Annual Report of Accomplishments and Results 2003

Rhode Island
Agricultural Experiment Station
and
Cooperative Extension

Dr. Jeffrey R. Seemann, Director

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

Table of Contents

WHAT IS COVERED IN THIS REPORT

This Report 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.

- Dr. Richard C. Rhodes III replaced Dr. Cathy Roheim as the Associate Director of the Station and Extension on August 1, 2003.
- We have appended the current **Call for Proposals** for the Station to document the procedures used for merit and peer review for projects submitted during fiscal year 2003. These guidelines were originally adopted in January 2000. (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 FY2003, to illustrate the pervasive adoption of the current outcomes-orientation for all projects. The identification of specific target audiences and external linkages and explicit outcomes demonstrates a commitment to further integration with Extension.

Annual Report of Accomplishments and Results
Rhode Island Agricultural Experiment Station & Cooperative Extension
FY2003

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 (parks, ball fields, and golf courses) throughout Rhode Island. Our focus is to maintain an economically viable 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.

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 FY03.

Key Theme–Invasive Species:

Overview: Invasive species research is conducted under Hatch project RI00663 "'Biological Control of Invasive Plants and Insects in Rhode Island." Other key initiatives include our Rhode Island Invasive Species Council that serves both education and advisory roles. Other key programs involved in this key theme area include GreenShare (described in the Key Theme area "Ornamental/Green Agriculture) and the Rhode Island Natural History Survey (RINHS). RINHS is jointly funded by URI AES/CE and private funds (e.g., foundations and NPO's such as the Nature Conservancy.) Program 6, Natural Resources and the Environment also addressed invasive species.

Milestones:

Biological Control Projects

- **Lily Leaf Beetle Biological Control.** The lily leaf beetle, *Lilioceris lilii*, first reported in the U.S. in 1992, has spread throughout New England and northeastern Canada where it is eliminating native and cultivated lilies from its range. In Europe, this insect is controlled by six parasitoids. After evaluating biology and host specificity of the European parasitoids *Tetrastichus setifer*, *Lemophagus errabundus* and *Diaparsis jucunda*, we obtained USDA approval for field releases in Massachusetts and Rhode Island. In 2003 we released all three parasitoid species 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. Beetle populations have declined over 80% as a result of parasitoid activity at our initial release site in MA and we see evidence of similar pest population decline (66%) at a release site in RI only two years after parasitoid release. Our cooperators in MA, NH, and ME are collecting needed data and we are sending them additional parasitoids for field release.
- **Cypress Spurge Biological Control.** We monitored cypress spurge and the biological control agent, *Aphthona flava*, in 10 release sites. We report excellent cypress spurge suppression in 6 out of the 10 sites, and fair suppression in 2 other sites. Two other sites have yet to experience significant suppression. We collected approximately 4000 *Aphthona flava* beetles and released about 2800 of these at 4 Rhode Island sites, to augment earlier releases. We also sent 1200 beetles to colleagues on Long Island, New York, to control a cypress spurge problem on a Nature Conservancy property. We continue to look for potential *Aphthona flava* release sites in Rhode Island; particularly looking for cypress spurge infestations in pastures and farm land. (Cypress spurge is easy to spot in May when it is flowering.) Information about Cypress spurge biological control in Rhode Island is available through our biological control website (http://www.uri.edu/cels/pls/biocontrol/index.html). We also displayed an educational poster at the New England Invasive Species Conference. However as spurge comes under biological control, some of these same pastures are now experiencing invasion by black swallow-wort. We are surveying the distribution and natural enemies of this plant as well.
- **Purple Loosestrife Biological Control**: There were four initial release sites of *Galerucella* spp. in Rhode Island's biological control of purple loosestrife program. In 2003, two sites showed significant impact of the Galerucella release. At one site, in Providence RI, there was a noticeable increase in native plant species in the wetland where *Galerucella* adults were released. The purple loosestrife plant population has also diminished, and the plants that remain are stunted, and produce fewer flowers. The release site in Providence was located in a wetland of the Roger Williams Zoo. We placed is an educational poster near the release site, which describes the biological control program. 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).
- ***Phragmites australis* Biological Control**. We have determined that the native *P. australis* exists only on Block Island in Rhode Island and 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*.

- **Birch Leafminer.** In 1994 we released *Lathrolestes nigricollis* (Thompson) (Hymenoptera: Ichneumonidae), a European parasitoid of the against the invasive birch leafminer, *Fenusa pusilla* in Rhode Island. We have subsequently followed the expansion of this parasitoid's distribution throughout southern New England and the increase in parasitism rate. Populations of this pest have declined to a point that we have not seen any damage from this pest in Rhode Island in the spring of 2004.

Rhode Island Invasive Species Council

- Conducted informational seminars, lectures and advice on the topic of invasive species and their impacts and control to multiple stakeholders.

Rhode Island Natural History Survey:

- In 2002–2003, the RI Natural History Survey received grants of $2000 from the US Fish & Wildlife Service, $1000 from the URI Coastal Institute, $1000 from The Nature Conservancy of Rhode Island, and $500 each from RIAES and the RI Wild Plant Society to produce a poster and brochure on invasive plants in Rhode Island. Representatives from RINHS, RI Department of Environmental Management, US Fish and Wildlife Service, and RI Wild Plant Society worked together to produce a poster and brochure entitled *Rhode Island's Natural Heritage Under Seige: Meeting the Challenge of Invasive Species.* Outreach events are available through the RINHS website at http://www.uri.edu/ce/rinhs/freepubs.htm.

Outputs/Outcomes/Impacts:

- Lily leaf beetle populations have been reduced over 80% and 66% at two sites where we established parasitoids against this pest.
- Cypress spurge is under good control at several farms in Rhode Island as a result of our introduction of natural enemies against this weed.
- Birch leafminer has been reduced to non-pest status throughout Rhode Island as a result of our parasitoid release in 1994.
- *Rhode Island's Natural Heritage Under Seige: Meeting the Challenge of Invasive Species* was released in September 2003. 1000 full-color posters and 2000 full-color brochures were produced and distributed to participating agencies. Copies were also distributed to the New England Invasive Plant Group (NIPGro) and Northeastern Aquatic Nuisance Species (NEANS) Panel.
- 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.
- 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, URI Biological Control Lab, 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 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 Office of Mosquito Abatement Coordination and the Rhode Island Department of Health, and collaborate by providing specialized pathogen testing facilities in our BL-3 laboratory, and by maintaining a statewide tick surveillance effort. We provide expertise and capacity for a wide variety of zoonotic diseases, including Lyme disease, Babesiosis, human erhlichiosis (HGE), West Nile Virus, EEE, and other diseases of major public concern. Hatch projects focused on infectious diseases includes RI 00664 "Developing Vector-borne Disease Watch-Warning Systems and Responses for the Northeastern U.S." Additional funding complementing this Hatch investment is an NIH grant, RI01 AI37230, "Role of Tick Saliva in Lyme Disease and Vaccine Strategy."

