Massachusetts Agricultural Experiment Station & UMASS Extension

FY 2005 Annual Report

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2005 Plan of Work Addendum

Certification:

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

_____ _____

Mr. Robert Schrader, Interim 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 18 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, MAS00882, NC-1012, MAS00916, NE-1023, MAS00876, NC-1002, NC-1011 and MAS00886, WDC005 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 office of the Vice-Provost for University Outreach and Continuing Education, Sharon Fross, 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.

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	883,595	26.9	11	355,557
UMEXT	257,070	3.6	12	33,487

Goal 1 Executive Summary –

Emphasis in Goal 1 remains directed towards apple and cranberry production. Significant progress has been made towards reducing the reliance on pesticides for the production of these crops. This progress includes a 70% reduction in the pesticide use due to the reduced canopy volume of dwarf-tree-fruit rootstock. New flooding management techniques are reducing herbicide usage to control dodder in cranberry bogs by 60%. Additional work on cranberry production is leading towards more conservative nutrient management strategies that both make cranberry production more competitive and reduce pollution to surrounding areas. Finally, basic research on livestock vaccines are leading to new approaches for protecting against bioterrorism.

Key Theme: Agricultural Profitability
Title of Program/Project: Rootstock and Interstem effects on pome and stone fruit trees
Contact Person: Autio, W., Greene, D., Cooley, D.
Brief Description of Program/Project: Global competition increases the need for enhanced efficiency of orchard businesses. Rootstocks dramatically affect efficiency and fruit quality, but

results vary greatly with climate and pest pressure. Further, new rootstocks are becoming available regularly, thus potentially enhancing efficiency. This project evaluates the performance of tree-fruit rootstocks with a variety of climates, pest pressures, cultivars, and training system in order to enable orchardists to develop orchards with the greatest likelihood of economic success and least likelihood of environmental damage.
Short Impact: Approximately 250 acres were planted to dwarfing rootstocks during the last year. These rootstocks, as defined and recommended by this project, will reduce pruning and harvest labor by 50%, increase fruit quality, increase size by 10-20%, and enhance the economic return on this acreage by as much as 50%. Further, smaller trees require 70% less pesticide because of reduced canopy volume. The net effect of the planting in 2005 is to reduce the amount of spray material in total by about 250,000 gallons per year in Massachusetts. The beneficiaries of this year's research are tree-fruit growers and the citizens of the Commenwealth.
FTE's: .5
Source of Funding: Massachusetts Fruit Growers' Association, Inc., International Dwarf Fruit Tree Association, Hatch Multistate NC-140, Smith-Lever 3b & c
Scope of Impact: Multistate Extension/Research: MA, RI, NH, VT, ME, CT at other growing areas of Northeastern US and Eastern Canada

Key Theme: Agricultural Profitability
Title of Program/Project: Determinants of Food System Performance: Product Quality and Prices
Contact Person: Caswell, J. A., Lass, D. A., Lavoie, N.
Brief Description of Program/Project: The combinations of quality attributes and prices offered to consumers in food products are changing, affecting the performance of the food system. This project uses case studies to examine the factors the influence the quality and price combinations offered to food consumers.
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 were used in decision making by the private and public sectors (state, national, and international), including being cited by the Government Accountability Office (GAO) and the United Kingdom Food Standards Agency.
FTE's: 1.3
Source of Funding: Hatch, Grant
Scope of Impact: State

Key Theme: Agricultural Profitability
Title of Program/Project: Environmental and Economic Impacts of Nutrient Flows in Dairy Forage Systems
Contact Person: Herbert, S., Randhir, T.
Brief Description of Program/Project: Dairy and beef production are major contributors to the economy of the US, but increasing costs of production, the decline of real prices towards a world market price, and environmental issues are jeopardizing the long-term sustainability of these farms. This is causing a continuing trend toward larger farms concentrated in certain geographic locations. More efficient, economical, and environmentally sound production systems are needed

to maintain a viable agricultural industry. Integrated research and technology transfer programs are needed to help dairy and beef farmers manage their farms in a cost effective and environmentally acceptable manner and to comply with new farming regulations. Integrated crop, pasture, and livestock farms form very complex physical and biological systems. Most research focuses on one or relatively few components of the system, providing a narrow view of the potential effects of strategic production changes and an inadequate assessment of the farm-level issues of environmental impact and profitability. Modeling and computer simulation provide an effective research strategy for integrating component-level effects and interactions to predict farm level or higher outcomes.
Short Impact: The corn stalk nitrate test provides farmers with an evaluation method to determine whether they are applying sufficient or too much N fertilizer. The soil amino-sugar nitrogen test did not prove consistent for corn but farmers can still use the pre-sidedress nitrate test. 2. The passive pan sampler which equates suction on the pan with soil matrix tension will allow a simple and accurate real-time measure of nutrient leaching. 3. The decision aid FarmSoft has proven useful in comprehensive nutrient management planning. It has a broad nutrient focus applicable to dairy and livestock and to other commodities. It has become useful as both a decision aid for farmers and farm planners and for classroom teaching.
FTE's: .6
Source of Funding: Hatch - Multistate
Scope of Impact: ARS, UC-Davis, IL, IN, LA, MD, MA, MI, NJ, OR, PA, UT, VA, WA, WV, WI

Key Theme: Agricultural Profitability
Title of Program/Project: Maximizing Yield and Value of Muscle Tissue Foods, Especially Fish
Contact Person: Hultin, H.O.
Brief Description of Program/Project: Using a new isolation method based on differential solubilization of muscle components, this research will improve techniques for isolating functional proteins from low value raw materials with minimal contamination of undesirable components. Many muscle sources have low value because the proteins are difficult to isolate or have poor functional properties due to handling procedures or the presence of other muscle components.
Short Impact: These results define quantitatively the factors important in improving WHC and tenderness in beef by acid marinades and should lead to improved control of quality in these products.
FTE's: .6
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Animal Geonomics
Title of Program/Project: Interpreting Cattle Genomic Data: Biology, Applications and Outreach
Contact Person: Jerry, J.
Brief Description of Program/Project: Nuclear transplantation provides robust means to create transgenic livestock rapidly. However, facile methods to introduce targeted alterations in the bovine genome are needed to take full advantage of this technical advance. Toward this goal we

are developing strategies to interrupt cellular pathways that inhibit homologous recombination. Using these methods it should be possible to move genetic polymorphisms that affect production between breeds.
Short Impact: 1-Methods to evaluate the quality of bovine fetal fibroblasts for supporting gene targeting have been established. 2-Enhanced efficiency of gene targeting will create new opportunities to create genetically modified cattle that are resistant to pathogens or engineered to increase productivity.
FTE's: .9
Source of Funding: Hatch - Multistate
Scope of Impact: AZ, AR, UC-Davis, IL,IA, KY, MA, MI, MN, MS, NC, OH, SD, TN, TX, VT, WI

Key Theme: Animal Health
Title of Program/Project: Transcriptional Regulation of female fertility and sexual behavior
Contact Person: Good, D.
Brief Description of Program/Project: An understanding of the molecular events controlling estrous is necessary for effective management of dairy & beef cattle herds. Since the use of cows in molecular analyses is difficult, we use the Nhlh2 transcription factor knockout mice, which are hypogonadal with reduced fertility and GnRH peptide levels to examine fertility and the transcriptional and post-transcriptional regulation of GnRH.
Short Impact: We have identified NHLH2 as a central nervous system regulator of adult body weight, and shown that this gene maps near to a QTL for marbling in cattle. We are currently analyzing different breeds of cattle to determine if polymorphisms in either the coding region or promoter affect different marbling and fat content in cattle. Breeding programs have responded to consumer demands for increased meat quality for many years, but it is only recently that breeders have been able to use genetic markers to select for meat quality. Identification of polymorphisms in bNHLH2 linked to the QTL for marbling on BTA 3 may have a direct impact on using the bNHLH2 gene in future selective breeding strategies.
FTE's: 1.2
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Animal Health
Title of Program/Project: Runx1 in Hematopoiesis
Contact Person: Telfer, J.
Brief Description of Program/Project: Mammals make different kind of T cells, with differing functions. It is not understood how the production of these different types of T cells is regulated. This project examines the mechanisms by which one protein turns genes off and on during T cell development, which has the potential to regulate T cell production.
Short Impact: My research addresses how a particular protein turns off or on genes that encode other proteins that are important in the formation of the cells of the blood. We study how a mutant form of this protein affects the stem cells of the blood and how the activity of this protein is regulated. This is important because understanding how the activity of the protein is regulated will enable us to devise treatments for diseases like myelodysplasia (30,000 new cases per year) and to expand customized blood stem cells for bone marrow transplants for diseases like leukemia, AIDS, and diabetes.

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

Key Theme: Biotechnology
Title of Program/Project: Establishment of Zebrafish Bioassay Technology for Assessing the Acute, Developmental & Reproductive Toxicity of Toxaphene & Water Samples
Contact Person: Arcaro, K.
Brief Description of Program/Project: Protection of aquatic ecosystems and drinking water supplies is one of the great environmental challeneges facing us and future generations. This project examines the usefullness of zebrafish bioassays for the detection of aquatic pollution.
Short Impact: Examining changes in gene expression in medaka fish using real time RT-PCR has proven to be an excellent approach for detecting endocrine disrupting compounds in water because the method is 1) sensitive, 2) reliable, 3) inexpensive, 4) can detect both parent compounds and their metabolites, and 5) can detect both common and novel pollutants. Because changes in gene expression in medaka serves as a sensitive biomarker of both exposure and effect to endocrine disrupting compounds in waterways, we anticipate that this assay will be useful in monitoring and protecting water quality in Massachusetts and beyond.
FTE's: .3
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Biobased Products
Title of Program/Project: Influence of cosolvents on protein functionality in food emulsions and gels
Contact Person: McClements, D.J.
Brief Description of Program/Project: Current understanding of the influence of ingredient interactions and thermal processing on protein functionality is limited and fragmentary, which is holding back the development of novel and more efficient processing operations. The purpose of this project is to systematically investigate the influence of cosolvents (sugars and salts) and temperature on the ability of globular proteins to form gels and stabilize emulsions.
Short Impact: This project will lead to the development of novel and more efficient processing operations in a number of industries (e.g., foods, cosmetics & pharmaceuticals), as well as to the more efficient utilization of existing and novel protein sources (e.g., whey, egg, meat, fish and soy proteins). It should also provide consumers with a wider variety of high-quality and low cost products.
FTE's: .6
Source of Funding: Hatch, Grant
Scope of Impact: State

Key Theme: Biotechnology
Title of Program/Project: MEMORY RESPONSES OF BOVINE WC1 + YO T CELLS
Contact Person: Baldwin, C. L.
Brief Description of Program/Project: As new infectious diseases emerge and antibiotic resistant strains of bacteria develop, the need for new vaccines increases. It would also be

advantageous to have methods to stimulate the immune system in a global manner to prevent infections that occur due to suppression of the immune system resulting from stress and to combat infections caused by unknown agents. Our goal is to understand the role of these cells in protective immunity in ruminants. "Memory" is a hallmark of responses by the other major type of T lymphoctyes known as alpha beta T cells and B lymphocytes that produce antibodies. Their ability to remember is the keystone of vaccination. The studies proposed here will help us determine whether gamma delta T cells undergo physiological changes akin to establishment of memory cells. If so, vaccines that stimulate these cells may be generated thus prevent or alleviate infectious disease and increasing animal health and well-being.
Short Impact: The results of these studies suggest bovine gamma delta T cells do have a memory response and thus could be exploited for generating vaccines. This is a new paradigm for vaccination. The threat of bioterrorism makes generating vaccines for livestock important for protecting the health of humans who are susceptible as a result of contact with infected livestock.
FTE's: .1
Source of Funding: Grant, Hatch
Scope of Impact: State

Key Theme: Biotechnology
Title of Program/Project: Production of immortalized bovine embryonic fibroblasts
Contact Person: Osborne, B.
Brief Description of Program/Project: It is difficult to create genetically modified animals for agricultural use. This project will create cell lines that can be used for gene targeting in cattle.
Short Impact: The impact of this research would be high if we could produce the appropriate cell line.
FTE's: .5
Source of Funding: Hatch
Scope of Impact: State, Industry

Key Theme: Managing Change in Agriculture
Title of Program/Project: Integration of Agricultural Research and Extension in a Center for Agriculture
Contact Person: Goodwin, S., Cromack, P.
Brief Description of Program/Project: This proposal is part of the operational plan for the Center, and formalizes funding that targets high-priority issues in agriculture, integrating both research and Extension components, and where possible involves other states. Funding through the Experiment Station will be matched by funding from Extension, and the money will be used to initiate joint sub-projects.
Short Impact: More than one hundred and twenty agricultural stakeholders from across the state had the used the resources of the Center for Agriculture to provide feedback into the impact of the agricultural program at the University of Massachusetts. The activities of the Center have directly addressed the concerns that were expressed by the agricultural community last year. The perception that the Center acts directly on stakeholder feedback has created a greater willingness on the part of stakeholders to provide additional feedback. Based on stakeholder input, the Center for Agriculture at the University integrated Extension and Experiment Station resources to promote research and education projects that impact agriculture. The three new projects that have resulted from the feedback generated by the Center for Agriculture have completed their

first year of operation.
FTE's: .1
Source of Funding: Hatch, Extension
Scope of Impact: State

Key Theme: Niche Market
Title of Program/Project: Biology and management of flea beetle species in traditional and newly introduced Brassica crops
Contact Person: Hazzard, R., Van Driesche, R., Mangan, F.
Brief Description of Program/Project: Expanded production of new Brassica crops that are highly susceptible to flea beetle damage has increased the pest status of flea beetles and created a need for better understanding and management of this pest. The purpose of this study is to understand more about the biology of flea beetles in relation to brassica crops and develop effective and safe ways to manage them.
Short Impact: Over 350 farmers have received training on biology and management of flea beetles in eleven different winter and on-farm educational programs. Over 500 growers have received several educational publications about flea beetle management through Vegetable Notes newsletter articles. Fifteen additional growers reported improved flea beetle control due to using spinosad applications or more effective use of row covers. Based in part upon the data derived from this project, the manufacturer of spinosad insecticides, Dow AgroSciences, published a 2(ee) supplemental label in Massachusetts in 2005, listing control flea beetle in cole crops as a labeled use for Entrust which is allowed in organic production. Growers and extension staff from other states have requested assistance in testing PTC for B. oleracea crops in 2006. We anticipate that the combined understanding of crop preference, flea beetle reproductive and feeing biology, overwintering behavior, new reduced-risk insecticides, and perimeter trap cropping designs for brassicas will provide growers with many new tools for managing this pest.
FTE's: .2
Source of Funding: Hatch, Grant
Scope of Impact: State

Key Theme: Plant Genomics
Title of Program/Project: Genetic Improvement of Floricultural Crops
Contact Person: Boyle, T. H.
Brief Description of Program/Project: Continued growth in sales of floricultural crops requires the introduction of improved cultivars of existing crops. The purpose of the project is to utilize three Schlumbergera species in an interspecific hybridization program with S. truncata (Thanksgiving cactus) to increase the genetic diversity of the gene pool.
Short Impact: One of the critical procedures in most crop breeding programs is production of high-quality seed. Due to labor and time constraints, breeders aim to maximize their efficiency at obtaining seed for further breeding efforts or hybrid seed production. One factor that can affect the yield of viable seeds is the timing of pollen arrival on stigmas. Pollen grains arriving on immature or aged pistils may fail to set fruit or, if fruit set does occur, few viable seeds are produced. Determining the flower age when maximum seed set occurs will lead to greater efficiency in pollination and maximize seed yields.
FTE's: .3
Source of Funding: Hatch, Industry

