Annual Report of Accomplishments and Results 2004

Rhode Island
Agricultural Experiment Station
and
Cooperative Extension

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A report to the USDA-CSREES on progress under the Joint Plan of Work for FY2000-2004

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WHAT IS COVERED IN THIS REPORT

This Report covers accomplishments during the period from October 1, 2003-September 30, 2004 and corresponds to the 5-Year Joint Plan of Work for FY2000-2004 ("the Plan") for the **Rhode Island Agricultural Experiment Station** (RI AES; "the Station") and for **Rhode Island Cooperative Extension** (RI CE; "Extension"), administrative units of the **University of Rhode Island** (URI, "the University"). It is organized following the format prescribed in the **Guidance for the Annual Report of Accomplishments and Results**, with the following modifications.

- We have appended the current **Call for Proposals** for the Station to document the procedures used for merit and peer review for all projects begun in fiscal year 2004. (See additional comments under Program Review Process).
- We have appended a **Portfolio of Current Projects** for the Station, providing brief outlines for all projects approved for FY2004, to illustrate the pervasive adoption of the current outcomes-orientation for all projects.

Annual Report of Accomplishments and Results
Rhode Island Agricultural Experiment Station & Cooperative Extension
FY2004

PLANNED PROGRAMS

GOAL 1: AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY.

PROGRAM 1: LANDSCAPE HORTICULTURE AND TECHNOLOGY FOR SUSTAINABLE AGRICULTURE.

Overview: Rhode Island's AES and CE programs in agricultural system management emphasize the green industries (turfgrass and ornamental horticulture) of this state because of their relative importance to the economy of the state. We address the needs of the state in a coordinated program of research and outreach that covers plant production, landscape design, landscape use, installation, and maintenance. Thus we directly impact green industry professionals, homeowners, and all citizens and visitors utilizing managed landscapes (e.g., parks, ball fields, and golf courses) throughout Rhode Island. Our focus is to maintain an economically important industry with environmentally benign practices.

Our program in landscape horticulture does a superb job of integrating research and outreach. Research faculty work very closely with CE faculty, educators and staff and provide the basis for the coordinated outreach efforts in Invasive Species, Emerging Infectious Diseases, Ornamental/Green Agriculture and Integrated Pest Management.

A key to the future of the Program is the progress of the University's Environmental Biotechnology Initiative, an ambitious, faculty-led effort to secure core facilities for plant and animal genomics, transgenics, imaging, and bioinformatics. Progress on advancing a new state-of-the-art biotechnology building toward a State Bond Referendum on the 2004 ballot has been extremely positive, with $250,000 in planning money from the State allocated in FY04.

Key Theme: Invasive Species

Overview: Invasive species research is conducted under Hatch project RI00667 "Biological Control of Invasive Plants and Insects in RI" with outreach coordinated through our GreenShare program (described in the Key Theme area "Ornamental/Green Agriculture".)

Biological Control Projects:

Milestones:

- ***Phragmites australis* Biological Control**. We are continuing research on natural enemies of both native and exotic populations of *P. australis*, both here and in Europe, working

toward an ultimate goal of biotype-specific biological control of exotic *P. australis*. In 2004 we completed studies on the following:

- Field surveys determined the distribution of native and exotic *P. australis* in Rhode Island. Leaf samples collected from sites throughout the state were analyzed using restriction fragment length polymorphisms to determine native status. Exotic *P. australis* was abundant throughout the state with its greatest concentration around Narragansett Bay and coastal habitats. Native *P. australis* was found only in a tidal pond system on Block Island.
- In field and greenhouse studies, we determined the differential resistance of native and exotic genotypes of *P. australis* to the exotic aphid *Hyalopterus pruni* and the effect of aphids on plant survival. The lower resistance of native haplotypes of *P. australis* to exotic aphid infestation and damage may further decrease their ability to compete with exotic populations of *P. australis*.
- Two exotic gall flies, *Lipara similis* Schiner and *L. rufitarsis* Loew were found throughout coastal Rhode Island infesting both native and exotic *P. australis*. Both fly species prevent flowering in infested stems. Because native *P. australis* has a lower flowering rate than exotic populations, it may be more severely affected by a decrease in flowering caused by *Lipara* infestation.
- We developed an artificial diet for rearing *Rhizedra lutosa* (Hübner), an exotic moth that feeds on rhizomes of *P. australis*. Larvae fed diet experienced significantly higher survival and pupal weight, and faster pupal development than larvae fed rhizomes. The convenience and increased larval performance make artificial diet a good alternative to rearing larvae on rhizomes.
- Native and exotic *P. australis* were analyzed for the presence of endophytic fungi using a common staining technique and interference contrast microscopy. No endophytes were found in any of the native or exotic haplotypes.

- **Lily Leaf Beetle Biological Control.** The lily leaf beetle, *Lilioceris lilii*, has now spread through all New England states and well into New York, seriously damaging native and cultivated lilies throughout its range. This insect is native to Europe, where it is controlled by six parasitoids. In 2004 we released *Tetrastichus setifer*, *Lemophagus errabundus* and *Diaparsis jucunda* against this pest in RI, MA, NH, and ME, selecting release sites by matching the European climate where each parasitoid predominates. High parasitism among *L. lilii* larvae indicates that many of these releases were successful and *Tetrastichus setifer* appears to be permanently established in 3 states. Our cooperators in MA, NH, and ME are collecting needed data and we are sending them additional parasitoids for field release.
- **Purple Loosestrife Biological Control.** There were four initial release sites of *Galerucella spp.* in Rhode Island's biological control of purple loosestrife program. In 2004, two sites showed significant impact of the *Galerucella* release with a noticeable increase in native plant species. The purple loosestrife plant population has also diminished, and the plants that remain are stunted, and produce fewer flowers. We reared and provided *Galerucella* beetles to the RI Department of Transportation for release against purple loosestrife in roadside locations throughout the state. Information about the purple loosestrife biological control program is available to homeowners and growers on our Biological Control Web Site (http://www.uri.edu/cels/pls/biocontrol/index.html).

Outputs/Outcomes/Impacts:

- The lily leaf beetle parasitoid, *Tetrastichus setifer*, appears to be permanently established in RI, MA, and ME.
- Lily leaf beetle populations have been reduced about 70% at two sites where we established parasitoids against this pest.
- In 2004 birch leafminer was reduced to non-pest status throughout Rhode Island as a result of our parasitoid release in 1994.
- We conducted informational seminars and lectures on invasive species and their impacts to the Rhode Island Nursery & Landscape Association, Master Gardeners Association, URI Master Gardeners training sessions, classes at the University of Rhode Island, garden clubs, and civic groups.
- We provided information and advice to the US Geological Survey, US Fish & Wildlife Service, US Environmental Protection Agency, NOAA, Northeastern Aquatic Nuisance Species Panel, New England Plant Conservation Group (NEPCoP), New England Invasives Plant Group (NIPGro), Invasive Plant Atlas of New England (IPANE), Rhode Island Department of Environmental Management Division of Agriculture, Rhode Island municipalities and land trusts, and other agencies and private citizens about the identification and spread of invasive species in Rhode Island and their impacts on local biota and ecosystems.

Source of funds: AES, industry groups, The Nature Conservancy of Rhode Island, North American Lily Society, private funding

Scope of impact: New England

Key Theme: Emerging Infectious Diseases

Overview: The vector-borne and zoonotic diseases program includes our projects on zoonotic disease surveillance and management, and on conventional and biological control of tick and mosquito vectors. Key elements of the program continue to focus on enhancing surveillance, improving diagnostics, gaining knowledge on vector-pathogen interactions, and developing and implementing vector control strategies that are appropriate for communities. They represent an important capacity for research and outreach in vector-borne and other zoonotic diseases that is critical for protecting animals and humans in Rhode Island and throughout the northeastern region. Moreover, ongoing surveillance for disease agents and continued development and implementation of rational vector-borne disease management plans are key elements for a public health approach to bioterrorism preparedness.

We maintain close ties with the Rhode Island Department of Environmental Management's Office of Mosquito Abatement Coordination, the Rhode Island Department of Health, and Brown University's Center for Biodefense and Emerging Pathogens. We collaborate by maintaining a statewide tick surveillance effort, and implementing interactive education-based disease prevention programming in the highest risk areas. We provide expertise and capacity for a wide variety of zoonotic diseases, including Lyme disease, Babesiosis, human anaplasmosis (formerly HGE), West Nile Virus, EEE, and other diseases of major public concern. Hatch projects focused on infectious diseases includes RI00664 "Developing Vector-borne Disease Watch-warning systems and Responses for the Northeastern United States" and RI00666 "Effects of Coastal Ecosystems of

Methoprene and Microbial Larvicides Used for Control of Mosquitoes and West Nile Virus." Additional funding sources complementing this Hatch investment are CDC grant "Assessing Community-based Tick Control for LD Mitigation", USDA Special Grant "Tick-borne disease prevention, RI", and NIH grant, RI01 AI37230, "Role of Tick Saliva in Lyme Disease and Vaccine Strategy."

Tick Borne Diseases:

Milestones:

- We completed the 12th year of a state-wide tick surveillance in 2004 and will use this information, together with previous years of tick abundance information, to monitor changes in the spatial distribution of Lyme disease and to aid in the development of a tick risk model for the Northeast US. Vector tick abundance in 2004 was 9.1% higher than during the previous reporting period (FY2003). However, we have found a close correlation between June-July precipitation amounts and nymphal tick abundance. We explored the use of MODIS (Moderate Resolution Imaging Spectroradiometer) images in identifying environmental predictors of tick abundance. This imagery is at lower spatial resolution, but is free and available at a more frequent temporal resolution. We used the Normalized Difference Vegetation Index (NDVI) in analyses with tick abundance for 2004, at the same sites throughout Rhode Island. The tick abundance rates were grouped into risk categories of low (0-18 nymph/hour) and high risk (18+ nymph/hour) because of the small number of sites that fell into the highest abundance category. A significant difference was seen in the means of two groups of July NDVI data.

  The positive result from this analysis prompted further study. A MODIS image was ordered for June 2004 and the same methods of analyses were applied to tick collection data using the June and July images. Our tick sampling is conducted in two rounds; all sites are sampled in a random order in round one, and round two is a re-sampling in the same order as round one. Generally, round-one ticks are collected in June and round-two ticks are collected in July. A significant difference was seen in the means of two groups of June NDVI data, grouped by low and high round one tick abundance. Interestingly, this result was repeated for June NDVI and round-two tick abundance. A significant difference was seen in the means of two groups of July NDVI data, grouped by low and high round two tick abundance. As expected, the NDVI result from July 2004 and round-one was not significant. Lack of a significant result for the July image and round one tick data helps confirm a statistical relationship between NDVI and tick abundance as well as provide a biological basis for the result. These results support the hypothesis that the NDVI can be used to differentiate between sites of low and high tick abundance and also serve an important variable within a model used to accurately predict tick abundance.
- We are developing tools for disseminating risk-appropriate tick bite mitigation information to communities at risk. We constructed an "average" tick-borne disease risk map for RI based on 12 years of surveillance statewide (1993 – 2004). Additionally, we are collecting images of high- and low-risk backyard habitats for use in a novel information system," Assessing Your Level of Tick-Borne Disease Risk". The planned product will display the risk map together with images of low-, medium-, and high-risk backyard scenes. We have started to develop a web system for this and other relevant tick and Lyme disease information. These pages will be found initially as part of the Center for Vector-Borne Disease's web site

Although we expect that the final information system will be a stand-alone product available to a wide range of stakeholders.

- We are developing high-throughput screening tools for developing an anti-tick vaccine. Naïve guinea pigs were sensitized to tick salivary secretory proteins by repeated infestations of adult *I. scapularis*. A total of 68 tick salivary genes were cloned into the VR2001/TOPO cloning vector and the cloned genes were 1) screened for their ability to cause a DTH-like dermal response, and 2) histology of the skin site around the vaccination was analyzed. In this way, vaccine candidates can be scored for their reaction similarity to tick feeding, which to date, is the only treatment to yield 100% tick feeding rejection.
- We have provided technical advice on mosquitoes and West Nile Virus to the National Park Service, U.S. Fish and Wildlife Service, the Nature Conservancy and for the State of Rhode Island (DEM/DOH West Nile Virus Advisory Committee).

Mosquito abatement:

- We evaluated the environmental impacts of Methoprene, a widely used mosquito larvicide, on target and non-target organisms in catch basins. We described the ecological dynamics of the invertebrate community found in catch basins and found no effect of methoprene on the nontarget portions of that community in combined field and laboratory trials.
- The present dose recommended by the state of RI (3.5 g slow-release pellets) effectively controls mosquitoes.
- Preliminary data collected in the URI catch basin simulation lab show no significant differences in populations of non-target organisms in treated catch basin communities compared to control catch basin communities.

Outputs/Outcomes/Impacts:

- We demonstrated the value of the tick registry as a passive surveillance tool to assess the geographical distribution of Lyme disease risk.
- We provided Rhode Islanders with diagnostic services for ticks and training programs on public safety and the impact of tick-borne diseases.
- We improved the predictive capacity of a model that generates seasonal tick risk maps. The correlation between summer precipitation amounts and tick abundance suggests the possibility of developing a weather-based predictive model for tick-borne disease region-wide.
- Station research findings provided the RI Department of Environmental Management with crucial data used to determine tick and mosquito abatement needs, such as spraying needs and locations most needing abatement.

Source of funds: AES, CE, National Institutes of Health, Centers for Disease Control, USDA-CSREES, private foundations

Scope of impact: state and regional

Key Theme: Biotechnology

Overview: Biotechnology is a key theme and is integrated throughout our research portfolio. One area in which we have made significant progress is in the development of core infrastructure for

genomics, transgenics, imaging, and bioinformatics. Equipment grants including, RI-2000-001142 "Equipment Request to Strengthen Basic Infrastructure for Plant Biology Research at URI" have significantly strengthened our capacity to perform biotechnology research. Additionally, URI researchers have successfully competed for USDA-funded projects, including NRI grants RI001999901385 "A Genetic Dissection of the Sex Determination Pathway in Maize", RI-2000-01228 "Enhancing Kentucky Bluegrass Forage Quality Through Physiological and Molecular Approaches", and RI002001-00966 "Stable Expression of Yeast FLP Site Specific Recombinase in Rice". Last, research in biotechnology was supported by Hatch project RI00668 "Production and Analysis of Transgenic Lines to be Used for Functional Genomics of Rice."

