual Lawn Care Seminar
Contact Person: Mary Owen mowen@umext.umass.edu
Brief Description of Program/Project: To provide professional turf managers with information that will enable them to (1) manage the turf and grounds under their care in an environmentally sensible manner; (2) provide professional turf managers with information that will enable them to manage the turf and grounds under their care using integrated pest management principles and (3) to meet identified specific turf management education needs of professional turf managers and associated professionals and staff. Audience addressed: municipal grounds; public and private school grounds; public and private facility grounds; lawn care; landscape; athletic fields; construction; educators; environmental organizations; regulatory agencies; affiliated businesses.
Short Impact: 185 turf industry professionals participated in an annual lawn care conference. These professionals indicated that they would (1) implement environmental stewardship practices as an integrated component of turf management operations, (2) select most effective plant management materials with least negative environmental impact, (3) time plant management materials applications so as to reduce potential for movement off-site/target, and (4) increase the intensity and focus of integrated pest management in their operations.

Turf industry professionals also learned about healthy and ergonomically sound workplace practices specific to the types of work in their profession. Attendees indicated that they would (1) practice improved ergonomics when performing tasks such as driving, lifting, mowing, digging, (2) make better nutritional choices for breakfasts, snacks during work breaks and at lunch, (3) replace sugary drinks with water, especially when temperatures are high.
FTE's: 0.15
Source of Funding: State, Smith Lever, Fees
Scope of Impact: State Specific

Key Theme: Agricultural Profitability
Title of Program/Project: Soil and Plant Nutrition/Hydroponic Production of Rhododendrons for Export Marketing
Contact Person: Allen V. Barker
Brief Description of Program/Project: This research involves developing of specialized facilities and techniques for rhododendron production in hydroponics. Research was conducted at the University of Massachusetts, Amherst, and at Weston Nurseries, Hopkinton, Massachusetts. Research at the University was in hydroponics beds in a shaded greenhouse. Research at Weston Nurseries was in outdoor units as prototypes of a potential commercial production system. Twenty-five "Aglo" and 25 "Elite" plants were selected for shipment to Japan. The rest of the plants were potted in nursery media for assessment of growth. The exported plants were inspected by an agricultural agent and were deemed disease and pest free. The media were removed from the roots, and the plants were shipped to Japan, where they also passed quarantine inspections. In Japan, plants will be potted in a conventional, organic medium and held in storage for a few months to acclimate and then will be grown outdoors. The plants will be tested by at least three other nursery growers, representing regions of southern, middle, and northern Japan. These growers will monitor and record the growth of the plants under varying production conditions. This research will be repeated in 2003.
Short Impact: The research demonstrated that rhododendrons can be grown successfully in hydroponics to produce liners that are healthy in appearance and pest free. The research provided plants that can be tested for performance in the United States and in foreign markets. Adoption of hydroponically grown plants by the nursery industry will depend in part on demonstration that the plants can be grown by conventional means of culture after transplanting to containers of to fields.
FTE's: .15
Source of Funding: State
Scope of Impact: State Specific

Key Theme: Agricultural Profitability
Title of Program/Project: Evaluation of Weed Management Options, Nitrogen Rate, and Vine Density on Cranberry Productivity and Weed Abundance.
Contact Person: Hilary A. Sandler
Brief Description of Program/Project: Renovation of new bogs is among the most expensive tasks performed by cranberry growers. Managing invading weed species is essential for minimizing costs and promoting quick coverage of the bog surface. A multi-year project has identified the best horticultural combinations of planting density and nutrition that favor quick

stand establishment and fruit production. An economic analysis had identified the most cost-effective methods for maximizing vine colonization while minimizing weed infestation.
Short Impact: As cranberry growers continue to struggle for economic viability, this information will provide immediate cost-saving benefits for growers opting to renovate underproductive beds. Information will be transmitted to cranberry growers through UMass Cranberry Station newsletters, UMass Extension fact sheets, and the UMass Cranberry Station Web Site.
FTE's: 0.25
Source of Funding: Smith Lever, State, Grants
Scope of Impact: State Specific

Key Theme: Agricultural Profitability, Plant Germplasm, Sustainable Agriculture
Title of Program/Project: Storage of Honeycrisp Apples
Contact Person: Sarah Weis
Brief Description of Program/Project: The most planted new apple cultivar in Massachusetts is Honeycrisp. It lasts better than virtually any other apple cultivar; however, quality can vary greatly depending upon harvest time and conditions of storage. Research is underway to determine best conditions for short- and long-term storage of Honeycrisp grown in Massachusetts. Information and recommendations will be transmitted to fruit growers through educational programs, the periodical *Fruit Notes of New England*, the newsletter *Healthy Fruit*, and the website *UMass Fruit* Advisor
Short Impact: Appropriate harvest time of Honeycrisp was identified to ensure optimal fruit quality after storage. Best storage conditions for Honeycrisp were identified.
FTE's: 0.2
Source of Funding: Smith-Lever, RRF NE-103, RRF NE-183, Massachusetts Fruit Growers Association
Scope of Impact: Multistate Integrated Research and Extension (MA, RI, CT, NY, VT, NH, ME)

Key Theme: Agricultural Profitability, Plant Germplasm, IPM, Sustainable Agriculture
Title of Program/Project: Enhancing Adoption of New Rootstock Cultivars for Fruit Trees in Massachusetts
Contact Person: Wesley Autio
Brief Description of Program/Project: A number of apple and peach rootstocks have been under trial at the University of Massachusetts Cold Spring Orchard Research & Education Center and at a few commercial orchards for several years. Particular attention has been paid to rootstocks that provide a reduction in tree size, thus reducing labor required to prune and harvest and reducing the amount of pesticide needed per acre. Also, rootstocks have been selected that are well adapted to our weather conditions and are resistant to normal pest pressures. Information and recommendations have been transmitted to fruit growers through educational programs, the periodical *Fruit Notes of New England*, the newsletter *Healthy Fruit*, and the website *UMass Fruit Advisor*.
Short Impact: Approximately 150 acres of new dwarfing apple rootstocks were planted by commercial orchardists. -Current year's planting, and planting during the previous four years resulted in overall pesticide-use reduction of approximately 10%.

-Current year's planting and planting during the previous four years resulted in approximately a 10% increase in profitability.
FTE's:0.5
Source of Funding: Smith-Lever, RRF NC-140, Massachusetts Fruit Growers Association, State
Scope of Impact: Multistate Integrated Research and Extension (RI, CT, MA, ME, NJ, NH, NY, VT)

Key Theme: Agricultural Profitability, IPM
Title of Program/Project: Enhance Adoption of Accurate Diagnostics and Early Intervention to Manage Pests in Greenhouse Ornamental Crops
Contact Person: Doug Cox, Tina Smith, Paul Lopes
Brief Description of Program/Project: Each year, greenhouse growers are expanding their crop mix to include new vegetatively-propagated annuals imported from all over the world. This has resulted in several challenges: 1. Insects and diseases on plants that have not been problems in the past, 2. more growers carrying over stock plants for their own propagation and 3. the need for information on these new crops. As a result, growers are turning to Extension to help with diagnosing unusual problems in their greenhouses. Forty percent of all calls received from commercial flower growers involved diagnosing plant problems, pesticides and pest management. Information was disseminated to growers through the one-to-one consultations, workshops, conferences and the floriculture newsletter, Floral Notes (350), the Floriculture Website and through the Massachusetts Flower Growers Association Newsletter, the Mayflower (300**).**
Short Impact: 170 commercial greenhouse ornamental growers increased profitability and reduced pesticide use as a result of assistance with properly diagnosing pest problems and pesticide training. The booklet, Pest Management for Herb Bedding Plants Grown in the Greenhouse has been downloaded 5,000 times from the website during 2002. 100 greenhouse ornamental growers maintained their pesticide licenses due to training for integrated crop management through pesticide education offered by the Floriculture program.
Source of Funding: Smith-Lever, State, Fees, Donations.
FTE's: 1.0
Scope of Impact: State Specific

Key Theme: Agricultural Profitability
Title of Program/Project: Adopting New Retail Marketing Strategies.
Contact Person: Doug Cox, Tina Smith, Paul Lopes
Brief Description of Program/Project: In Massachusetts there are increasing numbers of new retail growers of greenhouse ornamental crops and traditional wholesale growers that are transitioning to retail. Due to this trend, a series of outreach programs over the past two years addressed retail marketing. The series began with a seminar on examples of layouts of retail garden centers, and continued with a hands-on workshop on Garden Center Critique and Merchandising at a local garden center, followed by a Garden Center Layout & Design Workshop at a different garden center. During the layout and design workshop participants

brought plans of their retail areas to work on in a group setting. As a follow up to the hands-on workshops a retail conference and trade show was held in 2001 and in 2002 workshop participants reported on their progress in their own business at the New England Greenhouse Conference. In addition to the workshops and conference, retail marketing information was disseminated to growers through the floriculture newsletter, Floral Notes (350), through the Floriculture Website and in cooperation with the Massachusetts Flower Growers Association through their newsletter, the Mayflower (300).
Short Impact: Fifty five growers of ornamental greenhouse crops made layout or design changes in their retail store that improved their retail business. Ninety growers in Massachusetts increased profits as a result of participating in one or workshops. Seventy four growers stated that they expect to increase sales by an average of 16% over this next year.
FTE's: .5
Source of Funding: Smith-Lever, University, Fees, Gifts
Scope of Impact: State Specific

Key Theme: Agricultural Profitability, Sustainable Agriculture, Urban Agriculture
Title of Program/Project: Strengthening the Pioneer Valley Food System
Contact Person: Anne Carter
Brief Description of Program/Project: A number small organizations of varying strength are working to increase the local competitiveness of Massachusetts Agriculture. One of the key similarities of each of the organizations is the involvement of UMass Extension. Extension personnel are involved in training new entry growers in organic production techniques, helping with the promotion of farmers markets, creating programs which enable consumers without cars to have access to markets, sitting on councils which determine the needs of an entire community in regards to local food purchase and access, and supporting the local farm to school efforts through a graduate student.
Short Impact: Farmers' Market in Springfield Mass. is now the largest market in Western Mass and has the largest redemption of WIC coupons. Shuttle service moves elderly patrons to and from their home and market. Holyoke Farmers market now has a permanent location next to a health care center. Holyoke Food Council now has a permanent director. Holyoke Community Center opened its shared use kitchen. Holyoke Community gardeners made commitment to expand from gardening to organic commercial agriculture. Local empowerment for people of color.
FTE's: 0.25
Source of Funding: Grants, Vitamin Litigation Funds, State
Scope of Impact: State Specific

Key Theme: Agricultural Profitability, Ornamentals/Green Agriculture
Title of Program/Project: UMass Turf Research Field Day
Contact Person: Mary Owen mowen@umext.umass.edu
Brief Description of Program/Project: To provide turf managers and associated professionals and staff with information that will (1). enable them to manage the turf and grounds under their care in an environmentally sensible manner, (2) provide professional turf managers with

information that will enable them to manage the turf and grounds under their care using integrated pest management principles and (3) meet identified specific turf management education needs of professional turf managers and associated professionals and staff. Audience addressed: municipal grounds; public and private school grounds; public and private facility grounds; lawn care; landscape; athletic fields; construction; educators; environmental organizations; regulatory agencies; affiliated businesses.
Short Impact: 130 turf managers and associated professionals and staff learned about research underway at the University of Massachusetts Turf Research Facility. Evaluations indicated that attendees would (1) time pesticide applications more carefully, resulting in use of less pesticides and reduction in potential for movement of pesticides off-site, (2) would implement more focused monitoring strategies for annual bluegrass weevil and other turf insect pests and (3) that attendees' turf management skills and productivity would improve as a result of information learned at the Field Day
FTE's: 0.35
Source of Funding: State, Smith Lever, Grant, Revenue
Scope of Impact: State Specific

Key Theme: Aquaculture, Animal Health, Diversified/Alternative Agriculture
Title of Program/Project: Southeastern Massachusetts Aquaculture Center (SEMAC)
Contact Person: William Burt
Brief Description of Program/Project: The Marine Resources Office and SEMAC continue to support the sustainable development of aquaculture within the five counties of the southeast region of the state. The center coordinates the activities of various agencies, and partners to provide educational programs, research initiatives, demonstration projects, technical assistance, and financial support for the aquaculture industry. As in previous years, the center continues to expand its library resource network, hold informational and technical workshops, monitor marine water quality at pre-selected sites, and investigate disease and growth issues.
Short Impact: -Fifty-seven people were trained in restoration of submerged aquatic vegetation as part of a scallop restoration program. Several pilot sites were chosen and planted with submerged aquatic vegetation. -Shellfish diseases were monitored at 26 selected sites across Barnstable County. Oysters, quahogs, and softshell clams have been collected at both wild harvest and cultured sites, and tested for diseases associated with each species. -Water quality monitoring continued for the fourth year, sampling was conducted and data collected at 15 different aquaculture sites within in the region. -As part of a Bay Scallop Restoration Program spawning sites were then once again deployed in early summer in Eastham, Orleans, Falmouth, Barnstable, Brewster, and Yarmouth. Anecdotal information shows juvenile scallops appearing at several locations.
FTE's: 2.0
Source of Funding: Smith-Lever, County, Grant
Scope of Impact: State Specific

Key Theme: Animal Health
Title of Program/Project: Therapeutic Anti-Microbial Oxidative Responses in Bovine Milk - MAS00805

Contact Person: Sam Black

Brief Description of Program/Project:
The project was designed to evaluate the contribution of oxidative enzymes in milk to control of mastitic bacteria. The previous report showed that although milk contained high concentrations of xanthine oxidase and lactoperoxidase and consequently had the capacity to yield superoxide anion, hydrogen peroxide and hypohalides when provided with substrate, these radicals had only a low toxicity for cloned Staphylococcal or cloned Streptococcal organisms. Milk was also shown to contain a high concentration of catalase which rapidly reduces hydrogen peroxide to water. These data suggested that milk oxidative responses are unlikely to play a major role in control of mastitis in cattle.

Short Impact: The finding that the capacity of bovine neutrophils to kill Staphylococcal and Streptococcal organisms is enhanced in the absence of gaseous oxygen indicates that oxygen-independent killing mechanisms are likely to play a major role in control of mastitic bacteria in cattle. It is now necessary to determine: (a) the nature of these killing mechanisms, (b) whether increased microbicidal activity in the absence of oxygen results from increased expression of genes encoding the defense molecules, and (c) whether neutrophils and monocytes from different breeds of cattle differ with respect to induction and expression of the oxygen-independent killing mechanism. Answers to these questions may suggest ways to reduce the incidence of mastitis in dairy herds.