Milestones:

- **Mosquito abatement**: We are evaluating the environmental impacts of Methoprene, a widely used mosquito larvicide, on target and non-target organisms in catch basins. Neither *Culex* spp. nor *Ochlerotatus japonicus* females preferentially oviposited in containers treated with methoprene compared to controls in a field study. In addition, a field efficacy trial examining different doses of methoprene in catch basins on laboratory-reared *Culex pipiens* suggested that 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 between treated catch basin communities compared to control catch basin communities.
- **Vector borne diseases**: Continued surveillance of ticks and tick-borne pathogens throughout RI. Vector abundance was 51.4% higher than during the previous reporting period (2001) and found a close correlation between June-July precipitation amounts and nymphal tick abundance. We examined relationships between nymphal black-legged tick abundance, temperature and precipitation. A drought index (Palmer Hydrological Drought Index, PHDI) suggested that there might be several climatological indices that could be used to predict tick abundance. Tick abundance has significant correlations (at 95% level p-value <0.05) with: precipitation departure (same year) from a 10 year mean (1993-2002) $r = 0.641$, Palmer Z average index (same year) $r = 0.654$, January precipitation departure (ticks 1.5 years

later) r = -0.644 and Palmer Z average index (ticks 1 year later) r = -0.658. This latter result suggests that the Palmer Z index could be used to predict the likely tick abundance 1 year in advance, and January precipitation may be predictive 1.5 years in advance.

- A human serological survey conducted in southern Rhode Island indicated that people being tested for a tick-borne disease (Lyme disease) also showed evidence of exposure to mosquito-borne West Nile virus. 1.3% of 600 samples tested from South County Hospital (SCH) were positive for WNV exposure, while just 0.2% of 624 tested from Kent County were positive. There were no reported WNV cases in 2001 in RI. These data are consistent with information collected from dead bird surveillance, showing a significantly higher incidence of dead birds from communities serviced by SCH than Kent. This finding also highlights the occurrence of subacute, undiagnosed WNV infection, which may contribute to contamination of the stored blood supply through blood donation.
- Recovered WNV from 37% of 53 dead birds collected in Kent County; 89.3% of 341 birds collected in Washington County. Crows and blue jays made up 98.6% of all WNV positive birds.
- Mosquito Barrier®, an all natural, garlic oil-based compound, was evaluated as a potential area-wide mosquito repellent. No differences in mosquito trap counts were detected between treated and untreated properties over a 7-week trial.
- Surveyed mosquito species and viral infection at 16 national park sites in the eastern U.S.
- 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).

Outputs/Outcomes/Impacts:

- Mosquito surveillance results were used to direct mosquito suppression efforts in RI for the 2002 season. There was one human case of WNV reported in RI during 2002.
- Human exposure, albeit subacute, has occurred in RI residents at a relatively high rate suggesting the potential for contamination of the blood supply through blood donation. WNV should be included along with other tick-transmitted infections in differential diagnostic testing for summer-time fever and flu-like illnesses.
- Continued to provide to Rhode Islanders with diagnostic services for ticks as well provide citizens of the state with 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 by integrating within-season May-July forecast data with precipitation data from the 12-month period preceding summer.
- 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.
- We are unable to recommend Mosquito Barrier® for area-wide mosquito repellency in Rhode Island residential and recreational sites.
- Station research findings presented 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, 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, RI00200103137 "Confocal Scanning Microscopy for Environmental Biotechnology", and 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".

Milestones:

Plant Biotechnology

- Various recombination systems have been evaluated for genetic manipulation in transformed plant cells (including the Cre/lox system of bacteriophage P1 and the yeast FLP/FRT system.)
- Using Agrobacterium-mediated transformation, we obtained transgenic plants with the FLP-containing construct or the FRT-containing recombination-reporter construct. Transient assays for GUS expression in transgenic rice leaves containing the FLP gene after bombardment with the FRT-containing test plasmid pUbi-FRT-hyg-FRT-gus exhibited GUS expression. Reciprocally, the leaves of transgenic rice plants transformed with the FRT-containing test plasmid, pUbi-FRT-hyg-FRT-gus, when bombarded with the FLP gene construct, also exhibited transient GUS expression.
- Detailed molecular analyses on all the DNA recombination events are currently underway, however, our preliminary results confirmed, at the molecular level, the in vivo FLP-mediated site-specific DNA excision in rice.
- Results to date demonstrate the efficient operation of FLP recombinase in catalyzing excisional DNA recombination in rice, indicating that the FLP/FRT recombination system functions in rice without any deleterious effects on plant development. This confirms the feasibility of using FLP/FRT system for genome modification in cereal crop species, and also provides transgenic rice lines expressing FLP recombinase as foundational stock material, thus facilitating the future application and development of the FLP/FRT system in rice genetic improvement.

Outputs/Outcomes/Impacts

- The results obtained so far for the current project demonstrate the feasibility of using FLP/FRT site-specific recombination system as an efficient tool for genome modification in cereal crop species. This will enhance, dramatically, 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.

- Trained students in cutting edge technologies.
- Significantly improved microscopy capabilities at the University.

Source of funds: AES, USDA

Scope of impact: state, regional, national

Key Theme–Ornamental/Green Agriculture:

Overview: We have undertaken several projects addressing the needs of owners, designers, and managers of landscapes as well as those producing ornamental plants. These include multi-state research projects NE-009 "Conservation and Utilization of Plant Genetic Resources", NE-187 "Best Management Practices for Turf Systems in the East", NE-169 "Integrated Turfgrass Management for Environmental Enhancement and Resource Conservation", and S-290 "Technical and Economical Efficiencies of Producing, Marketing, and Managing Environmental Plants." The integration of our research occurs through the URI Cooperative Extension GreenShare Program, a partnership between the University and the green industries. URI CE faculty and staff provide training for green industry professionals. Together the two groups work to provide scientifically based horticultural information to the gardening public.

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 400 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.
- **Healthy Landscapes Program:** Described in detail in Goal 4, Program 6 of this report

GreenShare Program

- **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 Marion Gold, GreenShare Program Coordinator, 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 2003 was designing sustainable landscapes and workshops, tours and demonstrations revolved around this theme. The public was also invited to bring samples of backyard insect and disease problems for diagnosis and tour URI's sustainable landscape gardens.

- **East Farm Open House:** On May 10, 2003 we hosted an open house that was modeled after the annual GreenShare Field Day. The purpose of this new event was to educate the public about the range of sustainable horticulture, agriculture and aquaculture activities ongoing at URI's East Farm Horticultural Facility. 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", traditional print material, into a website, www.uri.edu/research/sustland/. Thisd website in 2003 had over 55,000 visits. Further, nearly 600 hard copies of the sustainable plant list were distributed.
- We continued to develop and use the URI Learning Landscape Demonstration Gardens for outreach programming. These gardens showcase sustainable plants and practices.