Milestones:

- Major research objectives were to produce transgenic rice lines expressing FLP recombinase and demonstrate *in vivo* the efficacy of FLP-mediated site-specific DNA recombination in crop species.
- A total of 516 T0 transgenic rice lines transformed with the FLP-containing construct, and 247 with the recombination-reporter construct, were produced using *Agrobacterium*-mediated transformation. Transient assay of GUS expression by bombardment of *FRT*-containing transgenics with an *FLP* plasmid construct, or by bombardment of FLP-containing transgenics with an *FRT* plasmid construct, was performed to visualize FLP-mediated site-specific DNA recombination in transgenic rice. Out of 159 plants bombarded, 97 showed GUS expression and the density of blue spots varied among treatments. The negative control did not show any GUS expression. These results demonstrate that FLP recombinase expressed in transgenic rice plants effectively exercised the DNA fragment flanked by the *FRT* target sites, resulting in site-specific DNA recombination and consequently, the GUS expression.
- To test, *in planta*, the efficacy of FLP recombination activity when expressed in rice plants, we conducted cross-pollination experiments between the FLP-expressing plants and *FRT*-containing plants to bring together the FLP recombinase and the *FRT*-containing recombination-reporter construct in the hybrid. Based on molecular data obtained and results from transient GUS expression, as well as availability of pollen grains, we have conducted 28 crosses using 9 independent FLP-expressing T0 plants and 18 FRT-containing transgenic T0 plants. Seeds were harvested and germinated in the presence of both PPT and hygromycin to select the hybrid progeny inheriting both *FLP* and reporter gene *gusA*. GUS activity was evaluated in various tissues of the hybrids at different developmental stages. While all the hybrid progeny exhibited GUS expression, the progeny of selfed parental rice plants did not show detectable GUS activity. Molecular analysis further confirmed the FLP-mediated site-specific DNA excision in the hybrid. This observation clearly demonstrated the efficient operation of FLP recombinase in catalyzing site-specific DNA recombination, indicating that the FLP/*FRT* system functions in crop species.

Outputs/Outcomes/Impacts:

- We have determined that the FLP/FRT site-specific recombination system is an efficient tool for genome modification in cereal crop species. This will dramatically enhance our ability to genetically improve a wide variety of crop species important to agriculture in the United States.
- Results from this work have enhanced our ability to genetically modify crops of economic importance in the US.

- We have trained students in cutting edge, molecular technologies.

Source of funds: AES, USDA

Scope of impact: state, regional, national

Key Theme: Ornamental/Green Agriculture

Overview: Rhode Island's AES and CE programs in agricultural system management emphasize the green industries (turfgrass and environmental horticulture) of this state because of their relative importance to the economy of the state. We address the needs of the state in a coordinated program of research and outreach that covers plant production, landscape design, landscape plant use, installation, and maintenance. Thus we directly impact green industry professionals, homeowners, and all citizens and visitors utilizing managed landscapes (parks, ball fields, and golf courses) throughout Rhode Island. Our focus is to maintain an economically important industry with environmentally benign practices.

Our program in environmental landscape horticulture does a superb job of integrating research and outreach. Research faculty work very closely with CE faculty, educators and staff and provide the basis for the coordinated outreach efforts in Invasive Species, Emerging Infectious Diseases, Sustainable Agriculture and Integrated Pest Management. Support for this work comes from a Hatch Regional projects RI00NE009 "Conservation and Utilization of Plant Genetic Materials", RI00S290 "Technical and Economical Efficiencies of producing, marketing and Managing Environmental Plants" and RI00NE187 "Best Management Practices in the East."

Milestones:

- **East Farm Ornamental Trials**: The objective of this program is to evaluate trees and shrubs for sustainability and ornamental potential in the northeast and to provide the results to growers, landscapers and consumers. In addition, propagation material is provided to growers free-of-charge. Under the direction of URI Horticultural Professor Dr. Brian Maynard, over 500 individual taxa have been planted for evaluation and 30–50 new taxa have been added each year. After evaluation, plants are moved from URI's East Farm Horticultural Facility to the URI campus and other public landscapes for long-term evaluation.
- **East Farm Open House:** On May 15, 2004 we hosted an open house that was modeled after the annual GreenShare Field Day. The purpose of this event was to educate the public about the range of sustainable horticulture, agriculture and aquaculture activities ongoing at URI's East Farm Horticultural Facility. More than 3,000 people visited the East Farm in a 4-hour period. The open house included plant sales, guided tours, history talks, educational booths, children's activities, planting demonstrations and refreshments. A highlight of this open house is the crabapple plantation with over 175 disease resistant trees.
- We have converted our "Sustainable Trees and Shrubs" pamphlet (traditional print material), into a website. This website in 2004 had over 90,000 visits. Further, nearly 600 hard copies of the sustainable plant list were distributed.
- The URI Learning Landscape Demonstration Gardens have been renamed the URI Botanical Gardens. This 4-acre model landscape continues to be used for outreach programming and education. These gardens showcase sustainable plants and practices.

- The results of research on irrigation practices and modified container media requirements will increase production potential and reduce production costs by 10-30%. Our research on plant growth and marketing will boost industry sales and increase production potential by identifying plants that will stimulate consumer interest and increase purchasing. At the same time information and practices for optimizing production potential of new crops will be generated for growers. It is estimated that new crops information and production standards will increase industry sales by 5-10%. Research on reducing damage by deer in nurseries and landscapes should have an immediate impact of $3,000 to $15,000 per nursery, and an overall impact in nurseries and homeowner landscapes through reduced costs associated with lost plants and reduced production of 5-10%. Research on sustainable roadside planters will have an impact on public enjoyment of scenic bikeways and associate thoroughfares.
- **Cooperative Extension Activities**: Five fundamental objectives have been undertaken, with CSREES Extension Activities funds, to increase the capacity for Cooperative Extension programs within the University of Rhode Island (URI-CE) to meet the information and technology needs of the Rhode Island Nursery Industry (RINLA) and allied horticulture industries. The needs of RINLA and allies range from quality informational resources to more personal contact with URI Extension faculty, demonstrations of modern plant production technology and sources of new plant materials that will increase competitiveness in the regional horticulture industry. Each objective helps foster increased use of URI resources by a vital agricultural industry, and helps sustain increased production capacity to meet market demands for plant material while protecting worker safety and environmental quality.
    - *Objective 1*. Enhance the URI/Nursery Industry Partnership. We will further enhance this resource through the addition of interpretive signs, water-conserving irrigation, and safety lighting, and through a series of brochures based on the mission of the URI Botanical Gardens. RINLA growers will attend a GreenShare Field Day and twilight meetings where concepts of sustainable plants and best management practices will be presented.
    - *Objective 2*. Develop Grower Resources. Utilizing internal expertise we will upgrade the Sustainable Plant List and RINLA web sites, increase staff support for the GreenShare WinterSchool, and consolidate existing Extension Diagnostic activities (Turf Disease Diagnostic Laboratory, Tick Diagnostic Lab, URI Plant Clinic, and URI Master Gardener Hotline). Provide additional staffing to coordinate URI-CE outreach with worker safety programs directed at RINLA growers.
    - *Objective 3*. Enhance the URI-CE/RINLA Partnership through Increased Site Visits and Strategic Planning. Hire one additional URI-CE staff to travel to nurseries and related sites in Rhode Island to solve production problems. Work with growers to increase the use of digital photography as a means of rapidly and assessing plant production problems from remote locations. Meet with nursery professionals to discuss the URI-CE outreach mission and develop means of strengthening the cooperation of URI-CE and RINLA.
    - *Objective 4*. Improve the URI Technology Base in Support of RI Nurseries. Develop demonstration greenhouse plant production facilities utilizing state-of-the-art computer control, ventilation, heating and irrigation systems. An existing micro-irrigation system will be enhanced to permit demonstration and evaluation of methods for reducing water use, minimizing nutrient runoff and formulating better

plant growth media. Growers will be familiarized and/or trained with these facilities through short courses and field days. Purchase up-to-date equipment for testing media and water samples submitted by growers.

- *Objective 5*. Initiate a Plant Selection and Shrub Breeding Program. URI has just hired a plant geneticist/woody plant breeder who is developing a program focused on the development of new tree and shrub cultivars that will be grown and marketed by RI nurseries. In addition, research has been initiated to investigate the genetic underpinnings of recalcitrant adventitious rooting in important horticultural plants such as oaks. In support of this effort we propose to hire support staff to lay the groundwork for this program at URI. These staff will be responsible for accessioning plants, setting up greenhouse and nursery facilities, helping faculty develop priorities and guidelines for the distribution of new plants to the nursery industry, and developing programming to educate growers about the potential of new plants and the role URI plays in this effort.

- **Media Activities:** The GreenShare Program uses print and television media to communicate to our audiences. IPM, sustainable landscaping, water quality and horticultural information and research are guiding principles in our weekly television segments known as the "URI Plant Pro" on WJAR, the NBC affiliate station in Rhode Island and the television station with the largest market share in the region. Both features are filmed on location in the URI Learning Landscape Gardens and are hosted by Dr. Marion Gold, Director of the Cooperative Extension Education Center, with periodic appearances by other URI scientists and staff and horticulturists from throughout RI.
- **URI GreenShare Field Day:** This annual GreenShare Field Day provides the public with the opportunity to explore IPM and other environmentally friendly home landscape practices in a festival setting. The theme of the event in 2004 was "hardscaping" and workshops, tours and demonstrations revolved around this theme including a demonstration on patio construction. The public was also invited to bring samples of backyard insect and disease problems for diagnosis and tour URI's Botanical Gardens.

Outputs/Outcomes/Impacts:

- During 2004, the URI Cooperative Extension Plant Protection Clinic received 275 insect and disease samples for diagnosis and appropriate treatment recommendations. We also processed over 220 samples of turf from around the country for disease diagnosis and control recommendations, including recommendations for disease-resistant species.
- We continued to locate and increased germplasm of cold-hardy and salt-tolerant conifers to replace existing populations threatened by insect and disease problems.
- Through the delivery of educational programs (workshops, talks, public exhibits and open houses) by highly trained URI Master Gardener volunteers, over 5,000 RI homeowners increased their awareness of sustainability issues and knowledge of how to implement environmentally sound home and garden practices.
- Over 3,000 attended our East Farm Open house.
- URI Cooperative Extension Master Gardener volunteers answered over 10,000 calls from Rhode Islanders through the toll-free URI CE Gardening Hotline.

- We continued to update our web site including on-line fact sheets giving up-to-date recommendations for managing insects, diseases, and other aspects of the home landscape. Over 250 factsheets are on the web at: www.uri.edu/ce/factsheets/sheets/.
- **Healthy Landscape Program:** Over 100,000 Rhode Islanders each week tune into URI Cooperative Extension's "Plant Pro" segments on WJAR News Channel 10. Filmed in the URI Learning Landscape and Greenhouses, the segments emphasize environmentally friendly gardening tips for both backyard and professional gardeners. More than 100 URI "Plant Pro" segments were produced this year. The noon segments have an average viewership of 55,000 households and 45,000 households watch the Saturday shows. We estimate 7 million homeowner contacts annually.
- 2,800 school children, grades K-6, increased their knowledge and awareness of the environmental issues relating to Rhode Island's soils, plants, wildlife and water through hands-on activities while attending the Cooperative Extension Education Center's Learning Landscape Environmental Education held in the URI gardens and greenhouses.
- In 2004, 50 "Ask a Master Gardener" booths, staffed by URI Master Gardener volunteers, answered over 2,500 of the RI gardening public's questions through participation at fairs, the RI Flower Show and other public events around the state throughout the year. During these events, the booth promotes environmentally sound gardening practices and increases the public's knowledge regarding the use of sustainable, non-invasive plants in the home landscape.
- Two newspaper columns, Growing Green, a URI Cooperative Extension GreenShare horticultural column in the *Providence Journal*, and *Green Source*, a URI Master Gardener monthly column in several weekly papers reach over 200,000 households with our sustainable practices message.
- Annually, 130 Rhode Islanders complete a 16-week URI Master Gardener basic training program. Faculty, staff and members of the Green Industry teach classes. After successfully completing the course, approximately 50% of the participants go on to complete a 50-hour internship and become certified URI Master Gardener volunteers.
- GreenShare Field Day attracted 2,700 people; "Spring into Action with the Gardening Experts", an all-day workshop for the gardening public, was attended by 120 people.

Source of funds: AES, CE, industry-sponsored grants, MG volunteer in-kind contribution

Scope of impact: state and regional

Key Theme: Integrated Pest Management (including Biological Control)

Overview: This program overlaps with the Ornamental/Green Agriculture and Invasive Species Biological Control themes. Research projects on Biological Control in Rhode Island included a multi-state project, NE-171 "Biologically Based IPM Systems for Management of Plant-Parasitic Nematodes", Hatch projects, RI00665 "Phyllophaga Pheromone Traps and Biodegradable Spheres to Reduce Pesticide Use in Nurseries and Blueberries", RI00666 "Effects on Coastal Ecosystems of Methoprene and Microbial Larvacides Used for Control of Mosquitoes and West Nile Virus" (results described in Goal 1, Program 1, Key theme: Emerging Infectious Diseases), and the Interregional Research Project No. 4 (IR-4).