FTE's: .1

Source of Funding: Hatch Animal Health, State

Scope of Impact: State Specific

Key Theme: Biobased Products

Title of Program/Project: Computational Modeling of Mechanical Properties of Structural Composite Lumber - MAS00086

Contact Person: Peggy Clouston

Brief Description of Program/Project: Development of new wood composites to optimize wood fiber resource or under-utilized species, for example, is currently performed empirically requiring tremendous time and money. This project develops a computational model which can hasten development of new wood products while at the same time helping us to understand how we can more efficiently make use of our wood resources.

Short Impact: The purpose of this study is to develop a comprehensive, user-friendly computer model to simulate the mechanical properties of wood based composites. The model is an extension of an already very sophisticated approach developed by the Project Director. The existing approach has the capability to simulate stress/strain behavior for tensile, compressive or bending loading of small scale laminates with varying grain angle. The current work applies this approach to the commercial product Parallel Strand Lumber, PSL. The strength and stiffness properties of PSL in tension, compression and shear are characterized by appropriate statistical distributions. These properties are then used as direct input into the model to predict the constitutive behavior of static bending specimens under a variety of load scenarios of the same product.

This is an early phase of a multi-year research and development program that will include an extension-based training and technical transfer element in future years.

FTE's: .3

Source of Funding: McIntire Stennis
Scope of Impact: State Specific

Key Theme: Diversified/Alternate Agriculture
Title of Program/Project: Energy and Small Farm Sustainability
Contact Person: Cathy A. Roth
Brief Description of Program/Project: Rising energy costs are among the top economic pressures on farm budgets. UMass Extension has teamed up with the Center for Ecological Technology (CET) in a pilot project to assist Northeast farmers in reducing escalating costs by implementing energy efficiency and creating alternative, on-farm energy where feasible from biomass, wind, sun, and water. The pilot area of western MA and environs (NY and VT) has focused on a diverse group of 26 farms including vegetable, fruit and dairy.
Short Impact: Energy assessments and small technology improvements, the first phase of the pilot, has resulted in savings ranging from a low of $850 to a high of $5,600 on an annual basis for all pilot study farms. The second phase, energy production, has resulted in a research study now under way of three MA farms that are seeking to generate their own electricity needs by converting biomass to gas on-farm. A fourth farm (NY) is being assisted in installing solar energy technology to provide the electricity needs of its farm store through a $65,000 match provided by a NY state utility incentive grant. Results of these pilot efforts will form the basis of providing information and assistance on a wider basis to energy intensive Northeast farm operations.
FTE's: .5
Source of Funding: Smith Lever, State, Grants, Private Utility Companies
Scope of Impact: State Specific

Key Theme: Plant Health
Title of Program/Project: Biological Improvement of Chestnut and Management of the Chestnut Blight Fungus – MAS00066
Contact Person: Klaus Nuesslein
Brief Description of Program/Project: To better understand the interactions and ecology of this host/ pathogen/parasite system at the molecular, organismal and environmental levels to develop effective biological controls for chestnut blight.
Short Impact: DNA fingerprints of fungi isolates have been identified and biocontrol is being used to save the American Chestnut tree.
FTE's: .8
Source of Funding: Hatch, State, Industry
Scope of Impact: Multistate Research & Extension CA-A, CA-D, CTH, GA, KY, MA, MD, MI, MO, NJ, NYC, PA, TN, WVA Alabama, Tennessee valley Authority, American Chestnut Foundation, New York State University -CESF, Southern Institute of Forest Genetics, USDA, Tennessee State University

Key Theme: Plant Health
Title of Program/Project: Sustainable Vegetable Crop Production in Massachusetts - MAS00830
Contact Person: Frank Mangan

Brief Description of Program/Project: Vegetable production in Massachusetts is a multimillion-dollar industry. Many growers operate their farms near urban areas where there are strong developmental pressures and also concerns about environmental contamination. For agriculture in Massachusetts to be continued without further relative declines in importance, its farmers must maintain or expand their production and marketing of crop products. Sustainable systems will be researched and implemented that will increase production without compromising the environment.
Short Impact: Work implemented on management strategies of clubroot in brassica identified both organic and non-organic options for growers who have this soil-borne disease. There are resistant varieties that are effective in combating this disease. The fertilizer calcium cynamide holds promise for conventional growers. Raising soil pH also can help manage the disease.
FTE's: .3
Source of Funding: Hatch, State, Extension
Scope of Impact: Integrated Research & Extension State Specific

Key Theme: Precision Agriculture
Title of Program/Project: Environmental and Economic Impacts of Nutrient Flows in Dairy Forage Systems - MAS00763
Contact Person: Steve Herbert
Brief Description of Program/Project: Our objective has been to develop and implement the use of a decision aid (FarmSoft) for use in "comprehensive" nutrient management planning. This has been done to meet outreach needs of University of Massachusetts Extension and Massachusetts USDA Agencies with concerns and obligations regarding nonpoint source pollution control from animal feeding operations. All farmers who receive certain Federal farm assistance are now required to develop "comprehensive nutrient management plans". The FarmSoft computer worksheet program has been extended to generate whole-farm nutrient management plans that meet the more stringent requirements of a comprehensive nutrient management plan for crop and livestock farms. The updated second version of the program is capable of calculating a site vulnerability index for environmental concerns, and highlights any major concerns associated with individual fields. The planner may then choose from a list of major conservation practices to reduce the risk of non-point source pollution, which draws the farmers' attention to not only soil and crop management factors but also animal feeding practices that may contribute to excess phosphorus. FarmSoft generates a report of the nutrient management plan minimizing the time commitment of the planner. FarmSoft is currently being reviewed by USDA-NRCS for suitability and approval to be loaded onto their computer system in sate and county offices. Simplicity, ease of use, and transferability has been guiding principles in the design of FarmSoft.
Short Impact: The decision aid FarmSoft has proven to be comprehensive in terms of meeting most if not all of the needs of comprehensive nutrient management planning. With continued development and review this will become both a useful decision aid for farmers and farm planners and for classroom teaching. The introduction of the corn stalk nitrate test provides farmers with an evaluation method to determine whether they are applying sufficient or too much N fertilizer. The amino-sugar nitrogen soil test if found suitable for corn would eliminate the need for a separate soil sampling operation to test for N as is required in the pre-sidedress N test.
FTE's: 1.1

Source of Funding: Hatch, Multi-State Hatch, Extension, Grants
Scope of Impact: Multistate Research and Extension IL, IN, MA, MD, MI, NJ, NYC, OR, PA, UT, WA, WI, WVA, U of Penn, USDA-ARS/Pennsylvania, USDA-ARS/Wisconsin

Key Theme: Organic Agriculture
Title of Program/Project: Application of Research Technology to Improve Best Management Practices in Fresh Market and Processes - MAS00786
Contact Person: Ann Carter
Brief Description of Program/Project: Determine potential of new specialty crops for Massachusetts. Develop bio-intensive farm management practices for new and existing crops in Massachusetts. This will be achieved by:1. field trials of new crops. 2. testing new crops in growers' fields and evaluate yields, quality and popularity at farmer's markets and whole sale distributors. 3. developing pre-side dress nitrogen tests for cherry peppers. 4. studying feeding preferences of European corn borer and pepper maggot. 5. developing proper plant spacing for mechanically harvested cherry and banana pepper. 6. Comparing conventional versus bio-intensive management practices for weeds, insects and fertility in sweet corn. 7. Developing educational programs and for growers about new crops and bio-intensive management practices.
Short Impact: Impact for organic growers is to increase marketability of sweet corn. Results indicate a higher percentage of marketable corn using the organic methods. Winter squash growers can increase yields about 40 percent using transplants.
FTE's: .3
Source of Funding: Hatch, State
Scope of Impact: State Specific

Key Theme: Niche Market
Title of Program/Project: Commodities, Consumers and Communities: Local Food Systems in a Globalizing Environment - MAS00828 - NE-185
Contact Person: Frank Mangan
Brief Description of Program/Project: This project focuses on the crops used by emerging ethnic groups in Mass. The ethnic population in Mass. has undergone substantial change in the last few decades. Persons from Latin American countries (Latinos) are now the largest ethnic minority in the State, comprising 6% of the total population. Latinos are the fastest growing ethnic group in Mass. and are expected to grow to 8% of the population by the year 2010. Also the numbers of people of Southeast Asia origin are increasing in the state and are expected to reach 4% of its population by the 2010. These ethnic groups wish to continue consumption of vegetables that are customarily in their diets, thereby giving farmers opportunities for production of crops with a ready market. Some farmers are individuals of these ethnic groups and are specializing in production of their traditional foods.
Short Impact: An important part of this project is to identify crops and varieties that can be grown in Massachusetts. Despite the fact that much of Brazil is in the tropics, many of the crops used in their cuisine can be grown successfully in Massachusetts. Many of the important vegetable crops that are staples in Massachusetts are originally from the tropics, such as sweet corn, tomatoes, peppers, and many others. A preliminary marketing analysis of Brazilian markets has documented several vegetables that are used in Brazilian cuisine that can be grown locally. One

of the more promising crops for this initiative is called jilo. This crop is originally from West Africa and came to Brazil with the slave trade. Another is maxixi, which is a type of cucumber. There are also some processed agricultural products that are popular among Brazilians that hold promise for value added production in Massachusetts. For example, curau is a very popular desert that is made from corn.
FTE's: .8
Source of Funding: Hatch, Grant, State
Scope of Impact: Multistate Integrated Research & Extension CA-A, IA, KS, MA, MN, NC, NJ, NYC, OR, PA, PR, VT, WA, WI, WVA

Key Theme: Niche Market
Title of Program/Project: Production of Medicinal Plants as Alternative Crops for New England – MAS00807
Contact Person: Lyle Craker
Brief Description of Program/Project: Experimental plant materials chosen from among those used in traditional medicine systems and for which a market appears to exist will be grown under a series of different environments in the field and greenhouse. The effects of the environmental inputs (temperature, light, and nutrition) on plant development and on synthesis of bioactive chemicals will be evaluated to select potential crops for production in the New England states. Growth, development and secondary metabolite synthesis will be determined at different growth stages to establish guidelines (plant spacing, row widths, and fertilization schedules) for production of both annual and perennial species. Experimental procedures will be adjusted as necessary to obtain the most relevant data for each plant and experiment. Collected information will be used to develop preliminary, cultural guidelines for New England farmers interested in growing medicinal plants.
Short Impact: Understanding the limits and requirements of wild plants (black cohosh and goldenseal) will enable development the of field techniques necessary to bring these plants into cultivation. From earlier research efforts, lavender, echinacea, and basil have developed into prominent alternative crops for the New England area with multiple farms growing these plants as viable crops. Similar results are expected from cultivation studies on Chinese medicinal plants and plants currently wild-crafted.
FTE's: .7
Source of Funding: Hatch, State
Scope of Impact: State Specific

Key Theme: Urban Gardening
Title of Program/Project: Horticulture/Gardening
Contact Person: Karen Barshefsky
Brief Description of Program/Project: The Environmental Stewardship 4-H Action Team continues to promote gardening throughout the state to both school and community gardening youth groups. Urban gardening groups have been a focus in Boston and in Holyoke. The Junior Master Gardener™ curriculum along with several other reputable gardening curriculums has also been promoted.
Short Impact: A total of 2,821 children/youth were reached via the garden program through the schools, 4-H clubs, and out of school programs. 51 adult 4-H staff, volunteers, teachers and

collaborators were trained at 4 separate gardening workshops. An example of impacts below reflect data collected from three sites in Holyoke and one in Boston:
Holyoke Count-on-Me Youth Garden Project: Twenty-two children ages 7-12 participated in the Count-on-Me Garden Project. According to a Gardening and Science Program Observation checklist completed by the youth worker, 100% of children talked more about plants and gardening at the end of the summer; 32% talked more about science; 100% expressed a greater interest in nature and the environment; 55% were able to communicate ideas and information about science and nature more clearly; 100% expressed more concern about local environmental problems and issues; 100% had taken steps to make the community a better place to live; and 77% seemed to be more self confident.
Holyoke Beaudin Village Gardeners: Fifteen children, ages 6-13 were involved in the garden program. According to a Gardening and Science Program Observation checklist completed by the youth worker, 100% of children talked more about plants and gardening at the end of the summer; 33% talked more about science; 100% expressed a greater interest in nature and the environment; 48% were able to communicate ideas and information about science and nature more clearly; 67% expressed more concern about local environmental problems and issues; 100% had taken steps to make the community a better place to live; and 75% seemed to be more self confident.
Holyoke Count-on-Me Youth Garden Project: Five youth leaders, ages 13-15, participated in the Count-on-Me Garden Project. According to a Gardening and Science Program Observation checklist completed by the youth worker, 100% of the youth leaders talked more about plants and gardening at the end of the summer; 60% talked more about science; 100% expressed a greater interest in nature and the environment; 80% were able to communicate ideas and information about science and nature more clearly; 100% expressed more concern about local environmental problems and issues; 100% had taken steps to make the community a better place to live; and 80% seemed to be more self confident.
Boston staff collaborated with Franklin Field, a housing organization, to provide a 4-H Science and Gardening program for 52 youth, ages 5 – 14 years. A Franklin Field Youth Worker indicated that all 52 youth were more interested in plants and gardening as a result of participating in the program. In addition, 54% were more interested in science and 69% communicated ideas and information about science and nature more clearly after participating in the program.

FTE's: 1.15

Source of Funding: State; CSREES State Strengthening Grant; MA 4-H Foundation; Smith Lever

Scope of Impact: State Specific

Goal 2
A safe and secure food and fiber system

Key Themes:

Food Accessibility and Affordability
Food Handling
Food Quality
Food Recovery/Gleaning
Food Safety
Food Security
Foodborne Illness

Food Resource Management Foodborne Pathogen Protection
HACCP

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$133,160.25	9.9	1	$6273.5
UMEXT	$89,907.00	1.45	--	--

Goal 2 Executive Summary

Food safety continues to be an important emphasis within Goal 2. These efforts range from analysis of the impact of food safety and nutritional attributes on consumer preferences to techniques for monitoring for the presence of pathogenic bacteria on specific food items. The impact of food policy on decision making in the areas of food safety, food quality and food security is expected to be a growing emphasis for the program over the next few years. The impacts reported here set the stage for this growth. Of particular importance are our educational efforts in the realm of food safety education. These efforts have been very successful with food producers, food processors and food service professionals.