Scope of Impact: State

Key Theme: Plant Germplasm
Title of Program/Project: Development of Plant Pathogens as Bioherbicides for Weed Control
Contact Person: Caruso, F.
Brief Description of Program/Project: Weeds are significant pests in cranberry beds and cause considerable crop losses. There are no currently registered herbicides to control some of these weeds. The project will attempt to find pathogens that cause significant disease in noxious weeds in cranberry beds and eventually use them as biocontrol agents against these weeds.
Short Impact: The Canada mayflower fungus might potentially be more useful to cranberry growers in Washington where another weed pest of the same genus is a major problem and for which there is no good herbicide. We are always looking for possible bioherbicide candidates to manage our major weed pests in MA.
FTE's: .1
Source of Funding: Hatch - Multistate
Scope of Impact: UC-Davis, UC-Riverside, Canada, FL, IN, MA, NY, NC, PR, PA, USDA-ARS

Key Theme: Plant Health
Title of Program/Project: Cranberry Nutrient Management
Contact Person: DeMoranville, C., Vanden Heuvel, J.
Brief Description of Program/Project: Nutritional factors may be limiting sustainable cranberry production in Massachusetts due to environmental constraints and lack of knowledge regarding lowest effective rates and interaction with plant physiology. The focus of this project will be to evaluate nitrogen and phosphorus nutrition in order to develop recommendations that improve cranberry crop yields while minimizing environmental impact.
Short Impact: Based on preliminary findings, the MA Natural Resource Conservation Service State Office has developed nutrient management standards for MA cranberry farms. Growers following these standards are eligible to participate in USDA environmental cost-sharing programs. Further information developed in this project will be used to modify and improve cranberry nutrient management standards, incorporating appropriate soil testing methods.
FTE's: .8
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Precision Agriculture
Title of Program/Project: Validation of a Reduced Fungicide Strategy for Management of Cranberry Fruit Rot
Contact Person: Caruso, F. L.
Brief Description of Program/Project: Cranberry growers should be able to manage fruit rot with fewer fungicide applications. This project will attempt to show growers that fungicide effects carry over from one growing season to the next. To prove this concept, field trials and demonstration plots will be employed.
Short Impact: Fungicide use will be reduced with no loss in fruit quality in all regions where cranberries are grown. The keeping quality forecast will be shown to be as accurate as the currently generated computer models. It will be refitted as needed for cranberry cultivation in the

21st century. Isolates of the key cranberry fruit rot fungi will be compared from the different growing areas for uniformity.
FTE's: .4
Source of Funding: Grant (MAS00203777), Hatch
Scope of Impact: State Specific

Key Theme: Ornamental/Green Agriculture
Title of Program/Project: Turf Systems in the East
Contact Person: Bhowmik, P.C., Clark, J.M., Vittum, P.J., Wick, R.
Brief Description of Program/Project:
Short Impact: A better understanding of the fate of fertilizers and pesticides in turfgrass systems is in the works to evaluate and develop BMPs that minimize any potentially adverse effects on humans and the environment.
FTE's: 1.5
Source of Funding: Hatch – Multistate, Extension
Scope of Impact: CT, FL, ME, MD, MA, MI, NJ, NY, PA, RI, USDA-ARS

Key Theme: Agricultural Profitability
Title of Program/Project: Maintaining Long-term viability of the Massachusetts cranberry industry through stakeholder and public engagement
Contact Person: Anne Averill
Brief Description of Program/Project: Cranberry is the number one farm gate food commodity in Massachusetts. Cranberry lands provide regional character and open space in southeastern Massachusetts. The economic impact of the cranberry commodity in the region is substantial. This project is a sole source: Information forums and training for Massachusetts growers are not available from any other effort in the country. Audiences include 350 Mass cranberry growers/managers and 50 public officials/regulators. Project activities include newsletters, meetings, workshops, on-farm demonstrations, one-on-one training and field days.
Short Impact: This year, the cranberry team cosponsored a public officials workshop with the Cape Cod Cranberry Growers Association. Public officials (35 -- select board, board of health, conservation commission members) from around the region were presented with information about cranberry-growing practices. The outcome is a general improvement in the relationship between officials and the cranberry farmer, enabling the farmers to carry out their normal activities in a supportive regulatory climate. Regarding cranberry diseases, the final Keeping Quality Forecast (expected risk of rot diseases under field and storage conditions) resulted in many growers using fewer fungicide applications and lower fungicide rates in 2005 to manage fruit rot. Due to the accuracy of the forecast, fruit quality remained very good, growers did not suffer from quality issues, and fungicide costs were reduced. A new insect pest, black headed fire worm, whose larvae feed on cranberry foliage and fruit, exploded in MA in 2003. In 2004, 9 growers contacted researchers regarding huge crop losses owing to failed management; several required letters to support crop insurance claims. In 2005, a successful information barrage to growers was mounted, which included a fact sheet, newsletter warnings, and workshops detailing biology and management. This was coupled with

workshops and written information on methods to maximize efficacy of newly-registered environmentally-friendly insecticides, which are excellent tools against fire worm. No growers contacted us regarding management failures in 2005, in spite of a fire worm infestation risk that was comparable to previous years.

Source of Funding: Smith Lever3D, College Match, Contracts

FTE's: 2.4

Scope of Impact: State (MA)

Key Theme: Agricultural Profitability

Title of Program/Project Improved Fruit Quality for Consumers through Use of New Fruit Varieties & Species

Contact Person Duane Greene, Wesley Autio, Jon Clements, and Sonia Schloemann

Brief Description of Program/Project: It is well known that regular consumption of fruits leads to better human health. The quality of fruit available defines the level of consumption often below that necessary for optimal health. Enhancing that quality will result in greater consumption and therefore improved health.

This project has established plantings of new fruit varieties and species at the UMass Cold Spring Orchard Research & Education Center and at various farms. Thorough evaluation of potentially valuable varieties continued this year. Informal and formal quality evaluations were conducted to determine suitability for sales in Massachusetts, either as fresh or processed fruit. Farmers were informed of this research through publication of results in Fruit Notes, Healthy Fruit, Berry Notes, and fact sheets. Twilight meetings and annual winter meetings will also be used for regular updates. Press releases were used to inform consumers of new fruit varieties and species. The project aimed to reach 1000 established commercial fruit farmers and 100 new-entry commercial fruit growers.

Short Impact: Direct contacts (including face to face meetings, workshops, presentations) included 600 existing commercial fruit growers and 200 new entry commercial fruit growers. More than 2300 were reached through indirect contacts (including newsletters, fact sheets, web site hits).

The project conducted a survey to find out customer preference for new varieties of apples. The survey clearly showed that people who frequent commercial fruit stands like new apple varieties and indicate that they would purchase many of these in preference to traditional varieties. Many people wrote on their evaluations that they would increase apple consumption if some of these new varieties were made available. This indicates that growers in the Northeast have an advantage in that they can be a destination for individuals who are looking for unique tasting apples.

Source of Funding: State, College Match

FTE's: .25

Scope of Impact: State (MA)

Key Theme: Agricultural Profitability

Title of Program/Project: Sustainable Production of High Quality Brassicas

Contact Person: Ruth Hazzard

Brief Description of Program/Project: The driving force for the project is the growing

importance and diversity of Brassica crops in the Northeast and the need for better quality. Growers are producing more species and crop varieties, reaching into new markets, and extending their production season. Production of traditional Brassica oleracea crops (cabbage, broccoli, collard, kale, cauliflower) remains high, while production of other species of Brassicas is increasing. Concurrently, key insects and diseases that thrive on these crops are also expanding in severity. Practical strategies for managing the key pest, flea beetle, will include more effective use of cultural practices such as row covers and crop rotation, and application of reduced-risk or organic insecticides.

This project's goal is to support ecological balance and to raise our farmers' capacity to maintain a consistent standard of crop quality for their own and their customers' benefit, using sustainable methods. The project aimed to reach 75 cooperating growers, 300 farmers in Massachusetts and surrounding states, 200 consumers, and 100 agricultural professionals and research scientists.

Research projects on brassica production are conducted each year, and the resulting data is disseminated to our target audiences in a variety of ways. Cooperating growers are reached through farm visits and organized meetings. Educational presentations at conferences such as the New England Vegetable and Berry Growers Conference and winter meetings and the Northeast Organic Farmers' Association meeting provide information on brassica production. Additionally, newsletter articles, publications, and posters reach out to a broad group of farmers, agricultural professionals and scientists in the Northeast and throughout North America. More information on brassica species, production, and pest management can be accessed through the website.

Short Impact: The project recorded 384 direct contacts with vegetable growers and agricultural professionals through educational meetings and presentations, and 153 farm visits and phone calls with this group. A page 1 Boston Globe article (11/29/04) on the project exploded the project's audience into the tens, if not hundreds, of thousands, providing positive press in both the agricultural community and the general public and raising awareness of agricultural issues and the role UMass Extension plays in supporting local growers.

In the New Brassica Species and Flea Beetle Management Project (NESARE LNE01-142) an evaluation was conducted in fall 2004 by interviewing all participants in the project. Of 44 growers who participated in the project for one or more years, 10 adopted new management strategies for flea beetle and 21 added new Brassica species to their crop mix. There was an increase in the number of growers producing every one of 24 Brassica crops that were evaluated during the project. Since the 2004 survey was conducted, 6 additional organic growers have contacted us to state they have used spinosad with success; our pesticide trials identified this as a good candidate for organic control of flea beetles. The manufacturer, Dow Agro sciences, issued a R-184-020, Entrust* Non-Sec. 2(ee) MA For Suppression of Flea Beetle in Cole Crops, Fruiting Vegetables and Okra. This enabled growers to use this product for flea beetle in full compliance with label requirements.

In the High Quality Brassicas Project (NESARE LNE04-202), extensive initial surveys were given to growers directly participating in this project, allowing us to set a baseline for each farm. They were also required to set very specific goals in terms of what changes they would like to see in their production as a result of participating in this project. This information will allow us to make clear evaluations of the grower's progress toward their milestones as the project progresses, and make adjustments as necessary to ensure that they reach their goals.

Source of Funding: State, Contracts

FTE's: .87
Scope of Impact: Multistate Integrated Research & Extension

Key Theme: Plant Health
Title of Program/Project: Plectosporium Blight on Pumpkins and Summer Squash
Contact Person: Robert Wick
Brief Description of Program/Project: Plectosporium Blight is a new and emerging disease of economic importance in pumpkin and summer squash. This fungus disease can result in high losses in yield and, therefore, loss of money, to growers. A more complete understanding of the biology of this pathogen will help develop more effective management practices. This project aimed to reach 300 vegetable growers and 30 agricultural professionals with fact sheets and educational material, including presentations.
Short Impact: The project reached approximately 900 agricultural professionals through posters and presentations at professional meetings and 410 vegetable growers through face to face meetings and workshops.
Source of Funding: State
FTE's: .77
Scope of Impact: Multistate Integrated Research & Extension

Key Theme: Agricultural Profitability
Title of Program/Project: Ethnic Crop Production and Marketing
Contact Person: Frank Mangan
Brief Description of Program/Project: The demographics of the United States are changing rapidly as immigrant populations increase at rates not seen since the early 20th century. According to the U.S. Census Bureau, Massachusetts has the largest population of Portuguese-speaking people in the United States. This population comprises people from Portugal, the Azores, Cape Verde, and a growing Brazilian population, estimated by the Brazilian Consulate in Boston to be at least 250,000. This increase in ethnic diversity represents opportunities for local farmers to grow new crops for these markets. This project aimed to reach 300 farmers with research-based information for growers on producing and marketing ethnic crops. It aimed to reach 200 consumers, in particular members of the Portuguese-speaking community, with information on local farmers' markets. It aimed to reach 250 growers and agricultural professionals with updates on research and extension activities.
Short Impact: Research and extension activities produced over 20 facts sheets, extension articles, and presentations for growers to learn more about ethnic crop production. These are estimated to have reached over 100 growers. Refereed publications reached approximately 500 agricultural professionals. Presentations reached 579 consumers, nutritionists, and home gardeners. Two articles in Brazilian language newspapers reached an estimated 7,000 consumers. As part of this project, members of the UMass Vegetable Team worked closely with a 200-acre vegetable farm in the Connecticut River Valley of Western MA. In 2004, they participated in a USDA-funded project to identify new crops for the growing ethnic markets in the state. As part of this work, they grew two acres of an eggplant variety popular among the growing Brazilian population in Massachusetts and the region. Due to the positive response in 2004, they increased the acreage of this crop slightly in 2005. In 2005, they averaged selling this crop for

$1.60/pound wholesale (this compares to approximately $0.25/pound for "traditional" eggplant). Their crop was sold in Massachusetts, Connecticut, New York, New Jersey, and even in Florida. They grossed over $50,000 of this crop in 2005. The produce manager of a major supermarket chain in Somerville MA told the project that they sold over 500 pounds/week of this eggplant. The produce manager had never even heard of this crop two years ago.
Source of Funding: State, Contracts
FTE's: .5
Scope of Impact: Multistate Integrated Research & Extension

Key Theme: Small Farm Viability
Title of Program/Project: New Entry Sustainable Farming Project
Contact Person: Touria El Jaoual and Ruth Hazzard
Brief Description of Program/Project: Immigrants in the Northeast have limited skills and don't know English to find jobs to make a living but they know farming and interested in growing crops they are used to in their countries. This project allows them to have access to land to farm and improves their technical skills in farming. Through the project they learn about soil fertility, harvest and post harvest handling, pesticide application and pesticide safety, weed management, and marketing. The audience includes 40 Cambodian, African American, and Hmong immigrants. They are reached through face-to-face training and onsite assistance. UMass Extension has established trials of dozens of different cultivars of crops that are popular among these immigrant growers. These trials have been established on cooperating farms and at our Research Station allowing these growers to see first-hand which cultivars are most appropriate for our soils and climate. Production and marketing information on these crops are available at the UMass Vegetable Team website: www.umassvegetable.org and www.worldcrops.org. Other elements of the project include providing leadership on the legalization of water spinach (Ipomea aquatica) which is listed as a noxious weed but is frost sensitive and so not invasive in Massachusetts, and pest management through identification of pests of Asian crops and management of club root (Plasmodiophora brassicae Woron), which is especially difficult for these growers to manage this disease due to the number of crops in the brassica family that they grow on their farms.
Short Impact: Of the 34 immigrant farmers participating in the project, 24 farmers use safe, effective ways and strategies of pest management (they use more preventative measures, personal protection equipments while spraying, use careful measurements to mix the insecticide, pay attention to the weather conditions before they spray and respect reentry and pre harvest entry intervals). Also these farmers adopted rotation methods to deal with pests. Twenty nine farmers sell successfully in one or more farmers markets, 6 farmers sell to ethnic stores.
Source of Funding: State, Contracts
FTE's: .65
Scope of Impact: State (MA)

Key Theme: Agricultural Profitability
Title of Program/Project: Forestry and Forest-Based Businesses
Contact Person: Paul Catanzaro

Brief Description of Program/Project: Sixty-two percent of Massachusetts is forested. The overwhelming majority, Seventy-nine percent, of our forests are owned by over 212,000 non-industrial, private forest owners (NIPF). In landscapes dominated by small, private forest ownership, a vast array of important ecosystem services, such as clean water and carbon sequestration, are provided free of charge to the general public. In addition, private forests provide a wealth of additional public benefits: a buffer from development, a scenic backdrop for rural tourism, habitat, outdoor recreation, and a source of wood products and employment. To safeguard the future sustainability of public benefits from these private forest landscapes, it is imperative that non-industrial, forestland owners make informed decisions about their forests. Equally important is that their resource professionals have the knowledge to implement sustainable forest management at the landscape scale and that policy makers and municipal officials support working landscapes.