Milestones:

- Considerable progress was made in the use of *Phyllophaga* pheromone traps and biodegradable spheres as a means to reduce pesticide use at nurseries. Eight ratios of L – valine: L – isoleucine methyl esters were tested in Robbins and Trece traps for capture of Phyllophaga anxia (Leconte) adult males. The 90:10, 80:20 and 60:40 ratios of valine:isoluecine were the most effective blends for capture of beetles in Rhode island. The standard Japanese beetle trap manufactured by Trece captured significantly more beetles than the Robbins trap. Since the Trece trap is already marketed for Japanese beetles, a lure and trapping system can be adopted for *Phyllophaga anxia.* Cis-3-hexen-1-ol, butyl butanoate, and trans-2-hexen-ol captured significantly more blueberry maggots (*Rhagoletes mendax)* than unbaited spheres.
- Flowering crabapple variety disease resistance was evaluated in our trial block and data were integrated into database that is available to all Rhode Islanders.
- **Inter-regional Project #4 (IR-4)** A competitive grant in the Biopesticides program of IR4 was used to evaluate EcoGuard (*B. licheniformis*) for management of Botrytis flower blight of ornamental plants.
- **Sudden Oak Death (S.O.D.).** Basic biology studies were continued on this pathogen, which attacks several hosts and represents a substantial danger to the oak forests nationally.
- Our apple IPM program is dedicated to individual orchard visits. In 2004, we made 216 orchard visits to 28 Rhode Island orchards from April through September. In addition to these visits, we delivered IPM techniques through weekly-recorded phone messages and on our Apple IPM Website. We collaborated with the University of Massachusetts in hosting 3 twilight grower meetings, one in April, May, and June. We also hosted the Rhode Island Fruit Growers Annual Meeting in March and their Summer Tour in June. Through these avenues we promoted reduced use of pesticides.
- We maintained the RI Apple IPM website, making at least twice weekly updates on current pest status, April through August. We also maintained the RI Fruit Growers website with general apple growing techniques for homeowners.
- **NE-171 Multistate Project.** Greens from 38 golf courses in Connecticut, Massachusetts and Rhode Island were sampled in May, July and September of 2004 for plant parasitic nematodes. Nematode counts were made and the incidence of *Pasteuria penetrans* was recorded. Soil characteristics were also measured for each green including texture, pH, bulk density, soil aggregation and soil nutritional analysis. In addition, data were collected on cultural practices and management techniques. DNA was extracted from all soils and stored for future amplification of nematode antagonistic ribosomal sequences. Data from these studies indicate that nematode populations are highest on older greens and those primarily composed of annual bluegrass. In addition, nematode antagonists could be identified in golf course putting greens through DNA soil extraction and amplification.

Outputs/Outcomes/Impacts:

- Cooperating RI apple growers used fewer fungicides, fewer insecticides, and fewer miticides than is recommended in the New England Apple Pest Management Guide.
- Putting greens that have been damaged by pathogens of bluegrass, can be repaired by replacing affected stands with creeping bentgrass. This can be accomplished without increasing the number of chemical applications.

Source of funds: AES, CE

Scope of impact: Massachusetts and Rhode Island

Key Theme: Farm Safety

Overview: Extension in farm safety was supported by USDA/CSREES Smith Lever 3d funds in FY04. (It has since been discontinued, as has our program.) Of the 735 farms in Rhode Island, 276 are nursery and greenhouse operations and 75 farms are in fruit production. By focusing on the nursery/greenhouse industry as well as fruit growers, we provide farm safety services to 48% of Rhode Island farmers.

Milestones:

- Presented farm safety information to Rhode Island Nursery and Landscape Association (RINLA) members at their two-day annual meeting (January 2004).
- Presented farm safety information to Rhode Island Fruit Growers Association members at their annual meeting and twilight meetings.
- Provided safety manuals for Pesticide Applicators Training sessions.

Outputs/Outcomes/Impacts:

- We provided approximately 400 people at the RINLA meeting in January, 2004 with farm safety training.
- We provided growers who attended the RI Fruit Growers Annual Meeting with farm safety training.

Source of funds: CSREES

Scope of impact: State

PROGRAM 2: AQUACULTURE BIOTECHNOLOGY AND FISHING.

Overview: Rhode Island aquaculture grew only slightly (1.6%) in calendar year 2004, from $563, 891 in 2003 to $572,994 in 2004, of which 97% was the eastern oyster (Aquaculture Yearly Status Report of the RI Coastal Resources Management Council). Although this represents a pause in the steady growth of shellfish aquaculture in the state, prospects for the future are good in that the number of farms rose by two to 22 and the number of acres under cultivation rose from 61 to 70. Furthermore, farmers invested 39% more into their operations in 2004 ($377,472) than in 2003 ($271,000). Given that about 3 years are required for oysters to grow from seed to market product, these trends augur well for the future growth of the industry in the state. Industry growth until now can be attributed to a number of factors, including a more streamlined permit application process, but the positive role played by Cooperative Extension over the long term, especially by providing training courses in general shellfish aquaculture and shellfish diseases, has been enormous. In addition, a number of graduates of the University of Rhode Island have become leaders in the industry, e.g., by serving as presidents of the Ocean State Aquaculture Association.

The Rhode Island Aquaculture Initiative (RIAI), which began in 2002 with funds from Senator Jack Reed via the U.S. Department of Commerce and the RI Coastal Resources Management Council (CRMC) and on which we have previously reported, continued to provide support for research, extension and industry development in FY 2004. Drs. David Bengtson and Michael Rice and Mr. David Beutel serve on the RIAI Executive Committee as part of their CE commitments. Previously funded multi-year RIAI grants have allowed investigations of hard clam and oyster diseases, potential for marine ornamental fish culture, enhancement of natural stocks of hard clams, and improvement of natural habitats with shellfish aquaculture gear, among other projects. RIAI mini-grants to industry have also allowed oyster growers to experiment with other crops, such as bay scallops, surf clams, and soft-shell clams, as well as to improve the productivity of their oyster operations. The RIAI, in cooperation with CE, has also allowed the expansion of aquaculture extension in RI. Mr. Randy Mickley serves as the finfish aquaculture extension specialist and has completed the construction of the Aquaculture Demonstration Center at URI's East Farm to show the public (over 1,000 visitors in 2004) the possibilities for integrated finfish aquaculture and agriculture; he is also working with several individuals on the potential for development of finfish aquaculture operations on existing farms. Dr. Dale Leavitt, an assistant professor of aquaculture of aquaculture at Roger Williams University in Bristol, RI, is also an adjunct professor at URI so that his shellfish aquaculture extension activities are tied to CE efforts.

One of the first RIAI-funded projects, determination of the feasibility of an aquaculture technology park in RI, for which Dr. Bengtson served as a co-PI, evolved into a phase II study of the feasibility of a broader marine biosciences technology park. The latter concept has become a favorite of RI Governor Donald Carcieri and the RI Economic Development Corporation, who have proposed an $18 million facility and who are presently trying to market the idea to prospective tenants. This concept fits well with URI's vision of aquaculture biotechnology as a more promising long-term industry than simply aquaculture production per se. A major effort to strengthen the University's research in aquaculture biotechnology was supported in FY 2004 by a USDA Special Grant entitled "Environmental Biotechnology at URI", which has allowed the hiring of post-doctoral scientists to work in this area. Additionally, FY2004 saw the completion of construction of the USDA-funded Blount Aquaculture Research Laboratory at URI's Narragansett Bay Campus. This laboratory will provide state-of-the-art facilities for our faculty to work on pathogens and transgenics related to fish and shellfish.

In 2004, the University of Rhode Island joined with Roger Williams University to submit a proposal to USDA to re-establish the Northeastern Regional Aquaculture Center (NRAC) at URI and RWU as it moved away from the University of Massachusetts at Dartmouth. We unfortunately were not chosen as the new home of NRAC, but the joint submission strengthened the ties between our two institutions and we will continue to work together for the betterment of aquaculture in Rhode Island.

Key Theme: Aquaculture

Overview: Research in this theme area is a result of NRI grants RI0019903421 "Molecular Mechanisms of Osmoregulation in Salmon", and RI002003-03292 "The Role of Myostatin in the Development and Growth of Fish Muscle". Special Grant RI002003-06051, entitled "Environmental Biotechnology at URI" was also in effect in FY2004 and 40% of that was aquaculture biotechnology. Hatch projects included RI00401 "Vaccine Development for Bacterial

Pathogens: The Nutrient Approach", RI00894 "The Role of Myostatin (GDF-8) in Muscle Growth of Rainbow Trout", RI0085 "Comprehensive Utilization of Squid Processing Waste for Aquaculture Feed Development", RI00891 "Increased Efficiency of Summer Flounder Aquaculture through Nutrition" and RI00327 "Assessing the Value of Shellfish Aquaculture Gear as Fish Habitat." An Animal Health project RI00AH882 "Vaccine Development for Bacterial Pathogens: The Nutrient Approach" is also ongoing. One grant from the Northeast Regional Aquaculture Center "Development of Diets and Rearing Conditions for Commercial Aquaculture of Black Sea Bass" continued in 2004, and another one began "Increased Hatchery Efficiency for Summer Flounder and Cod"; both in conjunction with GreatBay Aquaculture, LLC, in Portsmouth, NH.

Milestones:

- In an effort to characterize genes that are up-regulated during the stressful period when salmon are transferred from fresh to salt water, work was completed on characterization of salmon glycine-rich RNA binding protein (SGRP), osmotic shock protein (Osp 1.8c), and taurine transporter. Along with our previous characterization of salmon hyperosmotic protein 21 (Shop21), this work reveals the complex array of mechanisms involved with adaptation to the marine environment.
- Larval rainbow trout were transfected with constructs coding for three mutant myostatin molecules or antagonists and found to exhibit the greatest degree of expression of the constructs when transfected 3-5 days post-hatch.
- Mutant strains of *Vibrio anguillarum* and *Vibrio harveyi* were created to investigate the role of nutrients in gastrointestinal mucus on growth of these pathogens in Atlantic salmon and summer flounder, respectively. Mutant strains grew much less than parental strains and experimental infections of summer flounder with *V. harveyi* indicated that the virulence of the mutant was attenuated compared to the parental strain.
- A monitoring program for *Vibrio harveyi* and other potential bacterial pathogens in a commercial summer flounder hatchery found that *V. harveyi* is a major threat to the industry and that incoming water is the likely source. While fish can tolerate intestinal colonization by these bacteria, environmental factors such as high temperature and transport stress can trigger epizootics.
- Hydrolysis of squid parts remaining after the squid are processed for human consumption yields protein and amino acids that can be used in diets for larval fish. Following previous successful experiments in which squid hydrolysate diets were fed to summer flounder larvae, we began working with industry to conduct feeding trials with Atlantic cod larvae and broodstock black sea bass. Based on the excellent results, a commercial feed company is testing the diets on tuna, shrimp and gilthead sea bream in other parts of the world. Commercial development of this product will allow squid processing waste (normally deposited in landfills) to be used in diets to aid the emerging marine fish aquaculture industry..
- The role of cortisol in food intake by larval summer flounder was investigated in an attempt to identify the reason that some summer flounder larvae (at about the time that their innate cortisol levels increase sharply) suddenly begin eating much more (and therefore grow faster) than their siblings. Although the results varied with developmental stage of the fish, there was no indication that cortisol increases food consumption.

Outputs/Outcomes/Impacts:

- Our work on myostatin increases of growth of muscle tissue.

- Environmental conditions can trigger disease outbreaks; this knowledge can be applied to the prevention of Flounder Infectious Necrotizing Enteritis (FINE) in summer flounder.
- The characterization of bacterial genes involved in the growth of enteric pathogens in the intestine will allow the design of innovative approaches toward protecting animals against gastrointestinal infection.
- Experiments were completed to define optimal protein and lipid levels in diets for black sea bass, a promising new aquaculture species in the Northeast. Providing optimal components in diets should allow maximum growth of fish at least cost and thereby help the industry to develop.
- The long-term impact of training of aquaculturists, both through short-courses and formal university education, is enabling the development of the shellfish aquaculture industry in RI.
- The provision of extension personnel in aquaculture is enabling clients to look at the potential for finfish aquaculture in RI, especially in conjunction with other forms of agriculture.
- AES and CE personnel were heavily involved in planning for the 2nd Northeast Aquaculture Conference and Expo, which was held in Manchester, NH, in December, 2004.
- Dr. Bengtson served as a member of the Governor's Commission on Narragansett Bay and Watershed Planning, and chaired the Commission's panel on Fisheries and Aquaculture. The Commission forwarded over 160 recommendations to the Governor, several of which covered aquaculture. The Governor and Legislature subsequently formed the Rhode Island Bays, Rivers, and Watersheds Coordination Team, and Dr. Bengtson currently serves on the Scientific Advisory Committee for that body.

Source of funds: AES, CE, Northeastern Regional Aquaculture Center, USDA-NRICGP

Scope of impact: state, regional, national and international

GOAL 2: A SAFE AND SECURE FOOD AND FIBER SYSTEM

Overview. A safe food and fiber system spans the health and well-being of domestic livestock and cultured fish. Animal husbandry practices that promote the health and well-being of animals and fish will simultaneously create safer and higher quality food products, yet be highly competitive in the global economy. Further, a secure food system is one that prevents contamination of food by any source, as well as a facilitating a predictable and steady supply of high quality and safe foods.

We report new progress in Programs 3 and 4. We have improved physical capacity to meet the goals of Program 3 by constructing and/or improving facilities for finfish and shellfish vaccine work. Progress in program 4 has been made possible through significant extramural funding to support program excellence in food safety.

PROGRAM 3: HEALTH AND WELL BEING OF FISH AND ANIMALS.

Key Theme: Emerging Infectious Diseases

Overview: This thematic area is supported by work dedicated to resolution of aquaculture-related diseases. Station scientists have initiated a series of studies to characterize bacterial genes involved in the growth of enteric pathogens of fish. This work will serve as the foundation for the development of vaccines against bacteria that harm cultured fish. This work is supported, in part, by Hatch funds. Milestones and Outputs/Outcomes/Impacts of our current work are described in this report under Goal 1, Program 2: Key Theme-Aquaculture.

PROGRAM 4: FOOD SAFETY.

Overview: The outreach professionals in food safety education continue to maintain and expand a comprehensive state and nationally recognized food safety education program that addresses the needs of diverse target audiences. This is achieved by utilizing resources and support from other land grant universities, state and federal agencies, non-profit agencies and community-base organizations and private industry. Our diverse funding portfolio includes external grants, the "lifeline" that maintains our viability. The integrated and applied research funding secured to support the program reflects the issues and needs of our target audiences. Finally, the Rhode Island Food Safety Task Force, which has been in existence for over 10 years, continues to play a significant role in bringing together industry, regulatory agencies and academia to promote and direct food safety education activities in Rhode Island.

The key theme areas that follow in this section address each aspect of our food safety program. We describe our activities in prevention of foodborne illness, education in industry, education to consumers and education to all target audiences.

Key Theme: Food Safety and Foodborne Illness

Food Safety Education - Educators and School-aged Children:

Milestones:

- With support of Kids First and the CDC funded "School Food Safe" Project, the specialists developed and conducted a "Food Safety and Policy Program for Schools" in May 2004. The purpose of this workshop was to provide participants with information and resources to assist them in the process of developing school food safety policies. The agenda included presentations on current food safety issues of concern in schools, legal ramifications of food safety issues and the policy development process. Participants included 23 teachers, administrators and foodservice directors. Participants rated the information presented during the workshop as useful and informative.
- The Detective Mike Robe's Fantastic Journey Interactive CD continues to be distributed. The interactive CD is based on the two Detective Mike's Fantastic Journey Curriculums developed in the early 90's. The CD includes a series of educational activities designed to help students in grades 3-5 understand basic food safety concepts including personal hygiene and correct food handling practices at home and at school. These CDs have become quite useful in our educational programs with EFNEP school-age youth participants.