Key Theme: Food Resource Management
Title of Program/Project: Private Strategies, Public Policies and Food System Performance - MAS00625
Contact Person: Julie Caswell
Brief Description of Program/Project: Identify, describe, and analyze the factors shaping strategic decisions by food systems participants emphasizing firm decisions on product offerings, advertising, pricing, and scope of operations. Analyze the impacts of the safety and nutritional attributes of food products on consumer preference articulation, firm behavior, and the operation of the federal and state regulatory system. Assess how the private strategic decisions and public policies examined under the above objectives affect the performance of the food marketing system.
Short Impact: This project is providing current analysis of the performance of the domestic and international food system. It analyzes how the system operates domestically, the prices and values it offers to consumers and producers, its competitiveness in international markets, and its ability to assure food quality, particularly food safety and nutrition. The results of this project are used in decision making by the private and public sectors.
Source of Funding: Hatch, State, Grant
FTE's: 1.6
Scope of Impact: Multistate Integrated Research & Extension IA, IN, MA, NE

Key Theme: Food Resource Management
Title of Program/Project: Food Quality Management Systems: Impacts on Competitiveness, Markets, and Trade - MAS0981670
Contact Person: Julie Caswell

Brief Description of Program/Project: The goal of this research project is a better understanding of the impact of mandatory, voluntary, and quasi-voluntary quality management systems (QMS) on competitiveness, market structure, and trade. We will develop this understanding by 1)identifying, describing, and measuring changes in internal production (company), transaction (between company), and regulatory compliance costs associated with adoption of and interaction between mandatory, voluntary, and quasi-voluntary QMS; 2)identifying and describing changes in firm strategies and incentives arising from adoption of QMS, with a particular emphasis on the impacts on different sized firms; and 3) comparing these costs and strategies between food companies in the United States and the United Kingdom to determine if common trends exist.
Short Impact: The future competitiveness of the U.S. agri-food industry in domestic and international markets depends on its ability to deliver high quality products at competitive prices. This project enhanced that ability by identifying, describing, and measuring the changes in internal production (company), transaction (between company), and regulatory compliance costs associated with adoption of quality management systems.
Source of Funding: Grant
FTE's: .1
Scope of Impact: State Specific

Key Theme: Food Quality
Title of Program/Project: Impact of Emulsifiers on the Oxidative Stability of Lipid Dispersions - MAS019991521
Contact Person: Eric Decker
Brief Description of Program/Project: Current dietary guidelines recommend increased consumption of polyunsaturated fats and omega-3 fatty acids. Delivery of these fats to the general public could be accomplished by their incorporation into food emulsion such as dairy products, mayonnaise, margarine, soups, sauces, baby foods, and beverages. Food emulsions are formed by the dispersion of lipids into water or visa versa. Unfortunately, food emulsions high in unsaturated fats can quickly go rancid due to metals in the water phase interacting with the lipids resulting in an unpalatable product. Therefore, the overall objective of this research is to develop technologies to engineer the interface of the emulsified lipids so that interactions between metals and lipids are minimized. This will be accomplished by studying how emulsifiers impact lipid peroxides-metal interactions, partitioning of lipid-soluble antioxidants into the water phase and regeneration of lipid-soluble antioxidants by water-soluble reducing compounds. Studies will be conducted using synthetic emulsifiers, phospholipids and proteins as emulsifiers. The technologies developed to engineer emulsified lipid droplets to decrease the development of rancidity, enable food manufacturers to create foods in which saturated fats were replaced by polyunsaturated fats resulting in the production of healthier food products.
Short Impact: The research in this project identified critical factors that impact the chemistry of lipid oxidation in food emulsions. In particular, this research has shown that the physical properties of a system are critical in chemical reactions that impact food quality. Identification of these factors has lead to new antioxidant technologies that can be used to protect bioactive lipids in foods. These new technologies can allow the food industry to incorporate lipids in our foods that are beneficial to health. Through this research we were able to obtain a new USDA-IFAFS grant that will focus on the incorporation of omega-3 fatty acids into foods. In addition, a patent application has been filed for the new antioxidant technology.

Source of Funding: Grant
FTE's: .2
Scope of Impact: State Specific

Key Theme: Food Safety
Title of Program/Project: Seafood Safety
Contact Person: Robert Levin
Brief Description of Program/Project: Seafood products can carry bacteria, which are pathogenic to humans. Bacteria can cause spoilage of fish products. There are many fish species that are not used for human food since they can contain high levels of environmental contaminants. The American diet is deficient in omega-3 fatty acids. This program will address the bacteriological and nutritive aspects of seafood safety by providing useful, science based tracking of pathogenic bacteria from seafoods and within seafood processing environments, increasing fish shelf life, allowing increased consumption of underutilized fish species, and development of stable forms omega-3 fatty acids to increase intake of these required fats into the American diet.
Short Impact: Reduction in human pathogenic bacteria on fish end enhanced refrigerated and iced storage life of fish. Enhanced stability of omega-3 fatty acids for reduction of blood cholesterol levels, and increased utilization of under-utilized fish species.
Source of Funding: Special Grant
FTE's: 1.1
Scope of Impact: Consumers, Fishing Industry, Industry Processors

Key Theme: Food Safety, Foodborne Illness, HACCP, Food Handling
Title of Program/Project: Food Safety Education Program for Food Producers and Processors
Contact Person: Rita Brennan Olson, ritabo@nutrition.umass.edu
Brief Description of Program/Project: UMass Extension continues to promote and deliver accurate and timely information, education, and resources through collaboration of state and federal agencies and associations representing workers and consumers from farm to table.
Short Impact: A. Using Good Agricultural Practices for Small Farm Production a New England-wide research, teaching and Extension project is designed to improve food safety knowledge and practices of small farms producing fruits and vegetables. Massachusetts summarized results of a survey of over 600 growers on food safety knowledge, attitudes and practices, and distributed findings at regional and national professional meetings. Educational materials for growers were developed by the New England Food Safety Education Consortium. 80 members of the New England Vegetable and Vegetable Growers Association attended statewide and regional presentations on survey results and GAP recommendations. B. Food safety education resources are made available through The New England Small Food Processors Project, HACCP Resource Center, Lending Library and the UMass Extension NEP website http://www.umass.edu/umext/nutrition/foodsafety .
FTE's: 0.2
Source of Funding: Smith Lever, Contract
Scope of Impact: Multistate Integrated Research and Extension (MA, ME, CT, RI, NH, VT)

Key Theme: Food Safety, Foodborne Illness, HACCP, Food Handling
Title of Program/Project: Food Safety Education Program for Food Workers and Consumers
Contact Person: Rita Brennan Olson, ritabo@nutrition.umass.edu
Brief Description of Program/Project: UMass Extension continues to promote and deliver accurate and timely information, education, and resources through collaboration of state and federal agencies and associations representing workers and consumers from farm to table
Short Impact: A. 1,054 food workers and regulators serving high-risk populations attended 44 12-hour ServSafe courses held in 6 regions across the state: 84% of participants achieved a passing score (75) and obtained nationally recognized food sanitation certification with National Restaurant Association. Over 85% of participants indicated they plan to change food practices such as setting up flowcharts, checking temperatures, setting up record keeping systems and training staff in safety procedures. B. 360 human service professionals, food workers and volunteers attended 34 Food Handling is a Risky Business (FHRB), Cooking, Cooling, Contamination & Kids and Food Safety Update workshops in collaboration with state and local educational and agricultural agencies, elder and child care providers, and emergency food networks. 82% of FHRB participants planned to change food practices to prevent foodborne illness: 78% indicated they plan to improve food storage practices; 74% indicated they plan to improve hand washing practices; 73% indicated they plan to improve thawing practices; 66% indicated they plan to clean utensils more thoroughly; 60% indicated they plan to cook foods thoroughly. C. UMass Extension has continued to make food safety education materials available to professionals, and educators through the UMass Extension website http://www.umass.edu/umext/nutrition/foodsafety, with links to the MA Department of Public Health, http://www.state.ma.us/dph/fpp/retail/training.htm and USDA at http://www.nal.usda.gov/foodborne/fbindex UMass Extension has continued to provide leadership and coordination of food safety education efforts in the Commonwealth through the Massachusetts Partnership for Food Safety Education (MPFSE) enhancing outreach efforts by collaborating with health, education, human service, child and elder care agencies and organizations to promote training and resources for over 100,850 regulators, food service personnel and consumers.
FTE's: 1.25
Source of Funding: Smith Lever 3b & c, State, Contract, County, Revenue Based
Scope of Impact: State Specific (Massachusetts only), Regional and National Resource Distribution

Goal 3
A healthy, well-nourished population

Key Themes:
Birth Weight
Infant Mortality
Medicinal Plants

Health Care
Human Health
Human Nutrition

Nutricueticals

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$68,329	3.0	2	$52,196
UMEXT	$15,501	.3	--	--

Goal 3 Executive Summary

Efforts toward Goal 3 include significant contributions to understanding the importance of biologicals such as genistein and carnosine on human health. We understand the importance of examining the bioavailability of such compounds — whether they are plant extracts or delivered as food components — in order to determine their impact on human health. In addition it should be noted that the work to incorporate omega 3 fatty acids into food products reported under Goal 1 can also be expected to have significant impacts on human health. Finally, our nutrition and health education programs have been very successful in providing nutrition education and training to educators, caregivers, and agency staff.

Key Theme: Human Nutrition
Title of Program/Project: Distribution of Lipid-Soluble Antioxidants in Muscle Lipids and Effect on Stability - MAS0200001796
Contact Person: Herb Hultin
Brief Description of Program/Project: Many minced muscle foods undergo quality loss due to the development of rancid flavors brought on by lipid oxidation. The lipids in muscle can be categorized as the triacylglycerols, i.e., fats and oils, or the polar lipids found in the membranes. The polar phospholipids of the membrane are more susceptible to oxidation than are the neutral triacylglycerols. Antioxidants may be added to foods to limit the rate and extent of rancidity due to lipid oxidation. Since the two classes of lipids are very different, it is likely that they will respond differently to antioxidation systems. The overall goal of this research is to improve the stability of minced muscle foods to lipid oxidation and/or to reduce the amount of lipid-soluble phenolic antioxidants that must be added to achieve a desired level of stability.
Short Impact: The results point to a simple way to selectively direct a lipid-soluble antioxidant into the membrane lipids, the most unstable lipid in the tissue. This will aid in stabilizing muscle foods to lipid oxidation and provide an economic advantage by allowing a longer shelf-life of a high quality product.
FTE's: .4
Source of Funding: Grant
Scope of Impact: State Specific

Key Theme: Human Nutrition
Title of Program/Project: Isoflavonoid Synthesis and Pathogen Control in Sprouts in Response

to Rosemary Phenolic Clonal Extracts - MAS00835
Contact Person: Kalidas Shetty
Brief Description of Program/Project: Sprouted soybean is potentially an excellent source of iso-flavonoid genistein that has implications for diet-based therapeutic applications. Sprouted legumes are also potentially susceptible to bacterial pathogens like *Salmonella* and *E. coli*. This project will utilize elite clonal extracts of high phenolic rosemary generated via tissue culture to stimulate genistein as well as simultaneously control bacterial pathogens in sprouted soybean.
Short Impact: Consumption of soybeans has been linked to reduced risk of coronary heart disease and development of certain cancers. The health benefit is linked to phenolic metabolites in soybean. Free phenolics have higher health benefit activity than bound forms. Enhancement of free phenolics during natural sprouting process and optimization of phenolic antioxidant activity using rosemary phenolic extracts will improve the nutritional value of soybean and therefore impact overall health and wellness. Impact is also through development of an added value approach to improving the functional value of soybean for the food processor.
FTE's: .2
Source of Funding: Hatch, State, Industry
Scope of Impact: State Specific

Key Theme: Human Nutrition
Title of Program/Project: Nutrient Bioavailability – A Key to Human Nutrition - MAS00762
Contact Person: Eric Decker
Brief Description of Program/Project: To develop methods for determining bioavailability of dietary factors including calcium, iron and other food components. We will examine *in vitro* techniques to maximize potential mineral bioavailability and other physiological effects through processing with other added food components, such as ligands. These effects are generally measured by analyzing soluble and insoluble minerals, in particular CA, Fe, Zn and Mg, in their complexed, free or ionic forms after undergoing a simulated gastrointestinal pH sequence (sequential incubation at pH 2, 4 and 6) with or without enzyme treatment. Solubility is used as the measure of bioavailability and other physiological effects such as increased bile acid binding by fiber-mineral complexes and modulation of iron oxidative catalysis by food extracts may be evaluated in future work.
Short Impact: Foods contain many nonessential nutrients that could have health benefits. This research shows that wheat contains antioxidants that can protect biological lipids from damage. These antioxidants are primarily found in wheat products made from bran or whole grains. During the digestion process, the health protecting activity of wheat antioxidants increases. Muscle foods also contain an antioxidant known as carnosine. Consumption of beef results in carnosine being absorbed into our blood. This dietary carnosine can protect our blood lipids and thus could be beneficial to health.
FTE's: .7
Source of Funding: Hatch, State, Industry
Scope of Impact: Multistate Integrated Research & Extension AZ, CA-B, CA-D, CO, CTS, IN, KS, MA, MI, NE, NM, OR, WA

Key Theme: Human Nutrition
Title of Program/Project: Nutrition and Health Education Programs
Contact Person: Rita Brennan Olson, ritabo@nutrition.umass.edu

Brief Description of Program/Project: Nutrition and Health Programs provide nutrition education and training to educators, caregivers and agency staff. Through traditional workshops and distance learning opportunities such as home study courses and videoconferences, program participants increase knowledge and improve food practices relating to the U.S. Dietary Guidelines of target groups including child and elder care providers and other agency staff who work with children, youth and elderly. NEP collaborates with state, regional and local education**,** public health and human service agencies to develop and promote programs.

Short Impact: The ABC's of Good Nutrition for Young Children, a learn-at-home nutrition course for child care givers designed to help increase knowledge of the Dietary Guidelines for Americans 2000 and their impact on the feeding and caring of young children was adapted for the Internet. In the spring of 2002, the web-based course was pilot tested and the traditional mail course offered to child care providers across the state. The course provides 2 hours of training credits from the MA Department of Education to family day care providers. 47 family day care providers participated in the ABC's of Good Nutrition for Young Children home study. Evaluations of the course participants showed that: 78% made changes in the type and/or amount of physical activity provided to children in their care, 85% made changes in the meals and snacks they served to reflect the US Dietary Guidelines recommendations.

One videoconferences on "Use of Motivational Interviewing in Pediatric Nutrition Counseling" was offered to over 57 allied professionals increasing their knowledge effective techniques for gathering nutrition information about children. The conference was sponsored in cooperation with the MA Dept. of Public Health, the MA Department of Education and the MA Dietetic Association.

