

Sent 7/20/99



UNIVERSITY of  
MASSACHUSETTS  
201 Stockbridge Hall  
Amherst, MA 01003

Office of the Associate Director  
Massachusetts Agricultural Experiment Station

voice: 413.545.2771

July 15, 1999

Mr. Bart Hewitt  
Partnerships/POW  
USDA/CSREES  
Mailstop 2214  
1400 Independence Avenue, SW  
Washington, DC 20250-2214

Dear Bart:

Enclosed, you will find the Massachusetts Plan of Work. It is a collaborative effort on the parts of the Massachusetts Agricultural Experiment Station and Umass Extension. If you need any further information, do not hesitate to contact, Dr. Mark Mount, Trish Manfredi, or myself

Sincerely,

A handwritten signature in cursive script, appearing to read 'Patricia Cromack', is written over the typed name.

Patricia Devine Cromack  
Research and Systems Analyst

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# Massachusetts Plan of Work 2000-2004

## Introduction:

The Massachusetts Agricultural Experiment Station is headquartered in the College of Food and Natural Resources at the University of Massachusetts. UMass Extension is a division of University Outreach in the Provost's Office at the University of Massachusetts.

✓ This Plan of Work is a comprehensive statement of the MAES's intended research activities and the activities of UMass Extension for the next five years, as required by the Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA), and as allowed under the USDA's "Guidelines for Land Grant Institution Plan of Work". This is a joint research and extension plan.

## Point of Contact:

All correspondence regarding the Massachusetts Agricultural Experiment Station portion of this plan should be directed to:

Dr. Mark S. Mount  
Associate Dean & Associate Director  
Massachusetts Agricultural Experiment Station  
201 Stockbridge Hall  
University of Massachusetts  
Amherst MA 01003  
e-mail: [mount@fnr.umass.edu](mailto:mount@fnr.umass.edu)  
Voice: 413.545.2771 FAX: 413.545.5910

All correspondence regarding the UMass Extension portion of this plan should be directed to:

Dr. Patricia Manfredi  
Assistant Director for Federal Relations  
UMass Extension  
213 Stockbridge Hall  
University of Massachusetts  
Amherst, MA 01003  
e-mail: [tmanfredi@umext.umass.edu](mailto:tmanfredi@umext.umass.edu)  
Voice: 413.545.2673 FAX: 413.545.6555

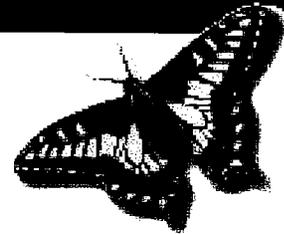
## Adoptions by Reference:

1. We adopt by reference the Northeast Plan of Work for fulfillment of our obligations to the AREERA's multi-state, multi-disciplinary and integrated research activities. Accomplishments reporting on multi-state, multi-disciplinary, and integrated research activities for MAES will be through the annual Northeast impact statements and the Northeast results reports.
2. We adopt by reference the University of Massachusetts' procedure for reporting Civil Rights compliance and Equal Employment Opportunity requirements. These reports will be filed through the University of Massachusetts Office of the President to the U.S. Department of Education.
3. The stakeholder input process described in this 5-Year Plan of work also considers the use of McIntire-Stennis forestry research and animal health and disease research funds.



# Massachusetts Agricultural Experiment Station

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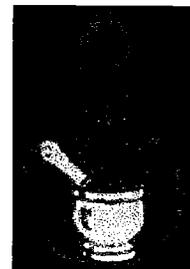
# UMASS EXTENSION

## 2000-2004 Plan of Work



Pesticide Education	Floriculture	Cranberries	Integrated Pest Management	Tree Fruit
Landscape Nursery	Vegetable & Small Fruits	Turf Grass	Dairy Livestock	Sustainable Agriculture

Program Information	<b>4-H Youth and Family Development Program</b>		University of Massachusetts Extension
Environmental Stewardship			Staff and Leadership
Community Development			National 4-H Council
Life Skills			2000-2004
501 Organizations	How To Volunteer	Camps	Program Advancing State Strategies
Diversity	Part for Youth	Part for Adults	Resources



# OVERVIEW

## Massachusetts Agricultural Experiment Station

### Goals

1. An agricultural production system that is highly competitive in the global economy
2. A safe, secure food and fiber system.
3. A healthy, well-nourished population.
4. Greater harmony between agriculture and the environment.
5. Enhanced economic opportunity and quality of life for Americans.

*Each numbered goal will be highlighted throughout the text and, in many cases, more than one goal will correspond to given areas of research.*

As the University of Massachusetts reexamines its role as a land grant institution, a planning process has been initiated to investigate and better meet the needs and expectations of its many constituents.

The mission of the College of Food and Natural Resources (CFNR) at the University of Massachusetts is to advance knowledge in its core areas by fulfilling its evolving land grant responsibilities and those of the University. To accomplish this, the College offers broad educational opportunities to a wide spectrum of public audiences, conducts applied and basic research that addresses the needs of citizens, businesses, and public agencies and makes numerous outreach opportunities accessible to its constituents. The College is uniquely qualified, equipped and committed to fulfilling its land grant responsibilities by promoting and contributing to economic development, environmental quality and human capacity building through programs in four programmatic cornerstones that provide a foundation for the College's future educational, research, and outreach offerings: Applied Management, the Environment, Planning and Design, and Plant and Animal Systems. These programmatic cornerstones provide the College with a focus for its planning efforts. The basic structure offered by the cornerstones encourages College departments to form working partnerships, collaboratively creating the fundamental building blocks for the future programs.

### Cornerstones:

*Applied Management*<sup>s</sup> - Applied management, the training of professionals in a wide variety of business-related disciplines, is a cornerstone of CFNR. These programs have been brought together to take advantages of commonalities while at the same time maintaining their uniqueness and autonomy. The departments involved share many areas of common interest. Enhanced quality of life, whether in environmental, social consumer or entertainment areas, is a concern of many departments in CFNR. This is especially true for the departments that concentrate on tourism and hospitality, sport and entertainment, retail, and family, consumer, and social needs. As we approach the twenty-first century, the need for business specialists, consumer experts and family

development professionals may be higher than ever before. The state also faces a desperate need for skillful professionals to deal with the failure in the family social systems.

*The Environment*<sup>4,5</sup> - The environment in Massachusetts is the product of millennia of natural forces and relatively recent human interaction with them. The landscape of Massachusetts, although severely altered in the past, is currently 66 percent forested. This is the third most densely populated state, yet forests and open space are the dominant landscape form. These factors, when joined with the Commonwealth's form of strong town governance, have led to a populace strongly interested in the quality of their physical environment. The College's status as the leading environmental educational program in New England is greatly assisted by the local convergence of state and federal agencies responsible for natural resource and environmental research and management. Research branches of the U.S. Fish and Wildlife Service, Forest Service, and National Marine Fisheries Service have active research and education units located on campus.

*Planning and Design*<sup>5</sup> - Massachusetts and New England communities face increasingly complex problems in managing their growth, promoting economic development and providing sustainable and livable environments for their residents. While expertise that focuses on aspects of these issues is found in many locations on the Amherst campus and within the University system, only CFNR provides instructional, research and outreach programs that specifically address the appropriate and achievable balance among competing needs and interests. The College's Department of Landscape Architecture and Regional Planning and the Department of Resource Economics are dominant players in these areas. There are also strong interests and capabilities in the Department of Natural Resources Conservation.

*Plant and Animal Systems*<sup>1,2,3,4,5</sup> - Plant and animal systems will remain a cornerstone of the College in the twenty-first century. CFNR will continue to serve agricultural needs in areas that are beneficial to the Commonwealth's economy<sup>5</sup>. Future growth areas include horticultural products related to increased urbanization, the production of high value specialty crops, and value-added processing of food products. The emphasis in plant and animal systems will continue to be technology-driven. Biotechnology, one of five program areas proposed for this cornerstone, is the application of modern biological or chemical manipulations to increase the value of, enhance, or preserve biological species and products. Plant and Animal Biotechnology programs will utilize genetic resources to increase the efficiency of existing agricultural and food processing enterprises and create new economic opportunities<sup>1,2,5</sup>. Plants resistant to pests and diseases, weeds and stresses will increase productivity and improve the quality of our environment by decreasing the use of agricultural chemicals<sup>1,4</sup>. Efficient production of food, fiber and polymers will be increased by adoption of new techniques in biotechnology<sup>2</sup>. Plants, animals and/or microorganisms will become primary producers of pharmaceutical, biopolymers, food ingredients, flavors and colors, organs for human transplantation and models for the study of diseases<sup>1,2,3,4,5</sup>. Areas that will benefit from an expanded effort in biotechnology include the development of: novel pharmaceutical and food additives; biocontrol technologies; and superior germplasm for disease and insect resistance, enhanced quality, and maintenance of species diversity. Additional areas include the development of downstream processing for the

utilization of waste as well as biotechnology-derived and genetically unique products<sup>2,4</sup>. The other four programs are: production ecology; value-added technologies; food safety and quality; and biopolymers and natural products.

The Production Ecology program will focus on development of plant, animal, marine and land use management programs that are ecologically sound sustainable and economically viable<sup>4,5</sup>. The efficient production of plants, animals and marine species and the wise use of forests, land and water resources are necessary to preserve open space, maintain a green living environment, protect water quality and maintain biodiversity. The Production Ecology program views farms, fields, communities, forests and marine systems as complex managed ecosystems involved in the production of food and fiber in a way that results in a quality living environment. Integrated plant and animal production systems will be based on research in biological control of insects and weeds, integrated pest management, long term rotation effects, nutrient cycling and complex crop, pest, animal and environmental interactions. This focus of the Production Ecology program allows linkage with Plant and Animal Biotechnology to develop new plants and animals that will provide new opportunities for the implementation of sustainable production and processing systems<sup>1</sup>.

Value-added Technologies increase the value to food and fiber systems by over \$700 billion dollars annually through new product and process development. By combining education, research, facilities and outreach in production science, the College of Food and Natural Resources is unique in its ability to create value-added technologies by focusing on basic and applied research and consumer interests<sup>2</sup>. The value-added products of Ocean Spray Cranberries reached \$1 billion in sales in 1993. Contributions from Food Science assisted in the development of Cranapple Juice™, one of the first and most successful value-added products of the cranberry industry. Today, cooperative research on sugar infused fruit and the development of craisins, a sweetened dried cranberry, will provide new marketing opportunities for the cranberry industry. Veryfine Products Inc. reports a \$100 million annual increase in sales due, in part, to new products developed in cooperation with the Food Science Department in CFNR using their pilot plant. Other fruit crops important to Massachusetts and the region, along with the dairy industry, will benefit from processing technologies and educational outreach programs. Linkages to plant and animal biotechnology will lead to the production of new ingredients and further the development of new technology oriented food companies<sup>1,5</sup>. Technologies for processing fish waste into value-added products have been developed in the last five years with at least two independent companies coming into being<sup>5</sup>. Agricultural and marine products will offer equally exciting opportunities for adding value through the development of processes and products leading to medicines, health related products, biofuels, packaging, building materials, clothes and food flavors and colors. Clearly, value-added technologies are critical for economic development and the growth of new jobs<sup>5</sup>.

Research in food safety and quality is undergoing dramatic changes due to a new scientific base, new definitions of total quality and heightened consumer awareness. In order to meet these diverse demands, basic research in food, plant, and animal systems must be combined with product safety considerations, from production to consumption, rather than on product safety alone<sup>2</sup>. This entails a systems approach combining production,

processing, storage, marketing and education in order to produce safe, high quality and nutritious foods. Assessment of nutritional risk in elderly, fiber, vitamin and mineral supplementation will add to a healthy, well-nourished population<sup>3</sup>. Microorganisms, natural toxicants, antibiotics, and pesticides all have to be monitored faster and with more precision. This will require the development of biosensors, immunoassays and DNA probes among other techniques. Better food processes must be developed to minimize microbial growth and the formation of potentially harmful reaction products and prevent nutrient degradation<sup>2</sup>. Alternatives may have to be found for antibiotics in animals and pesticides and herbicides in plants, to deal with problems of resistance and environmental contamination<sup>4</sup>. Sound scientific information provides a foundation for rational policy and regulations which promote consumer understanding and meet the needs of society.

Biopolymers and Natural Products program will involve the production, identification, isolation, and modification of plant, animal and marine products, polymers, and extracts necessary to meet industrial, food, feed, and pharmacological demands for compounds with specific biological action, consistency, and/or structure. The biopolymer and natural products program works with the food and ingredient industry, agricultural producers and other professionals in the food system<sup>1,2</sup>. The capacity of the program to tailor biopolymers with specific properties finds a wide range of applications in engineered foods, such as meat substitutes produced from fish and soybeans<sup>2</sup>. Other examples are the use of natural and/or, synthetic polymers designed to release synthetic copies of insect behavior-modifying chemicals for insect control or polymers to extend the shelf life of foods and provide edible packaging<sup>1,2</sup>. The program in natural products is also fundamental to understanding the taste and odor properties of foods, flavors and chemicals that influence sensory perception. Specific applications of this program in the College include the development of plants that are less susceptible to pests because of changes in their defensive array of natural products<sup>1</sup>, the identification and use of natural products to interfere with mate and/or host finding interactions of pests and the development of new foods and ingredients which meet the health needs of the consumer<sup>3,5</sup>. As we look to the future, it is obvious that we will use natural products and biopolymers in the medical field to create desirable biorational insecticides, modify plant growth and develop new foods and food ingredients<sup>1,2,4,5</sup>.

The faculty of the CFNR are involved in an impressive array of research projects, including: genetic improvement of plants and animals; conservation of threatened ecosystems; enhancing profitability through value-added processing; optimal planning of community development; and improving the lives of consumers and families. Many of these projects create immediate benefits for citizens, businesses and communities of the Commonwealth by providing new technologies and analyses which improve tourism, human nutrition, environmental protection, biomedicine, agricultural profitability and food processing.

## **OVERVIEW**

### **UMass Extension**

Effective, July 1, 1999, UMass Extension has completed the final administrative elements in the transition to become a formal outreach arm of the University of Massachusetts at Amherst, with administrative reporting lines to the Vice Provost, University Outreach, rather than to the Dean of the College of Food and Natural Resources. This was the first administrative change at the campus level since the Extension system was created.

A strong and integrated programmatic relationship continues with the College of Food and Natural Resources (CFNR). Faculty who have Extension appointments in combination with research and/or teaching appointments continue in the College's academic departments. Professional staff, including off-campus Extension Educators, are now formally members of the appropriate academic departments, as are Extension support staff, including clerical and technical positions. Three of Extension's four program areas, Agroecology, 4-H Youth and Family Development, and Natural Resources/Environmental Conservation, are integral to CFNR academic departments. The fourth program area, Nutrition Education, is part of the department of Nutrition, in the School of Public Health and Health Sciences (SPHHS).

Three of the four program coordinators are now faculty members, rather than professional staff. This change in status has facilitated the integration process within the academic departments, and with the research base.

UMass Extension is now positioned equally with campus Outreach units, including Continuing Education, Economic Development and others, and is taking the leadership to address several major outreach issues, such as reward and recognition systems for faculty involved in outreach, and communications and marketing of outreach to the citizens of the Commonwealth.

While public funding has not increased significantly, University support through the state budget continues to grow through 1999, and while a level-funded state budget is anticipated for FY2000, efforts are underway to advocate for increases for FY2001. In 1999, new professional staff and support staff were hired, primarily in 4-H Youth and Family Development, permitting expansion of programs in the Worcester, Boston and North Shore areas of the Commonwealth. The urban programs lost as a result of the downsizing in 1989, and nearly a decade of reduced state funding have been rebuilt.

As a result, UMass Extension has become very competitive in the grants and contracts arena, to the extent that grants and contracts in FY98 made up 20% of the total UMass Extension budget, and fees and gifts accounted for another 7%. Smith-Lever b&c funding was at 22%, and Smith-Lever 3d at 12%. State, University and county funds totaled 39%. The shift in funding sources reflects UMass Extension's attention to emerging state and local needs, as well as a record of accomplishment.

This five year plan of work is the first plan of work to be developed with the input of the UMass Extension Board of Public Overseers, created in 1997 by the Massachusetts Legislature to give stakeholders in Extension's programs a formal advisory role. The Board, whose members are appointed by the Governor, advise the Chancellor of the University of Massachusetts at Amherst on *overall* goal setting, budget and program delivery. While over 1000 citizens are currently engaged in providing advice to specific Extension programs, this 15-member board has been asked to take a broad and long term view of the needs of four constituency groups served by Extension and help the University identify and secure the resources needed to address those needs. The Board has full support from the campus Provost and Chancellor. Specific details of current and future Stakeholder input are detailed in the Section: Stakeholder Input Processes

Members of the Board represent the following groups and organizations: Massachusetts 4-H Foundation, Massachusetts Farm Bureau Federation, Massachusetts Nutrition Board, University of Massachusetts Outreach Office, Massachusetts Arborists Association, Massachusetts Forestry Association, University of Massachusetts President's Office, Massachusetts State Department of Food and Agriculture, Massachusetts Audobon Society, and Massachusetts 4-H State Advisory Council. The Board is currently developing a plan to expand representation beyond what the initial legislation specified.

UMass Extension continues to be an active member of the New England Extension Consortium, through which institutional support for multi-state activities is formalized through grants programs, conferences, workshops for users, publications and research projects.

## Process for Developing the Plan of Work

Although there is considerable functional integration of research and extension efforts, particularly in the College of Food and Natural Resources, a joint plan of work, which was an option under the GPRA process, had not been previously attempted. For this plan, the leadership of the Agricultural Experiment Station and UMass Extension committed to the development of a joint plan of work. Since AES does not have program areas and teams as does UMass Extension, several preliminary sessions were needed to discuss options. This resulted in a novel approach of convening research and extension faculty and staff on a single day, by Goal, to prepare an initial draft of plans for each goal. Each writing team had access to all Hatch project reports and Extension planning documents. In addition, the Northeast Research and Extension Program Outcomes Framework (<http://www.umass.edu/umext/consortium>) Attachment #5, which was developed by the Northeast Extension and Research Directors at their Winter 1999 meeting, was used to organize the plan. *Measuring Program Outcomes: A Practical Approach*, from the United Way of America, was used to provide a working outline and definitions. It may be found at: <http://www.unitedway.org/outcomes/library.htm>

This process of writing teams had several outcomes, in addition to the draft document. It focused leaders of research and extension on the 'fit' of research efforts to extension programs, as well as conversely. Further, it prompted dialogue to address strengthening the relationship of extension-research efforts.

Since UMass Extension delegates much responsibility to program coordinators, and in keeping with the lack of a formal template from CSREES-USDA, the final plan for each goal differs in format from the others. It was decided not to spend time 'fitting' each team's writing style into one mold.

## Stakeholder Input Processes

### *Introduction:*

Stakeholders are an integral part of research and extension at the University of Massachusetts, providing input in both formal and informal ways. There is continuous input and interaction between primary stakeholders and the components of UMass Extension and the Massachusetts Agricultural Experiment Station. The research and extension function are, at times, so integrated that it is difficult to determine where one begins and another stops. Most UMass faculty in the College of Food and Natural Resources (CFNR) have split appointments including research, instruction and extension. With a strong campus focus on outreach, many CFNR and School of Public Health and Health Sciences (SPHHS) faculty are involved with Extension customers, even if they do not hold a formal extension assignment. There is a natural flow of research needs from the 'field' to implementation as a research project, to dissemination of the results back to the primary users. Program teams, particularly Agroecology and Natural Resources and Environmental Conservation, are made up of faculty who have joint appointments, as well as of professional Extension educators who are equally involved in applied research projects. Thus, when faculty and staff interact with stakeholders, they represent both research and extension. Information gained from both from stakeholder processes as well as the informal ones, informs both research and extension issue identification and the resulting research projects and extension education programs.

### *State-wide organizational stakeholder input:*

Oversight for UMass Extension rests with the University of Massachusetts Board of Public Overseers, which was created by the State Legislature in 1997. The Board has been meeting quarterly since March 1998. The early meetings focused on program priorities and budgeting processes. The Board has learned about the eight categories of funding which support four programs in two colleges, over 200 staff members on campus and in 19 field offices, administrative services including communication and marketing, professional development, equipment, diversity, leadership, etc.

The Board has met with University of Massachusetts Chancellor Scott twice and University President Bulger once. The Board, in 1998-1999, had dialogue with Extension Program Coordinators at all meetings to discuss program priorities and funding. The Board is actively involved in the priority setting process.

The Board is appointed by the Governor. Currently, the Board is composed of the following groups and organizations: Massachusetts 4-H Foundation, Massachusetts Farm Bureau Federation, Massachusetts Nutrition Board, University of Massachusetts Outreach Office, Massachusetts Arborists Association, Massachusetts Forestry Association, University of Massachusetts President's Office, Massachusetts State Department of Food and Agriculture, Massachusetts Audubon Society, and Massachusetts 4-H State Advisory Council. The Board is currently developing a plan to expand representation beyond what the initial legislation specified.

UMass Extension undertook a strategic planning process in the mid-1990's, followed by a strategic marketing process, both of which involved significant internal and external listening activities. This approach has continued as program areas update their program plans. For example, as part of the strategic planning process, UMass Extension conducted a state-wide, stratified, random telephone survey, which asked people's opinion on issues related to families and children, nutrition, and agriculture. The responses from 200 people supported trends identified in both primary and secondary data collected by program teams; it provided a comparison between 'the general public' and current customers or primary target constituents.

Other methods of listening used then, and continue to be used by program teams include: written surveys, focus groups, and interviews with users and collaborators. In addition, data from other reports, studies and surveys done by federal, state and local agencies and organizations was reviewed, providing indirect access to potential stakeholders who had already voiced their opinion about issues to a provider.

Over 1,000 volunteers are involved in UMass Extension through active participation on advisory boards and committees across the four program areas. Meeting regularly, these individuals provide issue identification, and recommend priorities.

*Program specific Stakeholder input:*

UMass Extension is organized through four program areas; each approaches stakeholder involvement in ways best suited to their primary customers. Summaries by program area follow.

*Nutrition Education:* Stakeholders play an essential role in issue identification and program planning for the Nutrition Education Program area. In the mid 1990's, UMass Extension conducted a survey of stakeholders throughout the state to assess the quality of NEP programming and identify issues for which future programming was needed. From this, the major direction of the program was determined, as the foundation for the future. Currently, the Nutrition Education Program has four major components, including EFNEP, the Family Nutrition Program, Diet and Health and Food Safety.

All of the community projects in the Family Nutrition Program (FNP) are planned cooperatively with local stakeholders reflect local issues. Issues are identified through a number of processes. In some locations, a formal needs assessment is conducted. Other processes include informal assessment through communication with learners; literature reviews of national, state and local emerging issues; and planning with stakeholders in which priorities are identified. Implementation of EFNEP in Massachusetts depends on cooperative agreements with stakeholders throughout the state who provide access to groups of limited resource learners. Programs in Diet and Health, and Food Safety are based on national initiatives, as well as target audience input.

Examples of groups, organizations and agencies providing input as stakeholders and users, on both issues, and specific program planning and implementation follows:

**Single Mother/Family Shelters:** 14 in 8 communities, including the Mary Martha Learning Center - Hingham; Florence House Shelter - Worcester, and the Women's Center - New Bedford.

**Young Parents/Mothers Group/Family Support Groups:** 23 in 5 major cities, including Exitos - New Bedford; Club 60, Centros Los Americas - Worcester; Montachusset Opportunity Council - Worcester, and ABCD/Head Start - Boston.

**School Program/Adult Learning Center/Job Training:** 29 in 11 cities, including Mass Job Training - Brockton; Community Academic Remediation Program, (CARP) - Springfield; Mass Career Development Institute (MCDI) - Holyoke; New England Farm Workers - Springfield; the Martin Luther King Jr. Business Empowerment Center - Worcester, and the Mujeres Unidas en Accion - Dorchester.