Outputs/Outcomes/Impacts:

- We provided approximately 10,000 students in grades K-12 with "in class" instruction on food safety. In FY04, 18 schools developed food safety policies as part of their food safety action plans using the information provided at the workshop or by using the "Developing School Food Safety Policies Guidebook" that was written as part of a CREES/USDA-funded project in 1996.

Source of funds: Smith-Lever, state match, USDA/CREES, Kids First (CDC School Food Safe Project)

Scope of impact: State and national

The 11th Annual Food Safety Conference:

Milestone:

- The 11th Annual Food Safety Conference entitled "Fear Factor: A Realistic Look at Food Safety" was held in conjunction with the Rhode Island Food Safety Task Force in early October 2004. The conference was also co-sponsored by the New England Yankee Conference. The addition of the sponsorship of the Yankee Conference extended the usual half-day format to a whole day including an awards luncheon. The goal of the conference was to increase participant's understanding of the elements of risk assessment in an effort to better communicate with targeted audiences. The keynote speaker was Dr. George Gray, Executive Director of the Harvard Center for Risk Analysis and a Lecturer in Risk Analysis at the Harvard School of Public Health. Other perspectives were addressed through a panel representing the media, the state health regulatory authority and outreach education. The

target audience for the conference was educators, dictations, school and health care facility foodservice directors and food safety educators and regulators in the New England region.

Outputs/Outcomes/Impact:

- We successfully reached the appropriate target audience of educators, dieticians, school and health care facility foodservice directors, food industry professionals and workers, and food safety educators and regulators in the New England region. The approximate 100 participants rated this conference outstanding.

Source of funds: Smith Lever, state match, and external funding (participants, USDA, state match, FDA/RIDOH grant)

Scope of impact: Regional and state

School Food Safety Partnership:

Milestones:

- The URI Cooperative Extension Food Safety Education Program continues to be part of a School Food Safety Partnership that includes the RI Department of Education (RIDE), Kids First, and the RI Department of Health (RIDOH). This CD funded project has completed its fourth year. The funding is in the middle of a five-year renewal that began in March 2003. RI is the only state whose funding was continued for five additional years. At the close of the fifth year of the project, ten elementary, twelve middle and fourteen high schools in both rural and urban areas of the state are actively participating in the project's activities. These activities included the formation of a school-based steering committee, development of an action plan including establishing goals which if achieved will establish the school as a "Food Safe School" and school food safety policies
- One presentation about the School Food Safety Policy Development process was made at a northeast regional FDA meeting.
- The Food Safety Education Specialist is part of a three-state USDA/CREES funded project that began in September 2003. The project's goal it to access and address the needs of the under-educated and limited English proficient school food service workers who participate in food safety manager training programs including certification examinations. In the spring of 2004, 63 individuals employed in school foodservice and child nutrition programs participated in four 15-hour food safety manager certification courses held at various locations in the state.
- Presentations have been delivered at national meetings.

Outputs/Outcomes/Impacts:

- Thirty-eight schools completed and have implemented their action plans at a variety of levels.
- Eighteen schools have developed and implemented food safety policies for their schools.
- The majority (69.6%) of participants in the food safety certification courses for school foodservice personnel were food workers. Seventy five percent had less than five years experience in foodservice. Seventy two percent had less than 4 hours of any type of food safety training. The average reading level of RI participants in this project was grade 10.3.

This was the highest of the three states in the project. The pass rate of RI participants was 95%, the highest of the three states.

- USDA/CREES funded project which began in September 2003, has the potential to reach more than 500 school foodservice workers in Rhode Island. Importantly, through the multiplier effect with food safety information, all food handling practices in the school foodservice environment should improve. There is also an opportunity for national impact in relation to the redesign of teaching materials and certification examination to address the needs of the under-educated and limited English proficient school food service workers.

Source of funds: State match, Smith Lever, participant fees and external funding (CDC and USDA competitive funds).

Scope of impact: Initially, state specific. However, this partnership grant is only one part of a larger national initiative. Eventually, the work in RI will serve as a nationwide model. Also the three-state food safety manager certification for school foodservice workers has implications nationwide in relation to testing and course resource materials

Key Theme: Food Safety Education- Industry

Milestones:

- HACCP and sanitation education was offered to seafood, juice/cider and meat/poultry industry personnel to help them comply with FDA and USDA food safety regulations. Knowledge of these regulations and how to effectively design HACCP and sanitation programs will help keep the participants in business. HACCP courses were offered in Connecticut and Rhode Island. Two issues of "Seafood Savvy", a newsletter, jointly produced by the Universities of Connecticut and RI, were distributed to all those who participated in the CT and RI HACCP courses. The newsletter is designed to provide the industry with current information regulations or other pertinent information. This is an ongoing project between the two state programs.
- Outreach educators have added information and resources about food security (defense) to their program agendas.
- As part of a regional outreach initiative funded by USDA's implementation granting program, the Rhode Island outreach specialists are part of a region wide project focusing on the issues of concerns to individuals contemplating developing a food business or looking to expand that business.
- The seafood specialist was part of the Histamine Harvester education regional outreach program. This program, supported by the National Sea Grant program, is a multi-regional effort that includes seafood and food safety specialists from Maryland, New York, Delaware, Georgia, North Carolina, Oregon and Louisiana. This group also includes representatives from the FDA and the National Fisheries Institute. The goal of this program is to develop educational resources (e.g., brochures, videos and PowerPoint presentations) targeting seafood harvesters of fish species to in an effort to reduce the incidences of histamine toxin.

Outputs/Outcomes/Impacts:

- One hundred and seventeen (117) employees and managers of seafood and meat and poultry and juice/cider processors participated in the HACCP and/or sanitation courses. Participants in these educational activities gave them an excellent evaluation.
- Histamine education brochures were distributed to RI marinas and multi-purpose licensed seafood operators.
- Partnering with RIDOH, the outreach educators co-sponsored a Food Security Seminar for 65 participants
- Each of the two joint newsletters was distributed to over 600 recipients in CT and RI.
- Information for seafood processors and links to related websites are part of the URI Food Safety Education website.
- A New England Food Entrepreneur website was created and launched with the home server at the University of Massachusetts. Announcements of the availability of the website were sent to 500 regulators, farmers who participate in farmer's markets and state governmental agencies.

Source of funds: Smith-Lever and external funding (Sea Grant Extension), National Sea Grant College Program, RI State Department of Environmental Management

Scope of impact: State, multi-state (with Connecticut-Nancy Balsam, Diane Wright Hirsch, and Cameron Faustman) and national.

Food Manager Certification/Recertification:

Milestones:

- Manager certification and re-certification were offered to the foodservice industry as required by the state regulatory authority. As of September 2002, the National Registry of Food Safety Professionals Examination was administered. The course was also revised, in accordance with state regulatory curriculum requirements, began to utilize the text- *Essentials of Food Safety and Sanitation* (McSwane, Rue and Linton.) The "Serve Safe" (National Restaurant Association) certification exam and text continue to be used for those courses offered in Spanish. All certification and re-certification resource materials were revised and updated. In addition, the food safety specialist is available as an informational resource to the industry and family and consumer science teachers who offer the course to high school students in the state.

Outputs/Outcomes/Impacts:

- These courses must be offered to help educate foodservice personnel in safe principles of food handling and preparation and comply with the RI state regulations and, therefore, stay in business. The 15-hour certification course had approximately 200 participants and 75 participants in the six-hour re-certification course offered through the URI College of Continuing Education's Office of Special Programs. These courses, 6 certification and 5 re-certification, were taught by the food safety education specialist and other state approved instructors. The pass rate for the certification courses was 95%.

- We offered two certification courses in Spanish to 40 participants. However, the certification pass rate for these two courses continues to be only 50%. This is due, in part, to the low literacy level even in Spanish of the course participants

Source of funds: State match, Smith Lever, and external funding (including registration fees of participants.)

Scope of impact: State specific

Good Agricultural Practices (GAP):

Milestones:

- Good Agricultural Practices (GAP) to Integrate Food Safety Principles into Small Farm Production ended the fourth and final year of a USDA-funded project. This New England regional project is an integrated outreach/research effort and the state food safety extension specialists have completed all of the third year objectives outlined in the timeline. Meetings and/or conference calls have been on-going with the state project directors as well as with state advisory group. GAP program guidelines, audit forms, fact sheets and power point presentations have been reviewed and finalized. These resources will be placed on a CD that will be made available nationwide. Post-GAP microbiological testing of strawberries, leafy greens, apples and/or tomatoes was completed in all states.
- A workshop for growers on Rhode Island's new Farm Home Food Manufacture legislation was sponsored in cooperation with the RIDOH and the RI DEM's Division of Agriculture. This legislation allows for production of a limited number of value added products from raw ingredients grown on Rhode Island farms and processed in RI farm kitchens. The goal of the workshop was to acquaint growers with the legislation, the insurance and legal ramifications of this type of home food production as well as food safety issues of concern with home food processing.

Outputs/Outcomes/Impacts:

- Many small farmers of fruits and vegetables in the region learned more about Good Agricultural Practices and have incorporated GAP into their practices.
- Consumers benefited from the GAP program as they recognize and understand the meaning of produce grown on GAP-certified farms.
- The public as a whole will gain from decreased foodborne illness incidents associated with microbial pathogens now found on farms that do not practice GAP.
- In Rhode Island, an educational session for potential participants in the grower certification program was held in February 2004. Of those attending, three growers choose to participate in the certification program that includes an on-site audit that was conducted by the Division of Agriculture, RI DEM. All three successfully completed the audit and were certified, bringing the total to thirteen GAP certified farms in Rhode Island.
- Information about the RI GAP certification program was shared with growers at two Crop Insurance Informational meetings.
- The meeting for growers on the Farm Home Food Manufacture legislation provided information to assist growers in determining whether it would be economically "phaseable" to engage in this activity. Thirty-three growers participated in the meeting.

- Information on the Rhode Island GAP program and links to other GAP related websites were added to the URI Food Safety Education website

Source of funds: State match and Smith Lever, USDA Food Safety Funds (406 funds)

Scope of impact: State and multi-state. The GAP grant has impact scope as multi-state integrated research and extension for the six New England states participating: RI (lead state), CT, NH, MA, ME, and VT. All states are involved in a variety of educational programming and crop sampling for microbiological assessment pre- and post- GAP.

Key Theme: Food Safety Education–Consumers

Milestones:

- The extension seafood/food safety specialist is part of a planning team for a seafood safety and quality lecture series for consumers that was offered once/month for June-September 2004. The four lectures focused on the marine environment.
- Rhode Island was awarded a USDA/CREES multi-state grant- "Garden to Table: Food Safety Principles of Home Gardeners." The goal of this program is to educate home gardeners about the integration of food safety principles into planting, harvesting and post-harvest handling of produce and therefore reduce the risk of microbial contamination of fresh fruits and vegetables. The research/outreach effort will utilize GAP of the current Good Agricultural Practices (GAP) to integrate food safety principles into small farm production. The goals for the first year of the project were met. They included the organization and structure of the program and the implementation of a regional consumer home gardener survey.
- Outreach efforts in seafood were expanded to include recreational fishermen.

Outputs/Outcomes/Impacts:

- The consumer lecture series attracted over 160 people.
- The seafood/food safety specialist was invited to speak at a monthly meeting of the RI Anglers Association on the topic of seafood safety. Over 100 people were in attendance.
- In the spring of 2004, a food safety garden to table survey was sent to a random sample of 5,000 fruit and vegetable home gardeners in 5 New England states. The survey assessed their food safety knowledge in all aspects of home gardening- from soil preparation to post harvest handling of produce. Statistical analysis indicates that the home gardeners surveyed are in need of food safety education in all areas. The results of this survey will be used in part to design educational food safety outreach programs targeting home gardeners.

Source of funds: Smith-Lever and external funding including Sea Grant Extension and a USDA Food Stamp grant

Scope of impact: State and multi-state

Food Safety Education Specialist:

Milestone:

- The URI Gardening/Food Safety Hotline continues to be supported by the food safety education specialist. Volunteers recruited and trained from the Master Gardner Program, have been critical in the success of the hotline. In addition, food safety specialists are available as an informational resource whenever needed.
- The food safety education specialist presented educational programs to community groups including service organizations and the staff and clients of agencies who provide services including group home settings for mentally disadvantaged adults. Topics covered during these programs include basic food safety principles of food handling, preparation and storage and how they would apply to home settings.

Outputs/Outcomes/Impacts:

- Approximately 1000 food safety-related calls from consumers have been answered. We have increased consumer awareness of food safety through print and voice media.
- We presented to approximately 50 adults and 30 staff and clients of agencies serving the mentally disadvantaged population. This program was well received by stakeholders.

Source of funds: State match, Smith Lever.

Scope of impact: State specific

Key Theme: Food Safety Education for All Target Audiences

Milestone

- A **URI Food Safety Website** is now online (www.uri.edu/ce/ceec/foodsafety.html) and linked to the URI Cooperative Extension and RI Department of Health websites. The website contains fact sheets and ordering information of food safety education curriculum developed by the URI food safety specialists. This site provides food safety information useful to consumers, industry and educators.

Outputs/Outcomes/Impacts:

- The website is being "hit" on a regular basis. How the "hit's" are evoking behavior change among the visitors to the website has not been assessed.

Source of funds: State match, Smith Lever and registration fees

Scope of impact: Local, state, and national

GOAL 3: A HEALTHY, WELL-NOURISHED POPULATION.

PROGRAM 5: NUTRITION.

Overview: Faculty depth for nutrition programs has become relatively strong within the Department of Nutrition and Food Science (NFS). The research agenda follows largely from outreach programming, complementing regional research programs on eating habits of both young and elderly adults, in both cases emphasizing behaviors determining consumption of fruits and vegetables, and on attending health benefits. Two multi-state projects RI00NE172 "Nutritional Risk and Antioxidant Status in the Elderly", and RI00NC219 "Using Stage Based Interventions to Increase Fruit and Vegetable Intake in Young Adults", provide the basis for much of the outreach program. The Department also houses the state of Rhode Island's USDA Food Stamp Nutrition Education Program (FSNE). The focus of this program is to provide food stamp eligible or participating elderly and families with relevant information related to improving diet quality, ensuring food security and safety and managing food resources (e.g., Senior Nutrition Awareness Project and Good Food Gives Life Project). In addition to ongoing programs under EFNEP, the following reflects progress in implementing research results through outreach.