One issue of the "Nutrition News and Reviews" newsletter provided easy-to-read articles on timely nutrition topics to agencies serving high risk groups. A reproducible fact sheet and information on nutrition resources were included on eating well as we age. Over 6000 agencies received the newsletter "Adding Life to Years" and disseminated the nutrition information to approximately 100,000 elderly, children and adults.

110 child and elder care givers and consumers participated in 6 programs on the *Food Guide Pyramid* and *the US Dietary Guidelines*.

FTE's: 0.25

Source of Funding: Smith Lever, Revenue Based

Scope of Impact: State Specific

Goal 4
Greater harmony between agriculture and the environment

Key Themes:

Agricultural Waste Management
Air Quality
Biodiversity
Biological Control
Drought Prevention and Mitigation
Pesticide Application
Recycling
Riparian Management
Soil Erosion

Endangered Species
Energy Conservation
Forest Crops
Forest Resource Management
Global Change and Climate Change
Hazardous Materials
Integrated Pest Management
Land Use
Natural Resources Management
Nutrient Management
Soil Quality
Sustainable Agriculture
Water Quality
Weather and Climate
Wetlands Restoration and Protection

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$569,143.75	23.1	3	$191,490
UMEXT	$700,657.00	11.3	--	--

Goal 4 Executive Summary

A significant amount of effort under Goal 4 has resulted in impacts that have benefited the cranberry industry, an industry that is under severe financial pressure. We have identified the key cranberry fruit rot pathogens and their over-wintering strategies, leading to improved timing of fungicide application. Improvements in forecasting have also benefited efforts to improve the efficiency of the timing of fungicide applications. We are working to identify reduced-risk pesticides for cranberry fruitworm and have recommended to growers a new strategy for fall flooding to control this pest. The introduction of indoxacarb to replace organophosphate pesticides is estimated to have saved growers 10 million dollars in crop losses. Other integrated pest management efforts have been directed towards apple crops and sweet corn.

Another theme under Goal 4 has been relating an understanding of metals in soils (e.g. interactions with soil organic matter and relationship to hydrology) to phytoremediation efforts. This is an area where further integration is warranted. We have also had significant efforts devoted to documenting the relationship between land use and biodiversity. We have been particularly successful at modeling at the watershed level. Outreach efforts under Goal 4 have impacted green-industry professionals, turf managers, nursery operators and professional horticulturalist among many other groups.

Key Theme: Sustainable Agriculture, Agricultural Profitability, Soil Quality
Title of Program/Project: Soils and Plant Nutrition/Soil Chemistry/Environment
Contact Person: Baoshan Xing
Brief Description of Program/Project: Soil organic matter (SOM) exercises a vital role in soil quality and health. SOM is also the principal sorbent for pesticides and strongly regulates their behavior in soil. But effect of agricultural management on SOM changes, particularly the quality (structures, functional groups, elemental compositions, distribution of individual SOM fractions)

and the relationship of these changes with pesticide sorption are poorly understood. Better knowledge of SOM changes caused by agricultural practices and their impact on pesticide chemistry in soil is urgently needed to maintaining or improving soil and environmental quality. The goal of this research is to gain a better understanding of the impact of agronomic practices on SOM, particularly SOM quality, and pesticide sorption and mobility in soil.
Short Impact: This research provides useful data for better understanding the sorption mechanisms of organic contaminants in soils which can be used to develop effective remediation methods, safe use of pesticides, and more accurate predictive models. Also, the NMR techniques developed in this work can be used by other scientists. Furthermore, discovery of crystalline aliphatic carbons in SOM can help to better understand the carbon cycling and mitigate the greenhouse effect. Cover crops and conservation tillage are encouraged, particularly for soils with light texture and low organic matter content. SOM content increased by cover crops and conservation tillage reduced pesticide leaching and helped improve soil quality. Spectroscopic techniques (e.g., NMR) are effective to elucidate the effect of agricultural practices on SOM.
FTE's: 0.15
Source of Funding: USDA Competitive Grant Program, Hatch
Scope of Impact: State Specific

Key Theme: Agricultural Productivity
Title of Program/Project: Soils and Plant Nutrition/Phytoremediation of Metal-Contaminated Soils
Contact Person: Allen V. Barker
Brief Description of Program/Project: The value of plants in the cleaning of metal-contaminated sites depends on plant growth and plant accumulation of metals. Under simulated conditions of zinc contamination employing hydroponics, zinc accumulation in Indian mustard (*Brassica juncea*), increases in nitrogen nutrition from deficient to sufficient levels increased plant growth and the concentration of zinc in shoots, resulting in a doubling of zinc accumulation. Increases in phosphorus nutrition did not stimulate growth but resulted in an increase in zinc accumulation by about 20%. Further studies of plant nutrition and zinc accumulation are planned with *B. juncea* and tall fescue (*Festuca arundinacea*) to be grown in soil. A series of zinc-contaminated soils have been developed with Hadley silt loam. The zinc chemistry of soils has been characterized by analysis of sequential extracts with water and universal extracting solutions (Morgan's and Mehlich 3). The effects of organic and chemical nitrogen-bearing fertilizers on the availability of zinc to Indian mustard and tall fescue are under investigation.
Short Impact: These investigations of plant nutrition and phytoremediation will lead to identification of methods to enhance plant growth and to increased solubility of zinc for extraction by plants in soils. The combination of enhanced growth and increased availability of zinc will lead to increased accumulation of zinc in plants and removal from contaminated sites.
FTE's: 0.15
Source of Funding: Hatch, state, Smith Lever
Scope of Impact: Multistate, Integrated Research and Extension, Mass., N.Y., N.H., Vt., N.J., Pa., Ont.; Regional Research Project NE-1001.

Key Theme: Biodiversity, Diversified/Alternate Agriculture
Title of Program/Project: Relationship of Bird Diversity to Forest Cover, Urbanization and

Agriculture - MAS00800
Contact Person: Kevin McGarigal
Brief Description of Program/Project: The purpose of this project is to 1. document the relationship between bird species richness and the cumulative representation of agriculture and housing developments in forested landscapes. 2. identify species sensitive to the cumulative representation of agriculture and housing developments in forested landscapes. 3. investigate mechanisms that might explain why species are sensitive to cumulative effects of agriculture and housing development. This research is part of the UMass Landscape Ecology program, and integrated research and extension program focusing on landscape level conservation and decision-support tools.
Short Impact: Specifically, we have completed a multi-scale, multi-dimensional analysis of landscape structure that provides a comprehensive basis for modeling species distributions and identifying important areas for biodiversity conservation in western Massachusetts. In addition, we completed the development of a new spatially explicit amphibian dispersal model which has allowed us to quantify the influences of residential development and urbanization on the population size, spread and connectivity of vernal pool breeding amphibians in Massachusetts. To date, as a result of this work approximately 220 acres of habitat for state-rare marbled salamanders have been acquired and set aside for permanent protection. This is a relatively new program and more tangible outcomes are expected in the years ahead.
FTE's: 1.0
Source of Funding: Hatch, Smith Lever, State, Grant
Scope of Impact: State Specific

Key Theme: Integrated Pest Management, Biobased Products, Organic agriculture, Niche Market, Small Farm Viability
Title of Program/Project: Developing and Implementing a Biointensive IPM System for Sweet Corn for New England Diversified Vegetable Farms
Contact Person: Ruth Hazzard
Brief Description of Program/Project: Sweet corn is grown on one third of vegetable acreage and by about 57% of vegetable farmers, totaling about 8000 acres in MA. Despite widespread use of IPM, broad-spectrum insecticides are widely used for control of ear-invading caterpillars. This project is evaluating a bio-based method using direct silk applications of corn oil mixed with Bacillus thuringiensis (Bt), combined with foliar sprays of Bt, to control caterpillar complex. Research seeks to achieve the highest possible ear quality by evaluating timing, materials, and rates of application. Eight farms in five states tested the method in commercial fields. Educational programs and publications assist growers in learning and adopting the method. 19 presentations or workshops were given, to total of 791 farmers and researchers, over the course of 3 years (January 2000 to Jan 2003) on using the oil method as part of a biointensive IPM system.
Short Impact: Of 8 farms who participated in the 3-year trials (from RI, VT, CT, ME and MA), 6 continue to grow corn and all of those 6 farms plan to continue to use the oil method and the Zea-later in their pest management. On 57 experimental plantings of corn, oil treatments gave statistically significant improvements in the percent of marketable ears and tip damage ratings on all farms for almost every planting. The overall mean improvement in the percentage of clean ears between the untreated and the oiled ears for all plantings on all of the farms was 21.6%, with the highest levels of improvement

generally occurring on farms with the greatest pest pressure. Of the eight farms that participated, five were able to achieve a 3-year average of over 80% clean ears with the oiling. As a result of this project, the Zea-later oil applicator was designed, patented, and commercialized, and is currently available from an independent regional agricultural supplier (Johnny's Selected Seeds). In the first year and half, 125 farmers nationwide have purchased Zea-later oil applicators to implement the method. These were from 29 states including west, Midwest, southwest, mid-Atlantic, and Northeast. 50% of sales were from farms in the Northeast region. CA., MA, PA, ME, WI, NY, CT, MI, NJ and VT were the states with the highest rates of sales (in descending order). The geographic distribution of sales indicates the scope of interest in the method. Approximately 50 farmers have requested information directly from our office.
FTE's: 0.10
Source of Funding: Smith Lever, State, Northeast SARE, Grants
Scope of Impact: State Specific

Key Theme: Integrated Pest Management
Title of Program/Project: Bio-Based Methods of Reducing Insecticide Use Against Two Key Apple Pests - MAS09904402
Contact Person: Ronald Prokopy
Brief Description of Program/Project: For both apple maggot and plum curculio, our approach will involve trials using un-baited or odor-baited traps placed in blocks of apple trees in commercial orchards.
Short Impact: Results of research on plum curculio (PC) have given rise to an entirely new, inexpensive and efficient way of monitoring PC using perimeter-row trap trees baited with grandisoic acid and benzaldehyde. Once action levels based on percent fruit with fresh injury are determined through future studies, sampling to determine need to spray against PC can be confined to examination of fruit for fresh injury on a few strategically located perimeter-row trap trees. Results of research on Apple Maggot have given rise to a ranking system for determining whether spheres baited with a five-component blend of attractive odor should be placed 5, 10 or 15m apart on perimeter-row trees to achieve direct control. A combination of large trees, susceptible perimeter-row cultivars and woods as adjacent habitat would call for traps to be 5m apart, whereas a combination of small trees, tolerant perimeter-row cultivars and open field as adjacent habitat would call for traps to be 15 m apart.
FTE's: .2
Source of Funding: Hatch, Grant, State
Scope of Impact: State Specific

Key Theme: Integrated Pest Management, Sustainable Agriculture
Title of Program/Project: Infection Biology of Key Cranberry Fruit Rot Fungal Pathogens
Contact Person: Frank Caruso
Brief Description of Program/Project: The objectives of this project are to define inoculum sources of four fungi that cause field rot and storage rot of cranberries and to pinpoint the precise time that these fungi infect the flowers or developing berries. Little information is known on how *Coleophoma*, *Colletotrichum*, *Phyllosticta*, and *Physalospora* overwinter and initiate their infections at the beginning of the growing season and how often they are able to infect the plant during the season. Knowledge gained from this project will allow growers to utilize fungicides only when they are necessary, and save unnecessary sprays. Cultural methods should also be

applicable, depending on where the inoculum resides. This has the potential of benefiting the environment and public safety, without sacrificing fruit quality for the farmer. Economic savings can also be realized by the farmer in a time when the price of cranberries does not even reach the break-even point.
Short Impact: We have determined during the first year of the project that each of the four fungi has a different primary overwintering source; *Coleophoma* has been the most difficult of the pathogens to delineate so far. Timing studies employing different fungicide schedules indicated that sprays applied earlier in the bloom period and fruit development offer the best control, indicating that this is the likely time of infection of the fungi.
FTE's: 0.6
Source of Funding: USDA/CSREES Northeast IPM Program, Cranberry Institute, UMass Faculty Research Fund
Scope of Impact: Multistate Integrated Research and Extension (MA, ME, MI, NJ, OR, WA, WI)

Key Theme: Integrated Pest Management
Title of Program/Project: Biointensive Management of Cranberry Insects in Massachusetts
Contact Person: Anne Averill
Brief Description of Program/Project: For cranberry fruitworm (*Acrobasis vaccinii*), the most serious problem insect in Massachusetts cranberry, reduced-risk compounds were screened, efficacy of such compounds under high gallonage application in sprinkler systems was evaluated, guidelines for use of pheromone traps in timing application of insecticides were developed, and the effect of a fall flood targeting cranberry fruitworm overwintering on the bog was evaluated.
Short Impact: Two reduced risk compounds, indoxacarb and methoxyfenozide, continued to show efficacy against fruitworm but methoxyfenozide efficacy was lost under high gallonage applications. Indoxacarb will be pursued to replace currently used insecticides that are scheduled to be eliminated through the Food Quality Protection Act. Onset of significant egglaying occurred at peak moth captures in traps; a recommendation that will impact spray timing and that can be made to growers and consultants following additional years' study to confirm this finding. The fall flood treatment resulted in significant mortality of fruitworm. This low-cost and superb non-insecticidal strategy can now be recommended to growers**.**
FTE's: 0.2
Source of Funding: Hatch, Industry
Scope of Impact: State specific

Key Theme: Integrated Pest Management
Title of Program/Project: Modeling the Fate of Genetically Engineered Baculoviruses - MAS009804117
Contact Person: John Burand
Brief Description of Program/Project: First, to measure the properties of both the wild-type Autographa californica nucleopolyherdrovirus and engineered virus strains, AaIT virus (expressing an insect-specific scorpion toxin) that contribute to fitness and viral transmission rates, second to incorporate this information into the model to predict the fate of the engineered virus in the field, and third, to perform field releases to test the predictions of the model.