**Substance Abuse Shelters:** 8 in 5 cities, including Marathon House - Springfield and Faith House Shelter - Worcester.

**Pregnant and Parenting Teens:** 7 in 5 cities, including Access Futures, Health Awareness Services of Central Mass, Inc. - Worcester and Parker School Parent Group - New Bedford.

**Public Schools System** in 6 cities, including Springfield, Holyoke, and Boston.

**Youth - After School/Summer Programs:** 22 in five cities, including Indian Orchard Girls and Boys Club - Springfield; Boys and Girls Club - New Bedford; Friendly House Neighborhood Center - Worcester and Citizens for Citizens, Inc. Summer Recreation Program - Fall River

**Health Centers:** 2 in Boston, Dimock Community Health Center and Boston Medical Center

Correctional Facilities: York Street jail - Day Reporting Program - Springfield

Farmers' Markets: in six cities, including Boston and Worcester.

Networking Collaborations: 9 in 6 cities including Worcester Food Bank; Holyoke Community Housing Program, and Food Pantry - Cambridge.

**Agriculture:** The Agroecology Program area engages the diverse members of the agricultural community (i.e., citizens, community organizations, public officials, and agricultural enterprise representatives) in participatory education using methods such as study circles, discussion groups, and other interactive public forums. The Agroecology Program has relationships with many agriculture advocacy groups, both long-standing and more recent organizations that provide the alternative voice.

For example, Farm Bureau is a very influential policy-setting organization for all of agriculture, with nearly a century of experience. Several commodity-based organizations, such as the Massachusetts Tree Fruit Growers, the Cape Code Cranberry Growers Association, the Golf Course Superintendent's Association of New England and the Massachusetts Vegetable and Berry Growers Association, provide research facilities and grants to Agroecology, as well as working on educational programming direction.

Groups such as the Massachusetts Flower Growers Association, the Massachusetts Arborists Association, the New England Sports Turf Managers Association, and the Massachusetts Nursery and Landscape Association work with Agroecology to set the agenda to provide educational and technical support to ornamental horticultural businesses. The Massachusetts Association of Roadside Stands works on direct marketing of agricultural products, while groups such as Coastal Growers and the Pioneer Valley Growers Association organize wholesale production of vegetables and related agricultural products.

Alternative agricultural groups such as the Community In Support of Agriculture (CISA), the New England Small Farms Institute, and the Massachusetts Natural Organic Farmers Association work with Agroecology to provide service and education to the agricultural community. Other groups, such as the Audubon Society and Mothers & Others, work with Agroecology on environmental and food safety issues.

Consultations on problems provide a two-way conduit, telling Agroecology what problems are facing agriculture and giving clients an opportunity to learn how to solve problems. On-site visits, or specialized services of the Diagnostic Laboratory and the Soil and Tissue Testing Laboratory, can open the door to this type of research/learning opportunity. Over the past five years, this model has been broadened to include growers and other clients in participatory research to solve problems. Such research strengthens the link between the University and citizens, keeps the research relevant to real problems and speeds transfer of solutions to end-users. Another powerful tool, the on-site meeting, is held on sites where such research is in progress, or on sites that use exemplary technology. Clients can discuss practices with each other, which tends to add validity to them.

Annual industry conferences and association meetings contain extensive contributions from Agroecology, in the form of educational sessions and sessions designed to share results from applied research. Agroecology works with various organizations to plan and execute these sessions, and is generally the lead institution among the New England land-grant universities.

*Agroecology proposal for future stakeholder input:*

Currently, the University of Massachusetts College of Food and Natural Resources is considering a proposal for a Center for Agriculture to bring approximately 60 faculty and professionals together functionally. The range of disciplines in agriculture is spread across seven departments, and the needs of agriculture; for producers, communities, consumers is complex. Massachusetts is a very urban state with 6 million people, yet 64% of the population live within 10 miles of a farm and 22% live within a mile of a farm. There is a need for a more

integrated approach to addressing issues facing agriculture in the Commonwealth. The concept underlying the Center is a single point of entry for stakeholders and users to access the land grant resources of the University of Massachusetts, and thereby the national system.

Such a Center will continue the integration of research and extension by providing a University-approved structure (Centers are approved by the Faculty Senate) which will permit the academic recognition of faculty for outreach and extension (promotion/tenure). Each faculty and professional staff affiliated with the Center for Agriculture would belong to at least one multi-disciplinary, issue-based team, while remaining administratively part of their academic department. The initial set of teams would be formed around single commodities or service areas. Also, issues that may be the focus of a team for example may include integrated pest management, waste management, and pesticide education. Teams will provide a programmatic focus.

Teams will interact with stakeholders to determine needs, develop strategies and acquire funding to support activities, develop research projects to solve problems, and present outreach programs to address needs. Further, teams assess stakeholder needs relative to formal education and interact with appropriate individuals and units to share those needs.

Advisory Committees of stakeholders are central to the Center for Agriculture. Both team committees and an overall Center Advisory Council are envisioned.

*Team Advisory Committees:* appropriate groups of stakeholders would be identified by teams. Often, such identified groups are characterized by their participation in an association. Where no association can be identified, secondary stakeholders will be sought. Among the responsibilities of a team advisory committee would be:

- Review and assess programmatic efforts of teams and needs of the respective industry
- Assist team with setting priorities and advocate for those priorities
- Maintain communication between the team and stakeholders

*Advisory Council on Agriculture:* The proposal calls for the majority of the Advisory Council to be elected from team advisory committees on an annual basis, i.e. a single member from each team advisory committee. These members in general, would represent primary stakeholders. The Advisory Council also includes Massachusetts' representative(s) of the Council on Agricultural Research, Extension, & Teaching (CARET) and an individual from the Massachusetts Department of Food & Agriculture appointed by the Commissioner of Food & Agriculture. Additional Advisory Council members would include individuals from other agriculturally related or interested organizations, particularly those that provide the alternative voice in agriculture - such as the Audubon Society, CISA, and other sustainable agriculture groups. Council responsibilities proposed include:

- Provide a continuing dialog with the University of Massachusetts Administration relative to agriculture.
- Regularly assess the needs of the agricultural industries
- Review the allocation of staffing and resources relative to agriculture and advise regarding future allocations.
- Review agriculture activities to determine if they are appropriate.

*4-H Youth and Family Development:* Over the past three to five years, several techniques were implemented to determine critical issues facing the 4-H Youth and Family Development program area. Internally, staff participated in a SWOT (strengths, weaknesses, opportunities and threats) analysis to determine issues facing the program. A random sample of key volunteers such as 4-H Foundation directors, state 4-H Advisory Council members, and campus administration were surveyed to gain input about the program and issues. A literature search also identified key issues facing youth, families and communities in Massachusetts. Evaluations of programs and events were scanned to identify general areas of concern.

To obtain external input, youth and adults were randomly surveyed at a New England wide event for their input which corresponded with a random telephone survey of Massachusetts households to determine peoples' knowledge of the total organization as well as the 4-H program. Information was also obtained from focus groups of youth conducted by the National 4-H Council.

Currently and over the next five years, similar techniques as described above will be employed to update current 4HYFD strategic marketing plan. In 1999, a focus group of Massachusetts 4-H Foundation Directors, a survey of key volunteers, and a survey staff were used to determine the most critical issues. During 2000, a survey for assessing the needs of teens both within and outside the 4-H YFD program will be designed and implemented. In the state, regional focus groups of traditional volunteers and key collaborators will be conducted to better understand their needs. Each of the five content teams will develop a five-year strategic plan identifying key areas of concern within their subject matter areas. Massachusetts will also participate in the National 4-H Impact Assessment Study by randomly surveying participants within out-of-school programs.

To solicit external input, the program will conduct an extensive literature review to determine cutting issues facing children, youth and families. The Program Area will implement a plan for assessing the needs of underserved populations. Some strategies being considered include conducting focus groups with "at risk" adults and youth, and interviewing key collaborators of local, regional and statewide youth serving organizations, such as Boys and Girls Clubs, and public schools. Community groups such as the "Y", and Enlace, a Latino Family Center in Holyoke, along with teen centers, will be included.

Both currently and within the next five years, internal stakeholders include those who have been directly involved with the 4-H YFD program such as staff, 4-H YFD youth and teen volunteers, the Massachusetts 4-H Foundation, the Massachusetts State Advisory Council members, and various collaborators of our program such as public schools, libraries, fair associations, and other youth serving organizations. External stakeholders would include those who are not familiar and/or directly involved in the program. These groups would include both youth and adult members of the general public, underserved populations, and other youth-serving agencies and organizations who do not know the program. The five year goal is to increase the awareness and knowledge of these external groups of the program, in order to build effective relationships.

Currently in 4HYFD, internal stakeholders are directly involved in the review of new publications for the program such as our risk management manual and the update of our record keeping and resume learning tools. They participate on search committees, and help to plan local, regional and statewide events. A major goal over the next five years is to increase the involvement of young people on both planning and search committees and in the review of materials, and to find ways to engage our newest program participants, such as urban youth and adults, in the implementation of the 4HYFD program.

#### *Natural Resources and Environmental Conservation*

The Advisory Committee for the Natural Resources and Environmental Conservation (NREC) program includes representatives of key stakeholder groups. Currently there are 23 members of this advisory committee representing the following stakeholder groups:

- Agricultural interests
- Forest landowners
- Professional foresters
- Natural resource professionals
- State and Federal environmental agencies
- Municipal officials
- Conservation organizations
- Private environmental consultants
- Regional planners.

The advisory committee meets annually to review and comment on the NREC accomplishments and plan of work for the coming year(s). Special advisory committee meetings are scheduled as needed, to provide input during strategic planning. In addition to the NREC advisory committee, some program initiatives also have advisory committees to facilitate stakeholder input and involvement that are specific by topic, or geographic parameters of the initiatives.

#### *Cranberry Oversight Committee*

This is a legislatively mandated stakeholder group appointed by the Governor. There are 7 Cranberry Oversight Committee members who recommend and/or direct all research and extension activities at the Cranberry Experiment Station. The committee consists of three cranberry growers (representing Ocean Spray Cooperative); the Commissioner of Agriculture, currently Jay Healy; Massachusetts legislators, currently Representative John Quinn and Senator Teresa Murry; and the Dean of the University of Massachusetts, College of Food and Natural Resources, Robert Helgesen.

## **How Research and Extension Activities will address Critical Issues**

The manner in which research and extension, including research and extension activities funded through other than formula funds, will cooperate to address the critical issues in the state, including activities to be carried out separately, sequentially or jointly.

As indicated in the Overview, this plan is an attempt to present a comprehensive, integrated approach to research and extension efforts in Massachusetts. As noted previously, there is a considerable history of collaborative research and extension efforts, fostered primarily by long-standing joint extension-research appointments in the College of Food and Natural Resources, and more recently, in the School of Public Health and Health Sciences.

Faculty and Extension educators, with varying combination of research, extension and instruction assignments, work in teams to address the critical issues facing the Commonwealth and its constituents. The details are described elsewhere in this plan by each of the five REE goals.

As described in other sections of this plan, under consideration is a Center for Agriculture, which would further focus attention on the complex agricultural issues facing the Commonwealth. Over 60 faculty and staff from more than seven academic departments, will be part of the team. This will create a unique synergy of research and extension, in an inter-disciplinary framework. The Center Director will work with an Agricultural Advisory Council of stakeholders to create and implement an integrated research and extension agenda.

The tables of fiscal and human resources that are included with each goal, demonstrate the diverse funding portfolio supporting research and extension. For example, in FY98, over 20% of the Extension budget was derived from external contracts, and other seven percent through gifts, donations and fees.

## **Education and Outreach programs underway to convey research results, including multi-county cooperation.**

Since the 1950's, UMass Extension programs have formally functioned across county lines. (there are 14 counties in Massachusetts, two of which are the islands of Martha's Vineyard and Nantucket). Extension educators in agriculture, community development and natural resources, as well as consumer and family sciences, were hired to work in a multi-county region. Since the late 1980s', the majority of Extension Educators have multi-county and/or state-wide assignments.

In the mid-1990's, the state legislature began to legislate county government out of existence, with nearly half the counties abolished as of 1999, and the remainder slated to terminate in the next few years. Thus, UMass Extension programs are planned and conducted without regard to county boundaries in the governmental sense. Several geographic areas still function in regard to county lines, due to the geographic nature of the area, such as "the Berkshires", due to the mountains that separate it from the 'valley'; Barnstable County, which is all of Cape Cod, accessible by bridges; and the islands, accessible by ferry and plane.

Therefore, all of the programs described in this plan by goal, are disseminated in a multi-county fashion.

Additionally, since UMass Extension is formally a part of the UMass Outreach, rather than reporting to one college, more linkages are being made with other University outreach units, such as Continuing Education, and the Office of Economic Development. UMass Extension has been instrumental in bringing outreach efforts, including research, together for increasing collaborative efforts in two cities in the Western part of the state, Springfield and Holyoke, and is about to do the same in Boston.

## **Collaboration with other colleges and universities and Multi-State efforts**

Primary to the collaboration with other institutions of higher education and multi-state efforts, the New England Extension Consortium was formally organized in 1992 after several years of planning. The Consortium resulted from nearly 30 years of informal multi-state programming initiated by faculty and staff in the six New England States. In the early 1980's, the Extension Directors agreed upon a working document outlining a continuum of ways in which faculty and staff expertise could be shared across state lines. This ranged from informal consultations to more formal contracts or institutional agreements, including joint appointments of faculty.

In 1988, the Presidents of the New England Land Grant Colleges began discussions of multi-state cooperation among their institutions, which resulted in a proposal by the Extension Directors to develop a more formal plan for multi-state cooperation. With funding from the Land Grant Institutions, Extension, USDA, the Kellogg Foundation and the Northeast Rural Development Center, several years of research and planning resulted in the formation of the New England Extension Consortium.

Currently the Directors of Extension in the six New England States serve as the Board of Directors for the Consortium. Multi-state faculty/staff work groups have a Director as liaison, and include Vegetables and Fruit, Work Force Prep, IPM, and Food Safety, among others.

In 1997-1998, The Directors reaffirmed their commitment to the following Consortium goals:

- To improve public access to the research base of the land-grant universities and to Cooperative Extension's expertise and educational programs on issues of particular relevance to two or more states in the New England region.
- To maintain and enhance the quality of technical expertise, effectiveness and educational programs offered to the public in the six New England states.
- To increase the efficiency and effectiveness with which Cooperative Extension develops and delivers programs in the six New England states.
- To increase the financial resources available to support New England priorities.

Thus, the University of Massachusetts Extension has a formal, on-going relationship with the Universities of Connecticut, Rhode Island, Maine, New Hampshire and Vermont with projects in agriculture, nutrition, 4-H youth development, and natural resources.

In addition, projects in agriculture are underway with Hampshire College and Tufts University; youth education efforts with the University of Massachusetts at Boston and Lowell; and with the University of Massachusetts at Dartmouth in aquaculture.

Other multi-state efforts include, but are not limited to:

- Participation in the National Leadership Development project
- Participation in and leadership for the Northeast Leadership Development project
- Northeast Regional Agricultural Engineering Service
- 4-H Youth Development programs at Eastern States Exhibition
- New England Volunteer Leaders development programs
- Northeast Integrated Pest Management program.
- New England Workforce Preparation
- New England Vegetable Growers Conference
- Various projects relating to the Connecticut River
- New England Food Safety projects
- Southern New England Emergency Preparedness
- New England Safe Night

- New England Expanded Food and Nutrition staff training
- Integration of Pest Management Expertise in New England via Electronic Conferencing and Image Capture
- Significant agricultural publications that serve New England, such as the New England Small Fruit Pest Management Guide; New England Vegetable Management Guide; New England Guide to Weed Control in Turfgrass; and New England Management Recommendations for Insects, Diseases and Weeds of Shade Trees and Woody Ornamentals, as examples.

It should be noted that nearly 25 e-mail lists by issue, or topic are managed by the New England Extension Consortium to facilitate multi-state collaboration among faculty and staff, many of whom hold joint Extension-research appointments. Over the past three years, the Consortium has offered planning and implementation grants to multi-state teams; the FY1999 successful proposals are on-line at <http://www.umass.edu/umext/consortium>.

## Multi-State Research

In developing Multi-state Research applicants from each participating State would provide, as a group, information based on:

1. importance
2. stakeholder need
3. technical feasibility
4. likely impacts
5. amount of multi-disciplinarity
6. likely SAES participants.

Details of this information can be found at <http://agmr.umd.edu/users/NERA/Workshop/PrioritySetting-Feb99.html>. This would replace the current "request to write" (pre-proposal). All other procedures would follow the existing manual for multi-state research with some modifications such as elimination of the Committee of Nine section. The url for details of the manual is located at: <http://aster.uvm.edu/rr/rrmantoc.htm>. Northeast Multi-State Research projects are summarized at the url <http://www.agmr.umd.edu/users/NERA/regpro.htm>. At this url, click on the project number to see a summary of the project. We have included several of our project summaries for your convenience as Attachments (see Attachment 6). To view a list of coordinated Multi-State Research projects in a framework which shows the relationships of all Multi-State projects to RPAs see url, <http://www.agmr.umd.edu/users/NERA/workshop/RPAFramework.html>.

## **Merit Review Process for UMass Extension**

UMass Extension is exploring a range of proposed options for carrying out the Merit Review process required by AREERA. Following the fall 1999 meeting of the New England Extension Directors, UMass Extension will decide which options are most appropriate. Program reviews have been, and continue to be part of Extension program development and strategic planning processes. As noted below, several review are currently in different stages. As an example, in the fall of 1997, the Department of Natural Resources Conservation (formerly the Department of Forestry and Wildlife Management) underwent an external review by a CSREES Review Team. This review also examined the UMass Extension NREC program and made comments and recommendations based on their review. The review committee is listed as Attachment # 2.

The options include:

- One option is to insure that Extension programs continue to be reviewed as part of departmental reviews.
- A second option is to have a comprehensive review of the total UMass Extension program, conducted by external faculty and staff.
- Third, already in the planning stage, is a review of Agricultural programs and funding, under the auspices of the UMass Extension Board of Public Overseers. This review will compare Massachusetts Extension agricultural programs with those in selected other states.
- Fourth, review of Extension programs is an on-going function of the Board of Public Overseers. It could be adjusted to insure that it meets the requirements specified under AREERA.
- Fifth, that each of four program areas could organize a review of their program plans. For example, the 4HYFD program is considering a review panel composed of individuals who represent the program's five content areas, plus representatives from CSREES, the National 4-H Council, at least two program leaders from other states, and several key researchers in the areas of child and adolescent development, diversity and the experiential learning model.
- And finally, the New England Extension Directors are considering developing a multi-state review process under the auspices of the New England Extension Consortium.

## **Peer Reviewer**

Expert Scientists are selected from around the country and requested as scientific peer reviewers for projects funded under the Hatch Act of 1887. In addition, we now request that pertinent stakeholders become involved in the review process. The review of research follows the National Science Foundation peer review model.

## **Addressing Underserved Populations**

Research, in the majority of cases, cannot be directed specifically to meet only the needs of the underserved populations. It is directed to all which includes the underserved. For example, a crop breeder is developing superior gene lines for disease resistance or increased nutrition. Although the underserved would certainly benefit, so would all other people. Similar statements could be said of all research projects. It is our contention that research serves all without bias.

In its strategic plan (1994) and its strategic marketing plan (1996), UMass Extension committed itself to the following values, among others:

- a deep respect for people, families and communities
- respect for diversity of people, ideas and organizations
- dedication to active citizen involvement
- respect for both experimental and experiential knowledge

With this as a foundation, UMass Extension strives to include under represented segments of the Commonwealth in planning and implementation of programs. Considerable attention to the diverse publics is detailed in the section on Stakeholder input. UMass Extension (and therefore the research component) has on-going relationships with both long-standing organizations, such as the Massachusetts Farm Bureau, as well as with newer, more alternate voices, such as the New England Small Farms Institute, which is based in Massachusetts, and which has been an early leader in sustainable agriculture. Recent efforts to develop and market Massachusetts grown vegetables that are staples of the Latino diet addressed the interests of the expanding population of Latinos in the Commonwealth, and involved both the Agroecology program and the Nutrition Education program.

As another example, the 4HYFD program is working to identify under-served populations by using statewide demographic data, with assistance from the Center for Immigrants and Refugees at the UMass Boston and Lowell campuses. This collaboration was built through the Department of Consumer Studies' Center for the Family. All 4HYFD Extension educators are associate members of the Center. The Center for the Family is also a participant in the Centers in the Commonwealth, hosted by Boston College. It has also established links with Smith College and is connected with the Center for Higher Education in Springfield, MA which is a major outreach effort of a collaboration of eight private and public colleges and universities.

A new joint initiative between 4HYFD and NREC will focus on urban youth. It is expected that this initiative will reach substantial numbers of traditionally under-represented teachers and youth in the Greater Boston area by building on linkages from the EFNEP and CYFAR State Strengthening efforts. In addition, recently, the Associate Vice Chancellor, University-School Collaboration, UMass/Boston, invited UMass Extension discuss a collaborative effort to address the needs of teachers, students and the community in certain neighborhoods in Boston. Staff from Nutrition Education, NREC, 4HYFD and Extension administration participated, with a preliminary proposal to work in one school to more fully understand the needs from the inside out, and to give teachers and students an equal voice in planning programs.

As evidenced by the examples of partners and collaborators outlined by Nutrition Education in the Stakeholder section, at-risk populations are very much a part of Extension programming.

As a integral part of University Outreach, UMass Extension is building on this new relationship to connect to populations it has not served in the past.

### **MAES Multistate Research**

All outside funding can be classified into one or more National goals as defined by the USDA and they in turn benefit the economy of Massachusetts and the surrounding region.

Formula funds in the amount of \$2,123,302.00 have been used to leverage for additional external funds in the amount of \$3,496,113.00 which represents a 165% increase in our research base.(See Attachment 3) These additional funds contribute to the conduct and delivery of the research and extension program by allowing our researchers to more efficiently adapt to the issues central to Massachusetts which include small farms, urban communities, value added foods, IPM, environmental conservation, social and policy issues.

The total research base represents an additional increase in FTEs to carry out the research goals and mission for commonwealth agriculture and meet the National Goals.

**Distribution of Research Formula Funds by National Goals (See Attachment 4)**

## Goal 1

# An agricultural production system that is highly competitive in the global economy

### Statement of Issues

#### *The Economic Picture*

**Land.** The vitality of the economy and the quality of life in the Commonwealth are heavily dependent on agriculture. Even though Massachusetts is a highly urbanized state, it produces 15% of its food and retains a significant amount of open land, much of it in farmland. Farms occupy nearly one-half million acres, 11% of the state's land. In many parts of the state agriculture accounts for most of the last remaining, privately held, undeveloped land, providing important habitat for wildlife, recharge zones for water supplies, and open vistas and recreational spaces for residents and tourists.

**Food.** Local production and utilization of food and ornamental crops provides important benefits to the economy, the environment, and society. Massachusetts currently imports 85% of its food, but studies by the UMass Department of Resource Economics indicate that available land and soil would allow the state to produce 35% of its food needs. This increase would add hundreds of millions in food dollars to the state economy annually, preserve open land and maintain the stability and sustainability of communities.

**The Economy.** Massachusetts agriculture adds over \$4 billion in sales to the economy and creates tens of thousands of jobs. In 1997, Massachusetts led New England in cash receipts from agriculture. Massachusetts agriculturalists purchase \$160 million worth of materials for their businesses, pay property taxes of \$22 million, disburse a payroll of \$77 million, and pay \$24 million in interest to Massachusetts and other financial institutions.

Typical of a heavily suburbanized state, Massachusetts' agriculture has a heavy horticultural component, including fruits, vegetables, and ornamentals. Fruits and vegetables gross \$243 million, 45% of the total cash receipts for Massachusetts agriculture. Cranberry production ranks first or second in the country, depending on the year, with 42% of the U.S. crop valued at \$146 million. Massachusetts is among the top fifteen states nationally in apple, maple syrup, and sweet corn production, and ranks 20th in tomato production.