The audience for this project is non-industrial, private forest owners, foresters, timber harvesters and mill owners, policy makers, municipal officials, and community leaders, and conservation organizations and land trusts.

Short Impact: Project results included a Coverts training workshops for private forest owners (19 participants), web-based information on stumpage price trends (1483 hits with 8 page views per hit) and MA Forester Licensing information (878 hits with 4 page views per hit), the Northeast Diameter Limit Conference (attended by 185 foresters, timber harvesters and mill owners, policy makers, municipal officials, and community leaders, and conservation organizations and land trusts).

The project also collaborated with the Center for Rural Massachusetts on three activities; first, to provide technical assistance to a forest landowner cooperative on forest practices (reaching 48 forest landowners and conservation organizations directly); second, to sponsor a Forest Based Businesses Conference (reaching 100 private forest landowners, policy makers, and conservation organizations); third, to help the Five Town Action Initiative to take a more complete view of shared natural, cultural, forest, and agricultural resources.

Source of Funding: state, Smith Lever bc

FTE's: 1.0

Scope of Impact: State (MA)

Key Theme: Managing Change in Agriculture

Title of Program/Project: Educational Training for Recreational Farmers

Contact Person: Carrie Chickering-Sears & Stephen Herbert

Brief Description of Program/Project: This project has 3 distinct goals: (1) to develop an instructional/research dairy farm dedicated to developing technologies that will improve the profitability and reduce the environmental impact of small dairy farms. (2) engage UMass students, Producers and 4-Hers in the research enterprise and (3) to develop data that will lead to additional external funding for farm based research on animal nutrition, pasture management, manure remediation and mammary gland inflammatory biology.

Target audiences include dairy farmers, 4-H dairy cattle project youth and leaders, UMass students, FFA schools, and school tours, and professionals from the MA Dept of Ag Resources, NRCS and USDA.

Project activities included a 4-H/community farm education program (host calf sales, 4-H & FFA camps, day seminars, and tours for school groups); a pasture management program dedicated to reducing agricultural pollution (day and evening seminars for producers, pasture walks, research trials); and an instructional research dairy (mammary inflammation research, UMass student research projects, work study opportunities for students).

Short Impact: Educational training for recreational farmers reached 291 participants with direct workshops and presentations, including Mass heritage breed enthusiasts, goat breeders, equine industry, and zoo keepers. 200 attended 10 summer pasture walks, and 2 newsletters reached 400 of the audience.

Source of Funding: State, contracts, Smith Lever bc

FTE's: .65

Scope of Impact: Integrated Research & Extension

Key Theme: Aquaculture

Title of Program/Project: **Marine Resource Conservation**

Contact Person: Scott Jackson

Brief Description of Program/Project: Land and water support a variety of terrestrial, wetland, aquatic and marine ecosystems in Massachusetts. These natural systems provide a variety of natural resources including water, fisheries, shellfish, wildlife, forest products and biodiversity. The land also supports human communities that rely on these resources as well as the open space, aesthetics and recreational opportunities provided by natural systems. Shellfish farming is practiced by the coastal municipalities of southeastern Massachusetts for restoration and restocking as well as by private individuals for economic gain. In 1996, the landed value of the shellfish farmed in southeastern Massachusetts was in excess of $4.5 million in reported income. However, shellfish aquaculture has a much broader economic impact, in excess of $15.5 million. Aquaculture crops, particularly shellfish that are farmed in inter tidal and shallow sub tidal locations, utilize relatively small areas of the tidal flats but are highly valuable and require intensive skilled management.

Program activities consist of: 1. Administration of the South Eastern Massachusetts Aquaculture Center 2. Administration of DMF/Barnstable County Municipal Shellfish Propagation Program (quahog seed) 7th Year 3. Workshops, presentations and technical assistance that work toward the restoration of living marine resources 4. Training and educating aqua culturists to improve production (workshops, demonstration, web site information – will include some multi-state collaboration) 5. Teach a component of a State certification course for shellfish Constables 6. Oyster Bed Restoration utilizing cultch deployment and remote setting techniques 7. Eelgrass Restoration using direct seeding 8. Bay Scallop Restoration using pulsed pediveliger release 9. Quantitative assessment of shellfish habitat (research and workshop) 10. Quantitative assessment of shellfish farm site performance (research and workshops) 11. Testing of bay scallop stocking (research and workshop) 12. Monitoring enhancement of oyster populations (research and component of workshop) 13. Monitor and improve methods of over wintering oysters (research and workshops) 14. Monitoring enhancement of quahog populations (research and component of workshop) 15. Testing of effects of hatchery source on seed performance (research and component of workshop) 16. Monitoring of shellfish diseases (research and workshops) 17. Tests of means to manage quahog disease (QPX) (research and workshops) 18. Test of the

effects of shellfish aquaculture on marine water quality (research and workshops) 19. Monitoring and reporting marine water quality data (Web site information) 20. Surveying green crab populations, a shellfish predator (research and component of workshop) 21. Development of GIS database of fisheries and Shellfish aquaculture statistics (Web site and workshop component) 22. Development of regional marketing effort (Research, workshops, special events web site information)

Short Impact: The program recorded 740 direct contacts with coastal resource managers, regulators, and policy-makers; shellfish wholesalers and retail outlets; shellfish growers, and shellfish constables and natural resource officers and managers.

Program highlights for this year included:

- purchase of thirteen million hard clam (quahog) seed for thirteen towns
- a remote set oyster project for ten towns
- ten towns conducted shellfish disease testing
- long term marine water quality monitoring instrumentation has been deployed at two locations, Wellfleet Harbor and Pleasant Bay in Orleans
- Eelgrass seeding experiments took place at five locations, and the pulsed release of 47 million bay scallop pedivelgers was completed at the two chosen test locations of Bass River in Dennis and Crows Pond in Chatham
- 800 bags of remote set oysters were added to the oyster bank created in 2004 potential of using shellfish to remediate marine water quality continues to be studied at a site in Orleans. Here 800 bags of remote set oysters were added to the oyster bank created in 2004

Source of Funding: SL3B&C, County, Contracts

FTE's: 3.0

Scope of Impact: Integrated Research and Extension

Goal 2
A safe and secure food and fiber system

Key Themes:

Food Accessibility and Affordability
Food Handling
Food Quality
Food Recovery/Gleaning
Food Resource Management
HACCP
Food Safety
Food Security
Foodborne Illness
Foodborne Pathogen Protection

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$168,942	6.9	2	$67,174
UMEXT	$21,129	.3	1	$6,574

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 Quality
Title of Program/Project: Determinants of Food System Performance: Product Quality and Prices
Contact Person: Caswell, J.A., Lass, D. A., Lavoie, N.
Brief Description of Program/Project: The combinations of quality attributes and prices offered to consumers in food products are changing, affecting the performance of the food system. This project uses case studies to examine the factors the influence the quality and price combinations offered to food consumers.
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 were used in decision making by the private and public sectors (state, national, and international), including being cited by the Government Accountability Office (GAO) and the United Kingdom Food Standards Agency.
FTE's: 1.3

Source of Funding: Hatch
Scope of Impact: State

Key Theme: Food Quality
Title of Program/Project: Postharvest Biology of Fruit
Contact Person: Greene, D. W., Weis, S. A.
Brief Description of Program/Project: Fruits which are of high quality at the time of harvest are often reduced to poorer or even unacceptable quality by the time they reach the consumer. This project seeks to find ways to extend storage life of fruit and to contribute to providing consumers with attractive, nutritious, and flavorful food.
Short Impact: Use of 1-MCP has lengthened the postharvest life of many apple cultivars. If it could be used more effectively on McIntosh, fewer fruit would be culled during packing, consumers would have a higher quality apple, and fewer postharvest chemicals would be needed for quality maintenance. Massachusetts has areas of very good climate for growing McIntosh and therefore has potential for a great niche product. McIntosh does not grow well where cool nights and warm sunny days do not reign in the fall. Ground gypsum applied to soil can benefit soil structure and increase calcium concentration in fruit without the negative side affects associated with calcium chloride sprays (corrosion of spray equipment) or postharvest calcium drenches (need to include fungicide in the drench).
FTE's: .7
Source of Funding: Hatch Multistate
Scope of Impact: MI, NC, Ontario, British Columbia, ME, MN, NY (Cornell), MD, MA, WA, CA

Key Theme: Food Safety
Title of Program/Project: Food Safety Training and Certification for Under-Educated, Limited English Proficient School Food Service Personnel
Contact Person: Carbone, E., Olson, R.
Brief Description of Program/Project: UMass Extension, in cooperation with the Universities of Connecticut and Rhode Island, and national partners in food safety training and certification will improve opportunities for under-educated and limited English proficient school food service personnel to successfully complete the food manager certification examination. This integrative approach responds to the increased diversity of the food service trainees and declining exam passing rates.
Short Impact: This project will improve food safety comprehension, efficacy, training and assessment for under-educated and limited English proficient school food service workers who participate in food manager certification training programs and examinations. The novel approach of this project provides insight to addressing needs of diverse audiences on issues critical for food safety and protection. These data suggest a need for further study of exam policies, exam construction, and item testing.
FTE's: .4
Source of Funding: Extension, Grant
Scope of Impact: State

Key Theme: Food Safety
Title of Program/Project: Bacterial Adhesion and Growth at Phase Interfaces

Contact Person: McLandsborough, L. A.
Brief Description of Program/Project: Although most research is performed in liquid systems, microorganisms can be found in foods and processing environments at solid-liquid, gas-liquid, and solid-gas interfaces. The purpose of this project is to study bacterial growth at solid surfaces-liquid and liquid-liquid interfaces. Our efforts will be using Listeria monocytogenes and Escherichia coli O157:H7 in each of these interfacial systems, respectively.
Short Impact: We identified the predominant microflora in a floor drain from which L. monocytogenes was persistently isolated. Knowledge of the how this pathogen can persist and survive in a microbially diverse environment can be used to design unique strategies for biofilm prevention leading to large economic savings for the food industry.
FTE's: .3
Source of Funding: Hatch, Grant
Scope of Impact: State

Key Theme: Food Safety
Title of Program/Project: Characterization of the Transfer of Listeria Monocytogenes Between Processing Surfaces and Foods
Contact Person: McLandsborough, L.
Brief Description of Program/Project: L. monocytogenes contamination is responsible for the majority of Class I recalls of processed foods. The presence of L. monocytogenes in processed foods is thought to be due to post-processing contamination from established organisms in the processing environment. Although research has focused upon adhesion and biofilm formation by Listeria monocytogenes, no one has studied the potential of bacterial transfer from food processing surfaces to foods, and from foods to processing surfaces. The overall purpose of this research is to obtain a more precise understanding of the potential for Listeria monocytogenes transfer and the influence of moisture on this transfer. Ultimately, the results of this research will answer the question: should food safety advice specify drying of food contact surfaces after cleaning and sanitizing?
Short Impact: Post processing contamination of food products with Listeria monocytogenes is one of the greatest economic challenges facing the food industry. Knowledge the influence of processing surface composition, food composition and the role of moisture in cross contamination will be critical to assessing the risks involved in cross contamination.
FTE's: .2
Source of Funding: Hatch, Grant (MAS0200303112)
Scope of Impact: State

Key Theme: Food Safety
Title of Program/Project: Seafood Safety
Contact Person: Levin, R., McLandsborough, L, Shetty, K, Labbe, R, Chinachoti, P, Decker, E.
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 a stable forms omega-3 fatty acids to increase intake of these required fats into the American diet.
Short Impact: Identification strains of L. monocytogenes in fish processing plants that have taken up permanent residence in the plants for eventual elimination by optimization of sanitary practices. Enhanced preservation of seafood using GRAS phytochemicals.
FTE's: 1.6
Source of Funding: Hatch**,** Grant (MAS0200206165)
Scope of Impact: State

Key Theme: Foodborne Pathogen Protection
Title of Program/Project: Isoflavonoid Synthesis and Pathogen Control in Sprouts in response to Rosemary Phenolic Clonal Extracts
Contact Person: Shetty, K.
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: Soybean has diverse health benefits through the chemopreventive potential of the phenolic phytochemicals they contain. Soy consumption has been linked to reduced cardiovascular risk and potential for reduced breast and prostate cancer risk. Research from this project indicate antimicrobial potential against ulcer bacteria, Helicobacter pylori and food-borne pathogens such as Listeria monocytogenes. Additionally research has indicated the potential for chemopreventive health benefits for managing enzymes linked to modulating glycemic index and therefore contributing to the management of Type 2 diabetes. The same research has also indicated the potential for inhibiting angiotensin converting enzyme I for reducing hypertension, a complication emerging from Type 2 diabetes. From this research it is clear that the key phenolics relevant for above chemoprevention potential of various disease are best released via sprouting and microbial bioprocessing, which involves specific enzymes of the plant and microbial systems.
FTE's: .5
Source of Funding: Hatch (MAS00835)
Scope of Impact: State

Key Theme: Food Safety
Title of Program/Project: Antimicrobial Delivery Systems to Improve Food Safety
Contact Person: Weiss, J.
Brief Description of Program/Project: Application of nanotechnologies may improve food safety. Naturally occuring antimicrobials capable of preventing the growth of pathogenic organisms have generally low activities in foods because of undesirable interactions with food components. In this project we will develop new food preservation strategies based on nanotechnological approaches to produce nanometer sized antimicrobial systems in the form of particles that improve antimicrobial activity in food formulations and food process operations.

Three different encapsulation systems have shown promise. These include: (1) natural phenolic compounds encapsulated in surfactant-based micelles for application in liquid/semi-fluid food systems (2) phospholipid liposomes for encapsulation of polypeptide antimicrobials and application in liquid or solid systems and (3) natural phenolic and polypeptide antimicrobials encapsulated in emulsion droplets for delivery in liquid/semif-fluid and solid food systems. We expect that the new systems will have either substantially higher antimicrobial activity or higher stability than free antimicrobials. Because of the small size of capsules, no change in appearance and texture of foods should be observed. This research has the potential to dramatically improves the safety of processed foods and may have counter-bioterrorism as well as military applications.

Short Impact: Nanostructured encapsulation systems can greatly improve activity of food antimicrobials in model microbiological and food systems thereby reducing concentrations needed for bacteriostatic and/or bacteriocical activity and limiting potential flavor impacts of antimicrobials on foods. Nanoencapsulated food antimicrobials may be used in the future as a substantial part of a hurdle concept to ensure food safety of a large variety of products

FTE's: .3

Source of Funding: Hatch

Scope of Impact: State

Key Theme: Food Safety

Title of Program/Project: Food Safety

Contact Person: Rita Brennan Olson

Brief Description of Program/Project: Millions or people get sick from the food they eat, thousands die each year. Young children, elderly, and people with compromised immune systems are at greatest risk for food borne illness. This project includes several separate programs to a variety of audiences, introducing and reinforcing basic food messages as well as providing teacher training, food service worker training, and meeting food manager certification requirements.

Short Impact: 235 high risk consumers and caregivers (shelters, home health aides, child care, emergency food) attended 20 "Food Handling is Risky Business" workshops. Of 81 completing evaluations 86% reported intended improvement in food practices at home and serving high risk populations and 5% reported that no change was needed. Of 308 CACFP personnel participating in Food Manager Certification Courses serving over 55,000 children in MA, 135 participants in MA courses completed evaluations with 69% reporting they had changed food safety practices (25% indicated that no change was needed).