Outputs/Outcomes/Impacts:

- We located and increased germplasm of cold-hardy and salt-tolerant conifers to replace existing populations threatened by insect and disease problems and distributed germplasm to cooperators for evaluation in 5 sites along coastal R.I.
- During 2003, over 300 Rhode Islanders submitted plant and insect samples to the URI Cooperative Extension Plant Protection Clinic for diagnosis and appropriate treatment recommendations. We also processed over 250 samples of turf from around the country for disease diagnosis and control recommendations, including recommendations for disease-resistant species.
- 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.
- 2-minute news segments appear on commercial television at noon news every other Wednesday. A second 4 minute feature airs on a Saturday morning news program. The segments focus on environmentally sound management of home landscapes.
- Both commercial nurseries and homeowners are now getting much more effective deer protection of landscape plants.
- Over 2,500 attended our East Farm Open house.
- URI Cooperative Extension Master Gardener volunteers answer over 12,000 calls from Rhode Island citizens 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 - details in Success Stories/Profiled Program Impact section 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. Over 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.
- This year 2,800 school children, grades K-6, increase 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 2003, 55 "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 2,500 people, Spring Into Action With The Gardening Experts, an all-day workshop for the gardening public, was attended by 100 people, URI Master gardener training sessions supported 125 people, Learning Landscape Environmental Education school enrichment program was attended by over 2,800 elementary children and numerous educational tours were held for the public.

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

Scope of impact: state, regional

Key Theme–Integrated Pest Management

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:

- Flowering crabapple variety disease resistance was evaluated in our trial block and data were integrated into database that is distributed annually. We updated our website on annual flowering crabapple evaluations and open house: http://www.uri.edu/ce/crabapples
- **Inter-regional Project #4 (IR-4).** Rhode Island's IR-4 contribution of 23 different plant-cultivar projects using biopesticides was performed and data were submitted to the national program in 2003 and reported at the Rhode Island Nursery and Landscape Association (RINLA) annual meeting.

- **Sudden Oak Death (S.O.D.).** Basic biology studies were performed on a new pathogen attacking numerous hosts and posing a substantial danger to the oak forests nationally. Environmental parameters for sporulation and growth of *P. ramorum*, the pathogen, were determined. Survival studies were initiated.
- **Insect Pheromone Traps**: We continued to test valine:isoleucine ratios of 100:0, 90:10, 80:20, 60:40, 40:60, 20:80, 10:90, 0:100, and a control in different nursery areas. During 2003, cis-3-hexen-1-ol consistently captured more *R. mendax* than unbaited (control) spheres. Other volatile compounds that were attractive to *R. mendax* were butyl butanoate and trans-2-hexen-ol. Spheres baited with ammonium acetate were either equally or more attractive to *R. mendax* compared with other volatile compounds tested.
- Our apple IPM program is dedicated to individual orchard visits. In 2003 we made 215 orchard visits to 31 Rhode Island orchards from April through August. 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.
- We investigated the effect of nematicidal applications of the organic acids butyric acid and propionic acid against *Meloidogyne hapla* on tomatoes and *Pratylenchus penetrans* on strawberries. Concentrations of butyric acid at 0.1M, 0.05M and 0.01M were employed as a preplant nematicidal treatment, in conjunction with an untreated control, a Vydate control and a propionic acid application at 0.5M. In the strawberry experiment, control plants had a significant nematode reproduction with a mean of 109 nematodes/g root. The lowest rate of butyric acid tested (0.01M) resulted in 37 nematodes/g root and like all other chemical treatments, was statistically different from the control. The 0.1M butyric acid treatment provided 95.2% weed control, significantly higher all other treatments. The 0.05 M butyric acid and propionic acid treatments provided 76.1 and 70.1% weed control and were not significantly different. The 0.01 M butyric acid, vydate and control treatments produced 7, 5.3 and 3.1% weed control not significantly different.
- In the Fall of 2002, a greenhouse experiment was undertaken using root-knot nematodes and treated with four levels of propionic acid (1M, 0.5M, 0.1M and 0.05M) and one level of HCl (2.16 ml 3.7% to mimic pH levels in the 0.5M propionic acid treatment). At harvest control plants had a mean of 14,173 eggs/g root, statistically higher than all other treatments. HCl treated pots had a mean of 5,434 eggs/g root and were statistically less than the control plots. The 1M treatment killed all plants but the 0.5M, 0.1M and 0.05M treatments all had statistically fewer nematodes than the other two treatments (0, 576 and 0 eggs/g root, respectively) and were statistically identical.
- Three greens from 38 golf courses in Connecticut, Massachusetts and Rhode Island were sampled in May, July and September 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 relating to cultural practices and management techniques was collected. DNA was extracted from all soils and stored for future amplification of nematode antagonistic ribosomal sequences.

Outputs/Outcomes/Impacts:

- In 2003, cooperating RI apple growers used 8% fewer fungicides, 35% fewer insecticides, and 84% fewer miticides than is recommended in the New England Apple Pest Management Guide.
- Low levels of butyric acid are as effective against plant-parasitic nematodes as high levels. Hence, growers can use less butyric acid for nematode control and still maintain, weed control.. Less input means less cost and thus more growers can potentially utilize butyric acid based strategies. In addition, less butyric acid means early planting times and the potent smell of the compound in the environment is limited.

Source of funds: AES, CE

Scope of impact: Massachusetts and Rhode Island

Key Theme - Farm Safety:

Overview: Extension in farm safety is supported by USDA/CSREES Smith Lever 3d funds. 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 members at their two-day annual meeting.
- Presented farm safety information to Rhode Island Nursery and landscape Association members at their two-day annual meeting
- Presented farm safety information to Rhode Island Fruit Growers Association members at their annual meeting and twilight meetings.
- Provided information to general public during National Farm Safety and Health week at GreenShare field Day.
- Provided safety manuals for Pesticide Applicators Training sessions.

Outputs/Outcomes/Impacts:

- Approximately 400 people attended the RINLA meeting in January, 2003. Provided information on Roll-Over-Protection-Structures and farm tractor safety.
- Handed out information on the plastic pesticide jug recycling programs to all participants at the RI Fruit Growers Annual meeting. Throughout the growing season met with fruit growers individually and discussed farm safety practices.

Source of funds: CSREES

Scope of impact: State

PROGRAM 2: AQUACULTURE BIOTECHNOLOGY AND FISHING.