Key Theme: Human Nutrition

Overview: The goal of nutrition outreach and education is to help individuals of all ages increase the quality and years of healthy life through improved diet quality. The ever-strong outreach program provides science-based information to help individuals gain the knowledge, motivation and opportunity they need to make informed decisions about food and nutrition. In addition, the program is designed to encourage local and state leaders to develop community and statewide efforts that promote healthy behaviors and create healthy environments.

Milestones:

- NFS Department received 3 sub-contracts (Wisconsin and Connecticut funded by IFAFS, Nebraska, funded by NRI) to deliver interventions with young adults.
- A six-month, stage-tailored educational intervention promoting consumption of fruits and vegetables (supported by funding from IFAFS) was delivered to 190 young adults. A total of 101 completed 12-month follow-up.
- A new social marketing campaign, "Keep Your Kids at a Healthy Weight" was launched and promoted an increase in breakfast, fruit and vegetable consumption and physical activity. A short text message promoting consumption of these foods and physical activity, free information, and a more prominent toll-free number was incorporated into the panel.
- A 5-week nutrition education curriculum for "Women in Transition" was presented to 504 women transitioning out of the RI Correctional Institute and into mainstream society.
- Results from a study comparing metabolic and appetitive responses to two different sugars were presented at the annual meeting of the Society for the Study of Ingestive Behavior.
- Results from a study examining the role of changing meal frequency during and after a URI weight loss program were presented at the annual meeting of the North American Association for the Study of Obesity.

- General Mills awarded the Energy Metabolism Laboratory a 1-year grant to investigate metabolic, hormonal, and appetitive responses to whole grains versus refined grains in lean and obese adults.
- Methods to test concordance between physiologic and subjective appetite were developed so that they may used as outcome measures in future studies of appetite awareness.

Outputs/Outcomes/Impacts:

- Family history of obesity might, at least in part, predict one's metabolic responses to different carbohydrates. The way in which appetite is influenced by consumption of different carbohydrates may be dependent on the differences in metabolism of those carbohydrates.
- Although small, frequent meals are often recommended for weight loss, this practice should be combined with proper diet, exercise, and continued support in order to be effective. If increased meal frequency is sustained after weight loss, but is associated with snacking on higher-fat foods, then it may be linked to recidivism.
- The fruit and vegetable screening tool (NE-172) was able to replicate the carotenoid intake estimates obtained from traditional dietary intake methods in low-income seniors. A knowledge survey showed that low-income seniors had limited knowledge of the recommended number of servings of fruits and vegetables that should be consumed each day, accurate serving sizes, and the benefits of carotenoid intake.
- An increase in fruit and vegetable consumption as part of a healthy eating pattern may help prevent a rise in obesity in young adults.
- College students should be provided with visual serving size examples before completing a self-assessment of fruit and vegetable intake.
- Seniors who do not take dietary supplements and have low energy intakes are at risk for dietary folate inadequacy.
- The Expanded Food and Nutrition Program (EFNEP) reached 505 families, 1070 individual clients, and 2838 youth reached through intensive small group workshops and individual counseling within EFNEP for a 4-6 month period.
- At program exit, 40% of surveyed EFNEP adult participants followed a 3-1-1-1-1 food pattern as opposed to 26% at program entry; 94% recorded a positive change in any food group at exit.
- The RI Public Transportation (RIPTA) Nutrition Education social marketing campaign placed 110 posters (11"x28") in bus interiors, 60 on exterior taillight bus posters (21"x72") for a 3-month period. Sixty-six calls requesting nutrition information were recorded from individuals and social service agencies.
- As a result of the RIPTA campaign, 72% of surveyed sample (n=200) reported seeing at least one bus poster and 38% reported to have made at least one positive behavior change in the areas of breakfast consumption, increasing fruit and vegetable consumption or increasing physical activity.
- As a result of participation in nutrition education efforts provided to seniors through the senior nutrition awareness project (1 year, repeated exposure to messages relating to food safety, improving diet quality and food resource management):
    - 95% ate more fruits and vegetables than before participation
    - 88% engage in some deliberate form of physical activity than before par

85% shop from a list more often
92% read food labels more often
97% wash hands before and during food preparation more often
86% now use leftovers within two days of initial preparation..

- Ten culinary workshops were held at Food Stamp offices, health centers and food pantries demonstrating low-cost, healthy recipes to one thousand sixty-three food stamp eligible individuals.
- Eight thousand limited income elderly are reached through the quarterly nutrition newsletter.
- Three thousand limited income elderly were reached through the monthly nutrition newsletter.
- Face-to-face nutrition programming reached 2119 high-risk elderly and families.
- Newspaper and video production efforts reach thousands of families and elderly each month.
- A review covering the implications of appetite physiology in body weight management was published as a continuing professional education article for registered dietitians in *Nutrition Today*.

Source of funds: State match, Hatch Funds, FSNEP, EFNEP

Scope of impact: Local, state, and national

GOAL 4: GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT

PROGRAM 6: NATURAL RESOURCES AND THE ENVIRONMENT.

Overview: This is a strong Land Grant program at URI. Its strength is steeped in the linkages between AES and CE, and on sound individual research and extension programs. Faculty and staff in this area are among the most productive and well respected nationwide. Our program in Natural Resources and the Environment is built on the recognition that protecting and restoring the quality of land and water resources in Rhode Island requires close coordination between efforts that work with a wide spectrum of audiences and topics. Our efforts are directed towards water quality, since water quality protection and restoration can integrate a wide variety of land management efforts. Other themes include: Critical Habitats; Wetlands Restoration and Protection; Forest Management and Natural Resources Management. We also coordinate our efforts with aspects of Goal 1, particularly research and outreach projects on sustainable (including low-pesticide) agriculture, with emphasis on the role of biological control for pest management of insects, ticks, and invasive plants.

Central to the Natural Resources and Environment program is our focus on land management to protect and restore water quality at the local and watershed scale. The water quality program reaches from private well supplies, to community water sources and from local ponds and streams to the watersheds that control the quality of our estuaries and bays. Our programs and projects share a common concern of protecting this resource from pollution and overuse.

Key Theme: Water Quality

Overview: URI Cooperative Extension's community-based natural resources and the environment education program targets municipal officials, local organizations, professionals, and individuals. Our goal has been to educate audiences to recognize, assess, and effectively minimize pollution risks to local water resources and to protect critical habitats within the State. Our approach implements the capabilities of the University of Rhode Island Cooperative Extension Natural Resources and the Environment Program, an integrated outreach program that educates, empowers and involves Rhode Islanders to become effective stewards of the State's natural resources.

*Multiplied Impacts of Research–Teaching–Extension linkage***:** The URI CE Water Quality Program is founded on a robust exchange of sound URI research that provides CE with new insights for nonpoint education management. Further, with the assistance of stakeholder input, the URI CE Water Quality provides RI AES with new research challenges. Examples of URI research efforts directed to our CE program include: research that centered on understanding fate of agrichemicals in home landscapes; pollution abatement technologies for on-site wastewater systems; analyses of spatial databases and GIS for watershed management; and recent research on the role of riparian areas for pollution control.

Performance Goals:

- Develop and deliver education programs to increase public knowledge of their local environments to improve community-based management of local water resources and critical habitats.

- Develop and deliver educational programs that increase the knowledge of municipalities, community groups, and the public on site-specific best management practices needed to address locally-identified resource protection issues.
- Maintain and strengthen effective partnerships with federal, state, local, public, and private organizations for more effective and sustained solutions to long-term watershed and critical habitat issues through community-based education.

The research agenda is driven by faculty and professional staff who are successful in securing competitive grants. In conjunction, the faculty and professional staff have successfully secured USDA funding for a sizable number of projects, including: Hatch Project RI00325 "Groundwater Nitrate Removal Capacity of Riparian Zones in Mixed Use Watersheds", RI 00703 "Fingerprinting Sources of Bacterial Input into Small Residential Watersheds", NRI grants RI 0019991119 "Subsurface Riparian N Removal: the Role of Landscape Setting", a 406 grant RI 0-2000-05493 "New England Regional Water Quality Program", a 406 grant 00-51130-9717 "National Facilitation Of CSREES Volunteer Monitoring Efforts and a 406 grant RI002004-04630 "Enhancing The Extension Volunteer Monitoring Network." The faculty and professional staff are also involved in complementary research projects that increase and extend the depth and breadth of our watershed studies to address the effects of conversion of agriculture and open space to urban sprawl. Examples of such projects include an EPA project, "Quantifying the Effects of Ecosystem Restoration", assessing riparian groundwater nitrate removal capacity along restored streams in conjunction with the urban LTER in Baltimore County, MD and a RI Sea Grant project, "Riparian Sinks for Mitigating Septic System Contamination in Urbanizing Coastal Watersheds."

Milestones:

- The National Water Quality webpage has been updated to include considerable materials on several national water quality themes, including Drinking Water and Human Health and Animal Waste Management. The website updates and approach was presented at the CSREES National Water Quality Coordinators' meeting in Florida in January 2004. The page is located at www.usawaterquality.org. The website serves as the portal to the National Water Quality Program and to Regional Water Quality Programs throughout the country.

URI Watershed Watch:

Overview: URI Watershed Watch is a scientist-led volunteer water quality monitoring and education program. Having just completed its seventeenth year, the goals of Watershed Watch remain consistent and relevant. They are to promote active citizen participation in water quality protection, educate the public about water quality issues, and to obtain multi-year surface water quality information both to determine current conditions and to detect trends. URI Watershed Watch encourages community-level and personal stewardship of local watersheds and serves as the steppingstone for increased community involvement by the volunteers themselves. Activities take place locally, regionally, and nationally.

Milestones:

- URI Watershed Watch volunteers monitor water quality in all of the 14 major RI watersheds and in all aquatic ecosystems except wetlands.

- Efforts to enhance coordination and build partnerships with RI Sea Grant were advanced with the implementation of Greenwich Bay Tributary monitoring in the summer of 2003, which continued in 2004. This permitted a continuation of monitoring that would have ended due to lack of State Agency funds and also included participation in the Greenwich Bay Special Area Management Plan development project, and supports the RI Department of Environmental Management Total Maximum Daily Load study underway.
- RI Department of Environmental Management is a strong supporter of the program, providing grant funding for overall program support on a five-year cycle.
- Significant local support for Watershed Watch was apparent through program sponsorship from than 30 local organizations, including one third of RI towns. This financial support stabilizes the program and provides funding for experiential learning by URI undergraduate and graduate students.
- URI Watershed Watch program director Linda Green was appointed to the Rhode Island Environmental Monitoring Collaborative, charged with establishing a mechanism to coordinate and make consistent, monitoring efforts between government agencies, municipalities, nonprofit organizations and universities.
- Workshops conducted under the joint New England Regional Monitoring Collaborative/ Volunteer Monitoring theme of the CSREES New England Regional Water Quality Program, provided targeted training to volunteer monitoring groups throughout New England.
- URI Cooperative Extension/Watershed Watch and University of Wisconsin Extension expanded the reach of activities conducted under its USDA-CSREES National Facilitation Grant, with workshops conducted in three CSREES regions and articles about the project in several national publications. This project received four more years of funding and was considered one of the highest ranked of the over 100 applicants.
- URI Watershed Watch program director Linda Green represents the nationwide volunteer monitoring community as a founding member of the National Water Quality Monitoring Council, co-chairs its Collaboration and Outreach workgroup. In the role she makes presentations and facilitates the growth of state and regional monitoring councils throughout the country. She was on the conference planning committee for the May 2004 National Water Quality Monitoring conference.
- URI Watershed Watch program coordinator Elizabeth Herron Represents the region on the board of the North American Lake Management Society, and is the prime staff for the CSREES Volunteer Water Quality Monitoring National Facilitation project. She is producing a widely-acclaimed series of factsheets on targeted aspects of volunteer monitoring.

Outputs/Outcomes/Impacts:

- URI Watershed Watch is the largest scientist-led volunteer water quality-monitoring program in the State as well as the most comprehensive. Data produced from field monitoring and laboratory analyses are incorporated into the State's 305(b) report to EPA, and are also used to identify waterbodies for the State's listing of impaired waters (303[d]) list. These monitoring efforts were and are used to provide baseline data, detect trends, supplement existing monitoring and track success of BMP and TMDL implementation efforts. Few states in the country accept volunteer monitoring data as comparable to professionally collected data. Because of strict quality assurance procedures the URI Watershed Watch

data is accepted and used as readily as professionally collected data in Rhode Island. In fact the program provides the State with approximately 90% of its lake water quality data. The seventeen-plus year data records on a number of sites are the only such long-term compilation in Rhode Island.

- The 330+ trained volunteers provided more than 14,000 hours in volunteer water quality monitoring at more than 200 lake, stream, salt pond, estuary and Bay sites statewide. At the 2004 rate of $17.55/hr (www.independentsector.org/) this is equivalent to over $250,000 in value.
- Volunteer monitoring workshops were held by invitation and in conjunction with other USDA_CSREES 406 programs in New Jersey, Oregon, and Florida.
- With funding provided by the national facilitation grant, a volunteer monitoring list serve was launched, as well as a web site (www.usawaterquality.org/volunteer/). Both have been well-received and actively utilized.

Source of funds: All of our programs exist through a combination of formula funds and external funds. We submit proposals to competitive grant programs through CSREES, EPA, the State of Rhode Island, and others.

Source of impact: Locally, state and region wide, and nationally.

URI OnSite Wastewater Training Center:

Overview: The URI OnSite Wastewater Training Center (OWTC), a program focusing on research and outreach education utilizing over 50 alternative and innovative onsite wastewater demonstration system BMPs, targets homeowners, real estate agents, septic system designers, site evaluators, installers, operation and maintenance service providers, municipal officials, and regulators. This program also provides many of the licensed private sector practitioners with continuing education credit classes needed to renew their professional licenses. The physical field-training Center, established in 1994, is located on the URI Kingston campus, and consists of twenty-one innovative and alternative full-scale systems constructed above ground for hands-on learning.