Food safety education and resources for under-educated, limited English proficient food service personnel in schools were improved with the development of Food Safety Word List and Food Safety Flash Cards. Of 116 MA and RI participants 90% surveyed reported using the booklet during the course with 91% finding the booklet useful or very useful (studying for the exam, remembering terms and understanding words)
Pre and post surveys of Food Safety FIRST teacher training participants indicated that Most teachers planned to teach food safety to their students as a result
of the course, with approximately 90% reporting this intention after each of the three courses.

Source of Funding: State, Contracts, Fees

FTE's: 1.0

Scope of Impact: Multistate Integrated Research & Extension

Goal 3
A healthy, well-nourished population

Key Themes:
Birth Weight
Health Care
Human Health
Human Nutrition
Infant Mortality
Medicinal Plants
Nutricueticals

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$129,684	3.5	3	$73,190
UMEXT	$0	0	0	0

Goal 3 Executive Summary –

Goal 3 efforts emphasize improved youth health through research and education projects focused on training for the day care providers and secondary school teachers respectively. In addition, research seeks to increase the use and availability of omega-3 fatty acids in food products, providing health benefits. Research also continues to focus on understanding the importance of biological products such as genistein and carnosine on human health.

Key Theme: Human Health
Title of Program/Project: Nutrient Bioavailability--Phytonutrients and Beyond
Contact Person: Decker, E., Clydesdale, F.
Brief Description of Program/Project: Many components in foods can have positive effects on health yet little is know about how they work. This project will investigate how non-essential nutrients from foods improve health.
Short Impact: Using this emulsion technology we have developed a food ingredient omega-3 fatty acid delivery system that contains either algae or fish oil. This omega-3 fatty acid ingredient system has a shelf-life of over 6 months and can be incorporated into foods without altering the original flavor of the product. Such products will soon be used to determine the bioavailability of the omega-3 fatty acids in humans. This research project will impact the citizens of the U.S. in several ways. First, the development of foods containing omega-3 fatty acids could provide an easy vehicle to increase the incorporation of beneficial fatty acids into the diet. These foods would be beneficial to the general population but in particular to populations at risk for coronary heart disease and pregnant and lactating women who must provide high levels

of omega-3 fatty acids to their infants. A second benefit would be to fishing communities. Underutilized fish species such as herring, mackerel and menhaden are naturally high in omega-3 fatty acids. If technologies can be developed to stabilize the oil from these fish, an increased market would be developed thus increasing the value of the fish stock which would provide new harvesting opportunities.
FTE's: .3
Source of Funding: Hatch Multistate
Scope of Impact: OK, IA, ME, MA, MI, CT, KS, AZ, OR, NM, CA, WA, ARS

Key Theme: Human Health
Title of Program/Project: Investigating Conditions and Mechanisms by which Conjugated Linoleic Acid Improves Bone Mass
Contact Person: Park, Y.
Brief Description of Program/Project: Osteoporosis is one of the major diseases in the elderly and can affect the quality of life. Thus the prevention of osteoporosis is of interest and conjugated linoleic acid may help to reduce its incidence. This proposal will help to understand how and under what conditions CLA may be beneficial, looking toward an eventual use in helping to control osteoporosis. The purpose of this proposal is to study CLA's effects on bone metabolism by two separate approaches; first, to identify the conditions under which CLA can improve bone mineral mass, and second, to clarify the effect of CLA on differentiation of bone marrow mesenchymal stem cell into adipocytes, osteoblasts, or chondrocytes.
Short Impact: Osteoporosis is a disease that slowly progresses over 20 or more years and is a major health concern for the elderly. Fracture is the main risk factor for osteoporosis and this not only affects quality of life but also results in significant health related consequences. However, the treatment of osteoporosis has either limited success or adverse effects. Thus it is generally recommended that the prevention of osteoporosis may be the best choice for overcoming osteoporosis. As prevention strategies, one emphasis is on the link between dietary calcium intakes and osteoporosis. Any dietary component that can improve effects of calcium on bone can improve bone health significantly. Results from this study strongly suggest that CLA can enhance effects of calcium on bone mass and this may be linked to effect of CLA on reducing marrow adiposity. The results generated from this proposal can be used to reduce the development of osteoporosis, which can lead to improved quality of life, particularly in the elderly.
FTE's: .6
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Human Nutrition
Title of Program/Project: Improving Plant Food: Fruit Vegetable and Whole Grain Availability and intake in older Adults
Contact Person: Cohen, N. L.
Brief Description of Program/Project: Despite the importance of fruit, vegetable and whole grain intake in maintaining health and functional status, older adults are not meeting minimum dietary recommendations. This project will examine behavioral approaches to encourage older adults to increase their intakes of these beneficial foods.

Short Impact: Identification of factors leading to whole grain food choice decisions in older adults; evaluation of field interventions related to whole grains; development and use of effective nutrition education interventions to increase whole grain consumption in older adults; and improved whole grain consumption in older adults.
FTE's: .2
Source of Funding: Hatch - Multistate
Scope of Impact: CT, DC, ME, MD, MA, MI, NH, PA. RI, ARS, Industry

Key Theme: Human Nutrition
Title of Program/Project: Online Education for Secondary Science Teachers: An Integrated Approach to Food Safety Training
Contact Person: Cohen, N., Olson, R., Mclandsborough, L
Brief Description of Program/Project: Food borne illness continues to plague American health and economy. While many children are responsible for food preparation, they do not learn safe food preparation practices from their parents or at school. Few teacher training institutions offer courses in food safety to educators. This collaboration will promote and enhance food safety education by developing an online training program for teachers to use with students, parents and other school community members.
Short Impact: The Food Safety FIRST program (Online Education for Teachers: An Integrated Approach to Food Safety Training) has increased teacher confidence, improved food safety practices of science teachers, and resulted in increased food safety education of youth. Through this project, teachers and youth may thus reduce the risks of foodborne illness for themselves, their families, and other consumers.
FTE's: .4
Source of Funding: Extension, Hatch Grant (MAS00203912)
Scope of Impact: State

Key Theme: Human Nutrition
Title of Program/Project: Nutrient Bioavailability—Phytonutrients and Beyond
Contact Person: Decker, E., Clydesdale, F.
Brief Description of Program/Project: Many components in foods can have positive effects on health yet little is know about how they work. This project will investigate how non-essential nutrients from foods improve health.
Short Impact: Many different food components could have health benefits. However, for foods to be a useful delivery systems for these nutrients, the nutrient must be stable during the normal shelf life of the food and the nutrient must be bioavailable. Evidence that carnosine is not destroyed during the cooking of meat shows that it is present in processed meat products. Absorption of carnosine into blood after consumption indicates that it could have potential benefits against mental disorders and heart disease.
FTE's: 0.9
Source of Funding: Hatch - Multistate
Scope of Impact: AZ, CA, CO, CT, IN, KA, ME, MA, MI, NB, NM, OK, OR, USDA-ARS, WA

Key Theme: Nutraceuticals

Title of Program/Project: Isoflavonoid Synthesis and Pathogen Control in Sprouts in response to Rosemary Phenolic Clonal Extracts
Contact Person: Shetty, K.
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.
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FTE's: .5
Source of Funding: Hatch (MAS00835)
Scope of Impact: State

Key Theme: Human Health
Title of Program/Project: Tween POWER
Contact Person: Jean Anliker
Brief Description of Program/Project: The goal of this project is to help identify the causes of obesity and develop and test a prevention program for White and Latino adolescents. Through cognitive interviews and focus groups, the project investigates the foods and beverages that adolescents buy with their money, why, and the potential contributions of these purchases to risks of obesity. Based on these findings, the project will develop and pilot-test a curriculum to help White and Latino tweens choose more wisely, both through a better understanding of marketing practices and through increased knowledge of foods and nutrition. Physical activity will also be promoted.
Short Impact:In this first year, the project's research phase worked with 24 White and Latino adolescents aged 11-14. The project's first year findings were presented at several national meetings, reaching approximately 325 professionals.
Source of Funding: Contract, state
FTE's: .35
Scope of Impact: Multistate Integrated Research & Extension

Goal 4
Greater harmony between agriculture and the environment

Key Themes:

Agricultural Waste Management
Air Quality
Biodiversity
Biological Control
Drought Prevention and Mitigation
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
Pesticide Application
Recycling
Riparian Management
Soil Erosion
Soil Quality
Sustainable Agriculture
Water Quality
Weather and Climate
Wetlands Restoration and Protection

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	$281,158	6.6	6	$106,875
UMEXT	$591,612	8.4	7	$116,640

Goal 4 Executive Summary –

Our effort under Goal 4 has targeted pests that are critical to Massachusetts and the northeast. Some of the targeted pest include: Coleophoma, Colletotrichum, Phyloosticta, and Physalospora (cranberry fruit rot); apple maggot flies and plum curculio (key pests of apples); and strawberry sap beetle (primary pest of strawberries and other crops). We continue to develop integrated approaches to pest management. For instance the perimeter trap cropping approach is leading to 90% reduction in pesticide use and grower enthusiasm for adoption is high. Significantly, the development efforts for the bio-based corn oil/Bt approach to caterpillar control in sweet corn has now been commercialized nationally.

Key Theme: Agricultural Waste Management
Title of Program/Project: Application of Sewage Biosolids to Agricultural Soils in the Northeast: Long-Term Impacts and Benefit Uses
Contact Person: Barker, A.
Brief Description of Program/Project: To evaluate the utilization of sewage biosolids in soil management in the Northeast by assessing the sustainability of soil quality, water quality and food safety (for people and other animals) where sewage biosolids are applied to agricultural

land. To develop appropriate outreach materials and educational events for the Northeast that links the current research to actual field management of sewage biosolids products in the Northeast.
Short Impact: The research demonstrated that composts can be used in formulations of media for container growth of plants. Composts that are high in available nutrients are better than ones with low available nutrients for these formulations. The research demonstrated also that limits of composts in potting media should be at 25% of the volume to avoid growth restrictions that might occur with higher concentrations. This research will have applications to the use of biosolids or biosolids compost in formulations of potting media, suggesting that guidelines for use of manure composts in preparation of media will apply to use of biosolids composts in media.
Source of Funding: Hatch
FTE's: .3
Scope of Impact: State

Key Theme: Biological Control
Title of Program/Project: Molecular Dissection of Bacterial Resistance Mechanisms to Plant-Derived Bacteriostatic Compounds by Functional Genomics
Contact Person: Pomposiello, P
Brief Description of Program/Project: The interaction between plants and microbes in the environment is essential for a wide range of processes, from nitrogen fixation to plant disease. This project examines the global responses of a bacterial species to plant-derived toxic compounds, and aims at identifying novel genes with roles in bacterial resistance to environmental toxins.
Short Impact: The interaction between plants and microbes in the environment is essential to a wide range of processes. From the beneficial, such as nitrogen fixation, to the detrimental such as infection and disease, plants and microbes exchange chemical signals in order to establish the nature of their association. An essential phenomenon in the plant-microbe interaction is the limitation of bacterial populations by plant-derived compounds. Through our work, we have advanced in our understanding of the global transcriptional response of a model bacterium to plant-derived oxidants. We have dissected the role of glucose metabolism in bacterial resistance to oxidative stress, and shown that glucose transport and gluconeogenesis play a capital role in the antioxidant response. We continue to refine our model of global transcriptional responses using genomic approaches. Since many soluble plant compounds induce oxidative stress in bacteria, the knowledge on the genetic determinants of bacterial resistance to oxidation will result in more predictive power for plant-microbe interaction models.
FTE's: .2
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Global Change and Climate Change
Title of Program/Project: Characterization and mechanisms of plant responses to ozone in the Northeast
Contact Person: Manning, W. J.
Brief Description of Program/Project: Our results are fundamental to understanding factors that affect O3 uptake and plant injury. This has direct bearing on air quality standards for plants

and people. We are also identifying new bio-indicators for O3 that will increase public awareness of the O3 problem.
Short Impact: Air quality standards for ozone effects on plants (the secondary standard) depend on accurate data obtained under actual field effects. The EDU method can be used to conduct field experiments that will provide data that can be used to establish standards for ozone, not only in the USA, but in developing countries, such as India, that are experiencing increasing levels of ozone. These results are also a clear indicator to the human health community that all is not well and action needs to be taken to reduce pollution levels of ozone.
FTE's: .1
Source of Funding: Industry Grant, Hatch Multistate
Scope of Impact: ARS, CA, NJ, NYC, VPI, MN, PA, MA

Key Theme: Natural Resources Management
Title of Program/Project: Benefits and Costs of Resource Policies Affecting Public and Private Land
Contact Person: Stevens, T.
Brief Description of Program/Project: Recreational fees are being increased but little is known about the impact on low income users. Forest ecosystem management programs are being proposed but little is known about how landowners will respond.
Short Impact: A valuation approach based on prediction of others behavior is expected to result in less hypothetical bias and value estimates that are more accurate.
FTE's: .2
Source of Funding: Hatch Multistate
Scope of Impact: CA, AZ, TX, LA, GA, NYC, IA, KY, WA, MA, OR, CO, PA, OH, WV, NH, MI, ND, ME, UT, NC

Key Theme: Natural Resources Management
Title of Program/Project: Mitigating Hypothetical Bias in Natural Resource and Environmental Decision Making
Contact Person: Stevens, T. H., Murphy, J., Allen, G., Lass, D.
Brief Description of Program/Project: Respondents to contingent valuation surveys often overstate the amount they would actually pay. This has motivated development of several techniques designed to either eliminate or reduce this problem. This project examines and compares alternative ways of reducing hypothetical bias and an improved method for dealing with this problem will be developed.
Short Impact: Current uncertainty adjustment procedures for mitigating hypothetical bias may produce misleading results because the relationship between hypothetical bias and uncertainty is not clearly defined.
FTE's: .3
Source of Funding: Grant, Hatch (MAS00858)
Scope of Impact: State

Key Theme: Pesticide Application
Title of Program/Project: Impact of Dissolved Organic Matter from Organic Amendments on Pesticide Leaching on Turf

Contact Person: Xing, B., Ebdon, S., Owen, M.
Brief Description of Program/Project: Dissolved organic matter (DOM) from organic amendments used on turf may increase leaching potential of pesticides. The project examines how DOM from organic amendments affects pesticide leaching in turf soils with a goal to develop a scheme to manage an environmentally friendly turfgrass ecosystem.
Short Impact: Chemical and structural information of dissolved organic matter (DOM) will help turfgrass managers and us to better understand the property of organic fertilizers/amendments and to properly use these organic amendments on golf courses.
Source of Funding:
FTE's: .1
Scope of Impact:

Key Theme: Water Quality
Title of Program/Project: Integrated Watershed Management to protect Water Quality and Ecological Integrity
Contact Person: Randhir, T.
Brief Description of Program/Project: Safe drinking water and sustaining healthy aquatic ecosystems through watershed planning will be the direct issue involved.
Short Impact: The results can be used to study land use impacts on water quantity and quality at a regional scale. The assessment of climatic impacts could be used by local communities to develop appropriate mitigation strategies through changes in land use. Changes in water quality could be used as a guidance to evaluate impacts on aquatic ecosystems. The Westfield study has developed spatial assessment of habitat conditions that can be used for protecting riparian and headwater regions. The results of both these studies can be used by farmers, communities, and policy makers to evaluate both climate-induced and landuse-induced changes in water quantity and quality. Minority communities who are impacted by the research include Asian and Hispanic communities in the lower portions of the watershed and low-income farming communities throughout the valley. Under-served communities can benefit through data and suggestions to protect water quality and aquatic ecosystem problems in their locality. Specific beneficiaries of the intermediate results include farmers, resource managers, water managers, scientists, nonprofits, and educators in Connecticut and Westfield watersheds. The models developed and particular results will help several communities in protecting their water supplies and aquatic ecosystems in the region.
FTE's: .2
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Nutrient Management
Title of Program/Project: Nutrient Management for Dairy Farms
Contact Person: Masoud Hashemi and Stephen J. Herbert
Brief Description of Program/Project: On a typical dairy farm, there is often an over-supply of farm nutrients on croplands, particularly nitrogen and phosphorus from excess application of nutrients and/or mismanagement of manure application to the fields. This may have a significant non-point source of pollution risk to the water resources. Through nutrient management planning, there will be an economic incentive for dairy farmers to adopt farming practices which are environmentally sound and reduce unnecessary expenditures for commercial fertilizers.