Short Impact: The development of genetically modified organisms (GMOs) that express insecticidal proteins has provided useful tools for use in controlling insect pests. Predicting the environmental fate of these organisms provides an additional measure of safety necessary for the further development of GMOs, including recombinant baculoviruses, as efficacious agents do for controlling insects.
FTE's: 0.2
Source of Funding: Grant, State
Scope of Impact: State Specific

Key Theme: Integrated pest management, Sustainable Agriculture
Title of Program/Project: Using the Keeping Quality Forecast in the Management of Cranberry Fruit Rot
Contact Person: Frank Caruso
Brief Description of Program/Project: The objectives of this project are to determine how successful the current keeping quality forecast has been since its inception in 1949 and to compare its accuracy with a model designed by Skybit, Inc. Weather parameters utilized in the KQF may not have the importance they had 50 years ago due to the vast changes that have occurred in cranberry cultivation. Weather data will be analyzed, as well as the predicted and final actual keeping quality for each year. The Skybit model has been used in New Jersey and will be adapted for Massachusetts. Fungicide trials will be designed using both forecasts to see which results in better control of field and storage rot. If the present KQF is found to be accurate and equal to the Skybit model, it will be adapted for use in NJ, OR, WA and WI. It is hoped that fungicide applications can be eliminated during those years that a forecast is for good or better fruit quality. This has the potential of benefiting the environment and public safety, without sacrificing fruit quality for the farmer. Economic savings can also be realized by the farmer in a time when the price of cranberries does not even reach the break-even point.
Short Impact: A critical question to be answered is whether the sunlight hour's values at Blue Hill Observatory can substitute for the values at Logan Airport, a location on the coast where fog is a frequent occurrence. When this location was switched in the mid-1990's, critical points may have been lost in some of the yearly forecasts. The KQF may have actually been underestimated in these situations, resulting in more fungicide applications than were necessary for good fruit quality.
FTE's: 0.4
Source of Funding: USDA/CSREES Pest Management Alternatives Program
Scope of Impact: Multistate Integrated Research and Extension (MA, ME, MI, NJ, OR, WA, WI)

Key Theme: Biodiversity, Endangered Species, Wetlands Restoration and Protection, Wildlife Management
Title of Program/Project: Habitat and Biodiversity Conservation
Contact Person: Scott Jackson
Brief Description of Program/Project: This initiative provides education, training and technical assistance covering a variety of topics, including: wildlife and wildlife habitat requirements, wildlife habitat evaluation, protection strategies for conservation of rare species, the importance of biodiversity, strategies and techniques for conserving biodiversity, landscape assessment, land conservation planning and involving volunteers in wildlife inventory and

monitoring. A particular focus of this program is assessing and mitigating highway impacts on wildlife.

Short Impact:
Plans for reconstruction of Rt. 2 in Concord, MA, are being revised to include construction of three wildlife passages.
A draft technical guidance for the design and construction of river and stream crossings has been completed and is out for review. The US EPA and other regulatory agencies have begun using the draft in the review of permit applications.
Forty volunteers have been trained to evaluate culverts and other crossing structures. Seventy-nine crossing structures were assessed (30 bridges and 49 culverts) on eight streams and rivers.
Approximately 220 acres of habitat for state-rare marbled salamanders have been acquired and set aside for permanent protection.
Two Hundred acres of land in Sturbridge, MA, and 70 acres in Southwick have been protected by acquisition and conservation restriction.
Twenty-three volunteers covering 19 routes collected data on calling amphibians as part of the North American Amphibian Monitoring Program.

FTE's: 1.5

Source of Funding: Smith-Lever, Smith-Lever 3d, State, Grant

Scope of Impact: State Specific, Integrated Research and Extension

Key Theme: Land use

Title of Program/Project: Iron Cycling in New England Landscapes – MAS00772

Contact Person: Peter Veneman

Brief Description of Program/Project: This research tests the hypothesis that in stratified sandy soils iron supersaturation may result in the precipitation of ferrihydrite and lepidocrosite without the presence of obvious redoximorphic features. The project has the following specific objectives: i. evaluate the distribution, dissolution, and precipitation of iron in soils in selected subwatersheds in southern New England; ii. assess the effect of hydrology on the distribution, dissolution, and precipitation of iron and other selected groundwater components in soils contained within the subwatershed; iii. develop a descriptive model interpreting the hydrology and associated iron transfer mechanisms, particularly in respect to pedological processes and related soil morphological development in wetland environments; and iv. assess the relationship between hydrology, soil development and vegetation in hydrosequences typical of southern New England.

Short Impact: Proper assessment of seasonal water table levels is essential for farming, wetland delineation and general land use decisions. This research contributes an improved determination method of the seasonal hydrology at a site. Avoiding sites with high seasonal water tables prevents potential contamination of surface- and groundwater by agricultural chemicals, soil compaction, and prevents degradation of soil quality.

FTE's: 1.7

Source of Funding: Hatch, State, Grant

Scope of Impact: State Specific

Key Theme: Natural Resources Management

Title of Program/Project: Relationship Between Landscape Structure and Wildlife Population Viability - MAS00081

Contact Person: Kevin McGarigal
Brief Description of Program/Project: This project: 1. quantifies the composition and configuration (i.e., structure) of the landscape under historic and present conditions, quantifies the changes over time, 2. assesses the relationship between the spatial and temporal variation in landscape structure and underlying environmental and human land use gradients, 3. develops a spatially-explicit wildlife population viability model within a GIS framework and quantifies the potential changes in the distribution and abundance of individuals between historic and present conditions for a select set of species. This research is part of the UMass Landscape Ecology program, and integrated research and extension program focusing on landscape level conservation and decision-support tools.
Short Impact: Methods for understanding how wildlife species respond to landscape changes under various disturbance regimes are needed to guide land planning and resource management decisions. Our findings provide a reference framework against which the impacts on wildlife of alternative land management scenarios can be evaluated. This is a relatively new program and more tangible outcomes are expected in the years ahead.
FTE's: 1.9
Source of Funding: McIntire Stennis, State, Grant, Industry
Scope of Impact: State Specific

Key Theme: Natural Resources Management
Title of Program/Project: Relationship Between Landscape Structure and Wildlife Population Viability - MAS00081
Contact Person: Kevin McGarigal
Brief Description of Program/Project: This project will quantify the composition and configuration (i.e., structure) of the landscape under historic and present conditions, and quantify the changes over time. Assess the relationship between the spatial and temporal variation in landscape structure and underlying environmental and human land use gradients. Develop a spatially-explicit wildlife population viability model within a GIS framework and quantify the potential changes in the distribution and abundance of individuals between historic and present conditions for a select set of species.
Short Impact: Methods for understanding how wildlife species respond to landscape changes under various disturbance regimes are needed to guide land planning and resource management decisions. Our findings provide a reference framework against which the impacts on wildlife of alternative land management scenarios can be evaluated.
FTE's: 1.9
Source of Funding: McIntire Stennis, State, Grant, Industry
Scope of Impact: State Specific

Key Theme: Nutrient management, Water quality, Sustainable Agriculture
Title of Program/Project: Phosphorus Dynamics in Cranberry Production Systems
Contact Person: Carolyn DeMoranville
Brief Description of Program/Project: Under the requirements of the Federal Clean Water Act, the Massachusetts DEP has been charged with the task of developing TMDL (total maximum daily load) reports for 'at-risk' water bodies on the state (303d list). Some of the water bodies on this list receive discharge water from cranberry production systems. In order to formulate TMDL standards for phosphorus for cranberry systems, we need to develop

information that is extensive enough to allow us to generalize the results of our studies to the predominant cranberry bog types in Massachusetts. The information may also allow us to recommend site-specific changes in practice that limit P export from cranberry systems while maintaining sustainable production of the crop (defined as >150 bbl/a for native selections and >200 bbl/a for hybrid cultivars). The intent of this project is to determine impacts of cranberry farming on water quality and define ways to limit that impact in order to allow the continued, sustainable farming of this crop in Massachusetts. The study includes the development of phosphorus budgets for organic and mineral soil cranberry bogs and determination of the impact of reduced P use on crop and water quality. In addition, experiments are included to test various water management strategies to determine best management practices for reduction of P movement off-site. A companion project is underway in Wisconsin, the other major U.S. cranberry producing State.
Short Impact: Based on preliminary project results, grower testing of alternative water movement practices (gravity flow with 'baffling' and living filtration) has been undertaken at an 'at-risk' site - mesotrophic water body adjacent to and receiving water from the cranberry bog. The project team has undertaken to act as facilitators in finding common ground between a cranberry farmer and home-owner association, both of which use a pond included as a study site for this project.
FTE's: 1.1
Source of Funding: State, Smith Lever, Cranberry Institute
Scope of Impact: State specific (but in conjunction with a similar study in WI)

Key Theme: Pesticide Application
Title of Program/Project: New Multi-Tactic Alternatives to Current Pesticides Against Key Apple Pests - MAS005559
Contact Person: Ronald Prokopy
Brief Description of Program/Project: Three key apple pests currently are controlled by pesticides facing elimination or reduction under the Food Quality Protection Act. Our purpose is to develop new multi-tactic alternatives for controlling these three key pests: the insects plum curculio and apple maggot and the disease flyspeck. Alternatives will involve evaluation of new and safer pesticides alone or in conjunction with behavioral and cultural control methods
Short Impact: The new orchard pesticides indoxacarb and trifloxystrobin proved just as effective as the standard orchard pesticides azinphosmethyl and Captan in controlling PC, AM and FS. Compared with spraying all rows of apple trees in an orchard, spraying only the perimeter row proved just as effective against PC, but was slightly less effective against AM and FS.
FTE's: .2
Source of Funding: Grant
Scope of Impact: State Specific

Key Theme: Pesticide Application
Title of Program/Project: Management of Resistant Cranberry Weevil
Contact Person: Anne Averill
Brief Description of Program/Project: Extensive populations of organophosphate-resistant cranberry weevil (*Anthonomus musculus*) emerged in Massachusetts cranberry beds in 2002, leaving growers with no management options. Our approach involved lab and field evaluation

of both conventional and new reduced risk insecticides to provide a cranberry weevil control option.
Short Impact: A reduced-risk compound, indoxacarb was identified as highly effective against the resistant populations of cranberry weevil. The industry estimated that the Massachusetts cranberry industry would have lost 10 million dollars of crop to cranberry weevil damage if we had not identified an alternative compound.
FTE's: .2
Source of Funding: Hatch, State, Industry
Scope of Impact: State Specific

Key Theme: Pesticide Application, IPM
Title of Program/Project: Green School
Contact Person: Kathleen Carroll
Brief Description of Program/Project: Green School is a comprehensive educational training program for Green Industry professionals, presented by the UMass Extension Landscape, Nursery, and Urban Forestry Program in cooperation with the UMass Extension Turf Program. The program is designed to provide training in horticulture fundamentals, and the relationship of those fundamentals, to environmental quality. Green School is intended to instill a sense of environmental stewardship in the participants. Knowledge of plants and plant systems, as well as Integrated Pest Management (IPM), form the foundation of the curriculum.
Short Impact: 138 professionals attended the sessions. 80% reported that they received new information that will assist them in reducing the use of fertilizers and pesticides on the properties they manage. 78% reported a better understanding on conservation practices and managing waste and water more efficiently.
FTE's: 3.0
Source of Funding: State, revenue based, Smith-Lever
Scope of Impact: State Specific

Key Theme: Pesticide Application, IPM
Title of Program/Project: Landscape Message
Contact Person: Kathleen Carroll
Brief Description of Program/Project: The primary objective of this project is to educate ornamental horticulture pest managers in the urban landscape about pest (insects, diseases and weeds) development that will lead to timely applications of pesticides including appropriate monitoring techniques for pests. The Landscape Message is a weekly message from April to October. It is available by fax, email and on the web. The message informs users about what insects are emerging that week, monitoring strategies, growing degree day reports, cultural problems and solutions and management strategies. Users include private and municipal grounds and turf managers, nursery operators, garden center managers, landscape architects and professional horticulturists.
Short Impact: The web site hits average about 800 weekly which totals to 12,000 hits per year. 80% of the users report improved results of pest management practices and timing, reduction of pesticide applications and increased use of biorational and alternative practices.
Source of Funding: State, revenue based, Smith-Lever
FTE's: 3
Scope of Impact: State Specific

Key Theme: Pesticide Application, IPM
Title of Program/Project: Management Guide of Woody Ornamentals
Contact Person: Kathleen Carroll kcarroll@umext.umass.edu
Brief Description of Program/Project: This manual is revised and published every two years. It provides current information on the materials and products available to manage pests of woody plants in New England. The objective is to instill a sense of environmental stewardship in users. Users include private and municipal ground and turf managers, nursery operators, garden center managers and professional horticulturists. IPM concepts and the optimization of pest control through proper cultural management of turf and woody ornamentals are included.
Short Impact: The manual was obtained by 1000 professional grounds managers. The information increased their knowledge and made them aware of technical resources that assist them in making environmentally appropriate decisions related to pesticide, nutrient and water management.
FTE's: 5
Source of Funding: State, Revenue Based, Smith-Lever
Scope of Impact: State Specific

Key Theme: Water Quality, Sustainable Agriculture
Title of Program/Project: Salt Effects on Cranberry Soils, Plant Growth, and Productivity
Contact Person: Carolyn DeMoranville
Brief Description of Program/Project: The objective of this project is to define both chronic and acute salt levels that can lead to adverse growth and yield impacts on cranberries. These levels will become the analysis standard for samples from water bodies used for cranberry production. Effects of salt loading on cranberry soil chemistry will also be investigated and mitigation options studied and field tested. Since cranberry has been assumed to have poor salt tolerance based on studies of similar species, the use of deicing salt (NaCl) on highways adjacent to bogs has come under scrutiny and in some cases been curtailed. However, deicing substitutes are expensive and less effective, posing a safety hazard. The purpose of this research is to determine a critical level for salt in cranberry production in order to set a 'safety' standard for cranberry water supplies receiving discharge of road salt due to runoff and overspray. By determining these standards and instituting monitoring programs, impacts of Highway activities on cranberry farming can be minimized while maintaining the use of deicing materials required to preserve public safety.
Short Impact: We have determined, to date, that the damaging level of salt on cranberry is less than 100 ppm in water - actual critical point remains under investigation. We have identified a mitigation treatment that desalinates cranberry soil in the laboratory. This will be field tested beginning in 2003.
FTE's: 0.3
Source of Funding: State Highway Department Grant (Federal Highway funds)
Scope of Impact: State (researchers from WA and WI are participating)

Key Theme: Water Quality, Hazardous Materials
Title of Program/Project: Hazardous Material and Water Quality Education
Contact Person: Marilyn Lopes
Brief Description of Program/Project: This program increases consumer knowledge and

understanding of groundwater as a resource and the effects of solid and hazardous material disposal to water quality issues. The Barnstable County Hazardous Materials Program and Hazardous Hot Line offers technical assistance and educational support to town household hazardous waste coordinators for household hazardous waste collections and the implementation of permanent collection programs for recyclable hazardous materials. Staff specialists also provide the public easy access to up-to-date information on the proper disposal of household hazardous materials on Cape Cod. Questions answered include what is hazardous waste, how to package hazardous waste for disposal, where and when these items may be safely disposed and how to reduce the use of hazardous materials in homes and businesses.