Milestones:

- The OWTC is now recognized as the premier demonstration and field training center for alternative septic system technologies in the Northeast, one of twelve regional centers nationally. The goal of the program is to provide research based training and technology information transfer on septic system design, operation and maintenance, and wastewater management to protect and restore local water quality.
- OWTC staff is currently working on a national curriculum development project funded by USEPA and Water Environment Research Federation (WERF). URI is one of five member universities of the Consortium of Institutes for Decentralized Wastewater Treatment that are partnering to produce materials that comprehensively cover operation and maintenance practices for all the many decentralized wastewater treatment technologies available throughout North America. As part of this project, five pilot testing sessions are being conducted throughout the United States, train the trainer activities are planned, with the complete ready-to-deliver curriculum package scheduled for availability in July 2005. This will represent the first ever produced document that illustrates these practices for service providers.

- OWTC staff in conjunction with over two dozen private sector septic installers and designers, RIDEM and the RI Independent Contractors and Associates, installed 13 additional alternative and innovative under the auspices of the USEPA Block Island / Green Hill Pond Watershed National Wastewater Treatment Demonstration Project. Information on treatment performance and operation and maintenance needs of these systems will be delivered to state, regional, and national audiences at scheduled OWTC workshops and professional meetings, as well as delivered to Rhode Island regulatory programs for policy decisions.

Outputs/Outcomes/Impacts:

- The OWTC operates in partnership with state and federal agencies, municipalities, and over 40 private sector contractors. Since 1996, the OWTC has established a network of 56 alternative and innovative research and demonstration systems. These systems were installed under the auspices of several State and federally funded projects to replace failed septic system at actual homes in priority watersheds, and these systems form the foundation for the OWTC's research based outreach education efforts. Each of the research and demonstration septic systems is based upon proven technologies that minimize nutrient and/or microbial loading to ground and surface waters. This long-term research information has also helped support important regulatory policy changes concerning the design and use of alternative and innovative septic system technologies in Rhode Island. The OWTC is also a major information resource for Extension programs throughout New England, regionally in the Northeast, and nationally.
- The OWTC staff, with State regulatory and private sector partners, ran a series of over twenty professional development classes. These one and two-day classes provided continuing education opportunities for several hundred Southern New England onsite wastewater practitioners who need to maintain professional licenses. During this reporting period, Onsite Wastewater Training Center staff delivered seven invited talks at national and regional conferences about the ongoing URI onsite wastewater research program.
- The Town of Charlestown, RI adopted procedures to require regular septic system inspection and repair began implementing the mandatory program this year. The town council also approved a resolution to require phase out of all cesspools, beginning in critical coastal areas. In both cases URI technical support and educational materials from the OWT and NEMO Programs were used to support local action.
- The Town of North Kingstown, RI implemented a septic system upgrade program for homeowners in critical locations of Wickford Harbor, providing partial grants for upgrading of conventional systems to advanced nitrogen reducing technologies. URI OWTC staff provided technical assistance to the town on establishing the program and reviewing system designs.
- Technical assistance was provided to five other Rhode Island communities concerning wastewater management and alternative and innovative systems.

URI Home*A*Syst Residential Pollution Prevention Program:

Overview: URI Home*A*Syst is a residential pollution prevention education program that provides an action-oriented approach to protect water quality. The program is a voluntary residential pollution prevention program that trains residents to protect their health and environment.

Home*A*Syst, or Home Assessment System, offers a procedure to assess environmental risks around the home and take actions to correct any identified problems.

Milestones:

- In September 2002, URI Home*A*Syst received funding from USDA CSREES 406 National Water Quality Program for a three year project entitled *Protecting Water Quality in Rural Landscapes: A Comprehensive Community Nonpoint Source Education Program.*
- In partnership with the Rhode Island Department of Health's Capacity Development Program and local municipalities, URI Home*A*Syst is conducting Protect Your Private Well Workshops monthly throughout the state. These workshops focus on well maintenance and testing and good housekeeping practices for protecting your private well. As part of the Capacity Development Program, Home*A*Syst is updating is private well water factsheet series, which consists of 26 factsheets and creating a new series on pollution prevention consisting of 7 new publications.
- Through the efforts of the New England Regional Water Quality Program, coordinating efforts with EPA-New England on a private well initiative for the region. EPA funds have been provided to New England Regional Water Quality Program.

Outputs/Outcomes/Impacts:

- We continue to provide educational programs on private well protection, septic system maintenance, wetland buffer landscaping, and other pollution prevention topics with the RI DOH, RI Department of Environmental Management, US EPA - New England Region, and several other local agencies and citizen groups.

URI Nonpoint Education for Municipal Officials (NEMO):

Overview: URI NEMO, part of the National NEMO Network provides outreach to municipal officials on controlling effects of changing land use on local water resources. The program focuses on use of GIS-based watershed assessment tools to provide local decision-makers with the knowledge and educational resources to identify local water quality problems and to adopt effective pollution controls within a watershed context.

Milestones:

- Source Water Assessments of Major Water Supplies: In partnership with RI HEALTH and RI communities, URI NEMO completed GIS-based pollution risks assessments for all major community water supplies in Rhode Island. Each assessment included GIS database development, pollution risk analysis using the GIS-based MANAGE model, active participation of local advisory groups, and presentation of results. Final products included: nine (9) full technical reports; a map inventory of six (6) large format GIS source water resource /pollution risk maps for each of the major study areas, available in digital form; and twelve (12) 4-page, full color summary fact sheets designed for direct distribution to local officials and homeowners in drinking water source areas.
- Source Water Assessment reports, fact sheets and maps were distributed to Rhode Island communities, public water suppliers, and state, local and nonprofit agencies in both printed and digital form. A new web page was created at the URI Cooperative Extension site to make assessment results available to view or download, with links to RI HEALTH.

- Block Island/Green Hill Pond Watershed National Wastewater Treatment Demonstration Project: URI NEMO and the Onsite Wastewater Training Center continued to provide training and technical support in developing local wastewater management program in the Rhode Island towns of South Kingstown, Charlestown and New Shoreham as a model for other communities. This included technical assistance in implementing South Kingstown's mandatory septic system inspection, repair and cesspool phase out ordinance, developing technical support for adoption of cesspool phase out resolution in Charlestown, educational fact sheets for residents which were distributed by the town via direct mail to residents, and workshops for local officials and residents in basics of onsite wastewater treatment system function and maintenance.
- URI NEMO conducted national outreach on results of the Block Island Green Hill Pond wastewater demonstration project through participation in several regional and national meetings on wastewater recycling and management.
- Expanded outreach to Rhode Island municipalities to support adoption of local wastewater management programs. URI NEMO conducted a wastewater needs assessment for the Town of Jamestown, as an expansion of the town's drinking water assessment and developed recommendations for integrated treatment standards to control storm water and wastewater impacts in high-density locations. In North Kingstown used GIS assessment results to develop priorities for repair and upgrading of substandard septic systems to advanced treatment.
- URI NEMO and Home*A*Syst was awarded $328,000 from RI Health to build local capacity for source water protection, focusing on local planning and land use controls as was as private well water protection. This is a three-year initiative designed to promote implementation of the Source Water Assessment results.

Outcome/Output/Impacts:

- Major community water suppliers are incorporating RI Source Water Assessment results into watershed protection plans completed under requirements of the RI Water Resources Board.
- Several communities are working with URI NEMO to expand community education on drinking water protection by mailing Source Water Assessment summary results directly to watershed and aquifer residents.
- The Town of Charlestown adopted procedures to require regular septic system inspection and repair began implementing the mandatory program this year. The town council also approved a resolution to require phase out of all cesspools, beginning in critical coastal areas. In both cases URI technical support and educational materials were used to support local action.
- The Town of Jamestown adopted a zoning overlay ordinance for two densely developed areas with substandard lots of record served by private wells and on site wastewater treatment systems. This landmark ordinance integrates control of both storm water and wastewater by requiring use of advanced treatment systems, prohibits new construction on high water table sites, limits impervious cover to 15% and requires no net increase in runoff from predevelopment conditions.
- The Town of North Kingstown implemented a septic system upgrade program for homeowners in critical locations of Wickford Harbor, providing partial grants for upgrading of conventional systems to advanced nitrogen reducing technologies. Priority areas for

awarding grants were based on results of the Wickford Harbor Watershed Assessment completed by URI NEMO and additional recommendations for treatment standards.

Geospatial Technologies for Natural Resource Management

Overview: The objective of this program is to continue to provide technical information and training through which the best available digital natural resource data are made available, understandable and useful to municipalities, professionals, and environmental and state organizations and agencies. The core of this program is instructor-led and Internet-based training, database development, GIS analysis, and Internet-based data access for local decision makers and the public in Rhode Island and beyond. It may be conceptualized in three components; the first is a data distribution component. Using the Internet, we provide geospatial data to users, including the Rhode Island Geographic Information System (RIGIS) data and Global Positioning System (GPS) base station files. To enhance the use of these technologies for natural resource management, the second component of the Program is to provide both instructor-led and Internet-based technology training programs that allow resource managers to use and access Geographic Information System (GIS) and remote sensing software, data, and tools. The third component of the Program is to conduct demonstrations and pilot projects on the use of the technology and data to resource managers.

Milestones:

- We teamed with the Rhode Island Geographic Information System (RIGIS) consortium and several University partners in submitting a successful proposal for three years of seed funding to create a Geospatial Extension Specialist position at URI. Hired on October 1, 2004, the Rhode Island Geospatial Extension Specialist is tasked with improving access to geospatial technologies within the State by implementing state-of-the-art Internet-based portal technology and mapping services, developing new instructor-led and Internet-based training opportunities, and helping to organize new initiatives within the State.

Outputs/Outcomes/Impacts:

- Updates to the RIGIS data distribution system consisting of the most current GIS and aerial image data available for natural resource management. Providing access to geospatial data (GIS, orthophotography, GPS Base Station correction files, digital maps) via the World Wide Web 24 hours a day, 365 days a year.
- Developed and conducted a new extension training course, *Introduction to ArcGIS I,* the most current version of ESRI GIS software available today. These courses are offered 4 to 6 times per year. Over 60 people are trained annually, including natural resource managers, state/local government officials, members of the private sector, and not-for-profit environmental organizations.
- Updated GIS training course webpage and produced marketing postcard to advertise training programs offered by URI Cooperative Extension.
- Block Island/Green Hill Pond Watershed National Wastewater Treatment Demonstration Project provides GIS-based analysis to the Towns of Block Island, Charlestown, and South Kingstown supporting development of wastewater treatment programs and standards.

- Source Water Assessments of Major Water Supplies: In partnership with RI HEALTH and RI communities, URI NEMO is completing GIS-based pollution risks assessments for all major community water supplies in Rhode Island.
- Development of successful grant application to USDA CSREES, NASA Earth Science Enterprise, and NOAA Sea Grant for a new Geospatial Extension Specialist position in Rhode Island.
- Education of local decision makers in the use of Geographic Information System (GIS) to:
    - Identify areas of critical resource protection in communities for the purpose of conservation and management.
    - Incorporate use of multiple spatial databases for water resource impact assessment and protection.
    - Identify high-risk pollution areas.
    - Using GIS data and the MANAGE model, analyze cumulative impacts of land use decisions to water quality and evaluate effectiveness of alternative land use scenarios and nonpoint BMPs to reduce pollution risk.
    - Identify locally acceptable and realistic management options.

Source of funds: CSREES RREA program funds, CSREES competitive GES grant, and external dollars from RI Health to support Source Water Assessments

Source of impact: Locally, state and region wide.

Key Theme: Integrated Pest Management (including Biological Control)

(see Goal 1, Program 1, above)

Key Theme: Sustainable Agriculture

Overview: The Station supported an examination of the effects of earthworms on the distribution of plant residue nitrogen in a corn soil system through a Hatch project RI00323 "Factors Affecting the Contribution of Anecic Earthworms to Nitrogen Nutrition of Corn".

Milestones:

- We examined the effects of an anecic earthworm (*Lumbricus terrestris*) on the distribution of plant residue nitrogen in a corn (*Zea mays*) soil system .

Outputs/Outcomes/Impacts:

- The presence of *L. terrestris* in soil can double the amount of litter nitrogen that is mad available to corn over a short time period.
- Anecic earthworms also promote gaseous losses of nitrogen originating in litter.
- The benefits of earthworms to the nitrogen nutrition of corn may be offset by losses of this element to the atmosphere.

Source of funds: USDA

Source of impact: state and multistate

Key Themes: Wetlands Restoration and Protection, Forest Resource Management

Overview: The Station has strength in its natural resources faculty, who are united in their focus on understanding the role of forest wetlands in the ecology of local and migratory wildlife. Vernal pools in particular are an object of interest to hydrologists, entomologists, herpetologists, and ornithologists. We are thus interested in developing predictors (hydrologic and geologic) of groundwater abundance, links to periodicity of temporary pools, and the corresponding distribution and abundance of insects, amphibians, and birds in the forest habitat. USDA projects include Hatch projects: RI00319, "Habitat Characteristics of Pond-Breeding Amphibians in Rhode Island", RI00324 "Carbon Sequestration and Flux in Forests at the Landscape Level", RI00326 "The Importance of Coastal Environments for Migrating Songbirds: Implications of Management of Natural Resources", and McIntyre-Stennis projects RI00MS970 "Vernal Pool Hydroperiod Prediction as a Basis for habitat Assessment and Management of Forest Amphibians", RI00MS971 "Effect of exotic earthworms on Forested Ecosystems in Rhode Island Watersheds", RI00MS972 and "Valuation of Forested Land Conservation Alternatives: Tools to Evaluate Validity of Willingness-to-pay".

Milestones:

- We have researched potential predictors of seasonal pond hydroperiod in 65 sites in the Pawcatuck River watershed site in southern Rhode Island.
- We undertook a major study to quantify population sizes, seasonal movement and calling phenology, and reproductive rates for pond-breeding amphibians in southern New England.
- We evaluated the impact of forest fragmentation and suburbanization on frogs and salamanders.
- We are exploring the value of our amphibian research work with developers (golf courses), non-government conservation agencies, and state conservation agencies concerned with threatened species.
- We are investigating the ways that aggrading temperate forests sequester carbon during regeneration. Potentially, this could represent the missing carbon dioxide sink in the global carbon budget.
- We have researched the body composition and blood metabolites of representative songbird species to evaluate the quality of habitats and foods for migrating birds while they use stopover sites in southern New England. We are also testing current ecological hypotheses relevant to songbirds during migration.
- We are analyzing the linkages between forest land conservation and public values.