Overview: Rhode Island aquaculture continued to grow in FY2003, due to both the growth of the shellfish aquaculture industry and the new activities of the Rhode Island Aquaculture Initiative (RIAI). The farm gate value of aquaculture (primarily oysters) has increased from $299,998 in calendar year 2001 to $478,160 in CY2002 to $556,326 in CY 2003 .Some of that increase is due to new entrants to the industry who were trained by Cooperative Extension personnel. The Rhode Island Aquaculture Initiative (RIAI) began in 2002 with funds from Senator Jack Reed via the U.S. Department of Commerce and the RI Coastal Resources Management Council (the lead aquaculture agency in the state). RI AES and CE personnel have been heavily involved in the planning and execution of the Initiative and Drs. David Bengtson and Michael Rice serve on the Executive Committee for the Initiative. In November, 2002, Mr. Randy Mickley was hired at URI as the finfish aquaculture extension specialist and spent much of FY 2003 refurbishing the aquaculture extension demonstration facilities at the University. In parallel, Dr. Dale Leavitt was hired as an assistant professor at Roger Williams University in Bristol, RI, with partial duties in shellfish aquaculture extension, and was made an adjunct faculty member at URI in order to tie in with CE activities. The RIAI includes research, extension, and specially targeted programs. Examples of targeted programs that involve RI AES/CE are:

1. The Initiative is providing $150,000 over three years for the continuation and expansion of a previously CE-funded effort at GIS mapping of RI state waters, by the RI Environmental Data Center, in order to assist aquaculture planning and siting.
2. A feasibility study for an aquaculture technology park in RI, for which Dr. Bengtson served as a co-PI. Although that study did not find the park to be economically feasible, it did lead the business consultant involved to a phase II study of a marine biosciences technology park, which is being heavily supported by RI Governor Donald Carcieri and the RI Economic Development Corporation.
3. A joint project with RI's commercial shellfishers to investigate the feasibility of planting hatchery-raised hard clams in protected areas for subsequent harvesting by the shellfishers. Mr. David Beutel, CE fisheries and aquaculture specialist, has been participating in this project.

The Initiative also funds several competitively awarded research grants, including two to AES researchers: Dr. Marta Gomez-Chiarri, for work on disease in hard clams (quahogs), and Dr. Graham Forrester, for evaluation of the effects of aquaculture facilities on natural habitats and description of the habitat values of shellfish aquaculture gear.

A major effort to strengthen the University's research in aquaculture biotechnology is being supported by two USDA Special Grants entitled "Environmental Biotechnology at URI." The University sees itself as being a source of economic development in the area of biotechnology products for aquaculture and for aquaculture seafood production itself. Another positive development has been the interest of the USDA Natural Resource Conservation Service office (Warwick, RI) in aquaculture. Due in part to the hiring of the new extension personnel to provide expertise, NRCS has been examining the options and possibilities for including aquaculture as part of their portfolio.

Another boost to RI aquaculture is the construction of the new USDA-funded Aquaculture Research Laboratory at the Narragansett Bay Campus of URI. Following ground-breaking in the fall of 2002, much of the construction of the building was completed in FY 2003. This facility will

provide state-of-the-art facilities for our faculty to work on pathogens and transgenics related to fish and shellfish.

Key Theme-Aquaculture:

Overview: Research in this theme area is a result of NRI grants RI0019903421 "Molecular Mechanisms of Osmoregulation in Salmon", RI00199903266 "Improving Flounder Productivity Through Enhanced Growth", RI-2000-01264 "Feed-Based Delivery of Recombinant Anti-microbial Peptides for Shellfish Aquaculture", RI0019903421 "Microbial Ecology of the Salmon Gastrointestinal Tract: A Molecular Approach" and RI002003-03292 "The Role of Myostatin in Development and Growth of Fish Muscle". Special Grants RI002002-34438-12688 (began late FY2002) and RI002003-06051 (began late FY2003), both entitled "Environmental Biotechnology at URI" were also in effect in FY2003 and 40% of each grant was for aquaculture biotechnology. Hatch projects include RI00401 "Vaccine Development for Bacterial Pathogens: The Nutrient Approach", RI00886 "Bivalve Aquaculture to Control Estuarine Eutrophication,", RI00894 "The Role of Myostatin (GDF-8) in Muscle Growth of Rainbow Trout", RI0085 "Comprehensive Utilization of Squid Processing Waste for Aquaculture Feed Development" and RI00891 "Increased Efficiency of Summer Flounder Aquaculture Through Nutrition". An Animal Health project, RI00AS882 "Vaccine Development for Bacterial Pathogens: The Nutrient Approach" is also ongoing. One grant from the Northeast Regional Aquaculture Center also continued in 2003: "Development of Diets and Rearing Conditions for Commercial Aquaculture of Black Sea Bass", in conjunction with GreatBay Aquaculture, LLC.

Milestones:

- Diets made from hydrolyzed squid processing waste were compared to live feed and to a control commercial diet in experiments with summer flounder larvae and juveniles. One of the experimental diets performed better than the commercial diet and as well as the live feed, indicating that this experimental diet might be developed into a commercial product.
- Diets with varied protein:lipid ratios were fed to summer flounder. No differences in growth or survival were detected with diets containing 50% protein:10% lipid versus 40% protein:20% lipid in the first experiment, or with diets containing 45% protein:15% lipid versus 35% protein:25% lipid in the second experiment.
- Larval rainbow trout were injected with constructs coding for myostatin and two mutations in the coding sequence. The trout were transferred to 3 replicate tanks per treatment for assessment of growth rate and feed conversion rate over a period of 4 months. The cDNA coding for myostatin in black sea bass also was cloned.
- A method was developed to create mutants in *Vibrio harveyi* using transposon mutagenesis and isolation of a slow-growth mutant in flounder intestinal mucus. This mutant was shown to be avirulent to summer flounder.
- Salmon are subjected to hyperosmotic stress during transition from freshwater to the marine environment. Using differential assay of mRNA expression, a number of genes have been found to be upregulated by exposure of the living animal or surviving tissue to hyperosmotic stress. Characterization has been completed for one of the cDNAs (Shop21) but continues on the salmon glycine rich protein (SGRP), osmotic stress protein 1.8c (Osp 1.8) and the taurine transporter. For Osp1.8 in vivo and in vitro studies indicate that the gene is upregulated only in response to osmotic stress.