Ornamental horticulture in particular has evolved rapidly to become a significant component of the state's economy. Beyond providing jobs in turf, nurseries, landscaping and greenhouses, these enterprises contribute to environmental protection and enhancement, effective use of municipal budgets, and improved quality of life. The 8,000 companies in this sector of the agricultural economy contribute an estimated \$2 billion in sales to the economy and employ over 12,000 persons. Annual wholesale production of greenhouse and nursery crops grosses \$147 million, representing 28% of all cash receipts from Massachusetts agriculture. Annual gross receipts from the landscape industry add another \$150 million.

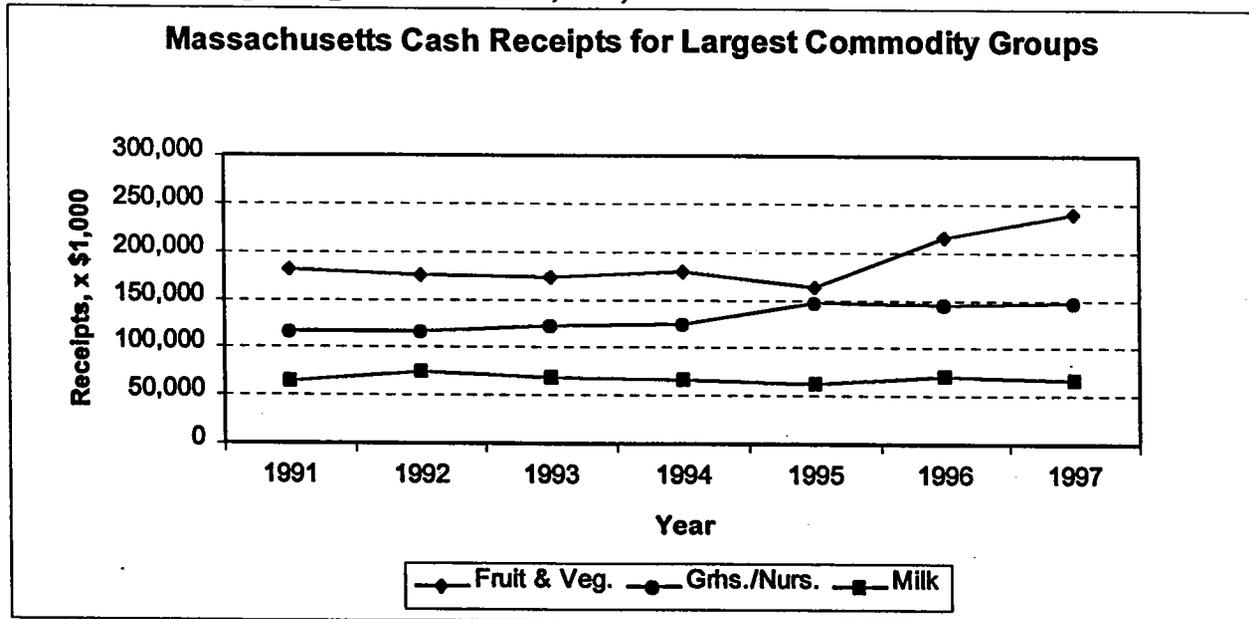
With annual receipts of \$73 million, dairy and cattle industry products account for 14% of all Massachusetts agricultural receipts. Other livestock operations, such as sheep, chickens and pigs add \$21 million or 5%. Interestingly, horses are not included in the USDA statistics, though recreational stables are increasingly popular in the state. Aquaculture accounts for \$3.667 million in cash receipts.

**A Changing Agriculture.** Despite these positive figures for a broadly defined agriculture, "traditional" farming in the state is precarious. The full-time farm focused on a single, wholesale commodity is disappearing. The number of full-time farms has shrunk from 35,000 in the 1940s to 3,000 today. Although some farms sell as much as \$1 million worth of products annually, many more of these farms are quite small, some netting only a few thousand dollars. The average size of Massachusetts farms is 93 acres, compared to 469 acres nationally.

Yet these new farms are efficient and profitable. In terms of net farm income, Massachusetts ranks 37<sup>th</sup> in the country. More important, on a per operation basis, Massachusetts farm income ranks 14<sup>th</sup>, and on a per acre basis ranks 4<sup>th</sup>. The number of dairy farms has shrunk rapidly in recent years under competition from large-scale dairy states in the Midwest and elsewhere. Massachusetts ranks 41st among states in terms of milk cows. Still, milk production has remained steady in the state over the past six years (Fig. 1). Recently, dairy farms have begun new marketing strategies, such as direct marketing as with the "Our Family Farms" Cooperative.

Cash receipts from the horticultural crops are generally growing (Fig. 1). Cranberries lead in this respect, though some small segments of the group are also expanding. Berry crops, for example, have grown 25% in cash value over the past 6 years. Greenhouse and ornamentals have shown steady growth over the period.

Figure 1. Massachusetts cash receipts for the three largest commodity groups for the years 1991 through 1997 (USDA/NASS New England Agricultural Statistics, 1998).



Direct marketing of agricultural products to a largely urban and suburban population will probably become more important. A statewide survey conducted by UMass Extension found that 64% of respondents lived within ten miles of a farm and 22% lived less than one mile from a farm. This presents problems and opportunities. Massachusetts already leads the country in taking advantage of the market at hand. Three counties in Massachusetts are in the national top ten for direct sales receipts.

There are 35 CSA (Community Supported Agriculture) farms in the state where over 4,000 participating community members prepay for food produced throughout the year.

In addition, finding and developing specialty products and integrating production with agrotourism will play a role in farm viability. The proximity of farms to cities means that large numbers of people can directly see how food and ornamentals are grown. A large number of farms provide recreational activities such as cross-country skiing, bed-and-breakfast accommodations, farm tours, and harvest festivals. Such new business is strongly related to Massachusetts' mix of urban and rural environments.

Parks, playing fields and yards make up a significant area of managed landscapes that are also part of the new agricultural mix. The aesthetics of the environment are a key component in Massachusetts tourism. Recreation, whether horseback riding or soccer, involve managing plants and animals in an agricultural context.

This defines the new agricultural era in Massachusetts, a mix of small, intensively managed farms, in close proximity to hundreds of thousands of people who have little understanding of farming. It is specialty crops. It is new ways of marketing. And it will undoubtedly continue to change.

### *Challenges to an Agricultural Future*

Stakeholder input sessions and the strategic planning process identified a number of key issues in Massachusetts agriculture.

**Land Use.** There is steady development pressure on farmland. Farmland value in Massachusetts is ranked fourth highest in the nation, at \$3,992 per acre. The temptation to sell farmland for development is unrelenting. Three areas in the state have been identified as among the top twenty most threatened farmland areas

in the country. The relative importance of preserving farmland is debated, but there can be little doubt that agriculture and horticulture contribute to the state economy, the quality of life, and the sustainability of the environment.

Agricultural interests are often under-represented before local boards that make decisions about municipal grounds management, wetlands preservation, zoning, resource and conservation area management, and open space preservation issues that impact grounds managers and growers. New ways must be developed to facilitate the exchange of information needed when resolving agricultural land-use issues for the benefit of the whole community.

**Marketing and Economic Development.** The future of agriculture may hinge on successful marketing. Large-scale commodity producers outside of Massachusetts, for example the Washington apple industry, can afford to pay to dominate supermarket shelves and advertising in the state. Agricultural products from Massachusetts must be cleverly and wisely marketed if they are to compete with products from other states, regions, and countries.

**Use of Chemicals.** The public seems to like open space and local farms, but not necessarily all of the processes that are needed to produce profitably. Chemicals are often identified as a problematic issue. New technologies that can reduce chemical usage while allowing agriculture to operate profitably are needed to address this issue. Public policy regarding the use of chemical agents should reflect an understanding of agriculture's economic realities.

**Production and Management Technologies.** Agricultural businesses need to be kept informed of advances in new technologies such as integrated pest, crop, and livestock management, biotechnology, biological pest control, and soil and composting science.

**Energy, Resources, and Waste Management.** Ways need to be found to ensure the efficient and ecological management of wastes, energy, soil, water, and other resources which contribute to the profitability of agriculture and the green industry.

**Labor.** Agricultural production and green industry businesses depend upon reliable, skilled, and affordable labor. Low wages, hard work, and the seasonal nature of production agriculture labor make it unattractive to those who have alternatives. Recent policies of the U.S. Department of Labor have made hiring off-shore laborers more difficult.

**Community Education.** Public support for farms, agribusinesses, urban forests and managed landscapes, and green industry services is essential for the vitality and long-term sustainability of agriculture and a protected environment in Massachusetts.

### ***The Global and National Context***

Globally, big capital and power brokers dominate agriculture and have tremendous influence on agricultural and economic policy. As the southern hemisphere increasingly produces food for the more prosperous North, rural populations North and South lose their occupations, their farmland, and food self-sufficiency. Southern populations often go hungry. Americans have grown to expect year-round low prices for what were once seasonal foods.

American agricultural businesses operate in an international marketplace, with crops often determined by export policies and competition from other countries. Passage of free trade agreements such as NAFTA and GATT have reduced import regulations and brought more agricultural products into this country, from places like Mexico and Chile. Environmental and food safety issues now increasingly need to be addressed at the international level. In many parts of the world, simultaneous trends toward the destruction of resources and ecosystems *and* toward conservation and better use of resources can be seen. American consumers are both nostalgic about the loss of farms and seasonal crops *and* eager to purchase low-cost imported foods and ornamental plants and flowers year-round.

Nationally, in 1994 there were slightly over 2 million farms, with 200,000 of those responsible for producing 80 to 90% of all crops. Large-scale corporate agribusiness is capital-intensive, using more fertilizers and machinery and less labor to produce more product per land unit. It depends upon new research and technologies such as animal and plant genetics, as well as highly rationalized production practices and management techniques.

## *Massachusetts and the World*

National and global agricultural trends have brought several smaller counter-trends into prominence in Massachusetts. Crop diversification, development of new crops, food processing, and value-added marketing have assumed increasing importance. Massachusetts consumers have shown a taste for seasonal fresh fruits and vegetables, thus favoring local producers and direct marketing. Concerns over pesticide usage on crops grown outside the U.S. widen marketing opportunities for the state's organic farms.

Genetic engineering and biotechnology related to agriculture are an important part of many Massachusetts businesses and academic institutions.

Massachusetts agriculture shares with large-scale national and global producers the need to keep up with advances in agricultural technology and implementation of intensive farm and business management practices. The complexity of farming decisions and methods today requires a whole systems approach that can integrate many perspectives into a dynamic, comprehensive whole. This is particularly true if agriculture is to be sustainable economically, environmentally, and socially. To remain healthy and successful, Massachusetts agricultural enterprises must continually adapt to a complex and changing situation, one that includes the local natural resource base, the social and political environment, and the local, regional, and global food and marketing system.

## Outcomes and Outcome Indicators

### *Outcome 1.1. The food and fiber system will be profitable.*

#### **A. Increased production efficiency**

##### 1. Genotypes utilized which provide optimal production and optimal quality relative to inputs <sup>S,I,L</sup>

*Genetic improvement of chestnut for pathogen management (NE140) <sup>I,L\*</sup>*

*Development of transgenic animals for production pharmaceuticals (MAS707) <sup>L</sup>*

*Increased milk production of cattle by genetic improvement (MAS714) <sup>I,L</sup>*

*Resistance of apple cultivars to summer disease organisms developed (NE183) <sup>L</sup>*

*Acquire and conserve genetic resources of crop plants (NE9) <sup>S,I,L</sup>*

*Identify scion and rootstock genotypes of apple for enhanced profitability and are resistant to biotic and abiotic stresses (NE183, NC140, AeTF) <sup>S,I,L</sup>*

*Identify vegetable and small fruit cultivars that enhance profitability (MAS786, AeVVSF) <sup>L</sup>*

*New cultivars, breeds, and species utilized in Massachusetts (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVVSF, AeF) <sup>S,I,L</sup>*

##### 2. Management systems utilized which optimize production and quality relative to inputs <sup>S,I,L</sup>

*Production system for bioherbicides developed and efficacy enhanced (MAS268, AeT, AeC) <sup>S,I,L</sup>*

*Bio-intensive strategies for insect and disease pests of fruit and vegetable crops developed (AeTF, AeVVSF, NC205, MAS780) <sup>S,I,L</sup>*

*Integrating cover crops and weed control of field crops (MAS670, AeCDL) <sup>I,L</sup>*

*Sustainable alternatives to chemical postharvest control developed (NE103) <sup>S,I,L</sup>*

*Resistance of cattle to microbial infection enhanced (MAS731, MAS732, MAS755, MAS805) <sup>L</sup>*

*Bio-intensive strategies utilized in Massachusetts (AeIPM, AeC, AeCDL, AeNLUF, AeT, AeTF, AeVVSF, AeF) <sup>S,I,L</sup>*

*Postharvest approaches for new and existing crops developed (NE103) <sup>I,L</sup>*

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<sup>1</sup> See glossary of acronyms at the end (Attachment #1).

*Cost-effective management strategies for new genotypes developed (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVVSF, AeF, NE183) S, I, L*

*Efficient management systems for plant and livestock production systems developed (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVVSF, AeF, AeWM, AeIPM, MAS809, MAS807, MAS751, MAS769) S, I, L*

*New technologies and management systems utilized in Massachusetts (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVVSF, AeF, AeWM, AeIPM) S, I, L*

## **B. More value-added products**

1. Plants and animals, new to Massachusetts agriculture, utilized for the production of high-value products, such as medicines, essential oils, etc. (*AeVVSF*) *L*
2. Genetically altered plants and animals utilized for the production of pharmaceuticals and other products (*AeCDL*) *L*

## **C. Diversified export and domestic markets**

1. Appropriate cultural and traditional food needs met by Massachusetts farmers (*AeVVSF*) *S, I, L*

## **D. Satisfied customers**

1. New and direct links between consumers and producer/farmers developed (*Ae*) *S, I, L*
2. Food needs met by Massachusetts farmers (*AeC, AeCDL, AeTF, AeVVSF, AeIPM*) *S, I, L*
3. Changing needs for recreational space and landscaping in the urban and suburban environments met by communities and local providers (*AeNLUF, AeT, AeF, AeIPM, AeWM, AePE*) *S, I, L*

## **E. Appropriate technology developed**

1. Appropriate genotypes for agricultural producers and managers identified *I, L*
  - a. A better understanding of the genetics of agricultural plants and animals developed
    - Understand genetic mechanisms controlling inheritance (NE9) I, L*
    - Understand genetic mosaics and their potential value in agriculture (MAS749) L*
    - Understand the genetics of floricultural crops (MAS746) I, L*
    - Understand the genetics of diseases and resistance to diseases in apple (NE183) I, L*
  - b. Breeding and biotechnology employed to improve presently utilized or potentially useful plants and animals for production or use in Massachusetts
    - Genetic improvement of chestnut for pathogen management (NE140) L*
    - Development of transgenic animals for production pharmaceuticals (MAS707) L*
    - Increased milk production of cattle by genetic improvement (MAS714) I, L*
    - Resistance of apple cultivars to summer disease organisms developed (NE183) I, L*
    - New plants and animals utilized in Massachusetts (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVVSF, AeF) S, I, L*
  - c. Existing genotypes identified that enhance profitability and reduce chemical inputs
    - Acquire and conserve genetic resources of crop plants (NE9) I, L*
    - Identify scion and rootstock genotypes of apple for enhanced profitability and are resistant to biotic and abiotic stresses (NE183, NC140, AeTF) S, I, L*
    - Identify vegetable cultivars that enhance profitability (MAS786, AeVVSF) S, I, L*

*New cultivars and breeds utilized in Massachusetts (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF)*<sup>S,L</sup>

2. Management systems developed that maintain ecological integrity and that enhance profitability

a. Understanding of the physiology of managed plants and animals developed

*Understanding of fertility of livestock developed (NE161, MAS734, MAS806)*<sup>L,L</sup>

*Understanding of plant responses to environmental stress developed (NE176, MAS756)*<sup>L,L</sup>

*Understanding of the environmental effects on plant physiology developed (MAS809)*<sup>L,L</sup>

*Understanding of the modes of action of plant hormones and plant growth regulators developed (AeTF, AeF)*<sup>L</sup>

*Understanding of senescence and the development of postharvest disorders developed (NE103)*<sup>L,L</sup>

b. Understanding of the ecology of agricultural ecosystems developed

*Understanding of the biology of pest organisms and their interaction with environmental factors and the agricultural systems developed (AeIPM, AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF, MAS809)*<sup>L,L</sup>

*Understanding of the behavioral ecology and management of insect pests developed (MAS774, AeIPM, AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF)*<sup>L,L</sup>

*Understanding of infection and reproduction of disease organisms developed (AeIPM, AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF, MAS770)*<sup>L,L</sup>

c. Bio-intensive strategies developed and utilized

*Production system for bioherbicides developed and efficacy enhanced (MAS268, AeT, AeC)*<sup>L,L</sup>

*Bio-intensive strategies for insect and disease pests of fruit and vegetable crops developed (AeTF, AeVSF, NC205, MAS780)*<sup>L,L</sup>

*Integrating cover crops and weed control of field crops (MAS670, AeCDL)*<sup>L,L</sup>

*Sustainable alternatives to chemical postharvest control developed (NE103)*<sup>S,L,L</sup>

*Resistance of cattle to microbial infection enhanced (MAS731, MAS732, MAS755, MAS805)*<sup>L</sup>

*Biointensive strategies utilized in Massachusetts (AeIPM, AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF)*<sup>L</sup>

d. New agricultural technologies developed and utilized

*Postharvest approaches for new and existing crops developed (NE103)*<sup>L,L</sup>

*Cost-effective management strategies for new genotypes developed (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF, NE183)*<sup>L,L</sup>

*Efficient management systems for plant and livestock production systems developed (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF, AeWM, AeIPM, MAS809, MAS807, MAS751, MAS769)*<sup>L,L</sup>

*New technologies and management systems utilized in Massachusetts (AeC, AeCDL, AeNLUF, AeT, AeTF, AeVSF, AeF, AeWM, AeIPM)*<sup>S,L,L</sup>

**Outcome 1.2. The public understand and value agriculture and its relationship to their daily lives**

**A. Communities strengthened**

1. Farmers, landscapers, planners, conservationists, and consumers connect and learn from each other (Ae)<sup>S,L,L</sup>

2. Increased capacity of legislative decision-makers to educate and interact with their constituencies regarding land-based issues (Ae)<sup>S,L,L</sup>

3. Public understanding of the relationships among agriculture, economic vitality, environmental health, and community integrity *(Ae)<sup>I,L</sup>*
4. Strengthened collaborations with and among groups that impact agriculture *(Ae)<sup>S,I,L</sup>*
5. Strengthened capacity of agricultural producers and managers to educate their communities and customers about the value of agriculture *(Ae)<sup>S,I,L</sup>*
6. Enhanced capacity of municipalities to use public resources wisely to ensure public health, safety, and fiscal responsibility for land-based resources *(Ae)<sup>S,I,L</sup>*

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

		FY2000	FY2001	FY2002	FY2003	FY2004	5Y(TOTAL)
Hatch Funds	dollars	\$557,788	\$574,522	\$591,757	\$609,510	\$627,795	\$2,969,372
Multi-State	dollars	\$291,143	\$299,877	\$308,874	\$318,140	\$327,684	\$1,555,718
College Match	dollars	\$760,453	\$783,267	\$806,765	\$830,968	\$855,897	\$4,037,350
Other Federal	dollars	\$463,379	\$477,280	\$491,599	\$506,347	\$521,537	\$2,460,142
Other Resources	dollars	\$1,137,547	\$1,171,673	\$1,206,824	\$1,243,028	\$1,280,319	\$5,039,392
Revenue Res.	dollars	\$161,071	\$165,903	\$170,880	\$176,007	\$181,287	\$855,148
<b>TOTAL MAES</b>	<b>dollars</b>	<b>\$3,371,381</b>	<b>\$3,472,522</b>	<b>\$3,576,698</b>	<b>\$3,683,999</b>	<b>\$3,794,519</b>	<b>\$17,899,120</b>
	FTEs	36.20	36.20	36.20	37.20	37.20	183
SL b&c	dollars	\$557,662.0	\$574,391.9	\$591,623.6	\$609,372.3	\$627,653.5	\$2,969,703
	FTEs	7.71	7.71	8.00	8.20	8.50	40.12
SL 3-d	dollars	\$198,332	\$204,282	\$210,410	\$210,410	\$210,410	\$1,033,845
	FTEs	1.00	1.00	1.00	1.00	1.00	5.00
State Funds	dollars	\$529,841	\$545,736	\$562,108	\$578,972	\$596,341	\$2,812,998
	FTEs	10.42	10.42	10.42	10.42	10.42	52.10
College Match	dollars	\$439,732	\$452,924	\$466,512	\$480,507	\$494,922	\$2,354,597
	FTEs	8.09	8.09	8.09	8.09	8.09	40.45
County Funds	dollars	\$152,933	\$152,933	\$152,933	\$152,933	\$152,933	\$764,665
	FTEs	2.46	2.46	2.46	2.46	2.46	12.30
Revenue/gifts	dollars	\$219,285	\$225,864	\$232,639	\$239,619	\$246,807	\$1,164,215
	FTEs	0	0	0	0	0	0.00
Contracts	dollars	\$163,686	\$173,507	\$190,858	\$209,944	\$230,938	\$968,932
	FTEs	0.74	0.74	0.74	0.74	1.00	3.96
<b>Total Extension</b>	<b>dollars</b>	<b>\$2,261,471</b>	<b>\$2,329,638</b>	<b>\$2,407,084</b>	<b>\$2,481,757</b>	<b>\$2,560,005</b>	<b>\$12,039,955</b>
	FTEs	30.42	30.42	30.71	30.91	31.47	153.93
<b>Total R/E</b>	<b>dollars</b>	<b>\$5,632,852</b>	<b>\$5,802,160</b>	<b>\$5,983,782</b>	<b>\$6,165,756</b>	<b>\$6,354,524</b>	<b>\$29,939,074</b>
	FTEs	66.62	66.62	66.91	68.11	68.67	336.93

These tables are based on organizational unit data and projections and are subject to variations between Extension and Experiment Station. It is a good faith effort to present the total resources based on a point in time. It is neither an official budget or report.

## Goal 2 A safe, secure food and fiber system

**Issue:** It is estimated that up to 81 million cases of foodborne illness occur each year, most of which are unreported. In Massachusetts, the number of foodborne illnesses has been increasing, with incidences in 1996 the highest reported since 1990. Reported cases were linked to food served from restaurants, retail outlets, nursing homes, schools and caterers. While the organism responsible for foodborne illness is often unidentified, most identified cases in Massachusetts were linked to salmonellosis, campylobacteriosis, and E. coli 0157:H7, with new concerns arising from listeriosis. Young people, the elderly, and people with compromised immune systems suffer more severely than other population subgroups. There are three main approaches for reducing the incidence of foodborne illnesses: identifying and reducing pathogens in raw materials, reducing pathogens in prepared and processed foods, and the education of consumers and other food preparers in preventative food handling methods.