Short Impact:
-There was an 11% increase in the amount of materials collected at the four-town Upper Cape Household Hazardous Products Collection Center.
-Participation increased by 36% over 2000, and volume of materials collected increased by 51% for household hazardous products collected by a three-town collaborative that includes Provincetown, Truro, and Wellfleet.
-Outreach resulted in a 1005% increase in participation of small businesses (to 210) in a program to properly dispose of hazardous materials.
-Eight municipal employees adopted BMPs for handling hazardous waste
-50,000 gallons of household hazardous waste collected and diverted from the waste stream
-More than 90 pounds of elemental mercury were collected this year and removed from the solid waste stream.
-More than fourteen hundred callers to the Barnstable County Hazardous Materials Program and Cape Cod Extension received up-to-date information on the proper disposal of hazardous materials on Cape Cod.

FTE's: 1.0

Source of Funding: Smith-Lever, County

Scope of Impact: State Specific

Key Theme: Water Quality, Natural Resources Management, Biodiversity, Land Use, Wildlife Management, Riparian Management

Title of Program/Project: SuAsCo Watershed Project

Contact Person: Scott Jackson

Brief Description of Program/Project: This project is designed to develop and implement a comprehensive education, training, and outreach model for identifying and addressing SuAsCo watershed-scale issues. This watershed is facing several problems that include rapid growth and development, water quality shortages, water quality issues, invasive exotic species, and habitat protection. By applying University expertise and resources to the SuAsCo watershed through partnership and volunteerism, this project aims to develop capability for citizen-based assessment of water resources, strengthen existing efforts in the watershed, and develop a transferable outreach model.

Short Impact:
-Completion and adoption of a long-term Biodiversity Protection and Stewardship Plan for the watershed
-Compilation of water quality data for the watershed, including data from government agencies, private consultants, and volunteer monitoring groups
-New local stream team steering committees formed in Ashland and Hopkinton

-Fifty volunteers in a dozen teams conducted shoreline surveys in the town of Hopkinton. Stream teams established priorities for action and have drafted an action plan. -Concord's Mill Brook Task Force mapped storm drains and designed, purchased, and installed catch basin decals
FTE's: 0.8
Source of Funding: Smith-Lever, State, Grant
Scope of Impact: State Specific

Key Theme: Water Quality, Natural Resources Management, Biodiversity, Land Use, Wildlife Management, Riparian Management, Endangered Species
Title of Program/Project: Mill River Watershed Project
Contact Person: Scott Jackson
Brief Description of Program/Project: This project is piloting an approach to community-based watershed protection in the Mill River watershed, a sub-basin of the Connecticut River watershed. The Mill River Watershed Project is an effort to identify and address environmental issues within five communities (Hatfield, Whately, Deerfield, Conway, and Northampton). The project involves working with municipal boards, conducting a variety of watershed assessments, targeted outreach, involving teachers from local schools in environmental education, and convening stream teams and a watershed council to facilitate public participation.
Short Impact: -Two pipe culverts that blocked fish passage and disrupted river continuity on the Mill River (Whately, MA) were replaced with a large box culvert, designed and constructed to restore streambed habitat and facilitate passage for fish and other aquatic organisms. -Commitments have been made by the USFWS and Town of Hatfield for funding and construction of another culvert upgrade project in 2003. -A fish and endangered mussel kill in the Mill River resulting from polluted agricultural runoff was detected and remedied. UMass facilitation helped coordinate and focus the enforcement actions of four agencies toward site restoration rather than punishment. -Six sites for state-listed or watch-listed were discovered on the Pocumtuck Ridge. Seven vernal pools were certified. An area with 26 species of ferns--half of the total species found in the Commonwealth --was discovered in one small area. -Twelve volunteers from affected communities participated in hydrological data collection used to model instream habitat and flow requirements for the Mill River.
FTE's: 0.8
Source of Funding: Smith-Lever, Smith-Lever 3d, State, Grant
Scope of Impact: State Specific, Integrated Research and Extension

Key Theme: Water Use Efficiency, Conservation and Quality
Title of Program/Project: Trickle Irrigation
Contact Person: John Howell/Ruth Hazzard
Brief Description of Program/Project: Vegetable and other growers are requesting information about trickle irrigation as a means of reducing water use, increasing efficiency of labor and water use, improving their techniques in applying nutrients and avoiding water contamination. They have asked for information regarding equipment and application of fertilizers and pesticides through a system. These processes are called fertigation and chemigation, and, can improve application efficiency and minimize chances of water

contamination if done correctly. A project was initiated to teach growers about equipment and the principles of trickle irrigation and demonstrate appropriate techniques.
Short Impact: A mobile demonstration unit was built, consisting of a pump, filters, injector, pressure regulators and gauges mounted on a trailer. This unit was used for on site talks and demonstrations to aquatint growers with the information. Audiences included vegetable, small fruit, tree fruit, and flower and nursery growers. The unit is also being used to irrigate and fertigate research plots and apply treatments to test insect management strategies at the University of Massachusetts Research Farm. A system of buried water lines as also been installed at the Research Farm to facilitate the use of the trickle and overhead irrigation on research plots.
FTE's: 0.2
Source of Funding: Smith Lever, Grants, Gifts
Scope of Impact: State Specific

Goal 5
Enhanced economic opportunity and quality of life for Americans

Key Themes:

Aging
Agricultural Financial Management
Character/Ethics Education
Child Care/Dependent Care
Children, Youth, and Families at Risk
Communications Skills
Community Development
Conflict Management
Consumer Management
Estate Planning
Family Resource Management
Farm Safety
Fire Safety
Home Safety
Home-based Business Education
Impact of Change on Rural Communities
Jobs/Employment
Leadership Training and Development
Literacy
Parenting
Promoting Business Programs
Promoting Housing Programs
Retirement Planning
Supplemental Income Strategies
Tourism
Workforce Preparation - Youth and Adult
Workforce Safety
Youth Development/4-H
Youth Farm Safety

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Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$54,780	1.2	1	$9,100
UMEXT	$1,196,697	19.3	--	--

Goal 5 Executive Summary

Particularly pronounced under Goal five have been the efforts of the 4H program. These activities have included Earth Connections, Mini Society, In Touch Science Program, "Conversations" on youth issues, Embryology, Teen Leadership Series, State Teen Leadership Conference, Teen Leadership Institute, and the Visual Presentation Event. We have attempted to document not only participation rates, but also impacts in changes in knowledge, changes in attitudes and changes in action. We will endeavor to improve this documentation over time. It should also be noted that we have devoted 10% time and effort to reaching out to under-served populations and have made several efforts to reach into urban areas including New Bedford, Holyoke and Boston.

Key Theme: Impact of Change on Rural Communities
Title of Program/Project: Preserving New England's Rural Character in the Face of New Residential Development: Local Residents' Perceptions - MAS00818
Contact Person: Robert Ryan
Brief Description of Program/Project: An increase in residential development poses a threat to the scenic quality of rural New England. Rural planners often find themselves with the charge to retain their planning area's rural character in the face of increased residential development. This project will explore local residents' perceptions of alternative forms of rural residential development, such as cluster housing, that have been planned to 'fit' into the rural landscape.
Short Impact: This research study was one of the first of its kind to empirically test the visual compatibility of cluster subdivision design from the perspective of rural residents and present clear planning recommendations for accommodating new residential development in a manner which is more compatible with the rural landscape. Furthermore, this study showed that the existing rural landscape, including farmland, is highly valued by local residents, including newcomers and long-time residents, farmers and non-farmers
FTE's: .1
Source of Funding: Hatch, State, Grant
Scope of Impact: State Specific

Key Theme: Promoting Business Programs
Title of Program/Project: Investigating Open-Source Concepts for the Enhancement of Environmental Research – MAS000847
Contact Person: Charles Schweik
Brief Description of Program/Project: Environmental researchers are constantly faced with complex problems that cannot easily be solved by one research group. This project examines the open source phenomenon in computer science and investigates factors that led to successful and unsuccessful applications. The purpose is to analyze how open-source endeavors can be applied outside of computer science to create Internet-based collaborations for solving complex environmental problems.
Short Impact: The paper we presented at the APPAM conference in Dallas was well received. This research is beginning to open the eyes of people in disciplines outside of computer science about the promise and application of open source collaboration principles toward solving complex problems facing humanity. The paper under review at the online peer-reviewed journal First Monday has the possibility of reaching well over 500,000 possible readers worldwide. And we are beginning to discuss the prospect of applying open source principles to help NSF Long

Term Ecological Research centers collaborate in the context of landuse change analysis. More broadly speaking, this project has potential to uncover important new approaches to collaborative problem solving over the Internet.
FTE's: .1
Source of Funding: Hatch, State
Scope of Impact: State Specific

Key Theme: Youth Development/4-H and Leadership Training and Development
Title of Program/Project: 4-H Conversations
Contact Person: Shirley Mietlicki and Gretchen May
Brief Description of Program/Project: To honor its history as a national youth development organization, 4-H decided to hold "conversations" on youth issues throughout the country and submit information gathered to governmental policy makers from the local level all the way to President Bush and his cabinet. For its part, MA 4-H held nine local conversations and one statewide event.
Short Impact: Over 400 stakeholders participated in our series of "conversations" around the state where they were asked for input on youth issues. Summary reports were submitted to government officials in the communities where the conversations were held. Nine stakeholders, including youth, were sent to the national conversation at which a report was compiled for and later presented to the President. A video on our conversations was produced and aired on over 40 cable stations for a total of 153 showings. Using station statistics, this video could have been seen by 3,888,332 people. A series of newspaper ads ran as well resulting in 4-H being visible in over a half million homes. Fourteen new volunteers had come forward by June 5, 2002. Staff has begun integrating the recommendations from the conversations into their work. The top recommendations were: to establish a network and clearinghouse of "youth working with youth" programs that train and empower youth to use effective communication tools for community outreach and to involve youth in all committees such as school, town, grant writing, etc in an environment of mutual respect where youth are heard and participate in decision-making.
Source of Funding: State, Smith Lever 3b & c
FTE's: 1.6
Scope of Impact: State Specific

Key Theme: Youth Development/4-H
Title of Program/Project: Reaching Diverse Populations
Contact Person: Shirley Mietlicki
Brief Description of Program/Project: It is critical that the 4-H YFD program continue to reach out to underserved and youth of color within Massachusetts and to recruit adult and teen volunteers that are more representative of the populations in which they work. To this endeavor, each educator is to spend 10% of their time and effort in recruiting underserved populations.
Short Impact: This past year, a total of 71,803 youth were reached through our 4-H program. Forty seven percent of these youth were reached through our Family Nutrition Program through schools in our urban areas. Fifty three percent were reached through our 4-H camp, club, school enrichment and out-of-school programs. Sixty-six percent of our youth were White, 20% Hispanic, 11% Black, 2% Asian and 1% or less as Native Americans. This past year, our numbers have doubled for reaching youth of color from our previous reporting year. This is

partially due to the numbers of youth of color reached through our Nutrition Program as well as those reached through our MA State Strengthening program in Holyoke and Boston and the expansion of the 4-H after school program in New Bedford and Worcester. Of the 4,448 adult volunteers working in our program, 94% were White, 4% Hispanic, 2% Black and less than 2% for Native and Asian Americans. From our previous reporting year, the number of Black volunteers has doubled with also a slight increase in our Hispanic volunteers.
FTE's: 4.5
Source of Funding: State, Grant and Contracts, Smith-Lever
Scope of Impact: State specific

Key Theme: Energy Conservation
Title of Program/Project: Earth Connection
Contact Person: Will Snyder
Brief Description of Program/Project: The 4-H YFD program continues to sponsor the Earth Connection, a conference on environment and community service for teams of high school age youth and their advisors. The conference attempts to support and inspire youth who want to address environmental issues in their own communities. It provides resources and skills for community-based learning and action, and serves as a forum for participants to share excitement and ideas, successes and lessons learned. It includes in-depth workshops; an EnviroTrek around campus to acquaint participants with environmental teaching, research and practices at UMASS; roundtable discussions, and time for reflection and planning.
Short Impact: Evaluation of the conference as a learning experience showed that participating youth -increased their knowledge of environmental issues, science, and public policy -gained a greater appreciation for science research and citizen action skills, and how these can be put to work in their own communities, -became more familiar with environmental research, education, and practice at UMass Amherst, their public university -increased their commitment to taking action on behalf of the environment in their community -gained appreciation for the diversity of Massachusetts communities, their land and people -practiced a range of thinking and communication skills noted in the Massachusetts Common Core of Learning and Curriculum Frameworks. Sixty-seven youth participated in the 2002 Conference. Participants reported that they were 53% White, 9% Black, 3% American Indian, 18% Latino, 5% Asian and 12% other. Eighteen percent of the seventeen advisors attending identified themselves as other than White. Thirty percent of the participants came from the large urban centers of Boston, Chelsea and Holyoke.
Source of Funding: Smith Lever, State, Revenue Based, International Paper Co
FTE's: 1.35
Scope of Impact: State Specific

Key Theme: Youth Development, 4-H
Title of Program/Project: Embryology
Contact Person: Kim Anderson

Brief Description of Program/Project: 4-H has a long tradition of members working with a variety of animal projects to not only learn about life skills, but develop those life skills as well. While caring for animals, youth learn patience, compassion, and responsibility and address life and death situations. Youth also keep records, analyze data and cost along with participating as part of a team or group. The embryology program brings these experiences to youth in our club and school programs, our after school initiatives and via trainings for other youth serving agencies. The program ties into the state and national frameworks and can easily be tied across the curriculum. "Many of our schools incorporate art (having youth draw or color development charts or what they believe is happening), math (charting graphs, finding averages, etc.) and spelling (learning new terms) in their embryology curriculum. Our handouts also encourage this." Carrie Chickering-Sears Extension Educator. "Goes nicely into adaptations and habitat for grade 3 science." Teacher-Hampden County

Short Impact: Five trainings reached 70 volunteers, staff, teachers and youth leaders; a total of 10, 359 youth were reached. Youth learned:
-about the life cycle of chickens, development after birth, and how to chart progress
-about the variables in any science project that may affect outcomes
-about caring for a living creature
-the scientific terms the egg and the difference between store bought eggs and fertile eggs
-about imprinting as they watched the chicks
-patience, diligence, responsibility and teamwork as they waited for the hatch and took turns caring for the eggs and chicks
-about the "survival of the fittest" and about death as they conducted brief simple discussion when one of the chicks died
-math applications like fractions of sets
In one evaluation, 100% of the participants stated that they would participate in the program again. Additionally, it was reported that those teachers who attended the trainings experienced a more successful hatch then the ones that skipped the training.