Outputs/Outcomes/Impacts:

- Research results show that even very small (<1 ha) swamps may provide significant habitat, as long as the surrounding upland is heavily forested, with a minimum of paved roads.
- We demonstrated that swamp size was the most important landscape variable in determining species richness of the bird community. For forest-interior birds, we showed that overall landscape composition (i.e., the amount of forest available to the birds) may be more important than swamp size for the most common species (Verio, Northern Waterthrush, Black-and-white Warbler and Canada Warbler).

- Our knowledge of stopover sites for migratory birds enhances our ability to effectively manage coastal ecosystems for migratory species.
- Our documentation of the inputs and outputs of carbon in the soil system of New England forested landscapes provides a better understanding of the mass balance of the carbon budget in these forested ecosystems.
- Our work in the valuation of forested lands will aid environmental managers and policy makers in understanding the linkages between forest land conservation and public values.

Key Theme: Natural Resources Management

Overview: We continue to provide support for the Rhode Island Natural History Survey (RINHS). The Rhode Island Natural History Survey is a clearinghouse for ecological information in Rhode Island, providing sound scientific data to scientists, naturalists, educators, land managers, decision makers, and the public. RINHS manages the Rhode Island Natural Heritage Database of Rare Species and Communities (http://www.uri.edu/ce/rinhs/db_rinhp.htm). Providing information for conservation land stewardship is an important new component of RINHS's activities.

We have extended our traditional strengths and interests in valuation methodology and public policy by the development of the Policy Simulation laboratory in the USDA-funded Coastal Institute, allowing us to take policy studies to new levels of scholarship and impact.

The USDA-funded research program includes Hatch project RI00105 "Experimental Analysis of the Political Economics of Fishery Governance" and the Fund for Rural America project RI-9704783 "Decision Information and Support Structures to Sustain Farm, Forest and Open Space in Rural Communities in Southern New England."

Milestones:

- RINHS gathers information on Rhode Island's flora, fauna, and natural communities and maintains a database of the state's biological heritage, along with associated collections, data, and maps.
- RINHS manages the Rhode Island Natural Heritage Program database of rare species and critical habitats.
- Researchers developed and applied economic valuation methods to address coastal resource management issues in the Northeast region. A wide range of valuation methods was applied to a variety of coastal issues.
- We have developed a formal game-theoretic model of fisheries governance and we have successfully designed and implemented a laboratory experiment for testing hypotheses derived from the model of fisheries governance. The game theoretical model consists of three stages. In the first stage, a fishery management authority proposes a catch quota; in the second stage, individual fishing firms decide whether and how much to invest in lobbying to change the quota; and in the third stage, a revised quota is set and firs decide how much to invest in a common fishery resource. Our model predicts that firms have an incentive to lobby to move a suboptimal quota toward its optimal level. By making voluntary contribution s to raise the initial regulation toward the social optimal, firms increase their private and collective rents for the fishery.

Outputs/Outcomes/Impacts:

- RINHS created inventory and monitoring protocols; offered outreach and stewardship assistance to land trusts and other conservation organizations; and provided data to assist conservation organizations in prioritizing parcels of land for acquisition.
- The lobbying game model allows us to better understand the incentives associated with lobbying, which we suspect cause many difficulties in implementing effective fishery management.
- Understanding these incentives allows us to identify management systems that are less affected by lobbying.

Source of funds–AES, USDA, EPA, NSF

Scope of impact–Northeast region.

GOAL 5: ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

PROGRAM 7: SUSTAINABLE AND NURTURING COMMUNITIES.

Overview: The strength of the Sustainable and Nurturing Communities Program continues on the strengths of its research in the thematic area of Sustainable Communities and its outreach in the thematic areas of Youth Development/4-H; Children, Youth and Families at Risk; Child Care/Dependent Care; and Parenting and Family Life. Our thematic area of Financial Literacy has both research and outreach components.

Key Theme: Sustainable Communities

Rhode Island continues to maintain a very strong research program in land use change, environmental values and decision-making. The following USDA-funded research projects have continued through FY04: Hatch projects RI00103 "A Policy Simulation System for Economic Science and Policy Analysis", RI00199 "Decision Support Tools to Manage Coastal Development", RI00104 "Ecosystem-Economics of Land Use Change and Environmental Values", and RI00101 "Forecasting the Spatial Dispersion of Rhode Island Population and Employment", and other projects such as the Fund for Rural Development Grant RI-9704783 "Decision Information and Support Structures to Sustain Farm, Forest and Open Space in Rural Communities in Southern New England", and NRI project RI002001-00527 "Ecosystem Economics of Rural Landscapes and Land Use Change." Several of the projects are interdisciplinary, joining ecologists with economists and are reported under two different goal areas.

Milestones:

- A database of socio-demographic and environmental indicators and employment levels in major industry categories for each town in Rhode Island, Connecticut and Massachusetts has been created for 1990 and 2000.
- Assessed the relationship of experts to public policy, applied to case studies involving economic development policy in rural counties adjacent to metropolitan areas. Factors that appeared most frequently to be related to increased knowledge transfer between experts and policy maker were: goal consistency, entrepreneur/facilitator roles, strong private sector participation and high levels of support for the project.
- Identified characteristics of growth management packages that maximize public support and provide effective incentives for land preservation, growth management, and maintenance of productive farms and forests; and land parcels that maintain ecologically unique and valued biodiversity attributes within rural communities.
- Through land-use modeling based on environmental factors and socio-economic models using historical population and employment data, research findings suggest that containment of sprawl will be increasingly difficult unless new techniques are found to encourage higher-density development in established villages.

Outputs/Outcomes/Impacts:

- Improved the understanding of approaches economists use to measure the value of land conservation and ecological amenities important to rural communities.
- Provided local towns and the state with data regarding public preferences for land use and land conservation.
- Provided previously unavailable information to rural Rhode Island communities regarding resident's preferences for development and conservation outcomes, and the potential correspondence among these preferences and resident's support for growth management tools.
- Furnishes the State and local communities with information about the patterns of employment and household growth around the region over the past decade.

Source of funds: AES, USDA, EPA, NSF

Scope of impact: local, regional

Key Theme: Youth Development/4H

Overview: The URI 4-H Youth Development program has reached a point where years of limited resources and vacant positions have reduced the professional staff to two fulltime positions. With a pending retirement, it was decided by the Director to request a CSREES program review of the Children, Youth & Families Program that includes the 4-H Youth Development Program. The review was hosted at the beginning of FY05 and brought together 4-H stakeholders, university faculty and potential partners. We will report in our FY05 Annual Review of Accomplishments the results of the review including the new vision for the 4-H program and youth development programs in Rhode Island.

Milestones:

- The URI 4-H Youth Development Program increased its emphasis on the development and enhancement of life skills through hands-on 4-H projects and experiences. Utilizing experiential learning, 4-H focused its efforts on the following content areas: science and technology, animal and veterinary science, fishing and aquaculture, foods, nutrition, and health, environment education, communications and creative arts, leadership development, and community service.
- 4-Hers met with Governor Carcieri's Director of Municipal Affairs and Appointments, Deborah Smith, who spoke to the children about their civic responsibilities and presented them a gubernatorial proclamation for 4-H Week.
- A new program was initiated, in partnership with 4 adult volunteers and 5 teen leaders, to respond to the rising "obesity epidemic". The 4-H Fitness Pilot Program "Jump Into It" educated 46 4-H members on the importance of fitness, helped them to realize the vast opportunities of exercise available and encouraged family participation in exercise. This life skills-building program will form the basis for a new URI 4-H focus on healthy lifestyles for 4-H youth. Faculty and undergraduate student involvement will be explored to expand the research base and form partnerships to address this critical issue.

- Four RI delegates were selected to attend the 74th National 4-H Conference in Washington D.C. One of the Rhode Island delegates, Leah Adams, gained the distinction of being asked to serve on the National 4-H Youth Directions Council. The delegates also discussed issues facing youth with Representative Kennedy and Senators Chafee and Reed.

Outputs/Outcomes/Impacts:

- Two 4-H professional staff and 193 4-H volunteers provided 1235 4-H youth with research-based, educational experiences through various delivery methods including 4-H club meetings, workshops, clinics, field days, fairs, conferences and newsletters.
- Rhode Island had 223 4-H members enrolled in the horse and pony projects, 118 with rabbits/cavies, 135 with dog care and training, 91 with dairy cattle, 63 with birds and poultry, 44 with sheep, and 32 with beef. Through 4-H project work, children gained skills and knowledge with and about animals, and developed social and leadership skills through 4-H club activities, quiz bowl, hippology, judging, general knowledge tests, and putting together public presentations, exhibits, and learning stations. This learning and skill development took place at 4-H meetings, workshops, district and state activities, events, and contests, and interstate events like the Eastern States Exposition, and the Eastern National 4-H Horse Roundup.
- Volunteers and teens from all 3 Cooperative Extension Districts trained 4-H Club members in public speaking, visual presentations, demonstrations, and creative communication (skits, dance, music, story telling, etc.) using materials prepared by University staff. Four-H members then had the opportunity to have their presentations evaluated by teams of volunteer judges on the district level, and those who scored over 90% were invited to the state 4-H contest on the University of Rhode Island campus. Ninety-nine 4-H members statewide achieved this level of excellence.
- For 2 decades 4-H has supported children's arts education by holding the Rhode Island 4-H Photo and Fine Arts Fair. Four-H members are given the opportunity to exhibit their artwork to the public and compete for awards. This year it grew to over 160 works of art that were displayed at the RI Photo and Fine Arts Fair at Warwick Mall. 4-Hers learned to appreciate art, explore their creativity and develop their own skills and abilities. Also, they learned from the Professional Artist Judges about career opportunities as an artist.
- 4-H Conservation Field Day immersed over 150 children and 4-H volunteers in a day of hands-on learning activities and demonstrations at URI Bay Campus, URI's East Farm and the Gilbert Stuart Birthplace. Participants learned about the deep ocean, marine in the biologically productive "edge" habitats and aquaculture. This program was in partnership with the URI Bay Campus, the Department of Fisheries, Animal and Veterinary Sciences and the RI Department of Environmental Management.

Source of funds: RI 4-H Club Foundation, District Cooperative Extension Boards of Directors, Southern RI All-Stars, state funds, federal formula funds.

Scope of impact: Primarily state specific – Rhode Island. Multistate involvement with Universities of Maine, New Hampshire, Massachusetts, Vermont, and Connecticut; National 4-H Council.

Key Theme: Children, Youth, and Families at Risk

Milestones:

- Cooperative Extension (CE) Educators continue to develop and provide: professional staff development and training for those working in child care and in-school and after-school settings; parenting education classes and parent-to-parent support groups in at risk communities. Additionally, CE Educators continue to support: community asset building through formation of Providence community advisory boards, an interactive web site, and opportunities for participants to earn college credit through the Office of Special Programs at the URI Providence campus.
- CE Educators and faculty from the University of Rhode Island secured new CYFAR funding to address the needs of three of the most at risk neighborhoods in Providence in 2002. This project has been renewed for a third consecutive year. In 2002 a total of nine new agencies were recruited to participate in the new FACE IT Providence project. As of June 30, 2004 over 27 Providence based agencies are now participating in the FACE IT Providence Project
- New to the FACE IT Providence project was a special youth development program Funding from FACE IT Providence project was awarded to 10 agencies in the form of honorariums to assist them in developing the TRY CAPS program (Try Reaching Youth through Creative Arts and Problem Solving).

Outputs/Outcomes/Impacts:

- Educators, in the CYF program, have provided training to Providence and Woonsocket agencies requesting assistance with their pregnant and parenting teens. Curricular materials have been developed and continue to offer education focusing on basic parenting education, independent living skills, and strategies for strengthening parent-child communication.
- As a result of the FACE IT Providence grant, workshops are being offered in Spanish as well as English in the three Providence neighborhoods targeted by this grant as well as Central Falls, Woonsocket, Pawtucket and East Providence.
- A portion of the FACE IT Providence federal funds where utilized to expand youth participation in the three at risk neighborhoods. Several Agencies are involved in a leadership community services project with youth from their neighborhood as a part of the TRY CAPS program
- A total of 121 TRY CAP youth where involved in the "In Your Own Back Yard" program sponsored and funded by the FACE IT Providence grant.
- Through the Electronic Connectivity component of FACE IT Providence grant, parents, teens and professionals in under-resourced communities have developed skills in finding information about resources on the Internet and communicating electronically with board members in other communities. Computer literacy and access to the Internet have continued to be important new resources for youth and families in these communities via the 6 federally funded computers and 3 laptops for use by the three FACE IT Providence neighborhoods.
- In FY 04: 70 teen parents from Providence and Woonsocket participated in parenting class; over 256 agency staff and parents participated in workshops and educational classes; the new community advisory board in Providence has been working to establish goals to address the needs of the three new FACE IT Providence neighborhoods.

- In post-workshop evaluations, 88% of participants indicated that the information was practical, 85% reported that they learned at least three new concepts or practices for working with their respective clients or children, and 95% rated the workshops as excellent
- URI graduate interns have worked as mentors, trainers and gathering data from the community sites each semester.

Source of funding: CSREES CYFAR, CE

Scope of impact: state specific

Key Theme: Child Care/Dependent Care

Milestones:

- Family Consumer Science teachers representing 10 high schools worked with high school seniors interested in Child Development Education by implementing their respective Child Development curriculum with the Children, Youth and Families curricula focused on providing child care from birth through grade 6.
- High school teens were involved in the Teen Child Care Providers Initiative, a service-learning project that focuses on the mastery of childcare principles and practices. Through this project, teens gained a new level of understanding of principles of child development, child guidance, and developmentally appropriate practices.

Outputs/Outcomes/Impacts:

- 910 adults and teen childcare providers participated in educational workshops this year from 25 Rhode Island communities.
- Provider staff trained at CE Children, Youth & Families educational workshops, represented over 50 child care agencies reached an additional 1,035 children utilizing the CE developed curricula
- As part of their high school community service project, teens participated as classroom assistants in childcare settings in their respective communities, thus improving quality of care and additional staff resources for the young children in these programs.

Source of funding: CE

Scope of impact: state specific.

Key Theme: Parenting and Family Life

Milestones:

- CE Educators and staff developed and implemented over 75 parenting and family life education classes to address the need of parents and promote positive parent-child relations.

Outputs/Outcomes/Impacts:

- 90% of parents attending CE CYF Parenting and Family Life education reported in post workshop evaluations that information was practical and easy to use and provided new insights into developing positive parent-child relations.
- Over 800 parents participated in parenting and family life education workshops.
- In post-workshop evaluations, 89% of the participants indicated that the information was practical 85% reported that they learned at least three new concepts or practices to implement with their children, 90% rated the workshops as excellent.