	Research and / or Extension	Duration	Activities and Impacts
<p>Education and training is needed for target groups including food workers and volunteers in child and elder care, school food service, shelters, pantries and other human service agencies, and local and state regulators</p> <p>To increase knowledge and adoption of current food handling practices, including HACCP, by food regulatory officials, teachers and food service personnel who serve vulnerable populations</p>	<p><b>Extension</b></p>	<p><b>L</b></p>	<p>Through continuation of Food Handling is a Risky Business (FHRB) and Cooking, Cooling, Contamination and Kids (CCKK), ServSafe and Safe Food at Home for regulators and professional and nonprofessional staff who serve vulnerable populations. Pre/post test surveys will be used to determine knowledge gain and planned practice change. Follow-up mail surveys will be administered to a sample of participants to determine actual change in behavior.</p> <ol style="list-style-type: none"> <li>Extension educators and trained volunteers will conduct 100 FHRB and CCKK workshops for 1,500 food workers serving high risk populations, including emergency food providers, home health aides, child and elder care providers.</li> <li>60% of participants will increase knowledge of safe food practices: wash hands, thaw, cook, cool, and store foods safely, and clean and sanitize utensils and equipment properly</li> <li>60% of participants will plan to change food practices to prevent FBI</li> <li>50% of participants will adopt safe food handling practices</li> </ol> <ol style="list-style-type: none"> <li>Extension educators will conduct two Safe Food at Home workshops for 35 staff serving people with disabilities</li> <li>60% of participants will increase knowledge of safe food practices: wash hands, thaw, cook, cool, and store foods safely, and clean and sanitize utensils and equipment properly</li> <li>60% of participants will plan to change food practices to prevent FBI</li> <li>50 consumers and staff will be taught using curriculum</li> </ol> <ol style="list-style-type: none"> <li>Extension educators will conduct 15 ServSafe courses for 500 regulators and food workers serving high risk populations</li> <li>85% of participants will achieve a passing score (75) and obtain certification with NRA</li> <li>50% of participants will plan to change food practices by employing methods such as setting up flowcharts, checking temperatures, setting up record keeping systems, and training staff in safety procedures</li> <li>30% of participants will adopt safe food handling practices</li> </ol>
<p>Understand physiological factors in pathogenesis and its control (MAS00789) Rapid techniques to identify pathogens (MAS00744, MAS00768, MAS00754) Economic impacts in place to reduce foodborne illness (MAS00625) Development and evaluation of novel educational approaches (ESFSQ)</p>	<p><b>Research</b></p>	<p><b>S, I, L</b></p>	<p>Foodborne illness is minimized</p>

	<b>Extension</b>	<b>S, I</b>	<p>UMass Extension NEP will adapt, promote, and conduct URI's Food Safety Education Program for Youth (FSEPY) for health, science, and family and consumer science teachers. Pre/post test surveys will be used to determine knowledge gain and planned practice change and intent to use curriculum materials. Follow-up surveys will assess actual change and curriculum implementation</p> <ol style="list-style-type: none"> <li>4. A 1-2 hour educational workshop will be adapted from URI's FSEPY curriculum</li> <li>5. Extension educators will pilot two teacher workshops for 50 teachers <ul style="list-style-type: none"> <li>• 60% of teachers will increase knowledge of safe food practices</li> <li>• 60% of teachers will plan to change food practices to prevent FBI</li> <li>• 150 students will be taught using curriculum</li> </ul> </li> <li>6. Program will be evaluated and revised as needed</li> </ol>
<p>To assess characteristics of home meal replacement vendors and consumers in New England</p>	<b>Research</b>	<b>S</b>	<p>UMass Extension and New England food safety specialists will assess Home Meal Replacement options, consumer food practices, and consumer and vendor needs for food safety</p> <ol style="list-style-type: none"> <li>7. Extension food safety education coordinator will assist NE regional food safety specialists in designing and disseminating survey instruments</li> </ol>
<p>To increase and update knowledge of food safety education resources available for use and adoption by professional and nonprofessional staff in agencies who care for high risk populations.</p>	<b>Extension</b>	<b>L</b>	<p>UMass Extension will continue to make food safety education materials available to professionals educators. Use of materials will be monitored.</p> <ol style="list-style-type: none"> <li>1. Extension food safety education coordinator will promote resources through: <ul style="list-style-type: none"> <li>• Published Directory of Food Safety Education materials, USDA/CES, USHHS/MCH, agency publications / periodicals and through existing programs</li> <li>• UMass Extension web page will maintain current food safety resource listings</li> </ul> </li> </ol>
<p>To maintain and strengthen linkages between the UMass Extension and agricultural, health, human service and hunger agencies and organizations to promote food safety education</p>	<b>Extension</b>	<b>L</b>	<p>The Extension Food Safety coordinator will collaborate with health, education, human service, child and elder care agencies and organizations to promote training and resources regulators and food service personnel.</p> <ol style="list-style-type: none"> <li>2. The Extension Food Safety Coordinator will provide leadership and coordination of the Massachusetts Partnership for Food Safety Education, enhancing outreach efforts <ul style="list-style-type: none"> <li>• Conduct four MPFSE meetings</li> <li>• Enlist over 300 hours of volunteer time from collaborating agencies</li> <li>• Co-sponsor food safety education training for food workers and agency / organization staff</li> <li>• Develop, produce, and distribute resource listing (print and electronic)</li> <li>• Develop, produce, and distribute safe food handling messages that reflect FightBAC and HACCP principles by over 10,000 food workers and consumers focusing on low literacy and non-English speaking workers and consumers</li> <li>• Promote Partnership at organization / association meetings</li> </ul> </li> </ol>

**Issue: The 1997 National Food Safety Initiative: Food Safety from Farm to Table, calls for commitment of food safety education in addition to enhanced surveillance, improvement in the areas of response to outbreaks, risk assessment, and inspection and compliance. The Hazard Analysis Critical Control Points (HACCP) system has become widely accepted as a standard for preventing FBI in food production, processing and food service. This process is also valuable to small-scale food processors. Resources and teaching materials have been developed for use in various settings.**

<p>To increase knowledge of food sanitation, regulations and good manufacturing practices</p>	<p>Extension</p>	<p>L</p>	<p>UMass Extension will promote and conduct programs and resources through the New England Small Food Processors Project and HACCP Resource Center and Lending Library. Pre/post surveys will assess knowledge and planned practice change. Follow-up surveys will assess actual change in food safety and GM practices.</p> <ol style="list-style-type: none"> <li>1. Extension educators and cooperators will promote and conduct two regional trainings for 50 small food processors using NE SMPGuide</li> <li>• 70% will increase knowledge of safe food practices including HACCP, MA regulations and good manufacturing practices</li> <li>• 30% will plan to improve practices using methods such as setting up flowcharts, checking temperatures, setting up record keeping systems, and training staff in safety procedures</li> </ol> <p>The Extension Food Safety Coordinator will maintain, promote, and expand the HACCP Resource Center and Lending Library. Usage will be monitored.</p> <ul style="list-style-type: none"> <li>• USDA/FSIS HACCP trainings will be promoted via UMass Extension web page, cooperating agency contacts and publications</li> <li>• HACCP Lending Library materials will be expanded to include materials for non-English speakers</li> <li>• 10 food producers will use materials</li> </ul>
<p>To coordinate delivery of accurate and timely information, education and resources through collaboration of state and federal agencies and associations working representing farm to table</p>	<p>Extension</p>	<p>I</p>	<p>The UMass Extension Food Safety Team (UMEFST) will increase access to accurate information and resources to food producers, processors, and consumers.</p> <ol style="list-style-type: none"> <li>1. The UMEFST, consisting of representatives from Food Science, Plant and Soils Sciences, IPM, and Fruit and Vegetable programs will: <ul style="list-style-type: none"> <li>• Assess status of Food Safety issues in Massachusetts producer and processing communities</li> <li>• Meet periodically and / or as needed to respond to current food safety issues</li> </ul> </li> </ol>

**Goal 2: A safe, secure food and fiber system**

		FY2000	FY2001	FY2002	FY2003	FY2004	5 Yr Total
Hatch Funds	dollars	\$334,602	\$344,640	\$354,979	\$365,629	\$376,597	\$1,776,447
Multi-State	dollars	\$62,603	\$64,481	\$66,416	\$68,408	\$70,460	\$332,368
College Match	dollars	\$457,775	\$471,508	\$485,653	\$500,223	\$515,230	\$2,430,390
Other Federal	dollars	\$95,326	\$98,186	\$101,131	\$104,165	\$107,290	\$506,099
Other Resources	dollars	\$237,698	\$244,829	\$252,174	\$259,739	\$267,531	\$1,261,971
Revenue Res.	dollars	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTAL/MAES</b>	dollars	<b>\$1,188,004</b>	<b>\$1,223,644</b>	<b>\$1,260,353</b>	<b>\$1,298,164</b>	<b>\$1,337,109</b>	<b>\$6,307,275</b>
	FTEs	18.06	18.06	18.06	19.06	19.06	92
SL b&c	dollars	\$67,647	\$69,676	\$71,767	\$73,920	\$76,137	\$359,147
	FTEs	0.64	0.64	0.64	0.64	0.64	3.20
SL 3-d	dollars	\$15,816	\$17,398	\$20,877	\$29,228	\$43,842	\$127,161
	FTEs	0.30	0.30	0.30	0.45	0.60	1.95
State Funds	dollars	\$23,564	\$24,271	\$40,760	\$41,983	\$43,242	\$173,820
	FTEs	0.31	0.31	0.46	0.46		1.54
College Match	dollars	\$0	\$0	\$0	\$0	\$0	\$0
	FTEs	0.00	0.00	0.00	0.00	0.00	0.00
County Funds	dollars	\$65,761	\$65,761	\$50,000	\$50,000	\$50,000	\$281,522
	FTEs	0.80	0.80	0.65	0.65	0.65	3.55
Revenue/gifts	dollars	\$6,729	\$6,729	\$6,729	\$6,729	\$6,729	\$33,365
	FTEs	0.00	0.00	0.00	0.00	0.00	0.00
Contracts	dollars	\$39,591	\$41,571	\$45,728	\$54,873	\$54,873	\$236,636
	FTEs	0.65	0.65	0.65	0.75	0.75	3.5
<b>Total Extension</b>	dollars	<b>\$219,108</b>	<b>\$225,405</b>	<b>\$235,860</b>	<b>\$256,733</b>	<b>\$274,824</b>	<b>\$1,211,930</b>
	FTEs	2.70	2.70	2.70	2.95	2.64	13.69
<b>Total R/E</b>	dollars	<b>\$1,407,112</b>	<b>\$1,449,050</b>	<b>\$1,496,214</b>	<b>\$1,554,897</b>	<b>\$1,611,933</b>	<b>\$7,219,205</b>
	FTEs	20.76	20.76	20.76	22.01	21.70	105.99

These tables are based on organizational unit data and projections and are subject to variations between Extension and Experiment Station. It is a good faith effort to present the total resources based on a point in time. It is neither an official budget or report.

## Goal 3

### A healthy, well-nourished population

#### Statement of Issues:

Issues surrounding nutrition and overall health have been compelling. Research being conducted in the area of nutrition and chronic disease as well as nutrition throughout the lifespan have been increasing in number. Nonetheless, there is still much knowledge needed, and hence, more research must be conducted to find definitive answers to many nutrition and disease-related questions.

#### Specific Projects and Programs Contributing:

- 1) Effects of low nutrient intakes on metabolic rate and thyroid hormone levels (MAS 00803)
- 2) Effect of fibers on nutrient availability (MAS 00733)
- 3) Assessing nutritional risk on the elderly (MAS 00663)
- 4) Bioavailability of vitamins and minerals (MAS 00762 and MAS 00758)
- 5) Develop technologies to stabilize nutrients in foods (MAS 00804)

#### Outcomes:

**Outcome 3.1: Health maximized across the lifespan <sup>1</sup>**

**Outcome targets:** Improve nutritional intakes and increase physical activity in all age groups <sup>2</sup>

**Outcome indicators:** Reduced disease treatment costs; reduced work days lost to illness; reduced physician visits <sup>1,2</sup>

**Outcome 3.2: Nutritionally-related health risks reduced <sup>1</sup>**

**Outcome targets:** Improve nutritional intakes and increase physical activity in all age groups; improve food quality for all age groups <sup>1</sup>

**Outcome indicators:** Reduce risk of chronic disease; develop technologies to stabilize nutrients in foods

**Target Audiences/Customers:** General population (all age groups, males and females: infants, young children, teenagers, young adults, adults, and elderly)

**Activities (program components):** Education and research actions that promote changed behaviors; development of more physiologically functional food products

**Internal and External Partners:** Nutrient and/or supplement companies; exercise equipment companies; Departments of Public Health; Federally-funded agencies (e.g., Women, Infants, Children; Expanded Food and Nutrition Education Program/Nutrition Education Program; Family Nutrition Program; National Institutes of Health; United States Department of Agriculture)

The University of Massachusetts NEP consists of three program areas: (1) *Dietary Guidance*; (2) *Food Safety*; and (3) *Food Security*. The majority of programming is in the areas of *Dietary Guidance* and *Food Security*, supported by funding from EFNEP and FNP. Food Safety, reported under Goal 2 (A safe, secure food and fiber system) is supported by Smith Lever funds and outside grants.

Extension professionals devote approximately 0.8 FTE to EFNEP and 0.15 FTE to FNP. Programming is developed in response to local needs, stakeholder input and identification of key issues. Issues having the greatest impact on UMass Extension NEP are summarized below.

#### Issues

##### 1. Poverty

In Massachusetts, 8.9% of the population and 34% of all children live below the poverty level. An additional 21% lives below 200% poverty. Poverty has a far-reaching impact on nutritional status.

National surveys indicate decreases, the nutritional adequacy of the diet also decreases. Similarly, studies show minorities are especially vulnerable to poor health.

2. Hunger

According to the national study, "Hunger 1997, the Faces and Facts", the poor are especially at risk of suffering from hunger and health problems associated with hunger. One in five Massachusetts children under age 12 faces hunger today. As public assistance benefits are reduced, there will be a greater need for educational programs in food preparation, meal management and food safety to assist people in making maximum use of limited resources.

3. Child and Adolescent Nutrition

Issues in child and adolescent nutrition include increasing incidence of both obesity and under-nutrition, eating disorders, and low nutrient diets that increase the risk of the future development of degenerative disease.

4. Elderly Nutrition

Massachusetts has one of the highest elderly populations in the U.S. In 1996, 14% of the state's population was 65. Chronic diseases including hypertension, heart disease and diabetes are often manifested in the older years and often are related to poor nutritional intake.

5. Technology

Rapidly changing communications technology has a significant impact on the means by which Extension can make the information accessible. Electronic mail, computer conferencing, video, CD-ROM, and access to the Internet enable more learners to participate in Extension programming.

Programming

In response to these issues, the following programs are proposed.

	Issue #	Research(R)/ Extension (E)	Duration	Impact
<b>EFNEP</b>				
• Adult Program – Group	1, 2, 3	E	L	90% participants will improve dietary quality (# servings in the food guide pyramid)
• Auld Program – Learn at Home	1, 2, 3	E	L	75% participants will improve behavior checklist scores by 35%
• When You Work (Pilot)	1, 2, 3	E	I	
• Youth Program	1, 2, 3	E	L	2000 youth will participate annually 40% will improve dietary variety 40% will increase fruit and vegetables in the diet 40% will decrease dietary fat
<b>Correlation of Paraprofessional Characteristics and 24-Hour Recall Accuracy</b>	3	R	S	
<b>Home Study</b>				
• Nutrition for Young Children	1, 2, 3	E	I	

• Fit in Five	1, 2, 3	E	I	
<b>Nutrition and Health Workshops</b>	1, 2, 3, 4, 5	E	L	65% participants will indicate and intention to improve diet in at least one way
<b>Ventures in Healthy Eating</b>	4	E	I	
<b>Resources</b>				
• Food & Nutrition: News & Reviews Newsletter	1, 2, 3, 4	E	L	2000 newsletters distributed 3 times/year
• Video Conferences	1, 2, 3, 4, 5	E	L	2-3 video conf. offered annually 200 health professionals participating 75% indicating intention to use information in their work and/or personally
<b>FNP Youth Program</b>				40% will improve dietary variety 40% will increase fruits and vegetables in their diet 40% will decrease dietary fat
<b>Boston Public Schools Project</b>	1, 2, 3	E	I	
<b>Nutrition Ed. For Dimock Community Health Center</b>	1, 2, 3	E	I	
<b>Nutrition and Agriculture Education</b>	1, 2, 3	E	I	
<b>Brockton Jr. H.S. Healthy Choices</b>	1, 2, 3	E	I	
<b>Brockton Integrated Nutrition Program</b>	1, 2, 3	E	I	
<b>Parent/Youth Nutrition Rights</b>	1, 2, 3	E	I	
<b>Worcester Vocational High School Project</b>	1, 2, 3	E	I	
<b>Food and Fitness Days</b>	1, 2, 3	E	I	
<b>Out of School and After School Programs</b>	1, 2, 3	E	I	
<b>Qualitative Study of the Boston Public Schools Project</b>	1, 2, 3	R	S	
<b>Assessment of Supplement Use in Low Income High School Students</b>	1, 2, 3	R	S	
<b>Adult Programs</b>				
<b>Teacher Training in Nutrition Education</b>	1, 2, 3	E	I	55% participants will increase the number of servings in at least one food group
<b>Farmers Markets Nut. Education (Asian Vegetables)</b>	1, 2, 3	E	I	
<b>Adult Nutrition Education Program</b>	1, 2, 3	E	I	60% will improve at least one dietary practice
<b>Head Start Nutrition Program</b>	1, 2, 3	E	I	
<b>Boston Medical Center Nutrition Program</b>	1, 2, 3	E	I	

<b>FNP Community Agency Program</b>	1, 2, 3	E	I	
<b>Food Bank of Western Mass. Assessment and Education</b>	1, 2, 3	R	S	
<b>Vegetable Consumption Study</b>	1, 2, 3	R	S	
<b>Barriers to Participation in a WIC/Extension Nutr. Ed. Prog.</b>	1, 2, 3	R	S	
<b>Cost Benefit Analysis of Mass. EFNEP</b>	1, 3	R	S	

**Goal 3: A healthy, well-nourished population.**

		FY2000	FY2001	FY2002	FY2003	FY2004	5 Yr Total
Hatch Funds	dollars	\$23,109	\$23,802	\$24,516	\$25,252	\$26,009	\$122,688
Multi-State	dollars	\$48,872	\$50,338	\$51,848	\$53,404	\$55,006	\$259,468
College Match	dollars	\$58,588	\$60,346	\$62,156	\$64,021	\$65,941	\$311,052
Other Federal	dollars	\$0	\$0	\$0	\$0	\$0	\$0
Other Resource	dollars	\$2,058	\$2,120	\$2,183	\$2,249	\$2,316	\$10,926
Revenue Res.	dollars	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTAL MAES</b>	dollars	\$132,627	\$136,606	\$140,704	\$144,925	\$149,273	\$704,135
	FTEs	2.95	2.95	2.95	3.95	3.95	17.70
SL b&c	dollars	\$193,579	\$199,386	\$205,368	\$211,529	\$217,875	\$1,027,737
	FTEs	2.30	2.30	2.30	2.30	2.50	11.70
SL 3-d	dollars	\$922,645	\$922,645	\$922,645	\$922,645	\$922,645	\$4,613,225
	FTEs	24.04	23.00	23.00	22.00	22.00	114.04
State Funds	dollars	\$94,132	\$96,956	\$131,638	\$135,587	\$139,654	\$597,967
	FTEs	1.73	1.73	2.18	1.73	1.73	8.10
College Match	dollars	\$16,684	\$17,185	\$17,700	\$18,231	\$18,778	\$88,676
	FTEs	0.35	0.35	0.35	0.35	0.35	1.70
County Funds	dollars	\$131,773	\$131,773	\$100,000	\$100,000	\$100,000	\$563,546
	FTEs	1.45	1.45	1.00	1.00	1.00	5.90
Revenue/gifts	dollars	\$34,941	\$35,989	\$37,789	\$39,678	\$41,662	\$190,059
	FTEs	0.00	0.00	0.00	0.00	0.00	0.00
Contracts	dollars	\$1,239,946	\$1,301,943	\$1,367,040	\$1,435,392	\$1,507,162	\$6,851,483
	FTEs	18.07	18.07	20.00	20.00	21.00	97.14
<b>Total Extension</b>	dollars	\$2,633,700	\$2,705,877	\$2,782,180	\$2,863,062	\$2,947,776	\$13,932,596
	FTEs	47.94	46.90	48.83	47.38	48.58	239.63

<b>Total R/E</b>	dollars	\$2,766,327	\$2,842,483	\$2,922,884	\$3,007,988	\$3,097,049	\$14,636,731
	FTEs	50.89	49.85	51.78	51.33	52.53	256.33

These tables are based on organizational unit data and projections and are subject to variations between Extension and Experiment Station. It is a good faith effort to present the total resources based on a point in time. It is neither an official budget or report.

## Goal 4

### Greater harmony between agriculture and the environment

#### Statement of Issues

**Land and Population.** At the heart of agricultural and environmental issues in Massachusetts are two factors: many people and little land. Massachusetts is the fourth most densely populated state in the U. S., and is bordered by states ranked two and three (Rhode Island and Connecticut). At nearly 600 residents per square mile, Massachusetts is as densely populated as Germany, Britain and other western European countries. Dense population and limited land resources lead to environmental problems. But even though Massachusetts is a highly urbanized state, it retains a significant amount of open land, much of it farmland. Farms occupy nearly one-half million acres, 11% of the state's land. In many parts of the state agriculture accounts for most of the last remaining, privately held, undeveloped land. In addition, in an urban state, agriculture is no longer simply farming. The total land in a broader "agriculture" includes parks, playing fields, golf courses, riding stables and backyards which are also managed landscapes requiring expertise in plant and animal production. Such land provides important habitat for wildlife, recharge zones for water supplies, and open vistas and recreational spaces for residents and tourists.

In spite of its relative scarcity, the temptation to develop remaining open land is unrelenting. At present, managed land is seen as both generating problems and providing environmental assets. When it comes to agricultural land, economic and environmental interests are often at odds.

**Agrichemicals.** The public likes open space and local farms, but not necessarily everything profitable farming produces. Agroecosystems, particularly those that are intensive, can be environmentally "leaky", contributing to pollution problems. Chemicals stand out as a problematic issue. Animal wastes and manufactured fertilizers also present problems. There is no indication that any of these problems are worse in Massachusetts than in other parts of the country. However, the fact that farms in Massachusetts frequently border residential areas makes these more sensitive issues. In addition, intensive horticulture tends to use more chemical inputs, and as has been noted, much of the agroecology mix in Massachusetts is intensive horticulture.

New technologies and practices that can reduce chemical use while keeping agribusinesses profitable are needed. Fortunately, the University of Massachusetts is well-positioned to help agriculture solve these problems, as it has a long-standing and well-respected program in integrated pest management. Recently, some commodity areas have begun to work with integrated crop management, in order to address a broader range of chemical issues, including fertilizers and growth regulators.

**Public Knowledge and Education.** Public policy regarding agriculture should reflect an understanding of ecological and environmental realities. This will involve doing research to better understand agroecosystems and to develop ways to reduce or use alternatives to practices that degrade the environment. Production programs that are more environmentally friendly can be developed, and growers and managers can be taught how to use them. This is the traditional land grant model.

However, it is not enough to work only with agricultural audiences. The number of full-time farms has shrunk from 35,000 in the 1940s to 3,000 today, while the population in the state has grown. Very few people directly understand how plants and animals grow. Even an expanded definition of agriculture that includes turf and other non-traditional areas doesn't greatly increase the overall percentage. Unfortunately, most people in Massachusetts are not aware of the benefits agriculture brings to the state. Hence they don't actively support agriculture. Lack of awareness is understandable, because the positive effects agriculture has on Massachusetts aren't always clear and apparent. As relatively fewer people are directly involved in farming, the intimate relationship between people and the plants, animals and land that supply them with food, shelter, recreation and beauty have faded or disappeared. Part of the educational role of Agroecology is to re-establish this relationship.

For people to appreciate the positive aspects that managed land can have on the environment, they have to be taught. So, land grant institutions must also educate the public regarding the benefits and the real versus perceived risks of local agroecosystems. Enhancing public knowledge allows the public and policy makers to make better informed decisions about agricultural and environmental regulations.

In addition, the university can facilitate the dialogue between agricultural producers and the public. Agricultural businesses provide great opportunities for children to learn about biology and the environment. Agroecology and education professionals could develop these opportunities.

The land-grant university of the future will have to use new technology and new models of learning to educate both traditional groups and the wider public. In the information age, access to information on agriculture and the environment will be critically important to a sustainable future.

**Local Food and the Environment.** Local production and utilization of food crops provides important benefits to the economy, the environment, and society. Massachusetts currently imports 85% of its food. From both an economic and ecological perspective, this can create problems. An economy that imports basic resources is vulnerable to disruptions such as might be caused by increased transportation costs. Rather than being a closed system, that cycles inputs and waste relatively efficiently, the present system uses significant energy to import food, distribute it, and deal with waste issues. It disconnects people from their food sources, leading to a lack of understanding and appreciation of the processes needed to sustain life. In it's largest sense, agroecology involves food systems, from production to use to recycled waste. To be environmentally sound, agriculture must look at the whole system.