FTE's: 1.2

Source of Funding: Smith Lever, State

Scope of Impact: State Specific

Key Theme: Workforce Preparation

Title of Program/Project: Mini-Society

Contact Person: Sherrie Guyott

Brief Description of Program/Project: Massachusetts worked with the other 5 New England states on the Workforce Preparation Task Force on several projects. One of these was the implementation of the Mini-Society program in New England. The New England Workforce Task Force sponsored two trainings for staff and volunteers in the New England region. In Massachusetts we trained four teams and two of these teams were from the urban areas of New Bedford and Fall River. The Mini-Society program was implemented in two out-of-school summer programs during the summer of 2002. Both sites were urban, low-income areas. These were collaborative programs where the UMass Extension 4-H YFD program worked with existing summer programs. The collaborating agencies provided the site and the youth and 4-H delivered the educational program. Each Mini-Society group met 2 days a week for four or five weeks.

Short Impact: Using our teams of trained volunteers and staff, we reached a total of 34 youth at the two sites. Evaluation was done through informal observations by the trained volunteers and staff implementing the program using a grid of 40 skills and business concepts. Examples of skills learned by the participants that were observed were leadership (80% of participants demonstrated this) and problem solving (90%). Examples of concepts learned by the participants were managing a society (80%), scarcity (100%), how to start a business (100%) and civic responsibility (50%).
FTE's: .50
Source of Funding: Smith Lever, State, Kaufman Foundation
Scope of Impact: Multistate Extension: VT, NH, CT, RI, ME and MA

Key Theme: Youth Development/4-H
Title of Program/Project: Science & Technology – In Touch Science
Contact Person: Jay Field
Brief Description of Program/Project: Extension Educators have completed their second year of providing training and curriculum to adult teachers, key volunteers and youth for the In Touch Science program that was developed by faculty at Cornell University.
Short Impact: A total of 246 staff, volunteers and teachers were introduced to and/or received In Touch Science training through delivery modes that included: camp counselor training, teacher conferences, Girls' Club staff training, all Extension staff conference and the Northeast 4-H Volunteer Forum. A total of 2048 youth increased their skills and knowledge in science by participating in In Touch Science programs through 4-H camps, after school science clubs, county mini conferences and family forums and other 4-H sponsored trainings. Evaluation results from adults who have received training in the In Touch Science curricula have shown the most popular part of the training has been the "hands on" element of the activities that makes learning about science fun and increases their comfort level in teaching science to youth. At the Northeast Volunteer Forum, 82% of the eleven volunteers trained stated that they were very well prepared to engage children in the In Touch Science activities. A new evaluation tool has been developed in cooperation with our state's evaluation specialist that will be used to measure future impacts from the In Touch Science trainings.
FTE's: .75
Source of Funding: Smith Lever, State, Massachusetts 4-H Foundation
Scope of Impact: State Specific

Key Theme: Leadership Training and Development
Title of Program/Project: Teen Leadership Programs
Contact Person: Wendy Marcks and Tom Waskiewicz
Brief Description of Program/Project : The 4-H Youth and Family Program (4-H YFD) is committed to providing learning experiences for teens at the local, regional and state level, which will increase their leadership capacity and build their confidence in taking on leadership roles. Three specific events-Teen Leadership Series, State 4-H Teen Conference and the Teen Leadership Institute-were designed to meet this goal. The Teen Leadership Series was a pilot program to assist teens in self-assessment and learning more about their individual leadership styles, as well as skill building in communicating, conflict resolution, time management, group process and team building. Unlock your Leadership Potential was the curriculum used. The

Teen Leadership Institute further expanded this goal by having teams of adults and teens teach these topics. The State Teen Conference brought teens from across the state together on the UMASS campus to experience college life, and develop leadership and good citizenship skills.

Short Impact: The Teen Leadership Series: Six teens and three adults met monthly for nine sessions, each 2.5 hours. These participants reported an increase in their ability to effectively lead meetings, manage conflict with others, manage their time more efficiently, and communicate more effectively in individual as well as group settings. One teen reported that this series was responsible for her being able "to take the initiative and take control of my life when I thought it was out of control." Another teen utilized the skills learned in the series to manage a challenging home environment and advocate effectively for outside intervention to deal with family issues.

The Teen Leadership Institute: Sixty-eight diverse teens from across the Commonwealth attended, along with seven adult volunteer chaperones. Survey results indicated that 42% of the participants reported that they were more aware of stereotypical behaviors and would work to eliminate them, personally and within their schools; 27% voiced an increased likelihood of working in a youth/adult partnership, as was evident by the weekend's successful role models; 45% indicated the need for more leadership training opportunities; 21% indicated that they were interested in developing a local 4-H Teen Council; and 30% requested information on the Rapid Response Team, a civics-focused team of teens.

State 4-H Teen Conference: One hundred twenty-eight high school students from across the state attended this four day conference on the UMASS campus. Sixty percent of the participants indicated that "making new friends" was the most important outcome of the conference. Other major outcomes for the participants were: "learning about the university", learning about college living" and "finding out about other leadership opportunities". All participants visited various departments on campus, to learn about undergraduate coursework and career opportunities.

FTE's: 2.0

Source of Funding: Smith Lever, State and Revenue Based

Scope of Impact: State Specific

Key Theme: Youth Development/4-H and Leadership Training and Development

Title of Program/Project: Visual Presentations

Contact Person: Shirley Mietlicki and Gretchen May

Brief Description of Program/Project: One of the major life skills developed through participation in 4-H is public speaking. Our local and state Visual Presentation Program enable youth to research a topic and present it by following a specific format to an audience of youth and adults.

Short Impact: In fiscal 2002, 265 youth participated at the statewide Visual Presentation Event. They came from all 12 counties in the state. Focus is placed on this program throughout the year because previous evaluations have given us favorable data which includes: a modest increase in participants' confidence in their public speaking ability, a more substantial increase in how comfortable youth would feel making an oral presentation in school and a substantial increase in their general level of organization when it comes to school work.

FTE's: 1.2

Source of Funding: Smith Lever, State, MA 4-H Foundation
Scope of Impact: State Specific

Key Theme: Leadership Training & Development
Title of Program/Project: Volunteer Management & Development Program
Contact Person: Kathleen Chatwood
Brief Description of Program/Project: The statewide Volunteer Management (VM) Team, comprised of staff and key volunteers, is charged with designing a comprehensive volunteer management system for the 4-H Y&FD Program as well as implementing related training for 4-H Y&FD staff and volunteers. Its inter-mediate goal was to involve the State Advisory Council, local advisory councils, staff and volunteers in the design and implementation of key organizational policies to unify and standardize UMass Extension 4-H governance and fiscal management policies. This included: -Volunteer Screening: In consultation with UMass legal counsel, in Fall 2001 the VM Team added key screening components: Volunteer Service Descriptions for Collaborating Agency's Volunteers, Embryology Program Coordinator, Chaperones, Short-Term Volunteers, Middle Managers, Club/Group Leaders, Advisory Board Volunteers, as well as new Board Volunteer Code of Conduct, revised Permission and Liability Forms, One-Day and Overnight Field Trip Permission Forms, and updated member Health Form. -Youth Protection: Training for staff on the statewide UMass Extension 4-HYFDP Incident Report process included training on the MA Department of Social Services reporting policies and how to recognize child neglect and abuse. -Advisory By-Laws: In Fall 2001, the MA State 4-H Advisory Council agreed to serve as a review body for all new volunteer forms and organizational initiatives in the areas of governance and fiscal management. -Fiscal Management System: The VM Team worked with UMass financial and legal staff and Michigan State University Extension 4-H to modify the Treasury Book template and to design training to establish consistent statewide financial accounting policies for all MA 4-H clubs and advisory councils.
Short Impact: -Volunteer Screening; 100% of 30 4-H YFDP educators and support staff were trained on the new volunteer forms, policies and their use in new volunteer orientation materials. The VM Team enhanced and completed the new screening process of 98% of MA 4-H volunteers in September 2002. -Youth Protection: 25 staff were trained in this program as part of the first stage in the development of a youth protection policy and educational training program to implement a unified procedure on reporting of serious incidents involving 4-H volunteers, youth and staff. -Advisory By-Laws: 100% of 4-H YFD educators and the State Advisory Council, comprised of 17 members, were trained in and presented the new Advisory Board By-laws template. In turn, they were to train their local advisories in the implementation of this new by-law template. The subsequent review resulted in the Advisory Board By-laws adoption statewide. The Volunteer Management Team participated in the design and delivery of a three-part Board Training Series, teaching over 67 volunteers and staff the particulars of successful board meeting process, strategic planning, liability and ethics/communication concerns. -Fiscal Management System: A pilot program on the proposed 4-H fiscal policy-training program was successfully developed and initiated in September 2002. Co-sponsored wit MA

State 4-H Advisory Council, it gained volunteer and staff involvement and feedback. It resulted in a new MA Treasury Book curriculum, training program for all MA 4-H volunteer treasurers with web-site listing 4-H fiscal policies under development.

FTE's: 2.9

Source of Funding: State, Smith Lever

Scope of Impact: State Specific

Key Theme: Children, Youth and Families at Risk

Title of Program/Project: MA Advocating State Strengths & New Bedford 4-H After School Program

Contact Person: Karen Barshefsky, Millie Gedrites

Brief Description of Program/Project: MA is a highly urban state with a majority of its population, including the youth, living in and/or around cities. A priority area of the MA 4-H YFD program has been to reach underserved youth in these highly urban areas. To that end, MA, has been successful in obtaining Youth at Risk federal funding to assist us in this endeavor. FY02 was the fifth year of the MA Advocating State Strengthening Project. Through it, UMASS has been able to hire an educator to work with the Hispanic community in the urban city of Holyoke and one educator to work in specific neighborhoods of Boston

Short Impact:

Holyoke: Examples of Impacts

-Two hundred and five children and youth, 52 youth volunteers and 18 adult volunteers benefited from a variety of 4-H Youth Development programs. Volunteers, both youth and adults, contributed approximately 735 hours combined.

-Americorps members reached 82 children and youth, ages 8-13, through the 4-H Rocket's Away program. According to a youth program leader survey, 80% of the participants gained skills in teamwork; 75% gained skills in problem solving and 50% developed a better understanding of the concepts of gravity.

-The Holyoke Youth Pride and Empowerment teen group advised by the local 4-H educator will continue through Girl's Inc., of Holyoke providing gay, lesbian, bi-sexual, and transgender youth a safe haven for discussing issues and gaining information.

-Youth from Holyoke also attended UMASS Extension Earth Connection Conference and the 4-H Teen Leadership Conference.

Boston: Examples of Impacts

-Over 120 adults were trained in 4-H curricula; 720 youth participated in the 4-H In Touch Science program and the Junior Chef program conducted in and out of school.

-About 230 youth were reached via the school enrichment 4-H embryology program with 42 adults receiving training. At least two of the seven schools consistently offer this program annually and have incorporated this 4-H program into their regular school year.

-The local 4-H educator organized the Boston Teen Serving Coalition as a means for youth serving organizations to network, share resources and training opportunities, and make plans for the future. In a questionnaire distributed to 14 members of the coalition, 93% said that they had gained knowledge that would help their organization achieve its goals, and 64% indicated that they made contact with people that would lead to further collaborations.

* 4-H Educators, both in Boston and Holyoke have established extensive collaborations with many other youth serving organizations such as Boys and Girls Clubs, Mission Main/Pride,

Grace Renaissance After School Program, Marken Properties, Holyoke Planning Department, Holyoke Youth Alliance, to name just a few.

New Bedford: Examples of Impacts
-For the after school program, 16 youth, ages 10-15, learned about nutrition and delivered information to over 500 low income senior citizens. They and other youth also provided food to nearly 2000 needy residents of New Bedford.
-Thirty youth planted and conducted clean-ups of their school grounds and enhanced the interior of their schools.
-Forty-eight youth learned about spring growth, the propagation of vegetable and flower plants, and how to properly plant a tree during the 4-H April Vacation program. +

FTE's: 3.3

Source of Funding: State, CSREES State Strengthening Grant, MA 4-H Foundation, New Bedford Housing Authority, MA Service Alliance, 21st Century Grant, United Way of New Bedford, Kraft Feed the Hungry grant, and New Bedford Police Department, Smith Lever

Scope of Impact: State Specific

Stakeholder Input Process

Overview:

Nearly 1000 individuals function as stakeholders involved in providing input and advice on extension and research programs in Massachusetts. Since the majority of college faculty and staff are involved in both research and extension, input from stakeholders is considered for both research and extension work. While some individuals provide input on a one-by-one basis, such as through surveys, interviews and unsolicited material, the large majority of stakeholder input is through organized groups. These are generally:

a. groups organized by Extension, either on an on-going basis, or convened for a one- time interaction.
b. existing groups, such as neighborhood councils, commodity associations, professional societies and foundations
c. groups formed by legislative mandate

The Agriculture Program reports input from 147 individuals and 12 organized groups. Several comprehensive grower associations, such as the Massachusetts Flower Growers Association, through their elected board of directors, also serve as stakeholder groups. In other commodity areas, individuals are invited to participate in advisory committees to provide input. Finally, one time focus groups used at times to provide input of specific themes.

The Agriculture program has also planned and invited a cross-section of agricultural stakeholders to two focus meetings held during November of 2003. In FY 2002, the invitee list was developed to include 185 people from agricultural producer and agricultural service provider groups. The sessions were facilitated by a professional consultant, and designed to get advice and feedback on how the Agriculture Program can adapt its activities to better meet stakeholder needs. The results of these meetings will be reported in FY2003. The Massachusetts Agricultural Experiment Station and UMass Extension also participated in stakeholder meeting organized by the Massachusetts Department of Food and Agriculture.

The 4-H YFD program area involved more than 600 individuals in county-wide, program, event-specific or other topical advisory groups. This past year, all board members were screened through our volunteer management process. To expand the diversity of the local Advisory Boards, new by-laws were implemented which indicated how boards needed to expand to include more youth, more people of color, and were more representative of the people we were trying to reach. Additionally, as a celebration of the 100th Anniversary of 4-H, nine Conversations were conducted across the Commonwealth to gain input from over 400 youth, volunteers, parents, youth serving professionals and teachers, on issues facing today's youth. This year, we will further implement the issues gleaned from these conversations and conduct further focus groups, if necessary, as part of a long range plan for 4-H. Staff have also participated on various local coalitions and youth serving boards to gain input on concerns facing today's youth, families and communities.