Source of funding: CE

Scope of impact: state specific.

Key Theme: Financial Literacy

Overview: The URI Center for Personal Financial Education is an endeavor supported by two Hatch projects RI00711 "Impact of Workplace Financial Education on Employee Personal Financial Behavior and Productivity" and RI00712 "Applying the Transtheoretical Model of Change to Financial Behavior". The Center provides outreach education and conducts research to improve the economic well being of families. Programming and research focus on topics including: personal financial management, credit use and debt management, home buying, personal investing and retirement planning. The Center directly supports the long-range goal for improving the economic well-being of families in Rhode Island.

Milestones:

- In a collaborative initiative between Cooperative Extension and the Agricultural Experiment Station, an experimental study of the impact of workplace financial education on financial behavior is being conducted. FY04, the final year of the grant, was devoted to data analysis. During the previous year, 211 State of Rhode Island employees participated in up to four of 24 educational seminars on financial planning and planning for retirement. Data collection tracked their pre-program financial behaviors, post-program intention to change financial behaviors and actual changes in behavior two months later. Analysis is being completed on this study with results to be reported during the fall. Initial findings were reported at the Association for Financial Counseling and Planning Education annual conference in November 2003 in a presentation titled, "Measuring the Impact of Workplace Financial Education." Under AES support, a Master's thesis was completed (Marcy Alves. December 2003. Workplace Financial Education: Does it Improve Employees' Financial Behavior?)
- Four hundred fifty teachers and financial education professionals subscribe to the Focus on Youth: Money Matters electronic newsletter. The semi-annual newsletter is also available online to the general public. The newsletter provides updates about the NEFE High School Financial Planning Program, information about new financial literacy teaching resources and teacher training events, and summaries of recent research related to teens and money. Also in support of the youth financial literacy goal, 25 teachers were trained on use of financial literacy resources at the "Personal Finance across the Curriculum" conference sponsored by the Connecticut State Department of Education.

- A totally revised and updated edition of the Getting Fiscally Fit CD-Rom (2004) was released. This edition includes a major revision of the graphics and content in the nine modules of the program.
- Three programs were presented in support of the CSREES national financial literacy initiative, Financial Security in Later Life: Legal Checkup, a community program for the general public; "Rate Your Financial Health" was presented to 23 State of Rhode Island Department of Transportation employees; and Spending in Retirement at the South Kingstown Senior Center enrolled 10 participants.
- An online credit education program was offered to first year students enrolled in the University of Rhode Island's first year orientation course. The program teaches basic financial knowledge including: credit terms and clauses in credit card agreements, the warning signs of credit abuse, resolution of credit problems, review of credit reports, financial goal setting. The program is being updated for delivery during the Fall '04 semester.

Outputs/Outcomes/Impacts:

- Financial literacy training of youth in school settings and adults at the workplace will help to reduce the bankruptcy rate and create individuals and families with better fiscal decision-making tools.
- Data for the USDA-funded research project is being collected on employees' personal financial behavior and workplace productivity.

Sources of funding: CE, AES; grant from CDNE Foundation; grant from National Endowment for Financial Education; support from Consumer Credit Counseling Service of Southern New England; administrative support from the Department of Human Development and Family Studies at the University of Rhode Island.

Scope of impact: Regional and national

Stakeholder Input Process

Stakeholder input is secured in a variety of different ways. Our original Plan of Work classified these under eight categories. In general, we rely on existing statewide organizations to provide input on our research initiatives, cooperative extension approaches and educational priorities.

We communicate with, seek input from, and coordinate through with a host of state agencies, federal agencies and local groups, committees and commissions. At the state level we seek input from: the RI Department of Administration, RI Department of Environmental Management, RI Department of Transportation, RI Department of Health, RI Department of Human Services, the RI Coastal Resources Management Council, the Water Resources Board, the RI State Conservation Commission, RI Rural Development Council, RI Farm Service Agency, RI Natural Resource Conservation Commission, RI Food and Agriculture Council, and RI DEM-Division of Agriculture. At the Federal level we work closely with EPA Region I, the Department of the Interior, USGS, USDA, and local federal NRCS office. At the local level we rely on focus groups, watershed councils, project-specific committees of town officials, Soil Conservation Districts and citizen groups for stakeholder input. Local organizations include: RI Food and Agricultural Council, RI Farm Service Agency, RI Farm Viability Committee, RI Chapter of the Nature Conservancy, Audubon Society of RI, local land trusts, Save the Bay, Environment Council of Rhode Island, RI Council for Agriculture Promotion and Education, RI Partners for Resource Protection, RI Grow Smart, the RI Chapter of the American Planning Committee, Source Water Assessment Committee, RI Natural History Survey, RI Builders Association, Soil Scientists of Southern New England, RI Independent Contractors Association, and the RI Chapter of the American Water Works Association.

Within the programs that use volunteers (e.g., Home-A-Syst, Watershed Watch, 4-H) we host listening post gatherings throughout the year to seek stakeholder needs and to receive feedback on our programs. All of our outreach/research programs have steering committees that consist of representatives from the private sector, local and state government, citizen groups, research scientists from the RI AES and educators from RI CE.

We continue to work closely with industry-based organizations like the RI Nurserymen and Landscape Architecture Association, the RI Golf Superintendents Association, the New England Golf Superintendents Association, Ocean State Aquaculture, the RI Seafood Council, RI Veterinary Medicine Association and the RI Apple Growers Association.

In FY2004, the Director and Associate Director continued a rebuilding process with the three former RI Cooperative Extension District Associations or boards. (These are boards that are similar to the county boards from other states.) We have identified leaders from each of the three district associations and a formed a collaborative committee that we call the "Triboard." As the TriBoard represents breadth in RI constituencies, we are currently employing the Triboard as an *ad hoc* CE Advisory Board.

Program Review Process

Program review, including project merit and peer review, are the responsibility of the Director, Associate Director and six Program Leaders.

Projects are awarded through a competitive, outcome-oriented annual request for proposals. Project proposals are peer reviewed by scientists external to URI and by the program leaders. They are prioritized based on anticipated outcome (merit), as well as goodness of fit to the program areas, quality of science, integration with extension, and multistate collaboration. Projects normally run 3 years, and funding typically includes support for graduate students, a small operating budget, and travel. Station funds also support a limited number of support staff for research and outreach operations as well as partial support for other research associates and assistants.

We have included the request for proposals used in FY 2003 for projects funded in FY 2004 (Appendix A) to provide details of the entire process, including statements of priority research areas (based on the Plan of Work Programs), and the specific instructions on target audience and outcome orientation. The RFP also includes complete documentation of procedures used for project review in the Station.

In addition to federal formula funds, all of our programs depend on external funds. We submit proposals to competitive grant programs primarily through the CSREES, EPA, NIH, NSF, DOC, and the State of Rhode Island. These proposals are peer reviewed and funding is merit based. We gain insights into the merit of our work from the feedback and assessment we obtain from the proposal reviews, along with the reviews that we receive from annual and final reports that are required by the granting agencies.

While we have moved far in changing the funding strategies used by the Station—from a near entitlement, curiosity-driven research approach with an annual disbursement of research funds to academic departments to a program and project based, outcome-oriented competitive process—we have not made commensurate progress on the Extension side. This is due largely to the high percentage of Extension funds devoted to long-term personnel. Nevertheless, we are committed to reorienting our Land Grant portfolio toward outcomes-based endeavors. We look forward to the challenges of meeting our target audience's needs.

Evaluation of the Success of MultiState, Multi-institutional, and Multidisciplinary Activities, and Joint Research and Extension Activities

Did the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?
For activities that we conducted in FY 2004, yes we addressed issues of strategic importance. As we have indicated, AES funding is predicated on outcome-based proposals, with a clear focus on target audiences. We now require further management refinements to follow-up on this commitment, to verify that intended milestones are addressed on a project-by-project basis, to clearly document impact of our work and ensure that our identified target constituencies remain involved in all aspects of our programming process.

Did the planned programs address the needs of under-served and under-represented populations of the state?
To the best of our abilities, yes. We have attempted to develop a full range of programs that serve all segments of society, without regard to community, economy, or scale. Our agricultural programs provide benefits to all through the success of new biological control releases, the development of improved plant strains, advancement of plant management strategies and progress in new technologies that advance animal production. Aquaculture research and outreach efforts meet the needs of industry leaders, as well respond to small-scale producers with equal intensity. Food safety and nutrition continues to be aimed at populations in greatest need, particularly in economically challenged communities and among the elderly. Water quality and natural resource management affect all Rhode Islanders. Our sustainable community's initiatives are particularly sensitive to addressing the needs of many of our rural towns.

Did the planned programs describe the expected outcomes and impacts?
We believe that we have made substantial progress in doing this. Each of the projects described in this report articulate both outcomes and impacts. We will continue to refine impact reporting, the most critical of elements in defining the success of a program.

Did the planned programs result in improved program effectiveness and/or efficiency?
The outputs, outcomes, and impacts described in this report suggests that we are productive and on track with CSREES objectives and the intent of the RI POW and RI POW Update. Further, by orienting our Land Grant programs to an outcome-based program we now have the means to effectively self assess our effectiveness and efficiencies. Identifying priority areas, seeking extensive stakeholder input and careful documenting of the impact of our work have been key elements in improving our Land Grant program effectiveness.

Multistate Extension Activities

Many of our extension programs are developed, coordinated, and operated in collaboration with sister institutions in other northeastern states.

The presence of a USDA-APHIS approved insect quarantine facility on campus serves as a regional focal point for biological control efforts involving new species, with particular and nationally unique emphasis on invasive plants and pests of ornamental plants. Programs in horticulture, turfgrass management, and aquaculture are all increasingly multistate, with focus on regional annual meetings, as highlighted under the key themes described herein.

URI Watershed Watch cooperates with Extension Programs from the University of New Hampshire and the University of Maine through the New England Regional Monitoring Collaborative. Watershed Watch also works closely with the UNH CE in the coordination of regional lakes conferences and regional and national volunteer monitoring conferences. The URI Municipal Watershed Management Program coordinates with the NEMO (Nonpoint Education for Municipal Officials) program from Cooperative Extension of the University of Connecticut. The URI Home-A-Syst program develops training materials in conjunction with CE programs from across the Northeast**.** In addition, the URI Onsite Wastewater Training Center participates in the Consortium of Institutes for Decentralized Wastewater Treatment. The Consortium has twenty-two member institutions throughout the US and Canada, these are listed in Section A: Multi State Extension section. In August, 2004, URI was again identified as the lead institution for the regional "406" multi-state, 4-year project which unifies water quality research and outreach programs at the six New England land grants.

Our outreach efforts in food safety, nutrition, and youth programs all benefit from annual conferences, presentations made across state lines, and multistate USDA 406 projects.

Integrated Research & Extension Activities

To the fullest extent possible, all RIAES research projects are committed to full integration with extension. That is, all projects are funded on the basis of outcomes, which are expected to occur when specified target audiences use the outputs of research to accomplish specific performance goals. We have attached the project guidelines for FY03, which were adapted with minor changes from those established in January 2000, to document the commitment to integration of research and extension. We have also attached the FY04 RIAES project portfolio (continuing or new projects that have completed RI review and approved by CRIS.) Last, the expenditure data for Integrated Activities is attached in the Appendix. As we complete the implementation of outcomes-based projects focused on the needs of the target audiences, we believe the portfolio of Station projects portfolio will reflect extensive integration of our research and extension efforts.

The integration of AES and CE projects would be advanced by greater cooperation on research-related multistate projects in areas of strength such as water quality, IPM, land-use planning, aquaculture, apples, turfgrass, etc. Rhode Island is providing regional leadership in this area of integration and will continue to do so.

Administrative Accomplishments and Results

An advisory management team consisting of six program leaders, the Director and Associate Director has been established consistent with the recommendations and requirements of AREERA. The advisory team has continued to refine guidelines for AES projects, incorporating all aspects of the AREERA requirements. The newest Program Leader, Ms. Marcia Morreira, was added to the advisory team with the responsibility for our Children Youth and Family Programs as was the Associate Director, Dr. Richard C. Rhodes III. Below we list the program leaders and the Goal and Program for which they provide oversight.

Program Leader in Sustainable Agriculture-Dr. Richard Casagrande: Oversees the implementation of Goal 1-An agricultural system that is highly competitive in the global economy Program 1-Landscape horticulture and technology for sustainable agriculture.

Program Leader in Animal Health and Aquaculture-Dr. David Bengtson: Oversees the implementation of Goal 1, An agricultural system that is highly competitive in the global economy, Program 2 Aquaculture biotechnology and fishing and Goal 2-A safe and secure food and fiber system, Program 3-Health and well-being of fish and animals.

Program Leader in Food Safety and Nutrition-Ms. Linda Sebelia: Oversees the implementation of Goal 2-A safe and secure food and fiber system, Program 4-Food Safety and Goal 3-A healthy, well nourished population, Program 5-Nutrition

Program Leader in Natural Resources-Dr. Arthur Gold: Oversees Goal 4-Greater harmony between agriculture and the environment, Program 6-Natural resource and the environment

Program Leader in Sustainable Communities-Dr. Cathy Roheim: Oversees Goal 5-Enhanced economic opportunity and quality of life for Americans, Program 7 Sustainable and nurturing communities

Program Leader in Children, Youth and Families-Ms. Marcia Morreira: Oversees Goal 5-Enhanced economic opportunity and quality of life for Americans, Program 7 Sustainable and nurturing communities

These Program Leaders serve as a very important role as an advisory body to the Director and Associate Director regarding every facet of the Land Grant Programs at URI. The RIAES web site is currently under revision and now has on-line description of current research programs and projects (see http://riaes.cels.uri.edu/).

With the entrance of the new Director and Associate Director in late 2001, 2002 was a year of introspection for RI AES and CE; FY 2003 and 2004 were implementation years. We have diversified our Land Grant funding portfolio and advanced our endeavors to integrate research and extension activities. Indeed, we are preparing to implement a new, university-wide integrated research and extension, competitive grants program

We have started to shift resources in RI CE, but face significant personnel challenges as a result of the great percentage of statutory CE personnel on the federal budget. However, we are committed to change. To this end, we have undergone a federal review of our programs in Children, Youth and Families in the fall of 2004.

APPENDICES

Appendix A – RIAES Call for Proposals FY 2004
Appendix B – RIAES Portfolio of Current Projects
Appendix C – CSREES-REPT (2/00)