Studies by the UMass Department of Resource Economics indicate that available land and soil would allow the state to produce 35% of its food needs. This increase would add hundreds of millions in food dollars to the state economy annually, preserve open land and maintain the stability and sustainability of communities. Appropriate technologies would encourage recycling of wastes through the food system.

**Global Markets and the Environment.** Globally, big capital and power brokers dominate agriculture and have tremendous influence on agricultural and economic policy. As the southern hemisphere increasingly produces food for the more prosperous North, rural populations North and South lose their occupations, their farmland, and food self-sufficiency. Southern populations often go hungry. Americans have grown to expect year-round low prices for what were once seasonal foods.

American agricultural businesses operate in an international marketplace, with crops often determined by export policies and competition from other countries. Passage of free trade agreements such as NAFTA and GATT have reduced import regulations and brought more agricultural products into this country, from places like Mexico and Chile. Environmental and food safety issues now increasingly need to be addressed at the international level. In many parts of the world, simultaneous trends toward the destruction of resources and ecosystems *and* toward conservation and better use of resources can be seen. American consumers are both nostalgic about the loss of farms and seasonal crops *and* eager to purchase low-cost imported foods and ornamental plants and flowers year-round.

Nationally, in 1994 there were slightly over 2 million farms, with 200,000 of those responsible for producing 80 to 90% of all crops. Large-scale corporate agribusiness is capital-intensive, using more fertilizers and machinery and less labor to produce more product per land unit. It depends upon new research and technologies such as animal and plant genetics, as well as highly rationalized production practices and management techniques.

National and global agricultural trends have brought several smaller counter-trends into prominence in Massachusetts. Crop diversification, development of new crops, food processing, and value-added marketing have assumed increasing importance. Massachusetts consumers have shown a taste for seasonal fresh fruits and vegetables, thus favoring local producers and direct marketing. Concerns over pesticide usage on crops grown outside the U.S. widen marketing opportunities for the state's farms.

Often, issues of national and international trade are addressed in terms of economics. But the decisions and policies set regarding these issues can also have a profound effect on the environment.

## **The University, Agriculture and the Environment**

The relationship between the University and agriculture is a major issue facing both agriculture and the environment as agriculture in a highly urban state such as Massachusetts is not seen as a significant economic contributor at the legislative level. Thus, this perception influences the allocation of university resources to agriculture. One strategy is to coordinate agricultural efforts via a Center for Agriculture which is under consideration. This would make agricultural research and extension a focal point both within the University and state government.

## **A. Renewable Resources, Water Quality and Environmental Policy**

### *Overview*

Proper stewardship of natural resources and maintenance of environmental quality are essential elements of sustainable human societies and economies. In addition to traditional natural resources such as water, fisheries, wildlife and forest products, the definition of "natural resources" includes open space, aesthetics and recreation. Natural systems also provide benefits that are difficult to measure such as climate regulation, nutrient cycling, biodiversity, and the maintenance of overall environmental quality.

Massachusetts contains a wealth of natural resources, including extensive forests, wetlands and coastal areas. It is also the third most densely populated state in the nation, with 5.8 million residents. As a result there are increasing development, land use, recreation and utilization pressures being placed on natural systems.

Massachusetts has a long history of reliance on its forests, soils and fisheries to provide every day products as well as employment and income. Today, recreation and tourism businesses that utilize the natural landscape and resources continue to provide significant income and employment to the state, particularly in rural areas. Increasingly however, there is concern that consumptive uses of natural resources (agriculture, timber cutting, hunting, trapping, fishing) are in conflict with other values and competing uses for natural areas.

Land use and natural resources are managed by a variety of state and federal agencies and private organizations on parks and recreation land, wildlife sanctuaries and refuges, state forests, reservations, watersheds and conservation land. In addition, many private landowners and land trusts (There are 235,000 forest landowners in Massachusetts) manage their land to protect natural resources through Chapter 61 (forest land classification), forest stewardship and conservation restrictions. Proper stewardship of natural resources depends, in part, on educating those who own and manage much of the land.

Massachusetts is a state with a strong "home rule" tradition and, as a result, local communities have a great deal of influence over natural resource issues. Zoning ordinances and other bylaws are generally administered at the local level and wetlands protection regulations are administered by volunteer conservation commissions in each city or town. Thus, the fate of natural resources is also closely linked to land use decisions made every day by local officials, including planning and zoning boards, conservation commissions, water districts and boards of health. Their statutory authority over development, wetlands and water protection, solid waste, on-site sewage disposal and open space make these officials primary stewards of our environment.

Citizens of Massachusetts are net consumers of natural resources. Everyday decisions made by people on what products they purchase, what building materials they use, where they choose to live, and how they dispose of their wastes, have profound effects on natural resource systems. As human populations and the demand for consumer goods grow they place an increasing strain on natural systems, jeopardizing the resources and benefits provided by those systems.

Environmental issues and associated strategies generally fall into one of four broad categories:

- environmental quality,
- impact of land use and development on natural resources,
- sustainable use of natural resources, and

- protection of ecosystems and biodiversity.

### **Environmental Quality**

Environmental quality - healthy air, water, food and surroundings - is inextricably linked to the quality of life for all people. Activities that degrade soil, air and water quality undermine the health and well-being of people from urban, suburban and rural communities. Other aspects of the environment, such as scenic views and recreational opportunities, enhance the quality of life for citizens of the Commonwealth.

Air quality is related to a variety of activities such as waste disposal (incineration, sewage treatment), energy production and consumption, transportation and industrial/commercial production. Air quality issues tend to be most acute in areas where these activities are concentrated (urban areas). Several urban centers in Massachusetts are struggling to maintain air quality standards. Technology, land use and transportation planning can be used to protect and enhance air quality in Massachusetts.

Healthy and attractive natural areas are important resources that provide aesthetics and recreation to citizens of Massachusetts. Wooded parks, urban trees and riverfront areas are of particular importance to residents of urban communities and can contribute much to the quality of life in urban environments. Natural areas and urban trees also provide other benefits to city residents such as cleaner air, shade, windbreaks and noise reduction.

Water quality is effected by a wide range of land uses and polluting activities including direct discharges of pollutants, agricultural activities (pesticides and fertilizers), erosion, waste disposal, on-site waste water disposal, road salting, underground fuel tanks, landfills, storm water management (combined sewer overflows) and the destruction of wetlands. Addressing water quality on a watershed basis is emerging as an essential strategy for maintaining a clean water resource.

The quality of surface waters has historically been easier to address than that of ground water. As a result, surface water quality has generally improved over the last several decades, although concerns still remain.

Ground water is more difficult to monitor and treat than surface water, and the threats are not always obvious. Nearly one third of Massachusetts residents rely on ground water supplies for drinking water. Communities are becoming increasingly concerned about the contamination of ground water for good reasons. Through 1989, 74 supply wells and 636 private wells were closed due to a variety of contaminants. Programs and technologies designed to prevent costly ground water contamination are critical elements for protecting these vital water supplies.

### **Impact of Land Use and Development on Natural Resources**

The development and re-use of land for residential, commercial and industrial purposes places tremendous stress on natural resources such as wetlands, groundwater, surface water, wildlife habitat, coastal resources and agricultural land. Suburban growth has increased the numbers of roads, utilities, lawns and on-site waste water disposal systems, resulting in increased pollution, fragmentation of forest ecosystems, and wetland loss.

Since 1950 the rate of land development in Massachusetts has been over ten times higher than the rate of population growth. Between 1951 and 1971 35% of agricultural lands (365,000 acres) was developed. On Cape Cod 17% of the land area and 26% of the forest ecosystem was developed for residential uses between 1951 and 1984.

The impacts of development can be ameliorated to a large extent by the use of innovative land use planning, sustainable development concepts, environmentally friendly construction materials, and best management practices that protect wetlands and water quality. Landowners, developers, engineers, architects, consultants and businesses need up-to-date information that will help them reduce or mitigate their impacts on the environment and help design developments that minimize reliance on non-renewable resources and fossil fuels.

Responsibility for managing land use and development, and mitigating its impacts, falls principally on local officials who enforce state and local statutes related to zoning, planning, wetlands, public health and water supply. However, these volunteer boards often struggle with increasing levels of responsibility, liability, time demands and public mistrust, without adequate financial resources or technical support. Burn-out, high turn-over and a general lack of knowledge and training

often undermine the functioning of these boards. Training of land use officials is conducted by a variety of agencies and organizations with little coordination. If good land use practices rest on a foundation of knowledgeable local officials, then education and support for these boards is of paramount importance.

### **Sustainable use of Natural Resources**

There is increasing concern about the impacts of timber harvesting and other forestry practices on wetlands, surface water quality and wildlife habitat. The impact of commercial fishing and shellfish harvesting on replacement stocks is of critical concern and is a source of on-going controversy. The introduction of non-native animals and management of habitat for game species has been questioned for its potential impacts on biodiversity. Management of watershed lands for increased water yields creates conflict with other desired values. Agricultural practices can result in erosion, runoff of nutrients and pesticides, and the conversion of upland and wetland habitats.

Often complicating these issues is the relatively low profitability of natural resource based industries and the limited financial and technical resources of rural communities. Proper management of natural resources is important to the sustainability of both resources and rural communities. Healthy natural resource based economies can also serve as an important incentive to conserve natural resources.

Industry, natural resource managers and professionals need training and technical assistance on best management practices to limit environmental impacts of resource management and utilization, and techniques for monitoring impacts. Industry also needs assistance in identifying new and value-added products that will support rural economies.

Finally, communities need assistance in planning for and managing natural resource based economies in ways that protect those industries and the environment. Policy makers and local officials need to work together to better understand the relationship between healthy rural economies and natural resources management, and develop strategies and mechanisms to preserve these associations.

### **Ecosystems Protection/Biodiversity Conservation**

Recognition that many of the products we use every day and many of the drugs we use 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 a philosophic 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 proactively 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 the recovery of endangered species. Examples include management of grassland and coastal heathland systems, protection of remnant "old growth forests" in Massachusetts, and efforts to restore populations of endangered species, from the American burying beetle to the piping plover.

Biodiversity is a large and all-encompassing concept. 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 ecosystems management and restoration in order to effectively manage for biodiversity. As we learn more about ecosystems and the specific requirements of endangered species, new information must be quickly communicated to those who are applying conservation techniques in the field.

## **B. Key Program Components**

### **Extension Programs**

**This goal is addressed by two of UMASS Extension Programs: Agroecology (AE) and Natural Resources and Environmental Conservation (NREC).**

**The Agroecology program is organized as teams, largely commodity based. Usually team members come from more than one department; an interdisciplinary approach needed to address agricultural problems from an ecological perspective. These teams are:**

- **Community Development**
- **Cranberry**
- **Crops/Dairy/Livestock**
- **Integrated Pest Management**
- **Floriculture**
- **Nursery/Landscape/Urban Forestry**
- **Pesticide Education**
- **Tree Fruit**
- **Turf**
- **Vegetable/Small Fruit**
- **Waste Management/Utilization**

**Almost all Agroecology faculty and staff are housed in the departments of Entomology, Microbiology, Plant and Soil Sciences, Veterinary and Animal Sciences, and Resource Economics.**

**The NREC program is made up of faculty and professional staff that work together on specific program initiatives in one of four areas of emphasis.**

- **Watershed and Water Resource Protection**
- **Natural Resource Management**
- **Community Land Use Management and Planning**
- **Environmental Education**

**NREC faculty and staff are based in the Departments of Natural Resource Conservation, Landscape Architecture and Regional Planning, and Plant and Soil Sciences.**

## **Research Programs**

**Research is conducted by faculty and professional staff in a variety of departments with funding from the Agricultural Experiment Station and outside sources. Research relevant to Goal 4 is principally conducted by departments in the College of Food and Natural Resources, including:**

- **Entomology**
- **Microbiology**
- **Plant and Soil Sciences**
- **Veterinary and Animal Sciences**

- Resource Economics
- Natural Resources Conservation
- Landscape Architecture and Regional Planning

## C. Target Audiences

**Natural Resource Professionals** (including agency personnel, foresters, wildlife biologists, regional planners, environmental consultants, shellfish constables and land managers) - Natural resource professionals make decisions on a daily basis that impact natural resources. They have an ongoing need for continuing education and access to information in many areas related to conservation, management and utilization.

**Natural Resource Based Businesses** (loggers, commercial fisherman, farmers, pesticide applicators, development and site design professionals) - Persons who derive their income from natural resource systems impact these systems on a daily basis. They often lack up-to-date information on best management practices for resource conservation and utilization.

**Local Land Use Officials** - This group includes members of boards of health, planning boards, conservation commissions and other volunteer governance committees. An additional audience is the professional staff who serve these boards, and the associations, respectively, who serve the local officials and the professional staff. These audiences need information and technical training in a variety of areas related to environmental protection. Often these topics are closely tied to the legal jurisdiction of the board. There is also a need for assistance in building the capacity of these various groups to work together to solve local and regional problems.

**Local Department of Public Works and Water Department officials and staff** - Local water departments are under increasing pressure to protect community drinking water resources from pollution. Federal regulations, increased local land development and increasing public awareness of threats to water supplies have all contributed to the situation. These local officials often lack both technical information and the community development skills required to facilitate public discussion and planning.

**Community Opinion Leaders** - Within each community there are individuals who through their local work are seen as leaders. These individuals influence local decision making through individual contributions of time and/or money to the community. Many are active in local government, business or service organizations. These leaders are in a unique position to advocate for environmental stewardship and resource protection.

**Environmental/Conservation Organizations (non-government)** - Non-profit environmental organizations, land trusts, watershed groups and conservation districts provide significant outreach to landowners, communities, schools and citizens. Environmental organizations need access to both technical information and training that focus on technical details, organizational capacity building and effective educational approaches to adult learning.

**K12 Educators** - Public and private school teachers and environmental educators provide a mechanism for educating youth and parents in regard to environmental concepts, issues and action. This large group is both interested in environmental issues and able to effectively integrate environmental education into new and existing subject areas. K12 Educators need access to technical information, curriculum and training that focus on effective education methods which utilize experiential learning and critical and creative approaches to teaching.

## D. Key Program Components, Duration and Collaborators (NREC)

**Marine Aquaculture (Long-term)**

Through the SouthEast Massachusetts Marine Aquaculture Center (SEMAC) provide 1) industry support and technical assistance, 2) research and development, and 3) outreach and education related to management of tidal flats for shellfish production. Elements include: aquacultural resource centers, emergency disease diagnostic service, technical support, site evaluation, workshops and roundtables, and a mini-grants program to support technical development within the industry. Collaborators include shellfish industry groups, shellfish constables, Woods Hole Oceanographic Institute, MA Sea Grant Program, Cape Cod Community College, Cape Cod Economic Development Council, and the MA Division of Marine Fisheries.

#### **Training for Pesticide Applicators (Long-term)**

Through the UMASS Extension Pesticide Education Program, NREC provides training in the areas of wetlands and water resource protection, endangered species, and biodiversity conservation.

#### **Forestry and Land Management Education (Long-term)**

Education and information are provided to foresters and loggers through workshops, articles in trade journals and regular mailings. Extension faculty and professional staff work as part of a state-wide forestry education committee to plan and implement training workshops for timber harvesters, foresters and conservation commissioners. Coverts, a three and a half day residential workshop education and training for 25 community opinion leaders each year in forest management principles and techniques. The Extension Forester surveys loggers and foresters on a quarterly basis in Massachusetts, and combines these responses with data from Connecticut, and produces a southern New England quarterly stumpage price report, distributed to loggers, foresters, landowners, and assessors. Collaborators include: MA Departments of Environmental Management and Environmental Protection, MA Forest Stewardship Program, MA Wood Producers Association, MA Association of Timber Harvesters, Mt. Wachusett Community College, and UCONN Cooperative Extension.

#### **Raising Capacity for Watershed Management (Long-term)**

Training will be provided for agency personnel that serve as basin team leaders throughout Massachusetts. A 40-hour watershed management curriculum will be developed and used to train community opinion leaders and decision-makers through a combination of state-wide residential workshops and workshop series within specific watersheds. Collaborators will include the MA Water Watch Partnership, MA Watershed Coalition, and the MA Executive Office of Environmental Affairs.

#### **Mill River Watershed Project (Intermediate-term)**

This intensive watershed management and planning effort is focused on the four principle towns that make up the Mill River Watershed (Hatfield, Whately, Deerfield, Conway). Elements include assessments of water quality, sediment toxicity, fish communities and genetics, farm practices, land use, and local ordinances, education and outreach within the communities, an educational program within the regional school system, and a facilitated process of watershed planning. Collaborators include the Franklin Regional Council of Governments, USDA NRCS, USFWS Silvio O. Conte National Fish and Wildlife Refuge, Smith College, MA Water Watch Partnership, MA Riverways Program, Pioneer Valley Planning Commission, and Connecticut River Watershed Council.

#### **SuAsCo Watershed Project (Intermediate-term)**

This four-year project is scheduled to begin in the summer of 1999. The main goal of the project is to encourage community-driven assessment and action to protect water resources and ecosystems at a watershed scale. To achieve this goal we will focus on: 1) citizen involvement in volunteer assessment and monitoring programs; 2) public participation on issues of identification, prioritization, action planning and decision-making; 3) public outreach, education and technical assistance; 4) specific outreach and education on the importance of land use and growth management for protecting water resources and ecosystems; 5) and creating a model for strategic education and outreach to achieve specific water quality and conservation goals. Partners in this project include the SuAsCo Watershed Coalition and MA Watershed Initiative Program.

#### **Narragansett Bay Non-Point Source Water Pollution Control Program (Intermediate-term)**

The purpose of this program is to reduce water quality impairment by non-point sources of pollutants. A key focus has been training local decision-makers to recognize and manage threats. We are working cooperatively with Watershed

Associations, regional planning agencies, and state agencies to develop and deliver GIS products, training and technical assistance to twenty communities in the Blackstone and Taunton Watersheds.

#### **Land Sensitivity Modeling and Watershed Protection through Land Use Planning and Management (Long-term)**

Land sensitivity modeling identifies areas of watersheds that are particularly vulnerable to water resource degradation from inappropriate land uses. The results are used to educate municipal officials, regional planners and others about approaches to land use planning and management that will most effectively protect watershed resources.

#### **Wetland Biomonitoring Program (Intermediate-term; long-term if funding is available)**

UMASS Extension, EPA, Massachusetts Coastal Zone Management, and a variety of conservation organizations are developing and implementing a wetland biomonitoring program for New England. Biomonitoring is a cost-effective method for assessing wetland health and is an important component of watershed assessment. NREC is developing and testing biomonitoring protocols and providing training programs for volunteer monitors in the Parker River and SuAsCo Watersheds, and for the Wampanoag tribe on Martha's Vineyard.

#### **Water Resource Protection on Martha's Vineyard (Long-term)**

NREC staff work with towns to initiate zoning changes and other protective measures based on information gained from environmental monitoring and nitrogen loading analyses for water bodies on Martha's Vineyard. NREC also provides training and technical assistance for the Wampanoag tribe on topics of natural resource conservation.

#### **Cape Cod Hazardous Materials Program (Long-term)**

The Barnstable County Hazardous Materials Program and Hazardous Materials Hot Line offers technical assistance and educational support to town household hazardous waste coordinators for collection programs. It provides access for the public to information on the proper disposal of household hazardous materials on Cape Cod.

#### **The Citizen Planner Training Collaborative (Long-term)**

The Citizen Planner Training Collaborative (CPTC) is a statewide network of state agencies, local officials, professional organizations and private sector representatives. Since 1995, CPTC has offered education to local planning and zoning boards through a comprehensive core curriculum and advanced workshops. These cover zoning, development, planning for growth, transportation, natural resource protection and regional planning issues. CPTC reaches 500 to 700 local officials each year across the state with training, audiotapes and a well-utilized web site.

#### **Local Capacity Building Project (Short-term; intermediate or long-term if funding is available)**

In this new initiative, DEP has asked NREC staff to assess the training support system for planning boards, boards of health, conservation commissions, and water and sewer commissions. Jointly with a large network of training providers, they will assess the knowledge needs of those boards/commissions and whether existing training programs cover those needs. The project will also identify opportunities for closer cooperation among training providers around content and delivery. On the local level, NREC is working to promote more integration across town boards. On the state level, the goal is to build support for the educational needs of local volunteer officials in the land use arena. This project is co-sponsored and funded by the Massachusetts Department of Environmental Protection.

#### **Wetlands Education and Training Collaborative (Long-term)**

This is a collaborative approach to planning and implementing wetlands education and training programs for conservation commissions, volunteer municipal boards charged with administering the state's wetlands protection regulations. The Collaborative conducts cooperative needs assessment, establishes priorities and cooperative program planning. Collaborators include the MA Association of Conservation Commissions, Massachusetts Audubon Society, MA Department of Environmental Protection, U.S. EPA, and the U.S. Army Corps of Engineers.

#### **Habitat Assessment and Protection Methodologies (Long-term)**

"Wethings" and "Wethings-Birds" are new wetland habitat evaluation methodologies and software programs developed at UMASS. Extension is responsible for marketing, distribution, evaluation, and training for these methodologies. The New England Geographic Assessment Program (GAP) project, sponsored by the U.S. Fish and Wildlife Service and developed

at UMASS, is creating vegetation maps, wildlife habitat models and assessment methodology for identifying important wildlife habitat from remotely sensed data. The GAP program is being extended through the development of an expert decision-support system for establishing priorities for land conservation. Extension will provide outreach on GAP Analysis and strategic land conservation to natural resource professionals and regional planners. We also offer a course, available through continuing education, on "Wetlands Assessment and Field Techniques."

**Assessing Techniques for Mitigating Road and Highway Impacts on Wildlife Movement (Short-term; intermediate or long-term if funding is available)**

The goal of this project is to research the impacts of roads and highways on wildlife and assess possible techniques for mitigation. The results will be used to design and test highway mitigation projects. Technical training and education programs will be developed and implemented to raise awareness of the issues involved and approaches for mitigating highway and road impacts.

**Massachusetts Frog Call Survey (Long-term)**

NREC coordinates the MA Frog Call Survey as part of the North American Amphibian Monitoring Program (NAAMP). A total of 29 volunteers monitor 22 pre-selected routes in Massachusetts. Each year data are collected according to specific protocols and provided to the NAAMP organizers. The goal of the project is to provide long-term monitoring data that will allow scientists to better understand the conservation status and population trends for calling amphibians in North America.

**Environmental Stewardship Education Initiative (Intermediate-term; long-term if funding is available)**

In partnership with Extension's 4H Youth & Family Development Program and the UMASS Environmental Sciences program, NREC has launched a new initiative to support community service learning relating to environmental issues in Massachusetts. The initiative builds on the success of the Earth Connection, Envirothon, and NREC's work with watershed education. Plans include action research projects that involve high school educators in evaluating the effectiveness of community service learning and environmental education, and special outreach to youth in urban communities.

**The Earth Connection (Intermediate-term; long-term if funding is available)**

Earth Connection is an annual two-day "action conference" on community service and the environment that brings teams of high school students and teachers from across Massachusetts to the UMASS Amherst campus. Conference activities include skills workshops, introduction to UMASS environmental research and education, informal roundtable presentations of student projects, and team planning. Over 300 students, teachers, and resource people participate each year. Earth Connection is co-sponsored by International Paper.

**Watershed Education (Short-term; intermediate or long-term if funding is available)**

NREC's involvement in the development of watershed curriculum materials and methods for K-12 teachers and youth leaders includes working with schools in four towns to facilitate student involvement in the Mill River Watershed Project, a watershed education project in the South River watershed (South Coastal Watershed), and creating a model watershed education program for the Massachusetts Watershed Initiative. NREC coordinates the Massachusetts Bays Education Alliance's Education Initiative, a partnership program that works with educators from 69 environmental education organizations and agencies and over 900 teachers. The goal is to build a community of educators in Massachusetts who teach about watersheds and coastal processes, healthy ecosystems, non-point source pollution, problem-solving strategies and decision-making in support of the Massachusetts Bays Comprehensive Conservation and Management Plan.