This project targets dairy farmers, other livestock producers, and professionals from USDA agencies with fact sheets, computer programs, newsletters, on-farm research demonstrations, field days and twilight meetings, and customized nutrient management plan for individual farms to be used as educational workshops.

Short Impact: In addition to approximately 2900 indirect contacts, the project made direct contact with 297 dairy farmers, 26 livestock producers, 27 horse owners, and 151 USDA agency professionals.

It was estimated that the nutrient reduction from participating dairy and other livestock farms averaged 23 and 20 lb/acre for N and P_2O_5, respectively. The full impact of implementation of CNMP on the participated farms was not limited alone to the above reductions in usage of nutrients on these farms. Nutrient application timing, the prioritization of fields to receive manure based on the field location as related to environmentally sensitive areas, and use of cover crops to reduce the amount of nutrients leached and eroded from fields all contributed to minimizing the risk of nonpoint source pollution on these and other dairy and livestock operations.

Source of Funding: Smith Lever bc, contracts

FTE's: 1.0

Scope of Impact: Integrated Research and Extension

Key Theme: Sustainable Agriculture

Title of Program/Project: Enhancing Environment Sustainability and Economic Viability of Massachusetts Landscapes and Nurseries

Contact Person: Kathleen Carroll

Brief Description of Program/Project: The Massachusetts Landscape and Nursery industry holds a highly visible position in Massachusetts urban society especially with the growing awareness of the environmental, physical, and economic benefits of the industry. There is daily exposure of the public to street trees, lawns, gardens, residential landscapes and parks. It is imperative that landscapers, grounds managers, nursery growers and arborists understand and implement ecological practices including proper plant selection, insect, disease and weed identification and management while sustaining economic viability. Using proper management practices can enhance the urban environment, maintain profitability while reducing the exposure of the public and natural resources chemicals and fertilizers. The project estimates and audience of 15,000 grounds managers, landscapers, arborists, and nursery growers, and 10,000 home gardeners.

Short Impact: Project outreach includes Green School, 60 hours of training (reaching 130 landscape, nursery, and turf professionals), Newsletters (Hort Notes reaching 900 with 16 issues, and Garden Clippings reaching 1500 with 8 issues), demonstrations at the New England Grows Conference (reaching approximately 1000), 450 contacts for the Urban Forestry Diagnostic Laboratory, and 880 phone consultations.

Project work also includes responses to emerging issues, such as the eastern Mass Winter Moth caterpillar infestations and professional development for employers of Spanish speaking

workers.

Source of Funding: SL3B&C, State, College Match, County, Contracts, Fees

FTE's: 6.7

Scope of Impact: State (MA)

Key Theme: Pesticide Application

Title of Program/Project: Pest Management Survey

Contact Person: Natalia Clifton

Brief Description of Program/Project: UMass Extension has an agreement with the state Department of Agricultural Resources and the U.S. Environmental Protection Agency to provide continuing education to pesticide applicators. Licensed and certified pesticide applicators must attend between 6-12 hours of training every three years. UMass Extension has the necessary expertise to provide continuing education to farmers, landscapers, golf course superintendents, pest management professionals, municipalities, and others on the management of pests through the adoption of integrated pest management.

The Pesticide Education team offers workshops on its own and in conjunction with other teams within the Agriculture and Landscape Program to reach pesticide applicators on topics such as Massachusetts Pesticide Laws and Regulations, EPA Farm worker Protection, Pesticide Exposure Studies, Personal Protective Equipment, Pests and the Diseases they Cause, and Pest Identification. In addition, publications such as newsletters and websites provide much information about the management of pests and use of pesticides.

Short Impact: A two-day workshop to help prepare for the state's pesticide exam was offered 14 times with 396 participants. A pre and post test was administered in 2 workshops. The number of correct responses increased from 57% (pre-test) to 85% (post-test). Forty-nine percent of the individuals indicated that they learned "a lot" during the workshop, but 96% indicated that they would recommend this workshop to others. A comparison of exam results (for 23 exams) was conducted between the individuals who took the workshop and those who did not. Over all individuals who took the workshop had a 45% pass rate compared to those who did not take the workshop who had a 37% pass rate.

Evaluations were used in 22 pesticide recertification training workshops. Seventy-eight percent (1573) of the participants completed the evaluation forms. Sixty-six percent rated the overall quality of the presentation as "excellent". Fifty-eight percent indicated that they increased their knowledge "very much" and 45% indicated that they would apply this knowledge.

In all, the program reported more than 4000 direct contacts and 10,000 indirect contacts.

Source of Funding: SL3B&C, SL3D, State, Contracts, Fees

FTE's: 1.54

Scope of Impact: State (MA)

Key Theme: Natural Resources Management

Title of Program/Project: Annual Lawn Care Seminar

Contact Person: Mary Owen

Brief Description of Program/Project: Lawn and landscape professionals and others in the green industry need current and continuing information to manage public and private properties, and create policies about these activities, in a conscientious and environmentally responsible manner. Lawn and other turf management often involves the handling and application of fertilizer and pesticides. The full day Annual Lawn Care seminar addresses specific issues and presents current research information in areas such as: protection and enhancement of water and other natural resources; integrated pest management systems; understanding and communication of risk; sound agronomic practices; and other topics that are pertinent.

Short Impact: The Annual Lawn Care Seminar drew participation from 185 lawn care operators and landscapers and business owners; municipal turf managers; athletic field managers; public and private school grounds mangers; sales and other commercial business people, and 15 educators; private consultants; regulatory agency personnel; community environmental group representatives.

Participants reported gaining knowledge in integrated turf management systems, with an emphasis on 1) protection and conservation of environmental resources, including water resources and wildlife and biodiversity resources, 2) implementation of best management practices to reduce reliance on pesticides, including implementation of integrated pest management for diseases, and 3) operating safety for workers, applicators, and clients.

Source of Funding: SL3B&C, Fees

FTE's: .21

Scope of Impact: State (MA)

Key Theme: Natural Resource Management

Title of Program/Project: University of Massachusetts Turf Research Field Day

Contact Person: Mary Owen

Brief Description of Program/Project: Turf managers and associated professionals need up-to-date research based information on various agronomic and pest management issues and practices. Research at the University of Massachusetts Joseph Troll Turf Research Center addresses several issues, including evaluation of new turf grass cultivars for a range of factors (disease tolerance, weed invasion tolerance, heat and cold stress tolerance, mowing height, cultural management intensity, wear and traffic tolerance, etc). This field day provides an opportunity for the audience to see ongoing research results, to directly interact with UMass Turf Program researchers and staff, and to provide direct feedback on research in progress. Field Day book is also available to non-attendees.

Audience attends Field Day and receives Field Day book which includes research data and results for projects underway at the Turf Research Center. Some current project include: National Turf grass Evaluation Program Turf grass Cultivar Trials (Kentucky bluegrass, perennial ryegrass, tall fescue, bent grasses at greens height, bent grasses at fairway height); nutrient management studies (reduction of nitrogen levels coupled with increase in potassium levels to maintain turf quality); and reducing pesticide exposure to golfers study.

Short Impact: The field day drew 248 participants, including lawn care operators and business owners, landscapers, municipal turf and grounds managers, public and private school turf and

grounds managers, public and private facility turf and grounds managers, golf course superintendents and staff, educators, consultants, regulators, and industry sales people.

Participants reported gaining knowledge of current research in particular regarding: using best management practices to reduce reliance on pesticides, using integrated pest management for pests, and operating safety for workers, applicators and clients.

Source of Funding: SL3B&C, Fees

FTE's: .75

Scope of Impact: Integrated Research and Extension

Key Theme: Natural Resources Management

Title of Program/Project: Protection of Water Resources and Economic Sustainability of Massachusetts Turf Industry through Outreach and Publications

Contact Person: Mary Owen

Brief Description of Program/Project: Improper turf management practices have the potential to affect water and other natural resources. Turf grass mangers need reliable, current, research based information on integrated pest management systems, pest pressure, agronomics, proper nutrient management, etc., in order to manage turf in an environmentally responsible and economically sound manner. Popular public opinion is often incorrect about the real impact of turf management practices as established by research. This misinformation can have a negative economic impact on the people and businesses that provide turf management services. It is critical to provide true information to turf managers for them to use in their discussions with customers, clients and employers (e.g. municipalities and schools) regarding risk and the management of turf.

This project works to provide information through UMass educational programs (such as the Green School), invited presentations and classes, UMass Extension publications, articles published in other publications, and consultations.

Short Impact: Project records show direct contacts with 2355 and indirect contacts with 46,385 golf course superintendents and crew, lawn care and landscape operators and businesses, municipal turf and grounds managers, public and private school and facility turf managers, athletic field managers educators, regulators, community environmental activists, consultants, and sales people.

Audience reported gaining knowledge of new, research based information, as well as time-tested and proven information on environmentally responsible, economically sustainable turf management practices. Audience reported intent to use information learned to inform timely decisions and assist with problem solving.

Source of Funding: SL3B&C

FTE's: .65

Scope of Impact: State (MA)

Key Theme: Integrated Pest Management

Title of Program/Project: Sweet Corn IPM Development and Implementation in the Northeast

Contact Person: Ruth Hazzard

Brief Description of Program/Project: Sweet corn is a key vegetable crop in the northeastern United States, comprising one third of all vegetable acreage (40% in Massachusetts) and being grown by 57% of vegetable farmers (USDA 1998). Sweet corn is an anchor crop in retail markets, because it attracts customers and fosters sales of all crops. The market demands high quality, including freshness, flavor, and absence of insects or insect damage. However, sweet corn is subject to invasion a resident moth pest, European corn borer and by migratory flights of corn earworm, and fall armyworm. For control of these caterpillar pests, standard integrated pest management strategies rely upon broad-spectrum insecticides applied at intervals determined by crop stage, by the level of moth activity as measured in pheromone, and by field scouting. Timely response to pest influx is critical to maintaining crop quality and growers need field data regionally and on their own farms. Much of the sweet corn acreage in the state abuts homeowner lots; hence reducing risk from pesticide materials is critical to growers. New technologies for biological control, low-risk insecticides, and alternative application methods are needed. For growers who want to produce sweet corn organically, corn earworm to be an extremely difficult pest because effective non-pesticide methods have only recently become available. Because the margin of profit is narrow, especially for sweet corn marketed wholesale, growers are keenly concerned about cost and returns. Direct marketing to obtain highest net profits, reducing costs through lower inputs or input costs, saving labor are all key considerations in farmer's choices of management tactics.

Audiences for this project include vegetable farmers, agriculture professionals, consumers and home gardeners, and legislators and policy-makers. Activities include educational meetings and presentations, publication of fact sheets and newsletter articles, farm visits, and response to telephone and email inquiries.

Short Impact: Overall, the project reported 361 direct contacts with its audiences. The project also included a regional meeting with NE IPM Vegetable Working Group to develop Pest Management Strategic Plan (PMSP) for sweet corn in the northeast. This work identified key pest priorities and available treatment options and will help researchers and funding organizations target projects and funding for sweet corn.

Specific measured outcomes for the project included the following:

As a result of the Reduced Risk Sweet Corn IPM project, 7 growers used *Trichogramma* wasps for control of European corn borer and save one or more pesticide applications in each release field, with excellent control. At least nine farms tried reduced-risk products (spinosad, indoxycarb) to control European corn borer or fall armyworm, in place of the most widely used synthetic pyrethroid (lambda-cyhalothrin, Warrior). At least 14 applications of Warrior, a broad-spectrum synthetic pyrethroid were replaced with reduced-risk materials on 36 acres of corn this year in 9 farms; total acreage of these farms is 283.

Excellent response to the grower pesticide use survey (for herbicides, fungicides and insecticides) was obtained and results were presented to growers at the Chicopee NEVBGA

meeting in January. This will provide baseline data for comparison after the sweet corn reduced-risk IPM project and other educational programs are conducted over the next two years.

At least 523 people were informed of weekly pest conditions for key corn pests through the Vegetable Notes newsletter, with weekly information from 20 locations including new locations in RI and NH (for the first time) and additional locations in MA and NH. This was accessible via email, on two websites, and in hard copy. This scouting network showed that corn earworm, a key pest of corn, which migrates annually into the region, arrived 3-4 weeks later than usual. As a result, the hundreds of growers who read newsletter, use traps to monitor for the pest in their corn, relied on our scouts, or talked with growers who have traps were able to save 3-4 weeks of intensive (2-3 times per week) spraying to control corn earworm resulting in reduced pesticide use on approximately 2000 acres of sweet corn.

Source of Funding: State, Contracts, Fees

FTE's: .32

Scope of Impact: Multistate Integrated Research & Extension

Key Theme: Integrated Pest Management

Title of Program/Project: Cucurbit IPM Systems

Contact Person: Ruth Hazzard

Brief Description of Program/Project: Cucurbits are a vitally important crop to MA growers, comprising 40% of all vegetable acreage in MA. They are also of increasing importance to dairy and fruit growers who are trying to diversify their operations. Cucurbits are important in direct marketing, wholesaling, and processing industries (especially pickles and peeled butternut squash). The challenges growers face in producing these crops are increasing - diseases such as bacterial wilt and phytophthora blight are increasing in severity and new diseases such as plectosporium blight are threatening crops and causing crop losses. Insect management remains a huge issue, and is of increasing importance in light of the ability of insect pests to vector disease. Growers are using increasing amounts of fungicides and insecticides to produce viable cucurbit crops. We are helping to find IPM management techniques and new materials that will be effective, decrease cost to growers, and reduce chemical inputs into the environment. Growers rely on UMass Extension to test new materials and management strategies and help with dissemination and implementation of these new strategies and tools.

Eighteen growers are currently participating in on farm research trials involving new pest control materials and strategies; including perimeter trap cropping, reduced tillage, systemic and reduced risk insecticides, water management, and use of transplants. Research trials are being conducted on perimeter trap cropping and variety evaluations at the South Deerfield research farm. Fact sheets, newsletter articles, and the vegetable website are used to disseminate information to growers. Hundreds of growers attend meetings, conferences, and field days where new products and strategies for cucurbits and other crops are showcased, research results are presented and discussed, and new collaborations are formed. Grant funded research staff are available to MA growers for consultation and farm visits.

Short Impact: The project counted 497 direct contacts through educational meetings, presentations, email and telephone. The project received coverage regarding perimeter trap cropping systems in a trade publication, the December issue of Growing Magazine. This added an estimated 41,000 to the project audience, ranging along the eastern seaboard from Maine to

Florida.

End-of-season interviews with the growers involved in the SARE funded Perimeter Trap Cropping (PTC) project have indicated that without exception participants have found the systems we are promoting to be useful and to save time and money. Almost all of them are incorporating these systems into their own standard practices.