- In a monitoring program of two summer flounder hatcheries, we discovered that *Vibrio harveyi* can be a major component of the intestinal flora of larval and juvenile summer flounder in hatcheries. Significant mortalities were only observed after transport stress, both in challenge experiments and during the monitoring program.
- Experiments were initiated on the optimal protein:lipid levels in diets for black sea bass, a promising new aquaculture species in the Northeast.
- We determined the impacts of oysters on phytoplankton species composition and sedimentation rates in experimental mesocosms, as a representation of the ecological benefits/impacts of oyster aquaculture in the estuarine environment

Outputs/Outcomes/Impacts:

- CE personnel offered a Shellfish Aquaculture Training Course for the 8th consecutive year. Seven of the 16 commercial shellfish aquaculturists currently operating in RI have gone through this course.
- Dr. Gomez-Chiarri offered her annual Shellfish Disease Workshop.
- The value of the oyster aquaculture industry in RI has improved 85% in the last two years, due in part to the activities of AES/CE personnel over several years.
- AES and CE personnel were heavily involved in running the first Northeast Aquaculture Conference and Expo (NACE), held in November 2002 in Warwick, RI, were also heavily involved in planning the 7th Annual Rhode Island Aquaculture Conference, held at URI's W. Alton Jones Campus in October, 2003, and they began planning the second NACE, to be held in Manchester, NH, in December, 2004. RI Cooperative Extension is a co-sponsor of all these conferences.

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

Scope of impact: state, regional, national and international

GOAL 2: A SAFE AND SECURE

FOOD AND FIBER SYSTEM.

Overview. The Rhode Island Plan of Work includes its Program 3, Health and Well-being of Fish and Animals, under Goal 2. We reasoned in the Plan that "animal husbandry practices that promote the health and well-being of animals and fish will often simultaneously create safer and higher quality food products…" We report here under the Key Theme, "Emerging Infectious Diseases," which we found included under Goal 1 in the listing of Keywords and Themes.

We report limited progress on both programs 3 and 4. We have improved physical capacity to meet the goals of program 3 by constructing or improving facilities for fish and shellfish vaccine work. The vaccine work has been established as a new AES project. We have encountered greater than anticipated delays in hiring food science faculty, which we see as vital toward bolstering the research component of our food safety program.

PROGRAM 3: HEALTH AND WELL BEING OF FISH AND ANIMALS

Overview: This program has made progress in the area of aquaculture-related diseases (see program 2, above), by developing preliminary results and facilities for fish vaccines against bacteria. We have approved a new Hatch project for three such studies (*i.e.*, 3 pathogens), RI00401 "Vaccine Development for Bacterial Pathogens: The Nutrient Approach."

Animal health research and outreach has been slowed by shortages in faculty, forcing scientists to concentrate on classroom duties and a reduction in AES and CE activities. In the interim, limited progress is reported, as follows:

Milestones:

- Experiments on development of a vaccine for summer flounder against a bacterial pathogen are still ongoing.

Source of funds: AES

Scope of impact: state, region

PROGRAM 4: FOOD SAFETY

Overview: Specialists in the Food Safety Education Program in the Department of Nutrition and Food Sciences Department have developed a comprehensive education program that addresses the needs of a diverse target audience, by utilizing resources and support from other land grant universities, state and federal agencies, non-profit agencies, community-based organizations and private industry. This partnership has resulted in the program receiving state and national recognition. Importantly, external funding has become the "lifeline" of the program and maintains its 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 has

been existence for over 10 years and continues to play a significant role in bringing together industry, regulatory and academia to promote and direct food safety education activities in Rhode Island.

Each of the key theme areas that follow in this section address an 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

Milestone:

- **Food Safety Education - Educators and School-aged Children:** The food safety curriculum, entitled "The Food Safety House – Preparing Food Safely" designed for grades 1-3 and 4-6 completed in 2000, continues to be distributed both in-state and out-of-state. This curriculum, a self-standing unit with highly visual graphics and colorful design, contains the entire curriculum for teachers. The curriculum is accompanied by teacher's guide (1-3 or 4-6) containing optional activities and additional food safety information. However, all the curriculum information is contained in the "easel-like" curriculum and can be used by teachers without the guides if desired. The Food Safety house focuses on five areas or "floors" critical to understanding foodborne illness prevention – sanitation, food choices, food storage, food preparation and food reuse. It also contains a unit on the "microworld" and a concluding/review lesson. The results of an evaluation of the curriculum in January 2003 indicate that the total curriculum as well as individual lessons is being used in classrooms. The teachers who responded to the evaluation, gave it a very positive review. During FY' 03 the curriculum was given a favorable review by the National Environmental Health Association and included in their data base. It was also reviewed favorably by the California Department of Education**,** who purchased 4 copies for inclusion in their health education lending library.
- The Detective Mike Robe's Fantastic Journey Interactive CD was completed. This interactive CD is based on the two existing 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.
- The food safety specialists provided training for 40 Providence, RI Head Start classroom teachers and aides. The training included information and resources on current food safety issues and a review of the Detective Mike Robe's Fantastic Journey curriculum for Head Start preschoolers.
- In March of 2003, the food safety specialists in cooperation with Kids First, presented two food safety education in-service for 30 teachers, grades 1-6. Topics covered included a review of current food safety issues, cause and prevention of foodborne illness, a review of the Food Safety House and Detective Mike Robe curriculums, URI's Food Safety Website and the Detective Mike Robe interactive CD ROM

Outputs/Outcomes/Impacts:

- The potential impact in the state of RI could be approximately 74,000 students in grades 1-6. Presentations have been delivered at professional meetings. Since the initial release of the

curricula in early 2000. In FY 2003, over 50 curriculums were distributed – either through workshops or direct purchase. The impact will be that schoolchildren are better educated about foodborne illness and can take that information home with them to the benefit of their families.

- The Food Safety Program has had a direct impact in Providence, RI. The food safety program is now integrated into the Head Start program and reaches approximately 1,200 students.
- The Food Safety Program provided in-service training for teachers who reach out to approximately 750 students. Teachers, who attended the in-service gave it a favorable evaluation and indicated they would begin to integrate the food safety information and curriculum materials into their current curriculums.

Source of funds: Smith-Lever, state match, USDA/CREES POW grant,

Scope of impact: State and national

Milestone:

- **The 10th Annual Food Safety Conference** entitled Food Allergens: What You Need to Know "In a Nutshell" was held in conjunction with the Rhode Island Food Safety Task Force in mid September, 2003. The goal of the conference was to increase participant's understanding of the current issues of food allergens from a variety of perspectives including consumers, foodservice and food processing industries, schools and regulatory authorities. The keynote speaker was Steve Taylor, PhD, and Director of the Food Allergy Research Program at the University of Nebraska. The perspectives were addressed through a panel representing consumers, foodservice and food processing industries, schools and regulatory authorities. The target audience for the conference was educators, dictations, school and health care facility foodservice directors and food safety educators. The 90 participants rated this conference outstanding, indicating that this conference passed all their expectations and suggested it was the best one we had ever held.