**4-H Beachcomber (Long-term)**

Marine Education on Wheels. This traveling exhibit and educational program is designed to provide young people and adults with an opportunity to learn about marine life and the fragile, changing environment around them.

## **E. Outcomes and Outcome Indicators**

***Outcome 4.1. Sustainable agricultural systems that maintain healthy ecosystems and insure a safe and adequate water supply.***

**A. Increased understanding of the ecology of agricultural ecosystems and relationship to natural ecosystems.**

## Research

Understanding of European corn borer and other stalk boring Lepidoptera (MAS00694, AeVVSF).<sup>LL</sup>

Improved understanding of ecological and behavioral aspects of resource location by insects (MAS00725, MAS00775)  
<sup>LL</sup>

Improved understanding of reproductive physiology in pests (MAS00743).<sup>LL</sup>

Identify modes of pest adaptation to crops and pest management strategies (MAS00789, AeCDL).<sup>LL</sup>

Identify factors that make some plant species invasive in agroecosystems (MAS00813, AeC)<sup>LL</sup>

Identify key pathogens in agroecosystems (MAS00812) <sup>S,LL</sup>

Identification of unculturable species of microbes in soils, water, plants and animals (MAS00796)<sup>S,LL</sup>

## **B. Development of methods to reduce pollution and environmental degradation caused by agricultural practices.**<sup>S,LL</sup>

### Research

Efficient and non-polluting nutrient management strategies for crops developed (MAS635)

Identify and evaluate cultural controls for pests (MAS812, AeC, AeF, AeIPM, AeNLUF, AeT, AeTF, AeVVSF)

IPM advanced to include non-chemical methods, such as biocontrol, to solve pest management problems (MAS635 AeC, AeF, AeIPM, AeNLUF, AeT, AeTF, AeVVSF)

Develop models for pest development that will lead to timely application of pesticides including appropriate monitoring techniques for pests (MAS813, MAS775, AeC, AeF, AeIPM, AeNLUF, AeT, AeTF, AeVVSF)

Develop traps for insect pests (MAS775, AeC, AeF, AeIPM, AeNLUF, AeT, AeTF, AeVVSF)

Identify and evaluate biocontrols (MAS812, MAS813, MAS801, MAS802, AeC, AeF, AeIPM, AeNLUF, AeT, AeTF, AeVVSF)

Identify and evaluate resistance to plant pathogens and arthropod pests (MAS812, AeC, AeF, AeIPM, AeNLUF, AeT, AeTF, AeVVSF)

### Extension

IPM implemented in new crop areas and managed landscapes (AeIPM, AeF, AeT, AeTF AeVVSF, AeNLUF).

Develop methods for recycling waste in agricultural systems (AeWM)

Watershed-based agricultural NPS pollution control program developed (Ae, NREC)

Provide education on conservation topics (biodiversity conservation, function and values of wetlands) for pesticide applicators as part of the UMASS Extension Pesticide Education Program (Ae, NREC)

## **C. Development of better tools to measure pollution effects and mitigation efforts.**

### Research

Characterize nutrient flows through the crop, forage conservation, feeding, animal, and manure components of livestock and dairy production system (MAS00763, NE132, AeCDL)<sup>S,LL</sup>

Quantify pesticides and pesticide impacts in the environment. (MAS00764, MAS00773, AeC, AeCDL, AeF, AeIPM, AeNLUF, AeT, AeTF, AeVVSF)<sup>LL</sup>

## **D. Define non-target effects and environmental fate of agricultural chemicals and wastes.**

### Research

Determine effects of crop management on nutrient, pesticide and sediment pollution of water (MAS635, AeCDL, AeIPM)  
<sup>LL</sup>

Evaluate the environmental and economic impacts of alternative dairy feed systems, manure handling and storage systems, and selected feeding and manure management strategies (MAS00763, NE132, AeCDL)<sup>S,LL</sup>

The evaluation of halogenated aromatic hydrocarbons in white suckers from the Connecticut river basin (MAS00750)<sup>LL</sup>

***Outcome 4.2. Sustainable utilization of natural resources and use of resource management to maintain and enhance ecosystems.***

**Research**

The National Atmospheric Deposition Program (McComb, Brooks)

The evaluation of halogenated aromatic hydrocarbons in white suckers from the Connecticut river basin (Newsted)

Predation on Atlantic salmon smolts below dams (Juanes)

Restoration of marine fisheries (Juanes)

Management of marine sanctuaries (Juanes)

Effects of fishing gear on marine habitats (Juanes)

Relationship among exotic invasive species, marine aquaculture, and the ecology of coastal ecosystems (Juanes)

Comprehensive watershed planning (Ahern)

Develop a descriptive model interpreting the hydrology and associated nutrient transfer in wetlands (MAS772)

Develop a watershed model for interpreting land sensitivity to potential pollutants (Randhir)

Management of forest riparian buffers (Ross, McGarigal, Griffin, Kelty)

Timber harvest or disturbance affects on site productivity and downstream impacts (Barten)

Relationship of bird diversity to forest cover, urbanization, and agriculture (McComb, McGarigal)

Navigation and habitat use by raccoons and opossums in suburban forests: implications for management (Fuller)

Use of remote sensing for natural resource inventory, assessment and conservation planning (Finn, Griffin, McGarigal, Goodwin)

Volunteer stewardship for ecosystem rehabilitation: why do volunteers become engaged; what benefits do they see (R. Ryan)

Cultural perceptions of landscape: identifying local values around ecology and aesthetics (R. Ryan)

Sustainable forest products distribution: a proposed analysis of forecasted demand and supply for certified sustainably grown forest products, and distribution channel feasibility study (Damery)

Hilltown local wood initiative: a market feasibility study to promote regional economic development through coordinating local users and producers of wood (Damery)

Forecasting techniques for the pricing of red oak (Damery)

The value of the Northeastern NIPF: An econometric study to assess determinants of NIPF land values (Damery)

Timber peg performance (Fisette)

Performance of house wraps in energy conservation (Fisette)

Wood waste utilization (Fisette, Damery)

Economic and social importance of non-timber forest products in New England (Muth)

Ecophysiology of invasive exotic plants and their impacts on native species and ecosystems (Harrington)

Effects of silvicultural practices on the spread or control on invasive plants (Harrington)

Ecological land classification system: improving soil and topographic mapping for improved forest management (Kelty)

Effects of past land use history on nutrient cycling and forest regeneration (Kelty)

**Extension**

Southeastern MA Aquaculture Center (NREC)

Forestry and logger education (NREC)

Forest management/stewardship (NREC)

- Coverts
- Forestry education
- Stumpage price reports

Land management/stewardship for wildlife and biodiversity (NREC)  
Conservation strategies in suburbanizing environments (NREC, proposed pending funding)  
Wetlands Education and Training Collaborative (NREC)  
Habitat Assessment & Protection Methodologies (NREC)

- Wethings & Wethings-Birds
- Gap analysis
- Decision support system for strategic land conservation
- Wetlands Assessment

Mitigating road and highway impacts on wildlife (NREC)  
Massachusetts Frog Call Survey (NREC)  
Watersheds protected through community-based education and training programs (NREC)  
Watershed protection through land use planning & management  
Education and training in support of the MA Watershed Initiative  
Mill River Watershed project  
Blackstone River Watershed (Narragansett Bay) project  
SuAsCo Watershed project  
Stormwater management (NREC, proposed pending funding)

### ***Outcome 4.3. Land Conservation***

#### **Research**

Greenways and urban sustainable development used and integrated with agricultural efforts (Gross, Ahern, Finn)  
Metland VII: planning a New England greenway (Gross, Fabos, Ahern)  
Greenways: a tool to provide recreational opportunities, to protect water quality, wildlife habitat, and historical and cultural landscapes (R. Ryan)  
Planner's activities: task analysis used to improve rural & regional planning practice (suburban-rural fringe) (LARP, NREC)  
Future landscape scenarios: conception, simulation and evaluation (Ahern, NREC)  
Tax and job base enhancement and retention (Mullin)  
Brownfields: redevelopment of urban land (Mullin)  
Approaches to municipal comprehensive planning (Mullin)  
HongKongization: stacking the big boxes (Mullin)

#### **Extension**

Growth management strategies (NREC)  
Citizen Planner Training Collaborative (NREC)  
Local Capacity Building Project (NREC)  
Strategic land conservation (NREC)

- Decision support system for strategic land conservation
- Gap analysis
- Outreach, education and technical assistance to land trust community

### ***Outcome 4.4. Healthy livable environments including safe and adequate water supplies, clean air, healthy living conditions, and adequate outdoor recreational opportunities.***

#### **Research**

Land sensitivity modeling for water resource protection (Randhir)  
Non-point source pollution modeling at the urban/rural interface (Barten)  
Watershed management: ridgeline to tap (Barten)

Hydrological modeling to identify ecological thresholds related to stream flow (Barten)  
Stormwater management planning (R. Ryan)  
Performance evaluation of various stormwater management technologies (Winkler)  
Evaluation of on-site wastewater treatment techniques and technologies (Veneman, Winkler)  
Street tree risk assessment (D. Ryan, Bloniarz)  
Survival rates of recently planted street tree: bare root vs balled (Bloniarz)

#### Extension

Meet the cultural and traditional food needs of the diverse and changing citizenry of the Commonwealth (Ae, ExS, CFNR)  
Meet the changing needs for recreational space and landscaping in the urban and suburban environments (Ae, ExS, CFNR)  
Provide leadership to help agriculture serve food, fiber, and recreational needs (Ae, ExS, CFNR)  
Seize the unique opportunity provided by the close proximity of urban populations and agricultural providers (Ae, ExS, CFNR)  
Water resource protection on Martha's Vineyard (NREC)  
Cape Cod Household Hazardous Material Program (NREC)  
Stormwater management (NREC, proposed pending funding)  
Urban forestry (NREC, proposed pending funding)  
Sustainable building materials and design (NREC, proposed pending funding)

### ***Outcome 4.5. Public Policy Decisions Informed by Science and Community Management of Resources***

#### Research

Benefits and costs transfer in natural resource planning (MAS00717)  
Effect of economic issues in the enforcement of market-based approaches to natural resource and environmental policy (effectiveness of incentives and policy initiatives for protecting biodiversity) (MAS00799)  
The importance of catch-related aspects in the recreational fishing experience (MAS00782)  
Social function of conflict and its effects on resource allocation and management (MAS00074)

#### Extension

Strengthen capacity of legislative decision-makers to educate and interact with their constituencies, re: land-based issues (Ae, ExS, CFNR)  
Enhanced capacity of municipalities to use public resources wisely to ensure public health, safety, and fiscal responsibility for land-based resources (Ae, ExS, CFNR)  
Strengthened collaborations with and among groups that impact agriculture (Ae, ExS, CFNR)  
Watershed-based agricultural NPS pollution control program (NREC)  
Watersheds protected through community-based education and training programs (NREC)  
Watershed protection through land use planning & management  
Education and training in support of the MA Watershed Initiative  
Mill River Watershed project  
Blackstone River Watershed (Narragansett Bay) project  
SuAsCo Watershed project  
Comprehensive watershed assessment & monitoring program (NREC)  
Water resources protected on Martha's Vineyard (NREC)  
Wetlands/aquatic biomonitoring program (NREC)  
Wetlands Education and Training Collaborative (NREC)  
Citizen Planner Training Collaborative (NREC)  
Local Capacity Building Project (NREC)  
Growth management strategies (NREC)  
Mitigating road and highway impacts on wildlife (NREC)

## **Outcome 4.6. *Environmental Literacy Increased***

### Extension

Diverse members of the community engaged in participatory education and commerce (Ae, ExS, CFNR)

Help farmers, landscapers, planners and conservationists connect and learn from each other (Ae, ExS, CFNR)

Educate future farmers, growers, and landscapers through majors within the College that provide interdisciplinary training in production, business, legal issues and ecology (Ae, ExS, CFNR)

Help farmers educate consumers to strengthen farms and communities (Ae, ExS, CFNR)

Public better educated about the relationships between agriculture, economic vitality, environmental health, and community integrity (Ae, ExS, CFNR)

Strengthened capacity of agricultural producers and managers to educate their communities and customers about the value of agriculture (Ae, ExS, CFNR)

Community members educated to better understand the relationships between agriculture, economic vitality, environmental integrity, and social well-being and win their support for building and sustaining a strong local and regional agriculture (Ae, ExS, CFNR)

Agriculture Education (NREC, Ae)

Earth Connections (NREC)

Watershed Education (NREC)

Environmental community-based learning (NREC)

4H Beachcomber: marine education on wheels (NREC)

## **Outcome 4.7. *The University of Massachusetts recognized as a center for knowledge surrounding issues of agriculture and the environment***

### Extension

Internal organization of Agroecology strengthened (Ae, ExS, CFNR)

Establish a Center for Agriculture

Codify components of functional teams within the Center.

Enhance coordination, cooperation, and collaboration among individuals, teams, the Program, and the Center to improve productivity.

Identify and work toward a common purpose as one unit.

Establish and improve working relationships with other agricultural service groups (Ae, ExS, CFNR)

Develop leadership in region-wide programs

Identify key agricultural stakeholders and establish effective advisory boards.

Improve the functional capacity of the University to deliver research-based knowledge (Ae, ExS, CFNR)

Develop Regional Agroecology Centers.

Develop the leading plant diagnostic facility in New England, and network with in-state Regional Agroecology Centers.

Identify, prioritize, and invest in areas that need better staffing, funding, and facilities.

Modernize facilities for research and Extension after a thorough review and analysis of current strengths and weaknesses, and identification of equipment and staffing needs.

Identify, prioritize, and invest in technologies needed to do effective outreach, teaching and research.

Use technology (e.g., Internet, on-line databases, CD-ROM formats, distance-learning) to deliver existing and new research and education programs to clients.

Improve and expand interactions with non-agricultural departments and programs in the University (Ae, ExS, CFNR)

## F. Output Indicators (2000-2004)

Activity	# Workshop & Presentations	Audience/ Participants	Outcomes Addressed
Training for pesticide applicators (wetlands and biodiversity)	20	1000 applicators	4.1, 4.2, 4.4, 4.6
Marine aquaculture technology transfer/demonstration	20	450	4.2
Development of alternative species for marine aquaculture		50 growers	4.2
BMPs developed and training provided for inter-tidal shellfish growers		85% of growers	4.2
Forestry Education: Coverts workshops	5	125	4.2
Forestry Education: 10 newsletters, 15 direct mailings, 5 publications, logger education workshops	5	75 loggers 1500 foresters & forest landowners	4.2, 4.5
10 cable television shows produced; fifteen feature articles in local and regional newspapers, ten radio spots produced, and mailings of educational material on the subject of household hazardous waste		1000 consumers 32 municipal employees	4.2, 4.4
Martha's Vineyard nutrient loading studies and education		200 town officials, pond association members, & general public	4.2, 4.4, 4.5
Develop, test and implement volunteer biomonitoring protocols and training materials for wetlands biomonitoring			4.2, 4.4, 4.5
Develop and implement a training program for volunteer biomonitoring	20	250 volunteer biomonitors	4.2, 4.4, 4.5
3.5-day Community-based Watershed Protection workshops	4	100 community leaders	4.2, 4.3, 4.4, 4.5, 4.6
Comprehensive watershed education, planning and management projects (Blackstone River, Mill River, and SuAsCo Watersheds)	3	3000	4.1, 4.2, 4.3, 4.4, 4.5, 4.6
Conduct workshops on habitat assessment and protection methodologies (Wethings, GAP, wetlands wildlife habitat evaluation, strategic land conservation)	25	500 natural resource professional & conservation commissions	4.2, 4.3, 4.4, 4.5
Workshops and programs on habitat and biodiversity conservation	20	500	4.6
Coordinate the MA Frog Call Survey as part of the North American Amphibian Monitoring Program	5	25 volunteers	4.2, 4.5
Workshops & presentations on techniques for mitigating road and highway impacts on wildlife	15	300	4.2, 4.5
Workshops & presentations on topics related to wetlands conservation	25	500	4.2, 4.3, 4.4, 4.5, 4.6
Training workshops for members of conservation commissions through the Wetlands Education and Training Collaborative	25	500	4.2, 4.4, 4.5
Training workshops for members of planning boards and zoning boards of appeal through the Citizen Planners Training Collaborative	100	2500 local officials	4.2, 4.4, 4.5
School Involvement in the Mill River Watershed Project		6 teachers	4.2, 4.3, 4.4,

		100 students	4.6
Earth Connections Conference	5	200 teachers 1000 students	4.2, 4.3, 4.4, 4.6
Develop current issue portion of MA Envirothon	5	60 educators 750 students	4.6
A community landscaping program will be developed for youth from the Boston Housing Authority		5 educators 50 youth	4.4, 4.6
MA Agriculture in the Classroom		150 educators 2000 students	4.6
Teacher training on recycling	10	50 teachers	4.2, 4.4
4H Beachcomber: Marine Education on Wheels		35,000 students 15,000 citizens	4.6

### G. Outcome Indicators (2000-2004)

Outcome Indicator	Target	Outcomes Addressed
Pesticide applicators report increased understanding and appreciation for the need to protect wetlands and biodiversity	750	4.1, 4.2, 4.4, 4.6
Marine aquaculture growers adopting one or more BMP	50	4.2
People adopting forest stewardship practices	500	4.2
Acres in forest stewardship	10,000	4.2
Towns will increase household hazardous waste recycling options	15	4.2, 4.4
Town employees will adopt BMPs for household hazardous waste	120	4.2, 4.4
Consumers will adopt BMPs for household hazardous waste	2250	4.2, 4.4
Gallons of household hazardous waste collected and diverted from the waste stream	5000	4.2, 4.4
Teacher will adopt recycling BMPs	165	4.2 4.4
Towns will adopt recycling programs in their schools and incorporate recycling education programs in their curriculums	15	4.2 4.4
Martha's Vineyard Commission will become familiar with the nitrogen limitation concept and use it in their review process		4.2, 4.4, 4.5
Changes in Health Board regulations to limit nitrogen loading to ponds on Martha's Vineyard	3 ponds	4.2, 4.4, 4.5
Changes in zoning or subdivision review in watersheds on Martha's Vineyard	4 watersheds	4.2, 4.4, 4.5
Actions taken by municipalities to protect water resources and ecosystems	50	4.2, 4.3, 4.4, 4.5
Acres of riparian buffers restored	200	4.2, 4.3, 4.4, 4.5
People who plan to be involved in watershed protection projects	150	4.2, 4.3, 4.4, 4.5
People who plan to initiate watershed protection projects	75	4.2, 4.3, 4.4, 4.5
Volunteer biomonitors collecting data to assess and monitor watershed health	250	4.2, 4.4, 4.5
Stream teams and volunteer monitoring groups collecting data on watershed health	25	4.2, 4.4, 4.5, 4.6
Municipal officials reporting increased knowledge and confidence in fulfilling their regulatory and administrative responsibilities	3000	4.2, 4.3, 4.4, 4.5

Natural resource professionals adopting appropriate habitat assessment methodologies	250	4.2, 4.3, 4.4, 4.5
Monitoring data on calling amphibians collected for 25 routes in MA (MA Frog Call Survey)	25 routes	4.2, 4.5
People reporting increased knowledge and appreciation of the importance of habitat and biodiversity conservation	300	4.6
Projects initiated to mitigate in impacts of roads and highways on wildlife	3	4.2, 4.5
Educators will engage in environmental action projects and community-based learning	456	4.2, 4.3, 4.4, 4.6
Educators will present their collaborative action research findings to colleagues	25	4.6
High school educators will report improvements in teaching	125	4.6
Youth will report or demonstrate gains in knowledge and skills	3550	4.6

**Goal 4: Greater harmony between agriculture and the environment**

		FY2000	FY2001	FY2002	FY2003	FY2004	5-Yr Total
Hatch Funds	dollars	\$422,837	\$435,522	\$448,588	\$462,045	\$475,907	\$2,245,909
Multi-State	dollars	\$191,527	\$197,273	\$203,191	\$209,287	\$215,565	\$1,017,843
College Match	dollars	\$549,139	\$565,613	\$582,582	\$600,059	\$618,061	\$2,915,454
Other Federal	dollars	\$733,828	\$755,843	\$778,518	\$801,874	\$825,930	\$3,896,993
Other Resource	dollars	\$310,460	\$319,774	\$329,367	\$339,248	\$349,425	\$1,648,274
Revenue Res	dollars	\$65,615	\$67,583	\$69,611	\$71,699	\$73,850	\$346,368
<b>TOTAL MAES</b>	dollars	<b>\$2,273,406</b>	<b>\$2,341,608</b>	<b>\$2,411,856</b>	<b>\$2,484,212</b>	<b>\$2,558,738</b>	<b>\$9,404,704</b>
	FTEs	19.77	19.77	19.77	20.77	20.77	100.86
SL b&c	dollars	\$612,734	\$631,116	\$650,050	\$669,551	\$689,638	\$3,253,089
	FTEs	8.21	8.21	8.21	8.21	8.21	41.05
SL 3-d	dollars	\$247,722	\$255,154	\$262,808	\$270,693	\$278,813	\$1,315,190
	FTEs	4.45	4.45	4.45	4.45	4.45	22.25
State Funds	dollars	\$649,956	\$669,455	\$689,538	\$710,224	\$731,531	\$3,450,705
	FTEs	12.20	12.20	12.20	12.20	12.20	61.00
College Match	dollars	\$623,635	\$642,344	\$661,614	\$681,463	\$701,907	\$3,310,963
	FTEs	10.54	10.54	10.54	10.54	10.54	52.70
County Funds	dollars	\$475,805	\$490,079	\$504,782	\$519,925	\$535,523	\$2,526,173
	FTEs	5.40	5.40	5.40	5.40	5.40	27.00
Revenue/gifts	dollars	219,755	\$226,348	\$233,138	\$240,132	\$247,336	1,166,709
	FTEs	0.40	0.40	0.40	0.40	0.40	2.00
Contracts	dollars	\$766,917	\$766,917	\$766,917	\$766,917	\$766,917	\$3,834,585
	FTEs	5.46	5.46	5.46	5.46	5.46	27.30
<b>Total Extension</b>	dollars	<b>\$3,596,524</b>	<b>\$3,681,412</b>	<b>\$3,768,847</b>	<b>\$3,858,905</b>	<b>\$3,951,665</b>	<b>\$18,857,353</b>
	FTEs	46.66	46.66	46.66	46.66	46.66	233
<b>Total R/E</b>	dollars	<b>\$5,869,930</b>	<b>\$6,023,020</b>	<b>\$6,180,703</b>	<b>\$6,343,117</b>	<b>\$6,510,403</b>	<b>\$30,927,523</b>
	FTEs	66.43	66.43	66.43	67.43	67.43	337.15

These tables are based on organizational unit data and projections and are subject to variations between Extension and Experiment Station. It is a good faith effort to present the total resources based on a point in time. It is neither an official budget or report.

## **GOAL 5**

### **Enhanced economic opportunity and quality of life for Americans**

#### **Statements of issues**

*Introduction:* The socioeconomic viability of families in the Commonwealth of Massachusetts is an issue central to the work of the University of Massachusetts Experiment Station and Extension 4-H Youth and Family Development (4HYFD) Program. This plan reflects the relatively new relationship of the 4HYFD program with the Department of Consumer Studies in the College of Food and Natural Resources (CFNR). Over the past five years, the Extension Educators (professional staff, not faculty) of 4HYFD have become members of the Department, and within the past two years, a new program coordinator was appointed, with a faculty appointment. Previously, 4HYFD, for a number of reasons, had not had the level of research and extension integration that existed in the areas of agriculture and natural resources.

Thus, this planning process is one of several opportunities recently to begin to work toward a more integrated research and extension agenda.

*Issues:* Every day, Massachusetts families face decisions on housing, employment, money-management and family roles. Specifically, there is concern nationwide that too many young people are engaged in risk taking behaviors. Many grow up without positive role models or caring adults in their lives. Others experience violence to such an extent that they become numb to its impact. Still others do not engage in productive experiences during their out-of-school time.