Within the Natural Resources and Environmental Conservation Program, the NREC Advisory Committee serves a primary advisory function. It is made up of 24 educators, scientists, planners, local officials, and natural resource professionals from a variety of federal, state, town, and private organizations involved in conservation. Members of this committee represent a wide variety of viewpoints yet have broad perspectives on conservation issues. All have distinguished themselves as leaders in the fields of conservation and conservation/environmental education. Within NREC there are Boards of Directors for two program-supported Centers (20 members, total). Specific projects within the NREC program are guided by advisory committees, technical advisory committees, or steering committees (45 members). Additionally, the Natural Resources Conservation Advisory Board has been active in identifying our areas of emphasis, and identifying outreach needs and approaches. The board has 3 charges: 1. to provide us with advice in structuring our teaching, research, and outreach programs, 2. be an advocate for our programs as new initiatives are developed to advance natural resources management, education and research within the UMass system and regionally, 3. to assist us in raising funds which provide a 'margin of excellence' that funds beyond the state/federal allocations. The following organizations are represented on the Board: Mass Dep. of Environmental Management; Mass Watersheds Commission; US Fish and Wildlife Service; National Marine Fisheries Service; US Environmental Protection Agency; Mass. Department of Fisheries and Wildlife; US Forest Service; Forest Management and Arboriculture Industry; Forest Products Industry; National Park Service; Natural Resources NGO and Public Utilities Industry. Both of these departmental advisory groups provide stakeholder input on all aspects our “program of research” (McIntire-Stennis, Hatch, and contracts with agencies) as well.

The Nutrition program uses two primary advisory groups with 30 stakeholders. For food safety the Partnership for Food Safety Education provides input from state and federal state food regulatory and educational agencies in order to provide maximum impact of our efforts at all stages in the food system from farm to table. An advisory group for the Adult Day Health project, including MA DOE, MA Executive Office of Elder Affairs and practitioners from ADH programs also provide an advisory function.

For Extension as a whole, the UMass Extension Board of Public Overseers, created by the legislature and comprised of representatives of agriculture commodity groups, state agencies, natural resources groups, the state nutrition board and several state-wide 4-H advisory groups, meets regularly with Program Directors, the Director and Assistant Director. The legislation mandates the composition of the Board. Over the past five years, this group has addressed funding in general, as well as specifically how resources are allocated by program to meet the needs of the Commonwealth. The Board also provides input for overall program direction.

Actions taken to seek stakeholder input that encourages their participation:

As described in the overview, stakeholder input is encouraged through regular meetings, existing organizations, one-time focus groups and other strategies. Surveys, feedback forms, e-mail and the Web are also used to elicit input, as is personal contact.

A brief statement of the process used by the institution to identify individuals and groups who are stakeholders and to collect input from them:

Each program area seeks and identifies stakeholders appropriate to their program area. The process includes asking for volunteers; using criteria such as geographic representation, diversity and length of participation (long term participants as well as stakeholders less involved). Environmental scanning as part of strategic planning is also used to identify potential stakeholders. We also continue to stress the importance of listening to stakeholders at meetings of commodity groups, trade shows, twilight meetings and on-site visits.

A statement of how input was considered.

Input from the stakeholder group, is considered, in conjunction with the faculty and staff who are responsible for the program. Results of surveys, focus groups, discussion about reports and proposals are part of the information mix, along with the goals of the University, the mission of Extension and research, and the five USDA goals.

Program Review Process

No significant changes have been made to the review process since the 5-Year Plan of Work was written.

Evaluation of the success of Multi and Joint Activities

The Massachusetts Agricultural Experiment Station is combining the brief statement of progress with the response to the four evaluation criteria for each activity described.

Infection Biology of Key Cranberry Fruit Rot Fungal Pathogens
(Multistate Integrated Research and Extension (MA, ME, MI, NJ, OR, WA, WI))

The objectives of this project are to define inoculum sources of four fungi that cause field rot and storage rot of cranberries and to pinpoint the precise time that these fungi infect the flowers or developing berries. We have determined during the first year of the project that each of the four fungi has a different primary over-wintering source. Timing studies employing different fungicide schedules indicated that sprays applied earlier in the bloom period and fruit development offer the best control, indicating that this is the likely time of infection of the fungi.

1. This planned program addressed the number one issue identified by cranberry growers.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included understanding of the biology of pest organisms and their interactions with environmental factors and the agricultural systems.
4. The planned programs did improve the responsiveness of the activity to an industry under financial stress with limited state resources.

Commodities, Consumers and Communities: Local Food Systems in a Globalizing Environment
(Multistate Integrated Research and Extension
(MA, RI, NY,VT, NH, ME, CA, KS, WI, MS,))

Research and Extension activities benefited farmers who are interested in producing new crops for the growing immigrant communities in the Northeast. A focus of this work has been with growers who sell at farmers' markets. There are over 100 farmers' markets in the state and many are located in urban areas where large immigrant communities live. Research identified cultivars of crops that can be successfully grown and marketed in New England. Much of this information was made available in languages other than English. At least five new crops were grown and marketed by at least 40 farmers that they had not grown in the past, thus increasing their profitability.

1. This planned program addressed an important issue of a newly identified stakeholder group
2. This planned program directly addresses the needs of rapidly growing ethnic minorities, which are both under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included identify new cultivars that enhance profitability.
4. The planned programs did benefit from information exchange provided by both multi and joint activities.

Nutrient Bioavailability – A Key to Human Nutrition
(Multistate Integrated Research & Extension
(AZ, CA-B, CA-D, CO, CTS, IN, KS, MA, MI, NE, NM, OR, WA))

To develop methods for determining bioavailability of dietary factors including calcium, iron and other food components. We will examine *in vitro* techniques to maximize potential mineral bioavailability and other physiological effects through processing with other added food components, such as ligands. Foods contain many nonessential nutrients that could have health benefits. This research shows that wheat contains antioxidants that can protect biological lipids from damage. These antioxidants are primarily found in wheat products made from bran or whole grains. During the digestion process, the health protecting activity of wheat antioxidants increases. Muscle foods also contain an antioxidant known as carnosine. Consumption of beef results in carnosine being absorbed into our blood. This dietary carnosine can protect our blood lipids and thus could be beneficial to health.

1. This planned program is targeted for increased input from stakeholder groups.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included bioavailability of vitamins and minerals. This planned program expands on that impact.
4. The planned programs did benefit from information exchange provided by both multi and joint activities

Environmental and Economic Impacts of Nutrient Flows in Dairy Forage Systems
(Multistate Research and Extension
IL, IN, MA, MD, MI, NJ, NYC, OR, PA, UT, WA, WI, WVA, U of Penn, USDA-ARS/Pennsylvania, USDA-ARS/Wisconsin)

Our objective has been to develop and implement the use of a decision aid (FarmSoft) for use in "comprehensive" nutrient management planning. This has been done to meet outreach needs of University of Massachusetts Extension and Massachusetts USDA Agencies with concerns and obligations regarding nonpoint source pollution control from animal feeding operations. The decision aid FarmSoft has proven to be comprehensive in terms of meeting most if not all of the needs of comprehensive nutrient management planning. The introduction of the corn stalk nitrate test provides farmers with an evaluation method to determine whether they are applying sufficient or too much N fertilizer. The amino-sugar nitrogen soil test if found suitable for corn would eliminate the need for a separate soil sampling operation to test for N as is required in the pre-sidedress N test.

1. This planned program addresses concerns and obligations regarding nonpoint source pollution.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.

3. Description of outcomes and impacts from planned programs included determining the effect of crop management on nutrient, pesticide and sediment pollution.
4. The planned programs did benefit from information exchange provided by both multi and joint activities

Nutritional Risk and Antioxidant Status in the Elderly

Researchers at the University of Massachusetts (MA) have been collaborating with the food banks in both the western and the central regions of the state to quantify food insecurity, food choice, and health indicators particularly of older clients receiving food assistance through these sites. Results not previously reported show a low frequency of consumption of fruits and vegetables (F&V) by these same participants, 1.39 times per day for fruit and 2.06 times per day for vegetables. Improving fruit and vegetable availability at food pantries can increase fruit and vegetable and concomitant antioxidant intake in at risk populations such as the low-income elderly.

1. This planned program addressed an issue that has been of paramount importance to multiple stakeholder groups.
2. This planned program did address the needs of low-income elderly, an under-served and under-represented population in the Commonwealth.
3. Description of outcomes and impacts from planned programs included assessing nutritional risk on the elderly.
4. The planned programs provided resources that would not have been available in the absence of the multi and joint activities.

Enhancing Adoption of New Rootstock Cultivars for Fruit Trees in Massachusetts (Multistate Integrated Research and Extension (RI, CT, MA, ME, NJ, NH, NY, VT))

A number of apple and peach rootstocks have been under trial at the University of Massachusetts Cold Spring Orchard Research & Education Center and at a few commercial orchards for several years. Particular attention has been paid to rootstocks that provide a reduction in tree size, thus reducing labor required to prune and harvest and reducing the amount of pesticide needed per acre. Also, rootstocks have been selected that are well adapted to our weather conditions and are resistant to normal pest pressures. Approximately 150 acres of new dwarfing apple rootstocks were planted by commercial orchardists. Current year's planting, and planting during the previous four years resulted in overall pesticide-use reduction of approximately 10%. Current year's planting and planting during the previous four years resulted in approximately a 10% increase in profitability.

1. This planned program addressed an issue that has been identified by interactions with stakeholders over a number of years.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included understanding of the biology of pest organisms and their interactions with environmental factors and the agricultural systems and bio-intensive strategies.
4. The planned programs did benefit from information exchange provided by both multi and joint activities.

U.S. Department of Agriculture
Cooperative State Research, Education and Extension Service
Request for Waiver from Target Percentage
For Multistate Extension Activities and Integrated Activities

Institution: **University of Massachusetts Amherst**
State: **Massachusetts**
Waiver for (circle one)

Multistate Extension Activities

Integrated Activities (Hatch Act Funds)
Integrated Activities (Smith Lever Funds)

Fiscal Year (circle one) **FY2000**
FY2001
FY2002
FY2003
FY2004

Type of Waiver **Pre-waiver (must be submitted prior to October 1)**

Post-waiver
(must be submitted with Annual Report of Accomplishment and Results)

Justification: The FY02 goal for Massachusetts Extension is $82,500. UMass Extension requests a waiver for FY2002 for the following reasons:

UMass Extension faculty and staff are engaged in nine multi-state Extension Activities over a range of projects and with states, primarily in New England and the Northeast. Examples include the Extension Fruit program involved in three New England projects and the Dairy Crop Livestock program involved in two northeast regional projects. In addition, our 4-H, Vegetable, Waste Management and Nutrition program are involved with multistate projects. We estimate our investment of state and Smith Lever funds is approximately $200,000.

Because state law requires fringe benefits (costing approximately 22%) to be paid for personnel funded by non state funds, UMass Extension uses state funds primarily for faculty and professional position. Smith Lever monies fund clerical support and non personnel costs to the extent feasible. This situation has created difficulty in appropriately tracking Smith Lever project expenditures.

Massachusetts is taking steps to appoint on Smith Lever funds, staff assigned to multistate activities.

Stephen Demski — April 4, 2003
Director — Date

Note: all reports must be submitted regardless of request for waiver
Form CSREES-WAIVER (2/00)

Appendix C

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(For summaries see Planned Programs Section)

Institution__University of Massachusetts
State_____Massachusetts

_X_ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures		
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**
Goal One			
Management Strategies to Reduce Dairy Farm Non Point Source Pollution			7,250
Enhancing Adoption of New Apple and Stone Fruit Cultivars			4,708
Comodities, Consumers and Communities: Local Food Systems in a Globalizing Environment			2,708
Storage of Honeycrisp Apples			3,208
Enhancing Adoption of New Rootstock Cultivars for Fruit Trees			4,708
Sustainable Vegetable Crop Production in Massachusetts			2,708
Environmental and Economic Impacts of Nutrient Flows in Dairy Forage Systems			1,708
Goal Two			-
Food Safety Education Program for Food Processors and Consumers			1,708
Goal Four			-
Phytoremediation of Metal Contaminated Soils			3,708
Habitat and Biodiversity Conservation			8,416
Mill River Watershed Project			21,832
Total			**55,412**

_____ _____

Stephen Demski, Director **Date**
Form CSREES-REPT (2/00)

Integrated Activities
for the MA Agricultural Experiment Station

Revised March 6, 2003 by PDC

U.S. Department of Agriculture
Cooperative State Research, Education and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multi-State Extension Activities and Integrated Activities

Summaries of Integrated Activities can be found at
http://www.umass.edu/nre/contentpages/expst-integrated.html

Institution: University of Massachusetts
State: Massachusetts

Check one:
_____ Multi-State Extension Activities
__X___ Integrated Activities (Hatch Act Funds)
_____ Integrated Activities (Smith-Lever Act Funds)

Research Project Number (Click Number for Link)	Title	Affiliated Goal/s	2002 Expenditures/FTE's
MAS00815	Plant Parasitic Nematodes	Goal 1	$41,130/.2
MAS00826	Best Management Practices for Turf Systems in the East	Goal 1	$72,443/3.6
MAS00517	Postharvest Physiology of Fruits	Goal 1	$16,302/1
MAS00539	Rootstock and Interstem effects on Pome and Stone Fruit Trees	Goal 1	$12,879/1.5
MAS00828	Commodities, Consumers and Communities: Local Food Systems in a	Goal 1	$339/.8

	Globalizing Environment		
MAS00763	Environmental and Economic Impacts of Nutrient Flows in Dairy Forage	Goal 1	$42,333/1.1
MAS00647	Conservation and Utilization of plant genetic	Goal 1	$42,283/.6
MAS00620	Association of Fertility with Temporal Changes in Ovarian Function of Domestic Ruminants	Goal 1	$45,880/2.0
MAS00714	Genetic improvement of dairy cattle using molecular markers	Goal 1	$26,077/.2
MAS00625	Private Strategies, Public Policies, and Food System Performance	Goal 1&2	$12,547/1.6
MAS00663	Nutritional Risk and Antioxidant Status in the Elderly	Goal 3	$35,066/.6
MAS00762	Nutrient Bioavailability -- Phytonutrients and Beyond	Goal 3	$17,130/.7
MAS00686	Characterization and Mechanisms of Plant Responses to Ozone in the Northeastern U.S.	Goal 1&4	$10,455/.4
MAS00066A	Biological Improvement of Chestnut	Goal 4	$149,784/2.3
MAS00496	The National Atmospheric Deposition Program	Goal 4	$8,291/.2
MAS00841	Application of Sewage Biosolids to Agricultural Soils in the Northeast: Long-term impacts, benefits & uses	Goal 4	$408/.6
MAS00857	Management of Wildlife Damage in Suburban and Rural Landscapes	Goal 4	$10,000/.2
MAS00717	Benefits and Costs transfer in Natural Resource Planning	Goal 4	$23,007/1.6
MAS00797	Rural Low-Income Families: Monitoring Their Well-being & Functioning in the	Goal 5	$9,100/.2

	Context of Welfare Reform		