Outputs/Outcomes/Impact:

- The target audience for the conference was educators, dictations, school and health care facility foodservice directors and food safety educators. The 90 participants rated this conference as outstanding, indicating this conference passed all their expectations and suggested it was the best one we had ever held

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

Scope of impact: Regional and State

Milestone:

- The URI Cooperative Extension Food Safety Education Program is part of a School Food Safety Partnership that also includes the RI Department of Education (RIDE), Team Nutrition Institute at Kids First, and the RI Department of Health (RIDOH). This CDC funded project has completed its third year of operation. This project- "RI Healthy Schools! Healthy Kids! School Food Safety Partnership" was a direct result of the on-going

school food safety policy project from the RI food safety specialists and the programs in place at RIDE, Team Nutrition and RIDOH. It should be noted that RI is the only state whose funding for food safety education will continue for five additional years, commencing in March 2003. At the close of the third year of the project, 13 pilot schools including nine elementary, four middle and two high schools in both rural and urban areas of the state have participated in the project 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**.**

Outputs/Outcomes/Impacts:

- Thirteen schools completed and have implemented their action plans at a variety of levels.
- One middle school developed a food safety policy utilizing the "Developing School Food Safety Policies Guidebook" developed by the URI Food Safety Specialists. This policy was adopted the district school committee and will be included in their policy handbook
- Eight schools have developed and implemented food safety policies for their schools.
- The Food Safety Education Specialist is part of a three state (RI, MA and CT) USDA/CREES funded project which 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.
- This USDA/CREES funded project has the potential to reach more than 500 school foodservice workers in Rhode Island, Connecticut and Massachusetts with food safety information in an effort to improve their food handling practices in the school foodservice environment. 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, participants and external funding (CDC).

Scope of impact: State. However, this partnership grant is only one part of a larger national initiative. Eventually, the work in RI will serve as a nationwide model.

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 a "Seafood Savvy" newsletter, jointly produced by the University of Connecticut and University of Rhode Island, was 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.

- Developed and implemented shellfish harvester in-service on the new RIDEM regulations concerning shellfish quality and safety handling on board harvest boats.
- We brought on board a seafood specialist as 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 – brochure, video and PowerPoint presentations – for seafood harvesters of fish species that could from histamine toxin.
- .The seafood/food safety specialist is available to the industry for consultations on technical and regulatory issues. She serves on the board of the American Seafood Institute and acts as a resource on food-related issues. Also, the specialist is a member of the National Seafood HACK Alliance Steering Committee who oversee educational programming for the seafood industry and the Sea Grant National Theme Team.

Outputs/Outcomes/Impacts:

- Eighty four (84) employees and managers of seafood and meat and poultry processors participated in the HACCP courses. The shellfish harvester workshop had 58 attendees. Participants in both educational activities gave them an excellent evaluation.
- 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 were added to the URI Food Safety Education website.

Source of funds: Smith-Lever, Sea Grant, and RI State Department of Environmental Management

Scope of impact: State, multi-state and national.

Milestone:

- 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 by 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 175 participants and 100 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%.

- There were two certification courses offered in Spanish impacting 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 and Smith Lever, and external funding including user fees (e.g., registration fees)

Scope of impact: State

Milestone:

- **Good Agricultural Practices (GAP) for to Integrate Food safety Principles Into Small Farm Production** ended the third year of a three-year 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. Post-GAP microbiological testing continues in all states (strawberries, leafy greens, apples and/or tomatoes) but not completed due to weather conditions and also problems with delay in the educational programming.
- A workshop for growers on Rhode Island's new Farm Home Food Manufacture legislation was sponsored in cooperation with the RIDOH and the 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 in the farm kitchen. 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:

- All small farmers of fruits and vegetables in the region will learn more about Good Agricultural Practices and incorporate it into their techniques. Consumers will benefit because they will recognize and understand the meaning of their produce being 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 March 2003. Of those attending, four growers choose to participate in the certification program that includes an on-site audit which was conducted by the Division of Agriculture, RI Department of Environmental Management. All four successfully completed the audit and were certified; bringing the total to 10 GAP certified farms in Rhode Island. All of the GAP-certified producers have received promotional materials including a plaque, stickers for their produce, a sign and a brochure describing GAP for distribution to consumers at their roadside stands. The certification is must be renewed every three years. The Food Safety Specialists have agreed to continue to provide the educational portion of the project beyond the life of the grant.
- One presentation about the GAP project was made at a national professional meeting.

- One presentation about the GAP project was made to the state's fruit growers associations.
- The meeting for growers on the Farm Home Food Manufacture legislation provided information to assist growers in determining whether it would be economically feasible to engage in this activity. Fifteen growers participated in the meeting. To date, only one permit has been issued by RIDOH for this activity.
- 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 specific 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, developed and offered once/month for June-September 2003. The four lectures focused on the marine environment.
- In September 2003, 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) for to Integrate Food safety Principles into Small Farm Production.

Outputs/Outcomes/Impacts:

- The consumer lecture series attracted over 160 people.

Source of funds: Smith-Lever and Sea Grant Extension.

Scope of impact: State specific

Milestone:

- URI Gardening and Food Safety Hotline continue 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.

Outputs/Outcomes/Impacts:

- Approximately 1000 food safety-related calls from consumers have been answered. Increased consumer awareness as to food safety through print and voice media.

Source of funds: State match, Smith Lever.

Scope of impact: State specific

Milestone:

- The food safety education specialist presented educational programs to community groups including a service organization and a junior and senior 4-H groups who were preparing for and participating in Favorite Foods activities. 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:

- Presented to approximately 50 adults and 75 4-H youth. Well received by audiences.

Source of funds: State match and Smith Lever funds

Scope of impact: State specific

Key theme- Food Safety Training for Volunteer Foodservice Workers

Milestones:

- In the spring of 2003, the food safety education specialist conducted three workshops attended by representatives from 35 community-based organizations in particular those serving large numbers of individuals at May Breakfasts and local fairs and festivals.
- The "Looking for a Safe Harbor Volunteer Foodservice Worker" curriculum in total was added to the URI Food Safety Education website. The website also provides an opportunity for purchase of the accompanying video.

Outputs/Outcomes/Impacts:

- More than 75 individuals representing a variety of community-based organizations participated in a two hour food safety education training in-service. On-site evaluations indicated participants had knowledge of basic food safety principles in a temporary food event setting, but planned to make some improvements based on their participation in the training.
- A follow-up evaluation of participants in the 2002 suggests that those who responded had made specific changes in their food safety practices during their community events.
- The volunteer foodservice worker curriculum is now available at no cost to a broader audience in an effort to reduce the risk of foodborne illness at community events.

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

Scope of impact: Local, state, national

Key Theme – Food Safety Education for All Target Audiences

Milestone

- A **URI Food Safety Website** is now online 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:

- Although we know that the website is being "hit", we have not assessed how the "hit's" are evoking behavior change among the visitors to the website.