Nationally, five million school-age children spend time without adult supervision during a typical school week (Miller, 1995); that violent juvenile crime triples during the hours of 3pm and 8pm (Fox & Newman, 1997); and that children without adult supervision are at significantly greater risk of truancy from school, stress, receiving poor grades, risk-taking behavior, and substance use (Dwyer et al, 1990; Pettit, 1997). The end results of such factors are too many young people reaching adulthood unprepared for achieving success.

Today, in Massachusetts, 23% of the population are children, 18 years old or younger with 17% of the total population ranging in age from 6 to 17 years old. According to the 1999 Kids Count Book, 16% Massachusetts children live in poverty; 12% live in high risk families; 28% live with parents who do not have full-time, year-round employment; 78% of mothers with children ages 6-17 are in the workforce; and 7% of teens (ages 16-19) drop out of school and are not working. Every 9 minutes a child is reported abused or neglected; every hour a baby is born to a teenage mother; and every 9 days a child or youth is killed by a gun (1998 Massachusetts Profile).

*Research:* Research projects in the Department of Consumer Studies encompass a range of underlying issues that impact on the health, well being, and future of young people in the Commonwealth. The specific projects, and their anticipated outcomes outlined below, will provide foundations and starting points for possible education interventions undertaken by the 4HYFD program.

Several of the Research Projects involve low-income families. One project (MAS00793) examines the decline in the availability of low-cost subsidized housing. Two projects deal with issues related to welfare families. One project (NC-223) looks at rural families coping with welfare reform and the circumstances that make the welfare-to-work transition rural families different than the transition for urban families. Another project (MAS00766) is a study of the money-management skills welfare mothers and their ability to be financially self-sufficient. The focus of another project (MAS00790) looks at the historical roots of domesticity their impact on women's family roles today.

Two projects deal specifically with youth. One (MAS00778) looks at adolescent employment and its impact on school performance and behavior. Another (MAS00790) centers on the relationship between clothing and self-esteem in a consumer-oriented society and the issues peculiar to adolescents in low-income families.

Two projects examine the economic factors related to employment and consumption. One (MAS00814) is a study of the textile industry as a major economic force in Massachusetts and its importance as a bridge from poverty for many low-income families. Another (MAS00790) examines the benefits of private labels to consumers and the decision-making framework for private-label choices.

*Specific Research Projects:*

MAS00793 – Demographic Analysis of Occupancy Standards: Legal and Social Implications. (Intermediate & Long Term)

NC-223 – Rural Low-Income Families: tracking Their Well Being and Functioning in the Context of Welfare Reform (Short, Intermediate & Long Term)

MAS00766 – Financial Management Skills and Coping Strategies of Mothers on Welfare (Short & Intermediate)

MAS00814 – The Economic and Social Impact of the Textile Industry in Massachusetts (Short & Intermediate Term)

MAS00778 – Labor Force Participation of Teenagers: Individual and Parent Perceptions. (Short, Intermediate & Long Term)

MAS00790 – Clothing Self Esteem Issues of Massachusetts Vulnerable Youth (Intermediate & Long Term)

MAS00810 – Individual and family Adjustment to Change: Educated Womanhood and Domestic Responsibilities (Short, Intermediate & Long Term)

*Anticipated Outcomes:*

The outcome of these projects will be a better understanding of several critical societal issues. This understanding may influence decision-making by policymakers with the power to resolve the issues. An understanding of the two-person per bedroom national occupancy standard for subsidized housing as a constraint on the availability of low-income housing may influence a relaxation of the standard thereby increasing the pool of housing stock eligible for government-subsidy approval.

Insight into the unique problems of rural families contending with welfare reform may persuade legislators to address the issues related to transportation, childcare and other problems that inhibit the welfare-to-work transition for rural families to a greater degree than urban families. Realizing the importance of the textile industry to the Massachusetts economy may encourage legislators to create an industry-friendly environment to retain exiting textile companies and attract new ones.

A better understanding of these issues is important to professionals who deliver social services to adolescents and families. School counselors will value a better understanding of adolescents' attitude toward work and school and adolescents' self-esteem as it relates to dress and appearance. Family counselors will gain historical insight to the plight of present-day women who work out of the home.

In order for young people to succeed, they need opportunities, supports and access to resources. They need to acquire life skills such as problem solving, decision making, resource management, literacy, employment skills and communication skills. They need to feel connected to the people and places in their environments. They need to feel safe and able to contribute to their communities.

*Outcome indicators:*

The barometers of success for these projects are as diverse as the projects themselves as reflected in the following outcome indicators:

- Changes in the codes established by the Building Officials and Code Administrators International (BOCA), Uniform Housing Code (UHC) and Southern Building Code Congress International (SBCCI). [*long term*]
- Improvements in the self-sufficiency, resiliency, functioning, quality of life, and family capital of 30 low-income families tracked over a three-year period. [*intermediate*]
- Better money-management skills by young mothers. [*intermediate*]

- Growth or stabilization of the textile industry in Massachusetts and/or greater economic influence of Massachusetts textile companies in the communities in which they are located. *[long term]*
- A valid assessment tool that measures the perception of work by teens and parents the effects of work on school performance. *[intermediate]*
- An instrument that reliably measures the relationship between clothing and self-esteem in adolescents and a program to train Extension educators to be more astute observers of this relationship. *[intermediate]*

Young people will be deemed healthy and competent: *Continuous intermediate long term:*

- when they do not engage in problem behaviors such as drug and alcohol use, delinquency and early sexual activity;
- when they develop a positive sense of self and sense of connection and commitment to others, and
- they develop the abilities and motivation to succeed in school and to participate fully in family and community life; and
- when they achieve endpoints of a successful transition into young adulthood such as graduation from high school, stable employment or attendance in post secondary education.

***Outcome target/milestones:***

- Changing attitudes toward low-income residents or residents with particular ethnic backgrounds. *[long term]*
- Each of 16 states will conduct 30 longitudinal family studies. *[long term]*
- Measuring the attitudes, knowledge and coping strategies of 200 young mothers under age 21 toward money. *[intermediate]*

***Target audiences/customers for research projects:***

Numerous populations may ultimately benefit from the research findings including:

- Large low-income families for whom subsidized rental options are now limited
- Low-income rural families who are making the welfare-to-work transition
- Young mothers with limited financial resources and their families
- The Massachusetts textile industry and
- State economic development and community-planning offices
- School professionals, parents, and employers of adolescents
- Vulnerable adolescents with low self-esteem
- Women who work out of the home

***Activities of Research Projects:***

- Gathering ethnographic data to enhance the housing-rental industry's understanding of opportunities that exist in responding to the needs of low-income and cross-cultural families
- Gathering data to educate policymakers regarding the specific needs of low-income rural families and their transition from welfare to work
- Gathering data to demonstrate the importance and economic viability of the textile industry in Massachusetts.
- Surveying young mothers, teens and parents
- Training people to run discussion groups related to topics such as My Culture and Me, Outside-Inside, and Clothes and Crime
- Archival research at women's colleges and interviews with professional women with families and present undergraduates

*Internal and External Partners:*

Several studies include several internal and external partners whose involvement is critical to the research including:

National Multi Housing Council, Washington, D.C.  
 Land-grant universities in California, Colorado, Idaho, Indiana, Kentucky, Nebraska, New Hampshire, Ohio, Oregon, Michigan and Missouri.  
 UMass Extension Expanded Food Nutrition Education Program  
 UMass Extension 4-H Youth and Family Program,  
 Springfield (MA) School Department  
 Brightside, West Springfield, MA  
 Nueva Esperanza, Holyoke MA  
 Girls Inc. Holyoke MA  
 School Street Clinic, Holyoke MA  
 Holyoke Youth Alliance Holyoke MA  
 Enlace de Familias Holyoke MA  
 University of Massachusetts – School of Education  
 University of Massachusetts – Dept of Forestry and Wildlife  
 University of Massachusetts – Dept of Psychology  
 Massachusetts Career Development Institute, Springfield MA  
 New Bedford Housing Authority  
 U.S. Dept. of Housing and Urban Development  
 Massachusetts Youth Serving Alliance

*UMass Extension:* These alarming statistics have prompted the 4-H Youth and Family Development Program to focus programming on three critical issues which research shows affect the ability of youth to succeed in their future. These issues are:

- the development of youth competencies—those skills such as decision making abilities, resource management, and coping techniques which prepare youth for adult success;
- a sense of safety, that is, providing children and youth with safe and nurturing environments where they can grow and thrive; and

- a sense of connectedness where children and youth feel a sense of belonging within their families, neighborhoods and schools.

The intent of the program is to provide educational experiences which address all three critical issues, result in positive youth development, and ultimately, prepare youth to become independent and contributing members of society. The program is mainly delivered through an extensive network of adult and teen volunteers recruited through schools, neighborhoods and communities, and other organizations and trained in the principles of youth development, communication skills, and leadership development. Youth are also reached in schools, through out-of-school programs, and via camps. Professionals working with youth also participate in various train-the-trainer educational programs.

Currently, the 4HYFD program focuses on five content areas:

- life skills education,
- science and technology,
- environmental stewardship,
- teen development, and
- volunteer management.

The objectives and projected outcomes for each content area are given below beginning with some general objectives.

**General objectives: (Timeline--Ongoing)**

- Eighty percent of staff and camp directors, and 25% of key volunteer leaders will keep up-to-date on our content areas of life skills education, environmental stewardship, science and technology, teen development, and volunteer management through participation in professional development seminars sponsored by the 4-H YFD program, the department's Center for the Family and those offered by other educational organizations.
- Each Extension educator within the 4-H YFD program will spend 10-20% of their time reaching under served populations and
- as a result, minority participation of youth and volunteers involved in the program will increase by 5%.

**Life Skills Education Objectives:**

**Ongoing:**

- Eighty percent of staff and camp directors and 25% of key volunteer leaders will increase their knowledge and skill level in working with youth by remaining up-to-date in the areas of child and adolescent development, educational approaches, and their understanding of diversity issues by participation in in-service training opportunities.

**Intermediate:**

- Eighty percent of staff and camp directors will implement the "Targeting Life Skills" model by incorporating the model design and content through print materials, direct teaching and as a measure for program outcomes and via daily programming.
- Eighty percent of staff and camp directors and 25% of key volunteers will become critical thinkers and involved learners by participating in the Experiential Learning process and replicating this model in daily programming.

- Eighty percent of staff and camp directors and 25% of key volunteer leaders will become well-versed in the content and delivery of specified "life skills" curricula.
- Eighty percent of staff and camp directors and 25% of key volunteer leaders will increase their knowledge of educational methods for reaching youth by participation in brain-based learning sessions.

**Long term:**

- 50% of youth statewide enrolled in the 4-H YFD program will improve their life skills in the areas of decision making, communication, coping strategies and resource management and their workforce preparedness skills by participating in volunteer organized groups which utilize specific Alife skills@ curricula and learning techniques.

**Science and Technology Objectives:**

**Intermediate:**

- Fifty percent of staff will explore and present in-service training for pre-kindergarten through 12<sup>th</sup> grade teachers on science and technology topics based on the successful teacher training module;
- 75% of the teachers will replicate learning activities experienced during training with youth in classroom settings, day care programs and out-of-school programs.
- Facilitated by the Science and Technology Team, 20 youth will participate in a statewide Tech Corps where they will increase their computer knowledge and skills thus improving their employability skills.

**Long Term:**

- 50% of youth enrolled in 4-H YFD programs such as camps and out-of-school programs will increase their knowledge and skills in the areas of science and technology.

**Environmental Stewardship:**

**Intermediate:**

- Two hundred high school youth and teachers/advisors will increase their knowledge of environmental issues and take action in their local schools and communities by participating in the annual Earth Connection conference.

**Long Term:**

- Staff involved in the environmental stewardship initiative will implement a "community greening" project involving unemployed teens and
- resulting in the revitalization of neighborhoods in targeted Boston communities.
- All 4H YFD projects and learning activities will have an environmental stewardship connection.

**Teen Development:**

**Ongoing:**

- 75% of teens will improve their self-confidence and increase their leadership capacity through participation in staff coordinated learning opportunities at the local, regional, state and national levels.
- 

**Short-term:**

- Staff, as members of the statewide Teen Team, will design and conduct a survey of teens both within and outside the 4-H YFD program to determine critical issues facing teens and define the appropriate delivery strategies for meeting these needs.

**Intermediate:**

- 75% of teens will exhibit their leadership skills through participation
  - in community service efforts,
  - in working with younger children, and
  - in planning and implementing local, regional and statewide 4-H YFD educational programs.

**Volunteer Management:**

**Short term:**

- The statewide Volunteer Management Team, comprised of staff and key volunteers, will design and institutionalize a comprehensive volunteers management for the 4HYFD program.

**Intermediate:**

- One hundred percent of staff will be trained in the utilization of this comprehensive volunteer management system.

**Long term:**

- Through this new "comprehensive volunteer management system", eighty percent of current and new volunteers will
  - become oriented, trained, recognized, and evaluated within the 4-H YFD program and
  - will perceive themselves as value contributors and equal partners in the implementation of the overall program.

To accomplish these outcomes, the 4-HYFD staff have organized into teams:

- lifeskills and workforce preparation,
- science and technology,
- environmental stewardship,
- teens, and
- volunteer management.

Each of these teams delivers programming through

- collaborating with organizations, agencies and individuals,
- conducting staff training workshops for adults and older teens who work with youth,
- train-the-trainer multi-session offerings,
- 4-H residential camps,
- providing access to youth development resources, and
- coordinating volunteer-led programs for youth.

*Activities ( for each team) :*

**Life Skills and Workforce Preparation**

Staff will ground their work in up-to-date research in the areas of youth development, life skills and education methods.

Staff will articulate the life skills taught in 4-HYFD and incorporate them into the system by participating in a 2-day training of Life Skills education with follow-up conducted by team members

Staff, volunteers and youth will be critical thinkers and involved learners.

Staff and volunteers will be confident users of the selected curricula.

Youth will be well-prepared to enter the workforce.

Staff and volunteers will use a variety of educational methods.

*Activities by team/content area*

**Science and Technology:**

Team conducted teacher trainings.

Team will develop a science and technology teacher training module.

Team will establish a statewide youth technology corps.

Team provides 4-HYFD program staff trainings on technology.

**Environmental Stewardship**

- Staff, volunteers and collaborators will have access to a variety of resources for environmental stewardship education.
- Team will be known as a collaborator for "community greening" projects.
- All 4-H projects and activities will have an environmental stewardship connection.

**Teen Team**

- Team will provide support and opportunities for teens to develop their leadership capacity and enhance personal growth. In turn, teens will contribute to the welfare of their communities and be a positive example for others.

**Volunteer Management**

- To develop and institutionalize a comprehensive volunteer management system in which volunteers are equal partners with staff and feel valued.

*Partners and Collaborators:*

UMass Extension Expanded Food Nutrition Education Program  
Springfield (MA) School Department  
Brightside, West Springfield, MA  
Nueva Esperanza, Holyoke, MA  
Girls Inc. Holyoke, MA  
School Street Clinic, Holyoke, MA  
Holyoke Youth Alliance Holyoke, MA  
Enlace de Familias, Holyoke, MA  
University of Massachusetts – School of Education  
University of Massachusetts – Dept of Forestry and Wildlife  
University of Massachusetts – Dept of Psychology  
Massachusetts Career Development Institute, Springfield, MA  
New Bedford Housing Authority  
Massachusetts Youth Serving Alliance  
Martin Luther King Center, Worcester  
Dimock Health Center, Boston  
University of Massachusetts, Boston campus  
University of Massachusetts Boston Center for Immigrants and Refugees  
University of Massachusetts Lowell Center for Immigrants and Refugees  
Boston College  
Smith College  
Center for Higher Education, Springfield (eight private and public colleges and universities working together)  
Massachusetts Agriculture in the Classroom  
Eastern States Exposition  
Massachusetts 4-H Foundation  
Massachusetts Department of Food and Agriculture

**Goal 5: Enhanced economic opportunity and quality of life for Americans**

		FY2000	FY2001	FY2002	FY2003	FY2004	5 Yr Total
Hatch Funds	dollars	\$156,280	\$160,968	\$165,797	\$170,771	\$175,895	\$679,711
Multi-State	dollars	\$34,541	\$35,577	\$36,645	\$37,744	\$38,876	\$153,383
College Match	dollars	\$301,468	\$310,512	\$319,827	\$329,422	\$339,305	\$1,600,534
Other Federal	dollars	\$138,127	\$142,271	\$146,539	\$150,935	\$155,463	\$633,335
Other Resources	dollars	\$151,004	\$155,534	\$160,200	\$165,006	\$169,956	\$641,700
Revenue Resourc	dollars	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTAL MAES</b>	dollars	<b>\$781,420</b>	<b>\$804,863</b>	<b>\$829,008</b>	<b>\$853,879</b>	<b>\$879,495</b>	<b>\$4,148,665</b>
	FTEs	11.25	11.25	11.25	12.25	12.25	58.25
SL b&c	dollars	948,541	1,071,679	1,103,829	1,136,944	1,171,053	5,432,046
	FTEs	14.54	16.54	16.54	16.54	16.54	60.70
SL 3-d	dollars	\$170,293	\$175,402	\$180,664	\$0	\$0	\$526,359
	FTEs	3.20	3.20	3.20	0.00	0.00	9.60
State Funds	dollars	964,715	1,141,625	1,322,289	1,361,958	1,402,817	6,193,404
	FTEs	22.21	22.21	28.75	28.75	28.75	130.67
College Match	dollars	\$48,972	\$48,972	\$48,972	\$48,972	\$48,972	\$244,860
	FTEs	0.70	0.70	0.70	0.70	0.70	3.50
County Funds	dollars	\$333,272	\$185,303	\$185,303	\$185,303	\$185,303	\$1,074,484
	FTEs	5.63	2.29	2.29	2.29	2.29	14.79
Revenue/gifts	dollars	\$35,983	\$35,983	\$35,983	\$35,983	\$35,983	\$179,915
	FTEs	0.00	0.00	0.00	0.00	0.00	0.00
Contracts	dollars	0.00	0.00	0.00	0.00	0.00	0.00
	FTEs	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Extension</b>	dollars	<b>\$2,501,776</b>	<b>\$2,658,964</b>	<b>\$2,877,041</b>	<b>\$2,769,160</b>	<b>\$2,844,127</b>	<b>\$13,651,068</b>
	FTEs	46.28	44.94	51.48	48.28	48.28	239.26
<b>Total R/E</b>	dollars	<b>\$3,283,196</b>	<b>\$3,463,827</b>	<b>\$3,706,049</b>	<b>\$3,623,039</b>	<b>\$3,723,622</b>	<b>\$17,805,733</b>
	FTEs	57.53	56.19	62.73	60.53	60.53	297.51

These tables are based on organizational unit data and projections and are subject to variations between Extension and Experiment Station. It is a good faith effort to present the total resources based on a point in time. It is neither an official budget or report.

# Attachments

## Attachment 1

### *Glossary of Terms*

<b><i>Ae</i></b>	<i>Agroecology</i>
<b><i>AeF</i></b>	<i>Agroecology – Floriculture</i>
<b><i>AeC</i></b>	<i>Agroecology -- Cranberry</i>
<b><i>AeCD</i></b>	<i>Agroecology – Community Development</i>
<b><i>AeCDL</i></b>	<i>Agroecology – Crops, Dairy, &amp; Livestock</i>
<b><i>AeIPM</i></b>	<i>Agroecology – Integrated Pest Management</i>
<b><i>AeNLUF</i></b>	<i>Agroecology – Nursery, Landscape, &amp; Urban Forestry</i>
<b><i>AePE</i></b>	<i>Agroecology -- Pesticide Education</i>
<b><i>AeT</i></b>	<i>Agroecology -- Turf</i>
<b><i>AeTF</i></b>	<i>Agroecology -- Tree Fruit</i>
<b><i>AeVSF</i></b>	<i>Agroecology -- Vegetable &amp; Small Fruit</i>
<b><i>AeWM</i></b>	<i>Agroecology -- Waste Managment</i>
<b><i>MAS###</i></b>	<i>Denotes a project that is supported by Hatch funding.</i>
<b><i>MS###</i></b>	<i>Denotes a project supported by McIntire-Stennis funding.</i>
<b><i>MAES</i></b>	<i>Massachusetts Agricultural Experiment Station</i>
<b><i>NE###</i></b>	<i>Denotes a project that is supported by Multi-state funding.</i>
<b><i>NC###</i></b>	<i>Denotes a project that is supported by Multi-state funding.</i>
<b><i>NREC</i></b>	<i>Natural Resources and Environmental Conservation</i>
<b><i>ExS</i></b>	<i>Experiment Station</i>

## **Attachment II**

### **Members of 1997 Department of Forestry and Wildlife Review Team**

**Dr. Robert J. Bush, Director  
Center for Forest Products Marketing and Management  
Virginia Tech University**

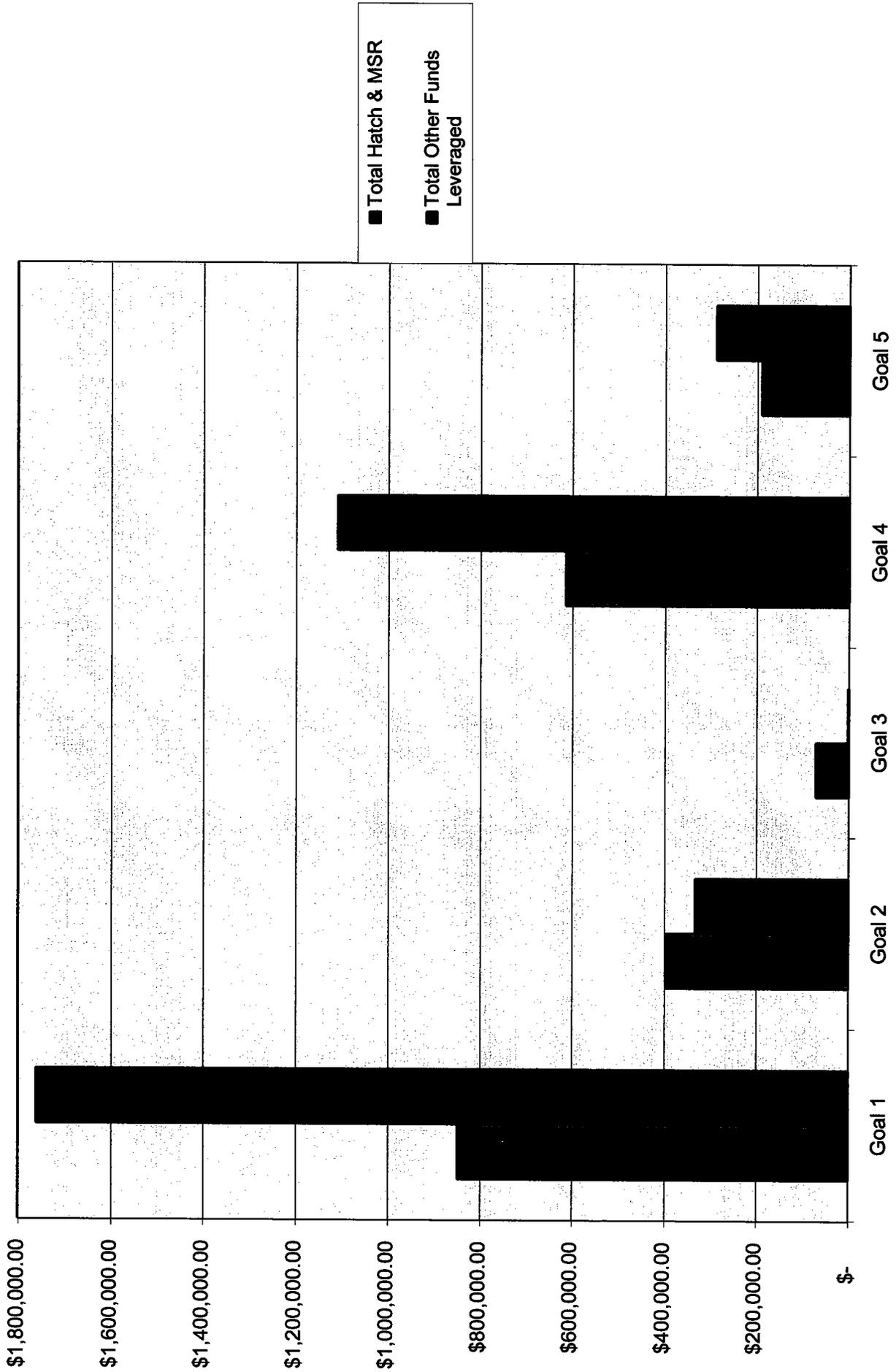
**Dr. Mary Fabrizio  
USGS BRD  
Great Lakes Sciences Center**