Source of Funding: State, Contracts

FTE's: .87

Scope of Impact: Multistate Integrated Research & Extension

Key Theme: Land Use

Title of Program/Project: Center for Rural Massachusetts

Contact Person: Glenn Garber

Brief Description of Program/Project: There is a wide gap in communities and regions between traditional land use planning (as practiced by board members, town officials and professional staff), and the fields of natural resources analysis and protection, and agriculture, forestry and related resource-based economic activity. This circumstance is because they come from differing historical roots. Modern planning in rural, exurban and developing communities is reaching for practical ways to more fully integrate these too-often separated spheres. That improved integration will result more rational planning practices, more sustainable local communities and sub-regions, and improving environmental conditions. The effort to incorporate land planning more affirmatively into the Extension mission, in this case by re-energizing the Center for Rural Massachusetts (CRM), is intended to create practical ways to bridge that gap.

This is the first year of this project. Over time, the CRM effort will employ: sponsored workshops and other colloquia; participation in other conferences and seminars; use of website; newsletters or bulletins; possible targeted e-mail list-serves; and some degree of direct outreach to limited target audiences, where feasible and appropriate. 1. Workshops, presentations & technical assistance to exurban and growing communities on improved planning for balanced growth 2. Workshops, presentations & technical assistance on inclusionary housing models for smaller communities 3. Workshops, presentations & technical assistance on local rural economic investment

Short Impact: This program took the form of several related projects. Preliminary stages of the research into applicability and impact of advanced land use management tools and techniques was presented at five conferences and workshops involving an estimated 145 participants, including local officials, state officials, educators, professional practitioners, non-profit organizational representatives and private development interests. The start-up of the CRM's Five Town Action initiative involved more than 70 local officials, educators, and interested citizens. Total population of the five towns that will be involved is 7500.

Source of Funding: SL3B&C, SL3D, State

FTE's: 1.0

Scope of Impact: Multistate Integrated Research & Extension

Key Theme: Land Use

Title of Program/Project: Land Protection Education

Contact Person: Robert Levite

Brief Description of Program/Project: "Biocore" habitats, Priority Habitats and Living Waters "Core Habitats", as well as other special habitats, have been identified for large portions of the Commonwealth. Many of these sensitive areas occur on privately owned, unprotected land. With the increasing sprawl type development, these special areas are at threat from fragmentation and parcelization, negative ecosystem impacts and other growth pressures. It is imperative to develop and pursue an ongoing campaign to protect these special areas through such means as permanent and interim protection techniques and funneling of growth into appropriate areas where special habitats are not impacted. It is additionally important to develop and encourage new incentives for economic, social and environmental consequences that are compatible with the protection of these critical ecological areas.

This project: 1.Provides educational programs/workshops on the economics of preserving open space and how that relates to local taxes and land protection 2.Provides educational programs on estate planning 3.Produces written materials on landowner contacts, working with successive owners, building stronger relationships with landowners, providing landowner services 4.Provides workshops on growth management/sustainability 5. Provides continued organization, shepherding and development of a statewide easement defense program 6.Provides educational workshops/forums on forest stewardship/management issues, including Chapter 61 and 61A stewardship, conservation options and estate planning 7.Investigates and develops a program to help municipalities preserve or trade appropriate town tax title properties 8.Edits selected chapters regarding land protection of Mass Assn. of Conservation Commissions Manual 9.Supports CAPS program and provide backup and present programs as necessary and 10.Supports and works with the Center for Rural Mass on development of the Center and related programs.

Short Impact: This program takes the form of several connected projects. Individual consultations and group presentations resulted in 144 direct contacts with watershed organizations, land owners, and forest land owners. Work with land trusts resulted in 223 direct contacts involving 8 land trusts. 65 individuals were reached through the Green Valley Institute.

General work for this project included Mass Easement Defense Project – completion of Operating Principles, start on Action Plan and consultation on legal case challenging a CR; Legal support to land trusts in the way of providing answers to questions relevant to conservation restrictions and tax issues; referral of interested parties to attorney tax specialists; serving as Land Trust Alliance Ambassador and working with local land trusts to understand and adopt new Land Trust Alliance Standards and Practices; increased awareness for conservation commissions and planning boards on issues related to the preservation of land adjacent to new cluster and residential open space developments.

Several towns showed increased land conservation activity. Oxford applied for and received a grant to do an updated Open Space Plan and the Board of Selectmen appointed an Open Space Committee; the Open Space Committee is backing a smart growth partial construction moratorium that will go in front of Town Meeting in October; East Brookfield completed an updated Open Space Plan and is beginning to develop an updated Master Plan; Holland adopted a new town open space design/cluster development bylaw; several town planners have contacted UMass Extension regarding town bylaws to address cluster development issues; placement of

CR on land preserved as part of a Charlton town bylaw cluster development; Belchertown failed to pass a town bylaw that I helped author to slow down development while the town increased its planning, but the education process resulted in the Community Preservation Act being passed (at the same town meeting); development of state easement defense program with adoption of operating principles and beginning of action steps, including the creation of a legal library for use by land trusts; development of state land trust violation and easement amendment policies in progress; Brimfield completed its EO418 "mini" planning process.

Source of Funding: Smith Lever bc, state, contracts

FTE's: 1.0

Scope of Impact: State (MA)

Key Theme: Biodiversity

Title of Program/Project: Fish, Wildlife, and Biodiversity Conservation

Contact Person: Scott Jackson

Brief Description of Program/Project: Recognition of the fact that many of the products we use every day and the drugs used to treat medical ailments were derived from wild or once wild organisms has heightened our awareness of the importance of biodiversity. Much of the world's riches, in the form of genetic and biochemical resources, are unexplored. Equally unknown are the myriad ecological connections that organize ecosystems into self-sustaining entities. Protection of biodiversity--the sum total of living organisms and the ecosystems that support them--is increasingly being viewed as both an ethical and economic imperative. Although much attention has been focused on the impacts of land use and the utilization of natural resources on ecosystems, efforts are also being made to manage areas specifically for the protection of biodiversity. Numerous public and private conservation lands are being managed to protect or promote biodiversity by focusing on ecosystem restoration or endangered species recovery. Biodiversity is a large and all-encompassing concept and we may never know all we'd like to know about it. Management decisions cannot always wait for a complete understanding of potential impacts without risking the loss of species or communities of species due to inaction. Conservation organizations, state and federal agencies, natural resource professionals, landowners and land managers must all have access to the most up-to-date information on ecosystem management and restoration in order to effectively manage for biodiversity.

Activities for this program consist of: 1. Workshops, presentations, and technical assistance on instream flow modeling and habitat protection 2. As part of an outgoing outreach program in the Mill River watershed, communicate results of the dam feasibility study to Hatfield community officials, interested citizens, agencies, and organizations, and facilitate decision-making about the future of the dam 3. Participate in the development of a more efficient and effective process for reviewing forest cutting plans and protecting rare species during timber harvests 4. Participate in the development of "Conservation Management Practices" to protect rare species during timber harvesting 5. Workshops, presentations, and technical assistance on forest management and wildlife and biodiversity conservation 6. Work with Forest Stewardship Program on use of CAPS analysis for prioritizing stewardship cost sharing 7. Complete CAPS assessment of Housatonic watershed & Highlands communities 8. Work with Conservation organizations and agency personnel to interpret CAPS results 9. Conduct CAPS workshops in Housatonic & Highlands communities 10. Provide updated information from CAPS analyses to Alford, Tyringham, and Monterey as a follow-up to open space planning 11. Develop a web-

based system for disseminated results of CAPS analyses 12. Research the effectiveness of wildlife passage structures 13. Development of monitoring plan and train volunteers for Route 2 wildlife passage structures 14. Develop web site on transportation impacts on fish, wildlife and ecosystems 15. Upload content onto the newly designed Stream Continuity web site 16. Assessment and prioritization of river and stream crossing structures in the Westfield River watershed 17. Seek funding for development of a CAPS module to prioritize crossing structures for upgrade or replacement 18. Develop a funding proposal for statewide assessment and prioritization of crossing structures 19. Continue volunteer recruitment and training for the River and Stream Continuity Project 20. Workshops, presentations and technical assistance on mitigating the impacts of transportation on fish, wildlife, and ecosystems 21. Wetlands Assessment and Field Techniques course 22. Workshops, presentations and technical assistance on wildlife habitat assessment and protection under the MA Wetlands Protection Act 23. Identify a process for the revision and publication of WEThings and WEThings-Birds 24. Revise MA Snakes web site 25. Disseminate results of the MA Herp Atlas Project and develop online program for documenting the distribution of amphibians and reptiles in Massachusetts 26. Coordination of the MA Calling Amphibian Survey as part of the North American Amphibian Monitoring Program 27. Workshops, presentations, and technical assistance on wildlife natural history and conservation

Short Impact: This program made direct contact with 400 state and federal agency personnel, environmental consultants, and other natural resource professionals; 80 conservation organization staff and volunteers; 140 municipal officials and staff, 65 local, state & federal transportation personnel; and 570 others, including timber harvesters, landowners, teachers, K-12 students, general public. Indirect contacts were made with 12,050.

Program highlights for this year include:

- Massachusetts River and Stream Crossing Standards developed by a group of agencies and organizations led by UMass Extension were included in the Massachusetts Programmatic General Permit as a requirement for all new permanent stream crossings.
- Four wildlife crossing structures were constructed on Route 2 in Concord in an area of particular importance for its function as a wildlife corridor.

Source of Funding: SL3B&C, State, Contracts, Fees

FTE's: 1.45

Scope of Impact: Multistate Integrated Research & Extension

Key Theme: Water Quality

Title of Program/Project: Water Resource Protection

Contact Person: Scott Jackson

Brief Description of Program/Project: Water resources are affected by a wide range of activities including direct discharges of pollutants, agricultural activities (pesticides and fertilizers), erosion, waste disposal, septic systems, road salt, storm water management, the loss of wetlands, water withdrawals, and the disruption of natural hydrology. It is generally acknowledged that water quality is closely related to land use and that a watershed perspective is essential for maintaining water quality. The impacts of various land uses have degraded water quality in lakes, ponds, rivers, streams, estuaries, bays, salt ponds and groundwater. Increased nutrient loading to some water bodies has resulted in eutrophication, and threatens local and

regional economies based on recreational and commercial fisheries. Water conservation and Best Management Practices (BMPs) to protect water quality are essential elements for protecting critically important water resources.

Short Impact: The program made direct contact with 320 individuals in community organizations, 20 teachers, 125 municipal and regional planning officials, 150 state, federal agency personnel, and 800 members of the general public. 12,050 were contacted indirectly.

Program highlights for this year included:

- Beaver Lake Association restarted a long dormant monitoring program
- Fifteen towns initiated or enhanced ammunition, firearms, fireworks and military ordnance collection programs (hazardous waste disposal). Towns have disposed of dozens of containers of ammunition stored, sometimes for years, through this program.
- Thirteen Cape Cod towns initiated sharps collection programs. Cape Cod Healthcare is collaborating with Barnstable County Cooperative Extension and towns in the effort to stop disposal of sharps in the waste stream and public spaces. Since the start of the program in April, collection sites have given three hundred sharps collection containers to residents and taken in two hundred full sharps containers for disposal.
- Participation in the five-community Upper Cape Household Hazardous Products Collections increased 19% from 2004 to 2005.
- Hazardous materials collections increased 4.5% in the three-town Outer Cape Household Hazardous Products Collections
- Hazardous materials collections increased 18% and participation increased 30% in the Brewster, Harwich and Chatham Permanent Household Hazardous Products Collection Center
- There were twenty-five Household Hazardous Products Collections held in Cape Cod towns in FY05. Total participation was 6050 households, each bringing an average of 51 pounds of materials for disposal. This amounted to152.76 tons of hazardous materials removed from Cape Cod's waste stream. Fifty-seven per cent of all participants in household hazardous products collections were first time participants
- Seven hundred fifty digital thermometers and one hundred fifty programmable digital thermostats were received for exchange programs at household hazardous products (HHP) collections and public education programs.
- Negotiations with Cyn Oil led to an agreement by which participating towns will receive a ten-cent per gallon rebate on all used oil collected by Cyn. Most Cape towns utilize Cyn Oil for recycling used oil.
- Mercury collection programs in cooperation with businesses doubled in FY05. A record 95 pounds of elemental mercury were collected in FY05 and removed from the solid waste stream.

Source of Funding: SL3B&C, State, County, Contracts

FTE's: 2.03

Scope of Impact: State (MA)

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	$52,175	2.4	2	$11,922
UMEXT	$435,962	6.2	1	$16,400

Goal 5 Executive Summary –

Goal 5 projects focus on youth development, principally via the 4-H program as well as research and education projects targeted to improving rural communities through planning and access to software routinely used for community planning. Youth development impacts focused on animal science, general science literacy, leadership development, and communications skills. Specific efforts focused on at risk youth audiences.

Key Theme: Community Development
Title of Program/Project: Analyses of support, opposition and implementation of the Community Preservation Initiative
Contact Person: Hamin, E.
Brief Description of Program/Project: Massachusetts recently enacted the Community

Preservation Act (CPA), designed to support local growth management. This project will evaluate how and why towns have implemented the CPA, or not implemented it, to provide insight on its significance and how it can be adjusted in future years.
Short Impact: Expanded awareness of CPA among other states seeking to encourage local smart growth (through national/international publication listed below) Improvement to Massachusetts' reputation for innovative land use and community development policy (through publication listed below) Enhancement to continued support for CPA among Massachusetts policymakers and municipalities, because evaluation was positive Suggested revisions to CPA may be considered by legislature -- especially implementing a regional policy and addressing staffing issues in small towns.
FTE's: .1
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Impact of Change on Rural Communities
Title of Program/Project: Opportunities and Constraints for Interstate Greenway Planning in New England
Contact Person: Ryan, R., Lindhult, M., Fabos, J.
Brief Description of Program/Project: There is a need to coordinate greenway and open space planning across politically fragmented New England, in order to preserve the region's unique natural, cultural, and environmental resources. This project will explore the physical and institutional barriers to creating a New England-wide greenway network.
Short Impact: This study has created a consortium of greenway planners across New England that work towards collaborative land use protection and greenway development. Furthermore, it has informed the research about approaches to create large-scale, multiple jurisdiction greenway and greenspace corridors.
FTE's: .2
Source of Funding: Hatch
Scope of Impact: State

Key Theme: Impact of Change on Rural Communities
Title of Program/Project: Rural Low-Income Families: Tracking their Well-Being and Function in an Era of Welfare Reform
Contact Person: Mammen, S., May, G. A., Mietlicki, S. A.
Brief Description of Program/Project: The smooth functioning of the family is important to the well-being and viability of rural communities. This project will add to the understanding of rural low-income families over time using the primary longitudinal data set collected by the NC-223 multi-disciplinary research team.
Short Impact: Key findings: 1. Rural low-income mothers' quality of life is affected by their mental outlook, support of family and friends, and adequacy of their financial resources. 2. Employment can improve quality of life of low-income single mothers; working single mothers had incomes that were more adequate, they faced less deteriorating economic situations and were less food insecure. 3. Barriers to employment faced by Northeast rural low-income mothers include poor health, desire to stay home with young children, unreliable transportation, inaccessible and unaffordable child-care, and difficult working conditions at low wages.
FTE's: .4