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

Scope of impact: Local, state, 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. 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 NE-172, "Nutritional Risk and Antioxidant Status in the Elderly", and NC-219 "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 (FSNEP). 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:

- A screening tool to estimate carotenoid intake, complete with a program that calculates actual carotenoid values, was developed, tested, and validated against 3-day food records and food frequency methodologies in an older, low-income population. (NE 172)
- New instrumentation to assess nutrition risk among homeless individuals was developed and tested for sensitivity, as were techniques and partnerships for identifying these individuals/families.
- 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 200 young adults.
- Applied research on the food and nutrition needs of food stamp eligible elderly was published in the *Journal of the American Dietetic Association, Journal of Nutrition and the Elderly* and *Topics in Clinical Nutrition*.
- A new social marketing campaign 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.

- USDA Northeast Quarterly spotlighted the FSNEP Urban Container Gardening Workshop in their fall newsletter. Held throughout the state and delivered by URI Master Gardeners, food stamp eligible participants were taught the principles of container gardening, health benefits of vegetable consumption and low-cost recipe preparation. All materials including container, vegetables and printed materials were free to those enrolled in the *Pick Your Own…Free* program.
- A 5-week nutrition education curriculum for "Women in Transition" was developed and piloted to 35 women transitioning out of the RI Correctional Institute and into mainstream society.
- The RI FSNEP website is fully functional. The site houses the Family Nutrition Program.

Outputs/Outcomes/Impacts:

- Evaluation of knowledge, attitudes and barriers related to the intake of fruit and vegetables reveals the need to educate older consumers in the areas of lutein/antioxidant food sources and the association between the intake of carotenoid rich foods and prevention of age-related macular degeneration.
- 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
- An increase in fruit and vegetable consumption as part of a healthy eating pattern may help prevent a rise in obesity in young adults.
- The Expanded Food and Nutrition Program (EFNEP) reached 738 families, 1573 individual clients, and 3,250 youth reached through intensive small group workshops and individual counseling within EFNEP for a 4-6 month period.
- At program exit, 65% of surveyed EFNEP adult participants followed a 3-1-1-1-1 food pattern as opposed to 37% at program entry; 96% recorded a positive change in any food group at exit.
- RI Public Transportation Nutrition Education social marketing campaign placed 220 posters (11"x28") in bus interiors, 60 on exterior taillight bus posters (21"x72") for a 3-month period. 337 calls requesting nutrition information were recorded from individuals and social service agencies.
- A survey of 400 low-income families participating in RIFSNP nutrition education efforts revealed the following:
    - 304 moved closer to food guide pyramid servings
    - 230 increased physical activity
    - 170 improved overall food intake
    - 196 chose more nutrient dense foods
    - 192 employed a safe weight loss plan
- 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):
    - 91% ate more fruits and vegetables than before participation
    - 82% engage in some deliberate form of physical activity than before par
    - 78% shop from a list more often
    - 85% read food labels more often

97% wash hands before and during food preparation more often
75% now use leftovers within two days of initial preparation.

- Latino seniors are twice as food insecure as their non-Latino counterparts. Diet quality was also more compromised in this group than other older cohorts form Rhode Island and Connecticut.
- Sixteen culinary workshops were held at Food Stamp offices, health centers and food pantries demonstrating low-cost, healthy recipes to approximately one thousand food stamp eligible individuals.
- Eighty-six hundred limited income elderly are reached through the quarterly nutrition newsletter.
- 3475 limited income elderly were reached through the monthly nutrition newsletter.
- Face-to-face nutrition programming reached 4200 high-risk elderly and families.
- Newspaper and video production efforts reach thousands of families and elderly each month.

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

Scope of impact: Local, state, 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 staff who are prodigious in securing competitive grants. In conjunction, the faculty have various USDA-funded projects, including: Hatch project RI00321 "Control of Nitrate in Watersheds Affected by Unsewered Residential Development", RI00703 "Fingerprinting Sources of Bacterial Input into Small Residential Watersheds", NRI grants RI0019991119 "Subsurface Riparian N Removal: The Role of Landscape Setting", a Fund for Rural America grant, RI-9704767 "New Tools to Guide Land Use Change in Rural Watersheds", a 406 grant RI0-2000-05493 "New England Regional Water Quality Program", and a 406 grant 00-51130-9717 "National Facilitation of CSREES Volunteer Monitoring Efforts." The faculty 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, "Nitrate Removal from Groundwater at Rhode Island's Coastal Margins: Consequences of Coastal Enrichment", examining the effects of coastal development on groundwater nitrogen cycling.

Milestones:

- The National Water Quality webpage has been launched, modeled after The New England Water Quality web site. The model was presented recently at the National Water Quality Coordinators' meeting in Tuscon, Arizona in January 2003. 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.
- In May 2001, the Project Steering Committee met with EPA Region 1 representatives in Boston to begin coordination with EPA New England. Regional coordination is underway with EPA to address private drinking water well protection. In September 2002, EPA New England provided funding to URI CE through the Regional Water Quality Program to develop and distribute materials addressing private well water protection throughout the New England region.

URI Watershed Watch:

Overview: Watershed Watch is a scientist-led volunteer water quality monitoring and education program. Having just completed its sixteenth year, the over 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, obtain multi-year surface water quality information both to determine current conditions and to detect trends. 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 has volunteers monitoring water quality in all of the 14 major RI watersheds.
- 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. This project 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.
- 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 stabilized the program and provided funding for experimental learning by URI undergraduate and graduate students.
- 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 the three CSREES regions and articles about the project in several national publications.
- URI Watershed Watch program director Linda Green represents the nationwide volunteer monitoring community as a member of the National Water Quality Monitoring Council.
- URI Watershed Watch program coordinator Elizabeth Herron represents the region on the board of the North American Lake Management Society, and served as the conference committee chair for its international symposium held in Mashantucket, Connecticut, November 2003.

Outputs/Outcomes/Impacts:

- It 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 fifteen-plus year data records on a number of sites are the only such long-term compilation in Rhode Island.
- The 300+ trained volunteers provided more than 13,000 hours in volunteer water quality monitoring at more than 200 lake, stream, salt pond and bay sites statewide. At the 2003 rate of $17.19/hr (www.independentsector.org/ this is equivalent to over $220,000 in value.

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.

URI OnSite Wastewater Training Center:

Overview: The URI OnSite Wastewater Training Center, 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.

Milestones:

- The URI CE On-Site Wastewater Training Center (OWTC) was established in 1994. It 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 OWT operates in partnership with state and federal agencies, municipalities, and over 40 private sector contractors. Since 1996, the Onsite Wastewater Training Center 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 OWT Center's research based outreach education efforts. The physical field-training Center, located on the URI Kingston campus, consists of twenty-one innovative and alternative full-scale systems constructed above ground for hands-on learning. 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 OWT is also a major information resource for Extension programs throughout New England, regionally in the Northeast, and nationally.

- The OWT Center staff along 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 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 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.