**Dr. Gary San Julian  
Pennsylvania State University**

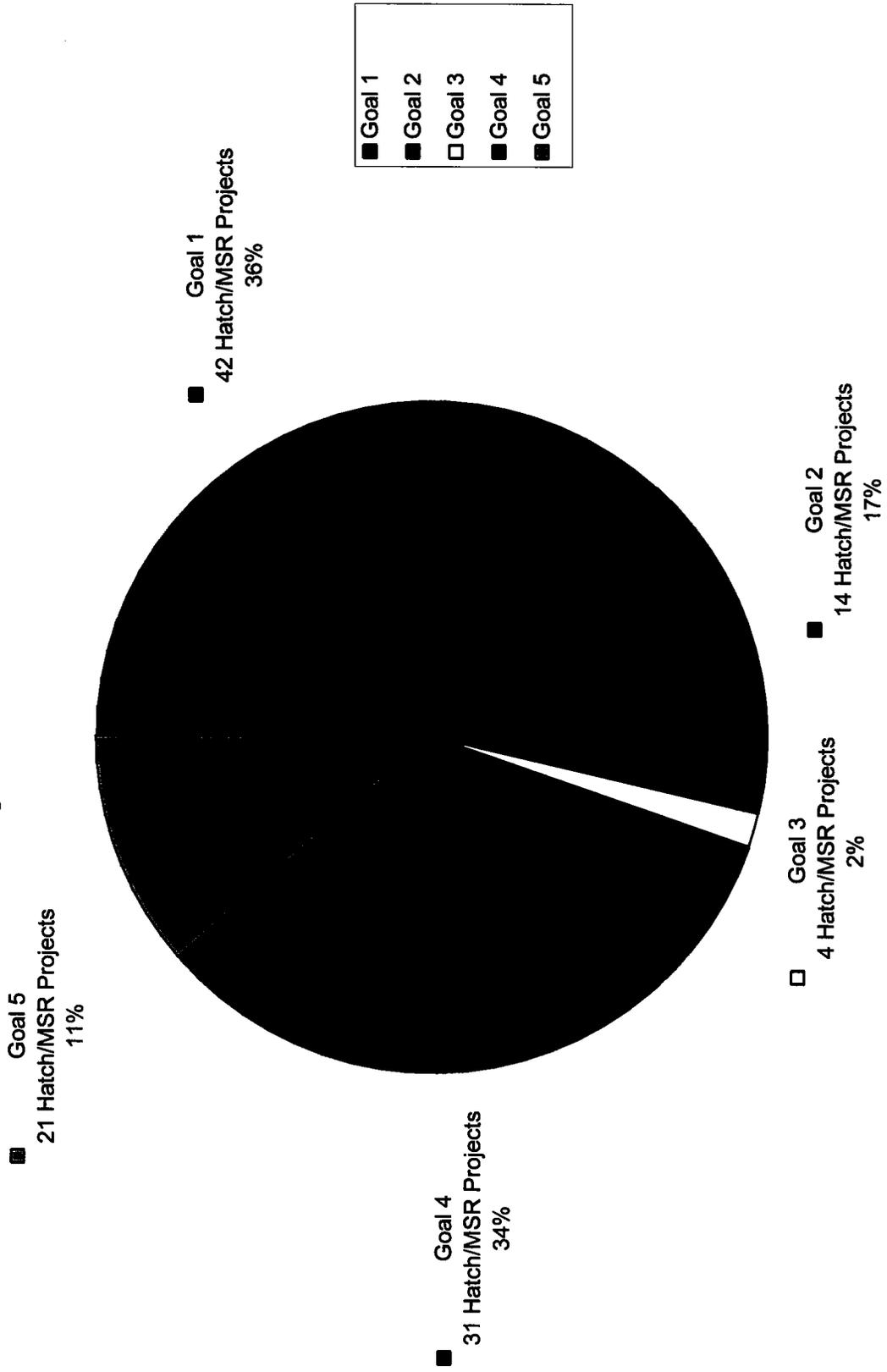
**Dr. James Miller  
National Program Leader: Fish and Wildlife  
CSREES**

**Dr. Logan A. Norris, Head  
Department of Forest Science  
Oregon State University**

Leveraging Hatch and MSR Dollars for Other Funds



# Massachusetts Agricultural Experiment Station Distribution of Research Projects by National Goals



## ATTACHMENT 5

Last revised on: 02/17/99 14:31:35

Version 2.0 Goals and Outcomes with Some Activities, Targets, and Indicators

## Northeast Research and Extension Program Outcomes Framework

February 10, 1999

Introduction: This framework is based on the USDA-REE Strategic Plan Goals as used by CSREES. The framework focuses on outcomes that are common across Research and Extension in the Northeast. These outcomes were developed through participant work groups during the Winter meeting of the Northeast Extension Directors and the Northeast Research Directors February 2-3, 1999 in Washington, D.C.

The results from the Winter meeting have been edited using *Measuring Program Outcomes: A Practical Approach*, from the United Way of America, as a guide (see note below for Web address). Several work groups generated additional statements, which have been re-positioned as activities, outcome indicators or outcome targets using the United Way model. This was done as an effort to capture all the ideas from the work sessions in D.C. Not all groups provided similar information, so it may appear sketchy and disjointed. A possible next step would be to completely develop one outcome per Goal as examples, using the United Way model or another format.

It should be noted that this is a first edit, and is presented for further review, discussion and refinement.

### **GOAL 1 An agricultural production system that is highly competitive in the global economy**

#### ***Outcome 1.1 The food and fiber system will be profitable.***

*Outcome indicators:*

- Increased production efficiency
- More value-added products
- Diversified export and domestic markets
- Satisfied consumers
- Appropriate technology developed
- Appropriate technology adopted.

#### ***Outcome 1.2 The public understand and value agriculture and its relationship to their daily lives.***

#### ***Outcome 1.3 Producers manage production, marketing and financial risks effectively.***

### **GOAL 2 A safe, secure food and fiber system**

#### ***Outcome 2.1 Food borne illness eliminated.***

#### ***Outcome 2.2. Non-pathogen health risks eliminated.***

#### ***Outcome 2.3 Production inputs used appropriately.***

#### ***Outcome 2.4 A secure food system.***

*Outcome Indicators:*

A food system that is:

- available
- accessible
- dependable
- nutritionally adequate
- safe
- affordable

### **GOAL 3 A health, well nourished population.**

#### ***Outcome 3.1 Nutritionally related chronic diseases prevented.***

*Outcome target:* (state by state)

- Reduce incidence of CVD in 50-59 year olds by \_\_\_\_\_ % by 2004 (time)

***Outcome 3.2 Health maximized across the life span. (through a nutritious diet and effective physical activity)****Outcome targets:*

- 10% increase in Americans engaged in effective physical activities by year 25% increase in Americans consuming 5 or more fruits and vegetable servings a day 40% of Americans consume low fat pork products instead of high fat products

*Outcome Indicators:*

- Reduced disease treatment costs
- Reduced work days lost to illness
- Reduced physician visits

***Outcome 3.3 Nutritionally related health risks reduced.****Activities:*

- Education and research actions that promote changed behavior

*Outcome indicator*

- Obesity

**GOAL 4: Greater harmony between agriculture and the environment*****Outcome 4.1 Safe and adequate water supply******Outcome 4.2 Land conservation for preserving future options******Outcome 4.3 Healthy ecosystems maintained******Outcome 4.4 Clean air******Outcome 4.5 Public policy decision informed by science******Outcome 4.6 Environmental literacy increased.*****GOAL 5: Enhanced economic opportunity and quality of life for Americans*****Outcome 5.1 Economically strong, stable, and caring communities******Outcome 5.2 Quality, accessible childcare******Outcome 5.3 Quality, accessible eldercare******Outcome 5.4 Quality, accessible healthcare******Outcome 5.5 Economic opportunities increased for limited resource residents******Outcome 5.6 Quality of life and economic viability improved for rural populations******Outcome 5.7 Youth engaged in activities that prepare them to be productive members of society******Outcome 5.8 Well-trained and skilled workforce***

**Note:** Information on United Way of America resources on Outcome Measurement may be found at: <http://www.unitedway.org/outcomes/library.htm>

*edited by Trish Manfredi, 2/10/99*



**Return to New England Extension Consortium**

Send comments to UMASS Extension at: [webmaster@umext.umass.edu](mailto:webmaster@umext.umass.edu)



## Multi-State Research Project Outline

**Project No.:** NE-132

**Title:** Environmental and Economic Impacts of Nutrient Management on Dairy Forage Systems

**Program Duration:** Initiated 10/79; Current 10/99 to 09/04

**Advisors:** SAES A.A. - P. Wangness (PA) CSREES Rep. - H. F. Tyrell

**Statement of Issues:** Dairy farming in the U.S. is under increasing pressure by two major factors. First factor is the decline of milk prices. Milk prices are moving toward a world market price that is causing a continuing trend toward larger dairy farms concentrated in certain geographic locations. The second factor is the relatively recent environmental concern for dairy farm nutrient losses. The cost of managing manure nutrients is being assumed by the farm owner. These two factors are colliding on traditional dairy production areas in ways that are having significant negative impacts on rural families and communities.

Integrated research and technology transfer programs are needed discover how to better help dairy farmers manage their farms in a cost effective and environmentally acceptable manner, and in ways that comply with newly imposed farming regulations.

### Objectives:

1. Develop, evaluate and refine cropping, grazing, and feeding strategies to optimize the dairy farm system for nutrient utilization, environmental impact, and profitability.
2. Develop research-based information, recommendations, and educational materials in support of state extension, teaching, and NRCS programs, agricultural consultants, and producers to strengthen the U.S. dairy industry.

### Performance Goals:

#### Outputs (Results)

- Evaluation of several cropping strategies using the models: DAFOSYM, GRASIM, and DNP
- Information materials on issues related to grazing, manure management and cropping systems that can be used to disseminate information to dairy farmers.
- Software that can be readily used for nutrient management in small and medium sized farms.
- Interactive WWW-based system that is easily accessible and user friendly that can be used to determine the best dairy farm nutrient and waste management strategy.

#### Outcomes (Impacts):

- Farmers that can apply, in their own operations, low cost and effective methods for crop production and manure management.
- Improved nutrient utilization by cattle, and thus, reduced nutrient losses on farms.
- Environmentally sound and profitable dairy farm operations for small and medium scale farmers.

#### Key Program Components:

- Field experiments to determine nutrient efficiencies and losses, frequency and intensity of grazing, and measuring pasture yield will be conducted in different locations in the country.
- Validation of models for whole farm predictions will be evaluated by simulation in different soil, climatic and management conditions.
- Use of the stochastic approach for modeling chemical transport, using the Monte Carlo approach to forecast the flow and transport events occurring within the targeted environment.
- Application of DAFOSYM to provide farm-scale assessment of the production and economic consequences of errors in estimating pasture production by various measurement methods.
- Development of information materials in the form of extension bulletins, WWW pages, and presentations.
- Develop WWW-based interfaces for dairy system models such as DAFOSYM, GRASIM, and DNP to allow users to input files, obtain assistance, run models and display results relevant to the conditions in their own farms.

#### Milestones:

2000

- Cropping strategies selected and evaluated using models.

**2001**

- List of cropping practices available by region and by other factors (such as farm size and soil type) that will be most effective in improving farm nutrient management while maintaining or improving farm profit.
- Software developed and tested via WWW
- Information materials for use by Extension workers developed.

**2002**

- Fully functional, user-friendly WWW interface available for use by the public

**2003**

- Plan for self-sufficiency, maintenance and updating of the software and the WWW interface in place.

**Internal:**

MD, MA, NJ, NY-I, PA, WV

**External Linkages (Partners):**

USDA/ARS Pasture System and Watershed Management Laboratory in PA, USDA/ARS Dairy Forage Research Center in WI, IL, IN, MI, UT, WA, WI, Univ. of Pennsylvania (School of Veterinary Medicine)

**Target Audience(s):** Small and medium scale dairy farmers in the nation, extension specialists, and scientists engaged in similar research in other parts of the world.

**Allocated Resources:**

(Commitment to National Goals in %)

Goal 1. 50%

Goal 4. 50%



## Multi-State Research Project Review

**Project No.:** NE-140

**Title:** Biological Improvement of Chestnut and Management of the Chestnut Pathogens and Pests

**Program Duration:** Initiated 10/81; Current 10/98 to 09/03

**Advisors:** SAES A.A. - J. F. Anderson (CT) CSREES Rep. - R. N. Huettel

**Statement of Issues:** Within fifty years after its discovery, the pathogen *Cryphonectria parasitica* had caused considerable destruction that led to the elimination of chestnut trees as major components of the forests of Northeast America. Chestnuts once occupied 25% of our eastern hardwood forests. Restoration of this important species and the successful control of this devastating pathogen will increase forest productivity and profitability, and hence will positively impact local and regional economies.

### Objectives:

1. To improve chestnut trees for timber and for nut production, and determine the cultural requirements of chestnut seedlings in nurseries and natural settings.
2. To better understand the interactions and ecology of the host/pathogen/parasite systems at the molecular, organismal, and environmental levels in order to develop effective biological controls for chestnut blight.

### Performance Goals:

#### Outputs (Results):

- Molecular markers to speed up selection for tree form and nut quality on 5-year-old chestnut trees.
- Fine-scale marker maps of the genomic regions of chestnuts associated with chestnut blight resistance.
- Development of five chestnut breeding lines that are resistant to chestnut blight.
- Worldwide comparisons of genetic diversity of mycoviruses as biological control agents for chestnut blight disease.
- Identification of effective biological management practices to control or eradicate the virulent form of the chestnut blight pathogen in the U.S.
- Detection of genetic variability in young, open-pollinated chestnut trees in plantations.
- Identification of important chestnut seedling characteristics for successful artificial regeneration.
- Evaluation of early growth characteristics of chestnut genotypes planted on different sites.

#### Outcome (Impacts):

- Increased populations of timber and nut-bearing chestnut trees in eastern North America.
- Improved stand diversity of eastern hardwood forests in North America.
- Improved economic opportunities in the local and international market for chestnut growers.
- Reintroduction of chestnuts onto xeric sites formerly populated by oak species that were decimated by gypsy moth infestations, in order to provide mast and wood products.

#### Key Program Components:

- Develop understanding of chestnut seedling/site requirements for successful artificial forest regeneration.
- Identify molecular markers for fine-scale mapping of genomic regions conditioning resistance, and for assessing levels of genetic diversity.
- Develop plant tissue culture to ensure preservation of important germplasm of chestnut.
- Use *Agrobacterium* -mediated transformation to insert two to four genes into somatic embryos of chestnut.
- Plant chestnut cultivar trials for nut production in different climatic and geographic regions.
- Continue comparative studies to strengthen and expand *Hypovirus* taxonomy.
- Utilize biological control agents to regulate *C. parasitica* populations.

#### Milestones:

1999

- Termination report summarizing 5-year accomplishments of previously completed project.
- Complete resistance mapping work in both 'Mahogany' and 'Clapper'-derived chestnut lines.
- Development of genetic markers for chestnut species and early hybrid identification.
- Complete evaluation of chestnut tissue culturing parameters including basal media, micronutrient levels, and continuous versus pulse 2,4-D embryo induction treatment.
- Development of a tissue culture bioassay to distinguish *C. parasitica* resistance levels among resistant Chinese, Chinese/American hybrid, and susceptible American chestnut callus tissue.

## 2000

- Chestnut seedling characteristics evaluated in nursery-run open-pollinated families.
- Open-pollinated chestnut progeny tests established on different forest sites in Tennessee, Pennsylvania, Connecticut, West Virginia, and Virginia.
- Third backcross chestnuts to be tested for chestnut blight resistance.
- Third backcross F3 from the 'Mahogany' and 'Clapper' chestnut lines are expected.
- Introduction of improved transgenic hypovirulent strains of *C. parasitica* for biological control of chestnut blight.

## 2001

- Additional forest site tests begun.
- Characterizations of putative genetically transformed American chestnut embryogenic cultures completed.
- Field evaluation of confirmed transgenic chestnut trees containing single-transgene constructs.

## 2002

- Sampling of sixty chestnut trees from each of 25 sites within a 135-mile grid completed, to assess the level of genetic diversity in wild American chestnut populations and to determine the geographic component of such diversity.
- Evaluation of transgenic hypovirulent strains of *C. parasitica* for biological control of chestnut blight.

## 2003

- Survival and growth of chestnut trees in genetic tests evaluated, information on the relationship of seedling characteristics to field survival and growth generated, and genotype by environmental interaction studied.
- Details of *hypovirus* genome structure/function relationships, and protein functions identified through comparative molecular studies of different *Hypovirus* isolates.
- Optimum strategies developed for the efficient repopulation of chestnut forests through combining biocontrol and resistance breeding.

**Internal Linkages:** CT, MA, MD, NJ, NY-I, WV

**External Partners:** GA, MI, TX, USDA Southern Institute of Forest Genetics in MS, Univ. of Tennessee, State University of New York-CESF, and The American Chestnut Foundation

**Target Audience(s):** Chestnut growers in the U.S., Scientists involved in chestnut research worldwide, and institutions (private and public) that are involved in forest preservation.

**Allocated Resources:**

(Commitment to National Goals in %)

Goal 1. 50%

Goal 4. 40%

Goal 5. 10%



## Multi-State Research Project Review

**Project No.:** NE-165

**Title:** Private Strategies, Public Policies, and Food System Performance

**Program Duration:** Initiated 01/87; Current 10/96 to 09/01

**Advisors:** SAES A.A. - D. Rossi (NJ) CSREES Rep. - S. Welsh, D. A. West

### Statement of Issues:

The need for economic research on food marketing is comprehensive and critical not only because of the changes in the structure of markets and in private strategies but also because of recent changes in federal investments in food safety and agricultural research. The key issues addressed in this project are:

- the scope and impact of market power and new cost efficiencies on food system performance;
- the effectiveness of new antitrust, food safety, and other regulatory measures;
- the impact of increased vertical integration and coordination in food industries and of internationalization of the food system;
- possible paths of convergence of food systems in developed economies on particular private strategies and competitive performance levels;
- the potential role of agricultural cooperatives as coordination and stabilization agencies in the event that federal farm programs are dismantled; and,
- the effectiveness of government regulatory and private voluntary systems in providing higher quality, especially safer food.

Given the length of this list of problem areas, the need for an international, coordinated, cooperative research effort is clear.

### Objectives:

1. To analyze the impacts of changes in strategies, technologies, consumer behavior, and policies on the economic performance of the food system.
2. To provide economic analysis of private and public strategies in order to assess their impact on improvement in food safety and other quality attributes.

### Performance Goals:

#### Outputs (Results)

- New improved methodologies for analyzing changes in the food marketing system that affect economic performance.
- Economic models based on profit-maximizing firms in market channels dominated by few buyers (oligopsony), few sellers (oligopoly), or both (bilateral oligopoly).
- Contributions to new, advanced analyses of unilateral market power and the impact of cooperatives upon market performance within the context of the competitive effects of small firms (entrants, niche market players) and of tacitly collusive strategies.
- An understanding of the impacts of global changes on food system performance and the competitiveness of manufacturers and retailers.
- Detailed analysis of differential access to food and dietary information among different types of consumers.
- Research results on commodity pricing and antitrust policies.
- Analysis of the impacts of safer food based on a broad theoretical framework that encompasses all consumer's choices: changing household production practices, changing consumer behavior, willingness to pay premium prices for safer food, and exerting political pressure as taxpayers to change regulatory policies.
- Benefit/cost analysis of alternative methods for affecting food safety that will contribute to the improved cost effectiveness of food safety assurance system. The project will hold a workshop on HACCP benefit/cost methodology.
- Roadmaps of policy options and consequences to assist legislators in policy making.
- Improved understanding on how consumer perceptions about food products are formed.
- Improved appreciation of the operation and performance of domestic and international food systems.
- Project will produce research methodologies that provide understanding of the use of incentive-based versus command and control-based regulatory systems.
- International and local conferences, symposia, and workshops.
- Policy white papers.
- WWW home page, Internet discussion groups.

### Outcomes (Impacts):

- Significant cost-saving to the public as research improves competition, efficiency, food quality and government policy.
- More informed policy decisions at all governmental levels.
- Improved equity in the marketplace.

### Key Program Components:

1. Integration of demand analysis into industrial organization work, through the use of the greatly improved, bar code scanner-based data now available on the brand level for food products.
2. Development of improved methodologies to measure benefits and costs of private strategies and public policies aimed at improving food quality.
3. Use of case study approach in analyzing opportunities and potential benefits for agricultural marketing cooperatives in the emerging deregulated environment.
4. Setting up collaborations for:
  - Internet exchanges for food safety data,
  - fostering interdisciplinary interaction through professional associations,
  - establishing clearinghouse to set data standards and facilitate data collection,
  - serving on expert committees, and
  - evaluating alternative criteria for setting food safety priorities.

### Milestones:

#### 1997

- Key issues identified by participants
- Models of vertical integration completed

#### 1998

- Problems of coordination outside commodity described.
- Game theory of tacit collusion completed.

#### 1999

- Tradeoff between market power and cost efficiency simulated.
- Consumer demand level models for food industries completed
- GIS on low-income communities (classified by poverty characteristics) completed.

#### 2000

- Analysis of changes in food policy completed.
- Roadmap of policy options and consequences developed.
  - Risk perceptions and information.
  - Consumer behavior, food demand, willingness to pay for safer food.
  - Risk assessment and benefit/cost analysis of food borne hazards.

#### 2001

- Alternative risk reduction strategies analyzed. (re HACCP)
- Incentive-based regulation approaches elaborated.
- Analysis of international market implications of food quality regulations completed.

### Internal Linkages:

CT-S, MD, MA, NH, NJ, NY-C, RI,

**External Partners:** AR, CA, FL, GA, IL, IN, IA, KS, KY, LA, MI, MN, MT, NE, OH, OR, TX, VA, WA, WI, USDA-Economic Research Service, USDA- Rural Business Cooperatives Service, USDA-Agricultural Marketing Service, USDA-Packers and Stockyards Administration, U.S. Center for Disease Control and Prevention, U.S. Food and Drug Administration, U.S. General Accounting Office, Farm Foundation,

**Others (international)** – Agriculture Canada; Institute Supérieur Agricole de Beauvais in France; Research Triangle Institute; University of London and the London Business School in the United Kingdom; University of Reading in the United Kingdom; University of Saskatchewan in Canada; University of New England in Australia; Federal University of Vicosa and State University of Campinas in Brazil; Catholic University of the Sacred Heart in Italy; Kyoto, Iwate and Chiba Universities in Japan; Zhiga Prefecture in Japan; and Uludang University in Turkey.

**Target Audience(s):** State and national legislators, public interest groups, private food industries and consumers.

**Allocated Resources:**

(Commitment to National Goals in %)

Goal 1. 40%

Goal 2. 10%

Goal 3. 15%

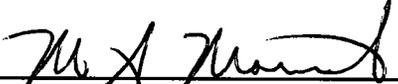
Goal 5. 35%

## Plan of Work

### Certification:

  
\_\_\_\_\_  
Dr. John Gerber, Director  
UMass Extension

7/14/99  
Date

  
\_\_\_\_\_  
Dr. Mark S. Mount, Associate Director  
Massachusetts Agricultural Experiment Station

7/14/99  
Date