Source of Funding: Hatch, Extension
Scope of Impact: State

Key Theme: Impact of Change on Rural Communities
Title of Program/Project: Development of a Gradient-Based Landscape Pattern Analysis Methodology
Contact Person: Mcgarigal, K.
Brief Description of Program/Project: The analysis of landscape patterns to aid land management is currently constrained by the lack of accessible methods for quantifying surface patterns. The purpose of this project is to develop and incorporate a suite of surface pattern metrics into the existing landscape pattern analysis software program, FRAGSTATS.
Short Impact: My lab is exclusively responsible for the development, distribution, and support of FRAGSTATS. The initial version (2.0) was released in 1995. Our latest version (3.3) and significant update was released in 2002. We are currently working on a major revision (4.0) of the software which we expect to release in mid-2006. As evidenced by the listserve membership demographics (several hundreds worldwide) and the frequency of use in scientific publications in the field of landscape ecology (I estimate that 10-20% of the papers published in the discipline's leading journal, Landscape Ecology over the last 5 years used FRAGSTATS), it is clear that FRAGSTATS is being used by hundreds of scientists, managers, and conservationists from academia, agencies, industry, and NGO's from around the world. There is no question that FRAGSTATS has had a major impact on the field of quantitative landscape ecology and has led to significant disciplinary progress and stimulated new directions in the state-of-the-art of landscape pattern analysis. FRAGSTATS has become the world?s leading software package for the calculation of landscape metrics and has greatly facilitated landscape level approaches to the understanding and management of natural resources. The ease of use of the software and efficient access to technical assistance has allowed landscape-level research and management activities to progress at a much faster rate than would be otherwise possible.
FTE's: .5
Source of Funding: USDA Grant, Industry Grant, Hatch
Scope of Impact: State

Key Theme: Children, Youth, and Families at Risk
Title of Program/Project: Building Capacity of MA Military Child & Youth Services
Contact Person: Gretchen May
Brief Description of Program/Project: With over 3000 soldiers deployed from MA and hundreds more on “ready reserve”, families are experiencing additional stressors due to one parent being gone. What to do with their children during out-of-school time is one such issue. To that end, MA CFY was approached to submit a proposal to connect 4-H and CFY efforts with military families in MA. The grant received is focused on connecting children of parents in the National Guard (NG), Army Reserve(AR) and Accessions Commands (AC) in MA to 4-H. Also included, upon request, is an effort to support the MA National Guard Youth Coordinator in developing a teen leadership program. A part-time 4-H program assistant will spend 12 hours per week supporting the staff of Hanscom AFB youth programs and recruiting Guard, Reserve and Accessions Command youth in the

surrounding areas into 4-H. She provides Hanscom staff and any newly recruited volunteers with orientation in running 4-H clubs, completing the appropriate paperwork, and connecting with the larger 4-H program in the county and in the state. Another CFY professional works with the MA National Guard Family Program Youth Coordinator to provide leadership development for youth in their program. This work includes recruitment of, training of and support for adults and youth. The goal is to develop a teen council. In addition, CFY staff will connect the media with military youth, where appropriate, and contact schools with print material in an effort to educate the civilian population on the effects of deployment on youth.

Short Impact: Direct contacts were made with 142 youth of military families and 65 Mass National Guard and Army Reserve personnel and volunteers. Indirect contacts included 9,000 military families receiving project information via their newsletters.

9 youth at Hanscom Air Force Base are enrolled in a 4-H After school club; another 11 are in process. 43 teens increased their leadership skills by participating in Teen Leadership trainings conducted for the Massachusetts National Guard. 19 evaluations were processed resulting in 95% of participants reporting some change in their understanding of leadership; 95% wanting to continue to participate in leadership trainings in the future; 58% stating they have talents or abilities they were willing to share and 68% stating they were interested in an active leadership role.

Source of Funding: SL3B&C, Contracts

FTE's: .4

Scope of Impact: Multistate Extension

Key Theme: Youth Development/4-H

Title of Program/Project: Building Capacity of Providers for Out-of-School Youth Programs

Contact Person: Gretchen May

Brief Description of Program/Project: Research shows that students in quality out-of-school (OST) programs have better academic performance, behavior, school attendance, and greater expectations for the future. Research also shows that ongoing and regular professional development of OST staff is a critical ingredient in developing effective and sustainable after school programs. Yet, according to a recent study conducted by the MA School-Age Coalition, current practitioners do not have consistent training. This program aims to address that need by providing technical assistance to OST programs through curriculum support and staff trainings.

The program aims to build relationships with out-of-school time programs, actively seek new diverse and non-traditional partners, train out-of-school time program staff, volunteers and Extension staff, assess training participants as part of national Extension evaluation system (ECI), facilitate access to National 4-H Council grants and Extension network, prepare educational training materials for print and web, and provide access to on-line professional development information, courses, etc.

Short Impact: The program reached 422 participants at training sessions and 334 collaborators at face-to-face meetings where education by Extension staff took place. The 4-H After school Sampler curriculum reached 2500 users. 4 different articles in the 4-H newsletter each reach

5000.

A 6-month follow-up survey of participants at workshops on brain development had a 28% return rate. Of those responding, 95% answered all 5 content questions correctly. A 6-month follow-up of participants at child development workshops yielded a 26% return. Of those responding, 100% answered all 3 content questions correctly.

Source of Funding: SL3B&C, County

FTE's: 2.09

Scope of Impact: State specific

Key Theme: Workforce Preparation

Title of Program/Project: Workforce Readiness

Contact Person: Karen Barshefsky

Brief Description of Program/Project: Preparing youth to become an asset in the world of work begins when a child is young and continues through adulthood. The character shaping and skill learning that happens in the home, school, and other places is an important foundation. Through the NCP project, youth and specifically higher risk youth will learn valuable skills in resume writing, conducting job searches and preparing for job interviews. At the same time, they will be exposed to various jobs and have the opportunity to demonstrate workplace behaviors and attitudes through actual job placement. Helping youth learn more about careers that best match their abilities and temperament can ensure job satisfaction and high productivity.

This program takes place in two locations. The workforce readiness project in North Adams focus's on working with youth, both males and females, who are either on probation or involved with a CHINS (Children in Need of Services) petition. Here, an Extension Educator offers workshops on: (1) the development of workforce preparedness skills with the goal of job placement with stipends awarded via the CYFAR grant. (2) life skills: decision-making, conflict resolution, problem solving, communication, goal setting, aspiration building, and character building; (3) and healthy lifestyle choices: drug and alcohol awareness, sexuality, and STD awareness. In Boston, educators incorporate workforce readiness as a unifying focal point to bring together youth from different communities to work together, learn useful skills, and accumulate relevant job experience that will then prepare them to be successful in seeking jobs. Work-related experiences include web page design and use of GPS and digital photography, and an environmental stewardship track engaging youth in a process of awareness and community service, working alongside people who care for, maintain, and protect the urban green spaces and public trees, a hands-on science module, and a module on working with children.

Short Impact: In North Adams, an evaluation was completed by 27 participants in the workforce readiness program over the course of the year. The survey asked participants to rate their agreement with statements regarding knowledge and attitudes about the job search process. Specific knowledge included job interviewing, filling out applications, and asking for references. This was a positive learning experience for the group. A large majority of the participants responded affirmatively to all the statements, including general attitude ("I am confident that I can get a job") and specific knowledge ("I know what to bring when I go to apply for a job"). A majority of participants reported that they had taken this knowledge a step further into the real world, with 18 reporting that they had already asked someone to be a reference and 20 reporting

that they had already filled out an application for a job.

In Boston, 35 participant evaluation forms were collected after the five modules. The evaluation form included a section asking youth to rate their own progress in terms of "getting along with others", "working under supervision", "attitudes toward work", and "skills and knowledge". Overall, youth participants believed that they had improved somewhat on all four areas. The exception was the Working With Children module, where the majority of participants indicated that they were not sure they had experienced gains, or that they had stayed the same. Youth participants ranked their skills and knowledge as the area with the most positive change. This was particularly evident in the Hands-on Science and Workforce Preparedness modules. The agency staff who worked with the youth in the Environmental Stewardship module believed that the skills and attitudes of a majority of participants had stayed about the same during that module, except in the area of skills and knowledge about environmental stewardship, where they believed there had been major improvement in the majority of youth.

Source of Funding: State, Contracts

FTE's: 1.75

Scope of Impact: State (MA)

Key Theme: Community Development

Title of Program/Project: UMass/Holyoke Planners Network Community Outreach Partnership Center (COPC)

Contact Person: Karen Barshefsky

Brief Description of Program/Project: This is the first year of this project, and this report represents a six month start-up period. This project will target low-income residents of Holyoke, primarily the Latino populations in the South Holyoke, Churchill, Flats, and Downtown neighborhoods. The struggle for basic human needs - housing, education, jobs, and public safety are the focal issues.

Activities include: 1. Education: a) Families and Parents: Leaders in Education - involving more parents in their children's education; and b) College Prep and Youth Development - involve youth in mentor programs and provide them with greater access to higher education. 2. Economic Development and Community Planning: a) Envisioning South Holyoke - community-wide meetings involved in a participatory envisioning process with community residents; b)Cultural and Media Asset Inventory and Creative Entrepreneurship - comprehensive survey of the arts and opportunities in Holyoke; c) Main Street redevelopment Project - analysis of properties on Main Street that are potential for purchase; and d) Small Business Development Through Converting Urban Lots to Gardening/Farming - addresses the problem gardening sites for contamination. 3. Puerto Rican Seminars - will address the lack of knowledge and understanding of Puerto Rican history and culture by area faculty and students.4) Financial Education and Sustainable Home Ownership - community financial education and sustainable home ownership workshops.

Short Impact: Direct contacts in this start-up period included 145 Latino residents of Holyoke, 100 of who were students.

In the College Prep and Youth Development component, gains in knowledge were assessed via a survey administered to 50 youth. Findings showed that: 80% of the youth who participated in

the after school “pathways to college” program reported that they better understood the steps they needed to take to get to college or a career. 75% of youth reported that after having participated in the College/Career Workshops they were both challenged and felt more confident to be able to achieve their college and career goals. 80% of youth reported that the youth focus groups were the first time they had the chance to discuss what helped and what prevented them from going on to college.
Source of Funding: State, Contracts
FTE’s: .2
Scope of Impact: State (MA)

Key Theme: Leadership Training and Development
Title of Program/Project: Massachusetts Envirothon
Contact Person: Will Snyder
Brief Description of Program/Project: Massachusetts communities face a wide range of challenges in environment and development. In addition to efforts that show results in the near term, such as training for local officials, there is a need for longer term education for the wider public. Supporting educators who introduce these issues and connect young people with their communities is an important element of any broad public education strategy. The Envirothon reaches not only young people but parents, community advocates, and policy-makers — and gets them thinking beyond the immediate crises to the roots and long term implications of key issues. As one of several partner agencies sponsoring the Mass Envirothon, UMass Extension serves as liaison between UMass interests (CNRE, School of Education, Community Service Learning program) and the Massachusetts Envirothon Committee, develop annual "current issue" community issues research curriculum, trains judges for the Envirothon event, and manages the Envirothon’s "community awards" program.
Short Impact: Approximate numbers of direct contacts by UMass Extension as part of this program include 300 youth, 80 educators, and 65 environmental agency staff, local officials, and environmental advocates. 25% of approximately 220 high school youth participants returned an evaluation form at the Envirothon event. Responses indicate several learning and action outcomes that meet Extension objectives, including science/environmental literacy, particularly knowledge of how science is applied to address real issues, skills and attitudes for effective teamwork, presentation skills, and civic literacy, including knowledge of the community, community research skills, and positive attitudes toward contributing to the community.
Source of Funding: State
FTE’s: .25
Scope of Impact: State (MA)

Key Theme: Workforce Preparation
Title of Program/Project: Boston Urban Stewards/Learn About Forests
Contact Person: Renée Toll-Dubois
Brief Description of Program/Project: People of color continue to be underrepresented in the UMass Amherst College of Natural Resources and Environment, and in the natural resource

professions. Urban teens are relatively unaware of the educational opportunities and resources available at UMass Amherst, particularly in areas related to natural resources. Urban youth are not aware, exposed, active, involved in environmental issues. At the same time, urban teens need improved employability skills and access to jobs, urban trees are in decline and continue to be underserved, and state and federal agencies as well as the private sector seek increased involvement and participation by urban people and "minorities". The Boston Urban Stewards initiative is a model for recruiting youth of color to become more involved in the environment by learning about the value of trees and green spaces, to develop skills that could be applied to future jobs in the green industry and beyond and to become advocates for the health and well-being of their urban environment.

The program offers youth hands-on community-based field work primarily during after school time and Saturdays. Activities include public street tree inventory health and maintenance assessment using IPod hand-held PCs, interviews and job shadowing with natural resource and environmental education professionals, skill development in tree identification, measurement, health and maintenance assessment, pruning, mulching, watering; community service and education events organized in specific neighborhoods; invasive removal, tree planting and woodland restoration; public speaking training; and the creation of specific educational products and outcomes.

Short Impact: Program direct contacts included 90 high school age youth, 32 middle school age youth, 145 elementary age youth, 72 natural resource professionals, and more than 1000 youth and adults at community events.

Assessments of youth show strong gains in basic forestry skills, scientific inquiry skills, job readiness, including web site development and use of electronic technology tools. All youth indicated increased awareness of educational and career opportunities. 3 former participants are now pursuing careers in natural resources and green industries.

Source of Funding: Smith Lever bc, state, gift

FTE's: 1.5

Scope of Impact: State (MA)

Key Theme: Youth Development/4-H

Title of Program/Project: 4-H Club Program - Youth Development

Contact Person: Sherrie Guyott

Brief Description of Program/Project: By providing youth the chance to practice and develop life skills as well as to have positive adult role models and mentors, 4-H provides a positive youth development experience for young people. Research from Tufts University shows that youth development programs are linked to higher levels of the "c's" of positive youth development: competence, confidence, connection, character and caring. Research also documents lower levels of problem behaviors among youth that participate in youth development programs. In addition, 4-H helps youth develop project related knowledge and skills in a safe, non-formal educational environment. The life skills that they develop such as communication, self-responsibility, decision-making and record keeping skills help prepare youth to enter the workforce and become effective citizens in a democratic society.

The 4-H system is large, including over 350 volunteers delivering the program to 2362 youth. This system must be managed to insure delivery of a high quality 4-H experience. Management activities include 1. Volunteer screening, filing of necessary forms, orientation of new volunteers 2. Member enrollment process including processing member paperwork, entering all members in database, collection and processing of fees 3. Information is distributed to members and leaders through newsletters, emails and mailings 4. A system of events and activities to support the focus areas is developed and implemented 5. Support is provided to advisory councils and local program councils 6. Publicity and recruitment efforts are conducted including press releases, feature articles, distribution of flyers and promotional materials, exhibits are conducted at fairs and other local events, 4-H Ambassadors are assisting with promotional activities and recruitment is conducted through the web site.

Short Impact: 4-H showed a 20% increase in club membership this year, from 2362 to 2825 club members. Participation in specific projects included 40 in Treasurers' Training, 35 in teen leadership, 56 in Teen Ambassador training, and 90 in school age child care and family clubs.

In addition, 21,615 youth were reached through school enrichment programs, and four issues of the newsletter were sent to 2812 volunteers.

A statewide community service project was completed. Over 200 toys and articles of clothing were collected for the FACES program at the UMass Medical Center.

Source of Funding: SL3B&C, State, County, Contracts, Gifts

FTE's: 4.6

Scope of Impact: State (MA)

Key Theme: Youth Development/4-H

Title of Program/Project: MA 4-H Animal Science Program

Contact Person: Carrie Chickering-Sears

Brief Description of Program/Project: The MA 4-H Animal Science Program is broadening its focus into new areas: heritage breeds, companion animals (assisted therapy) and offering new services such as day & weekend camps for youth from throughout the northeast. This will attract a new audience into the 4-H animal science program.

Short Impact: This program made over 1050 direct contacts with youth, parents, volunteers, and other members of the public through a variety of camps, quiz bowls, clinics, shows, tours, and seminars. High attendance at events indicates growing interest in this program. In addition, the 4-H Embryology program reached 1237 youth in school and after school settings.

9 4-H youth enrolled as freshmen in the UMass Vet and Animal Science Department.

Source of Funding: County, Gifts

FTE's: 1.55

Scope of Impact: State (MA)

Stakeholder Input Process –
No significant changes from last year's addendum.

Overview -
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 –
No significant changes from last year's addendum.

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
(Attach Brief Summaries)

Check one: _ **X**_ **Multistate Extension Activities**
Integrated Activities (Hatch Act Funds)
Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/ Activity	Actual Expenditures **FY2005**
Improved Fruit Quality for Consumers through Use of New Fruit Varieties & Species	**$ 6,543**
Using Pastures to Reduce Environmental Inputs from Animal Agriculture	**$31,400**
Fish, Wildlife, and Biodiversity Conservation	**$31,300**
Building Capacity of MA Military Child & Youth Services	**$16,398**
Total	**$85,641**

_____ _____
Director Date
Form CSREES-REPT (2/00)

Extension Multistate Project Descriptions (Smith Lever Act Funds)

1. Improved Fruit Quality for Consumers through Use of New Fruit Varieties & Species

This project has established plantings of new fruit varieties and species at the UMass Cold Spring Orchard Research & Education Center and at various farms. Thorough evaluation of potentially valuable varieties continued this year. Informal and formal quality evaluations were conducted to determine suitability for sales in Massachusetts, either as fresh or processed fruit. Farmers were informed of this research through publication of results in Fruit Notes, Healthy Fruit, Berry Notes, and fact sheets. Twilight meetings and annual winter meetings will also be used for regular updates. Press releases were used to inform consumers of new fruit varieties and species. The project aimed to reach 1000 established commercial fruit farmers and 100 new-entry commercial fruit growers.

2. Using Pastures to Reduce Environmental Inputs from Animal Agriculture.

The pasture coalition, comprised of regional organizations and New England Extension, arranged farm visits and pasture walks on farms (some institute farms). Added-on to the farm tour FY 2005 was a pasture condition review (which included species identification, etc.) at each farm as well as other pasture related management topics (i.e. grass- fed beef ultra-sound grading, New Zealand style calf rearing, added-value product and organic certification). The visits where arranged with the intention of being more animal species specific (beef, sheep and dairy) and offered at designated levels of experience. The schedule for the farm visits where coordinated with similar planned pasture walks in Connecticut and the NELA Grass-Fed Beef Conference. New and current educational materials on pasture were distributed. In addition to the pasture walks five Prescribed Pasture Management Plans (3 beef, 1 dairy and 1 sheep) have been written from farmer contact through USDA-NRCS.

3. Fish, Wildlife, and Biodiversity Conservation

Biodiversity is a large and all-encompassing concept and we may never know all we'd like to know about it. Management decisions cannot always wait for a complete understanding of potential impacts without risking the loss of species or communities of species due to inaction. Conservation organizations, state and federal agencies, natural resource professionals, landowners and land managers must all have access to the most up-to-date information on ecosystem management and restoration in order to effectively manage for biodiversity.

Activities for this program consist of development of “Conservation Management Practices” to protect rare species during timber harvesting, work with Forest Stewardship Program on use of Community Assessment analysis for prioritizing stewardship cost sharing, develop a web-based system for disseminated results of CAPS analyses, research the effectiveness of wildlife passage

structures, develop web site on transportation impacts on fish, wildlife and ecosystems and a variety of research and education projects focused on ecosystem management and protection.

4. Building Capacity of MA Military Child & Youth Services

With over 3000 soldiers deployed from MA and hundreds more on "ready reserve", families are experiencing additional stressors due to one parent being gone. What to do with their children during out-of-school time is one such issue. To that end, Extension was approached to submit a proposal to connect MA 4-H with national efforts to reach military families in MA. The grant received, and supplemented by Extension funds is focused on connecting children of parents in the National Guard (NG), Army Reserve(AR) and Accessions Commands (AC) in MA to 4-H. Also included, upon request, is an effort to support the MA National Guard Youth Coordinator in developing a teen leadership program.

Extension staff work with the Hanscom AFB staff of the Guard, Reserve and Accessions Command to reach youth in the surrounding areas via 4-H. Volunteers are assisted with orientation in running 4-H clubs, completing the appropriate paperwork, and connecting with the larger 4-H program in the county and in the state. Another Extension professional works with the MA National Guard Family Program Youth Coordinator to provide leadership development for youth in their program.

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
(Attach Brief Summaries)

Check one: _ **X**_ **Integrated Activities (Smith Lever Act Funds)**
Integrated Activities (Hatch Act Funds)
Multistate Extension Activities

Title of Planned Program/ Activity	Actual Expenditures FY2005
Marine Resource Conservation	**$ 8,445**
Improved Fruit Quality for Consumers through Use of New Fruit Varieties & Species	**$ 6,543**
Educational Training for Recreational Farmers	**$13,951**
Nutrient Management for Dairy Farms	**$22,540**
Fish, Wildlife, and Biodiversity Conservation	**$31,300**
Total	**$82,779**

_____ _____
Director Date

Form CSREES-REPT (2/00)

Extension Integrated Research Project Descriptions (Smith Lever Act Funds)

1. Marine Resource Conservation

Shellfish farming is practiced by the coastal municipalities of southeastern Massachusetts for restoration and restocking as well as by private individuals for economic gain. In 1996, the landed value of the shellfish farmed in southeastern Massachusetts was in excess of $4.5 million in reported income. However, shellfish aquaculture has a much broader economic impact, in excess of $15.5 million. Aquaculture crops, particularly shellfish that are farmed in inter tidal and shallow sub tidal locations, utilize relatively small areas of the tidal flats but are highly valuable and require intensive skilled management.

Program activities focus on training and educating aqua culturists to improve production (workshops, demonstration, web site information – all include multi-state collaboration), bay scallop restoration using pulsed pediveliger release, quantitative assessment of shellfish habitat, monitoring of shellfish diseases (research and workshops), monitoring and reporting marine water quality data (Web site information), development of GIS database of fisheries and shellfish aquaculture statistics (Web site and workshop component) and development of regional product marketing.

2. Improved Fruit Quality for Consumers through Use of New Fruit Varieties & Species

This project has established plantings of new fruit varieties and species at the UMass Cold Spring Orchard Research & Education Center and at various farms. Thorough evaluation of potentially valuable varieties continued this year. Informal and formal quality evaluations were conducted to determine suitability for sales in Massachusetts, either as fresh or processed fruit. Farmers were informed of this research through publication of results in Fruit Notes, Healthy Fruit, Berry Notes, and fact sheets. Twilight meetings and annual winter meetings will also be used for regular updates. Press releases were used to inform consumers of new fruit varieties and species. The project aimed to reach 1000 established commercial fruit farmers and 100 new-entry commercial fruit growers.

3. Educational Training for Recreational Farmers

This project seeks to develop an instructional/research dairy farm dedicated to developing technologies that will improve the profitability and reduce the environmental impact of small dairy farms, engage UMass students, producers and 4-Hers in the research enterprise and develop data that will lead to additional external funding for farm based research on animal nutrition, pasture management, manure remediation and mammary gland inflammatory biology. Audiences include dairy farmers, 4-H dairy cattle project youth and leaders, UMass students, FFA schools, and school tours, and professionals from the MA Dept of Ag Resources, NRCS and USDA.

Project activities included a 4-H/community farm education program (host calf sales, 4-H & FFA camps, day seminars, and tours for school groups); a pasture management program dedicated to reducing agricultural pollution (day and evening seminars for producers, pasture walks, research trials); and an instructional research dairy (mammary inflammation research, UMass student research projects, work study opportunities for students). Projects developed and conducted in collaboration with Vermont and Connecticut.

4. Nutrient Management for Dairy Farms

On a typical dairy farm, there is often an over-supply of farm nutrients on croplands, particularly nitrogen and phosphorus from excess application of nutrients and/or mismanagement of manure application to the fields. This may have a significant non-point source of pollution risk to the water resources. Through nutrient management planning, there will be an economic incentive for dairy farmers to adopt farming practices which are environmentally sound and reduce unnecessary expenditures for commercial fertilizers.

This project targets dairy farmers, other livestock producers, and professionals from USDA agencies with fact sheets, computer programs, newsletters, on-farm research demonstrations, field days and twilight meetings, and customized nutrient management plan for individual farms to be used as educational workshops.

5. Fish, Wildlife, and Biodiversity Conservation

Biodiversity is a large and all-encompassing concept and we may never know all we'd like to know about it. Management decisions cannot always wait for a complete understanding of potential impacts without risking the loss of species or communities of species due to inaction. Conservation organizations, state and federal agencies, natural resource professionals, landowners and land managers must all have access to the most up-to-date information on ecosystem management and restoration in order to effectively manage for biodiversity.

Activities for this program consist of development of “Conservation Management Practices” to protect rare species during timber harvesting, work with Forest Stewardship Program on use of Community Assessment analysis for prioritizing stewardship cost sharing, develop a web-based system for disseminated results of CAPS analyses, research the effectiveness of wildlife passage structures, develop web site on transportation impacts on fish, wildlife and ecosystems and a variety of research and education projects focused on ecosystem management and protection.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities
(Attach Brief Summaries)
Fiscal Year: 2005

Select One: □ Interim X Final
Institution: University of Massachusetts Amherst
State: MA

	Integrated Activities (Hatch)	Multistate Extension Activities (Smith-Lever)	Integrated Activities (Smith- Lever)
Established Target %	*25%* *%*	%	
This FY Allocation (from 1088)	**$2,099,037**		
This FY Target Amount	**$524,760**		
Title of Planned Program Activity			
MAS00896	**$51,842.00**		
MAS00496	**$6500.00**		
MAS00881	**$43,000.00**		
MAS00916	**$30,190.00**		
MAS00539	**$1,382.00**		
MAS00647	**$3,038.00**		
MAS00747	**$49,760.00**		
MAS00763	**$84,257.00**		
MAS00826	**$56,179.00**		
MAS00841	**$21,331.00**		
MAS00850	**$6,137.00**		
MAS00880	**$1,879.00**		
MAS00895	**$67,174.00**		
MAS00877	**$25,323.00**		
MAS00886	**$10,222.00**		
MAS00876	**$1,700.00**		
MAS00878	**$102,460.00**		
MAS00873	**$50,465.00**		
Total:	**$612,839.00**		

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.

, Associate Director, MAES **Date**

Integrated Research Projects

MAS00896 Cryphonectria parasitica has been identified as the causal agent of chestnut blight which has been responsible for the widespread loss on the American Chestnut. The goal of this study is to reestablish the American Chestnut for agricultural production, and to elucidate the fungal community on American Chestnut bark, in hopes of identifying a possible biocontrol agent(s) to the pathogen Cryphonectria parasitica.

MAS00496 Acid rain and atmospheric pollution continues to be a regional and national problem. The site's data contributes to the accurate assessment of precipitation chemistry and the effectiveness of the nation's air pollution laws and regulations.

MAS00881 many components in foods can have positive effects on health yet little is know about how they work. This project will investigate how non-essential nutrients from foods improve health.

MAS00916 Despite the importance of fruit, vegetable and whole grain intake in maintaining health and functional status, older adults are not meeting minimum dietary recommendations. This project will examine behavioral approaches to encourage older adults to increase their intakes of these beneficial foods.

MAS00539 Global competition increases the need for enhanced efficiency of orchard businesses. Rootstocks dramatically affect efficiency and fruit quality, but results vary greatly with climate and pest pressure. Further, new rootstocks are becoming available regularly, thus potentially enhancing efficiency. This project evaluates the performance of tree-fruit rootstocks with a variety of climates, pest pressures, cultivars, and training system in order to enable orchardists to develop orchards with the greatest likelihood of economic success and least likelihood of environmental damage.

MAS00647 This project helps to introduce a new crop to local growers for the benefit of fresh markets and good nutrition for this growing ethnic population. We have been able to supply virus-free seed to interested commercial growers, community groups, and institutions. We have begun a breeding program to select for genetic resistance to the virus. In addition, we continue to select for increased fruit size and productivity.

MAS00747 The apple industry in the US needs timely information on the attributes and regional adaptability of new cultivars order to avoid wasting. Plant Pathologists, entomologists and horticulturalists are cooperating to identify the best and most adaptable apple cultivars.

MAS00763 Global competition increases the need for enhanced efficiency of orchard businesses. Rootstocks dramatically affect efficiency and fruit quality, but results vary greatly with climate and pest pressure. Further, new rootstocks are becoming available regularly, thus potentially enhancing efficiency. This project evaluates the performance of tree-fruit rootstocks with a variety of climates, pest pressures, cultivars, and training system in order to enable orchardists to develop orchards with the greatest likelihood of economic success and least likelihood of environmental damage.

MAS00826 Turfgrass areas are perceived to contribute significantly to the pollution of surface water (phosphorus, nitrates and pesticides) and groundwater (nitrate and pesticides). Management strategies that integrate pest resistant germplasm, cultural practices, biological agents, biorational compoundds and the judicious use of pesticides constitute (BMPs). A better understanding of the fate of fertilizers and pesticides in turfgrass systems is needed to evaluate and develop BMPs that minimize any potentially adverse effects on humans and the environment.

MAS00841 To evaluate the utilization of sewage biosolids in soil management in the Northeast by assessing the sustainability of soil quality, water quality and food safety (for people and other animals) where sewage biosolids are applied to agricultural land. To develop appropriate outreach materials and educational events for the Northeast that links the current research to actual field management of sewage biosolids products in the Northeast.

MAS00850 Plum pox disease or "Sharka" is one of the most devastating and economically important diseases of stonefruit worldwide. Surveys are being undertaken to determine the extent of incursion into new areas.

MAS00880 Our results are fundamental to understanding factors that affect O3 uptake and plant injury. This has direct bearing on air quality standards for plants and people. We are also identifying new bioindicators for O3 that will increase public awareness of the O3 problem.

MAS00895 Fruits which are of high quality at the time of harvest are often reduced to poorer or even unacceptable quality by the time they reach the consumer. This project seeks to find ways to extend storage life of fruit and to contribute to providing consumers with attractive, nutritious, and flavorful food.

MAS00877 Recreational fees are being increased but little is known about the impact on low income users. Forest ecosystem management programs are being proposed but little is known about how landowners will respond.

MAS00886 The smooth functioning of the family is important to the well-being and viability of rural communities. This project will add to the understanding of rural low-income families over time using the primary longitudinal data set collected by the NC-223 multi-disciplinary research team.

MAS00876 Quantity and quality of time devoted to certain types of out-of-school activities may be differentiated according to the diverse familial and ethnic background of youths. This project will examine the influences of those familial and ethnic factors using selected family and ethnic characteristics.

MAS00878 Several possible reasons exist for the low reproductive success & importantly among them are the environmental and metabolic stresses that these animals must bear to achieve high milk production yields. We will assess possible detrimental effects on oocyte maturation and developmental competence of the female gamete. We expect to find abnormalities & since we

will evaluate the molecules involved in such effects, appropriate preventive measures can be taken.

MAS00873 Nuclear transplantation provides robust means to create transgenic livestock rapidly. However, facile methods to introduce targeted alterations in the bovine genome are needed to take full advantage of this technical advance. Toward this goal we are developing strategies to interrupt cellular pathways that inhibit homologous recombination. Using these methods it should be possible to move genetic polymorphisms that affect production between breeds.