- In September 2002, URI Home*A*Syst completed its final draft of *Today's Forest Tomorrow's Legacy: A guide for Small Acreage Woodland Owners*. This publication is currently being designed and then will go to press. This publication was produced in cooperation with the Southern New England Forest Consortium with funding from the USDA Forest Service and the RI Department of Environmental Management, Division of Forest Environment.
- 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 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. URI also promoted awareness of GIS-based methods for watershed risk analysis, participating as invited speakers at the EPA National Source Water Protection Conference in Washington DC in June, 2003. URI NEMO's poster on the Manage risk assessment method won 4th place in the instructional category at the International GIS User Conference in San Diego, CA.
- 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 was based on results of the Wickford Harbor Watershed Assessment completed by URI NEMO and additional recommendations for treatment standards.

- Research integrated into Municipal Watershed Management Training
  RI Source Water Assessment Program reports for all major community results incorporated a brief description of relevant URI research related to the value of particular resources in source water protection and the need for local action. Included were the following:
  1. Results of URI research on value of wetland buffers as potential sites for nitrogen treatment (Addy, K et al., 1999). The value of these riparian areas in maintaining drinking water quality and need for local protection of these sites was emphasized.
  2. Usefulness and accuracy of RI Soil Survey Maps (SSURGO) in local land use planning for riparian protection (Rosenblatt, 1999) was documented based on field verification by Rosenblatt (1999), under the direction of Dr. Art Gold.
  3. Potential for water table to rise higher than would be expected based on State-approved site evaluation methods based on field studies of water table fluctuations conducted in compacted till soils in Jamestown Rhode Island (Stolt, 2001) and on various soil types on Block Island, RI (Morgan and Stolt, 2002). Brief summary results emphasized need for careful siting and avoidance of highly marginal soils for new home construction and installation of onsite wastewater treatment systems. This evidence was used to support adoption of the Jamestown High water table and groundwater protection overlay zone.
  4. The GIS-based MANAGE risk assessment method, which was used in conducting source water assessments for all public drinking water supplies in Rhode Island (URI modified the method for use by RI HEALTH for smaller community and non-community supplies) incorporates results of URI research by Dr. Art Gold and others on sources and fate of nitrogen from various land uses.

Critical Habitats Program:

Overview: The Critical Habitats Program provides training, database development, GIS analysis, and internet access for local decision makers and the public to use spatial data to protect lands critical to sustain the health and environmental quality of Rhode Island. The Program can be conceptualized in three components. The first is a data distribution component. Using the World Wide Web, 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 hands-on technology training programs that allow resource managers to use and access GIS 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. The objective of this program is to continue to provide technical information and training through which the best available natural resource data are made available to municipalities, professionals, and environmental and state organizations and agencies.

Milestones:
Educate 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.

Outputs/Outcomes/Impacts:

- Conduct *Introduction to ArcView* professional training courses on GIS technology and its use in natural resource management. Expansion of course offerings to include *Introduction to ArcGISI*, the most current version of the ESRI GIS software. These courses are offered 3 – 6 times per year.
- Update the RIGIS Web database to incorporate the most current GIS and aerial image data available for natural resource protection. 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.
- As an extension to the The Critical Lands analysis developed and piloted within Narragansett, South Kingstown, and West Greenwich in 1998, a similar analysis was conducted for all towns located in Washington County. The extension of the analysis is being directed and funded by RI DEM under a grant sponsored by The US Forest Service and is referred to as The South County Greenspace Project. There will be cooperation from various agencies in Rhode Island including: The Coastal Resources Center, URI/Sea Grant Program, Grow Smart Rhode Island, Washington Regional Planning Council, and the South County Watersheds Partnership.
- In partnership with the Rhode Island Office of The Nature Conservancy, developed and held a short course in the use of ArcView for the Rhode Island Land Trust community.
- Continued work with Project One, Two, Tree in cooperation with the RI Geographer's Alliance to develop and deliver new training component targeted towards Rhode Island school teachers. Project One, Two, Tree is a year-long pilot educational program working with teachers from 8 Rhode Island middle and high schools. The project trains teachers in using GIS software and incorporating it into their classroom by participating in a community tree inventory project. Students present their work to their town councils and other community members at the close of the project. As an extension to this project, developed and delivered 8-week GIS training to Chariho Regional School District in the use of ArcView with their students. January – March, 2002.
- 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.
- URI was selected to participate in special pilot project (June 2001 – December 2002) with Orton Family Foundation's Community Viz software, a visualization software that runs inside ArcView to help communities weigh the impact of various decision making options. Project consists of pilot study site, training, and feasibility to determine use of software for target audiences. Our project achieved a number of important and tangible results. (1) It provided a neutral opportunity for the Town and the University to study the implications of

a dorm complex on the Peckham Farm site. (2) The negative impacts associated with a Peckham Farm site prompted, in part, the University to explore other options. They now have a new plan that embeds the dorms within the campus mosaic (in a villlage-center concept rather than sprawling out beyong the edges of campus, such as the Peckham option). (3) It created an excellent opportunity to work with CommunityViz and demonstrate its potential to the land use planning community in Rhode Island.

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: state

Key Theme–Integrated Pest Management (including Biological Control):

(see Program 1, above)

Key Theme–Sustainable Agriculture

(see Program 1, Key Themes Invasive Species, Ornamental/Green Agriculture, Integrated Pest Management)

Key Themes–Wetlands Restoration and Protection, Forest Resource Management:

Overview: The Station has strength in its wildlife 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 RI 00318 "Land Cover Change in Rhode Island from 1972 to 2002 and the Impact on Forest Ecosystems", RI00319, "Habitat Characteristics of Pond Breeding Amphibians in Rhode Island", RI00315 "Subaqueous Soils and Shallow-Subtidal Wetlands in Rhode Island", and RI00316 "Land Management and the Population Dynamics of Ecology" and "Physiology of Migratory Songbirds in Coastal Southern New England", and McIntyre-Stennis project RI00MS970 "Predictors of Hydroperiod in Southern Rhode Island Vernal Pools."

Milestones:

- 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.

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).

Key Theme–Natural Resources Management

Overview: We have brought on line a new physical facility dedicated to public policy decision making using economic simulations and visual and virtual reality tools. This facility is part of a Coastal Institute Building that opened at the end of 2000, collectively referred to as the Economic Policy Simulation Laboratory. Here we will extend our traditional strengths and interests in valuation methodology and public policy, allowing us to take studies such as those outlined in what follows to a new level of scholarship and impact.

The USDA-funded research program includes Hatch project RI00198 "Managing Coastal Marine Ecosystems: Socioeconomic, Environmental Science and Policy" and 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:

- 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.
- The Orton Foundation awarded the University software that the Foundation developed, called Community Viz, which is based on GIS data and allows for 3D visualization of development.
- The Policy Simulation Laboratory is now fully equipped and operational after significant Station investment in computers and programming support. The SimLab is a state-of-the-art facility for carrying out decision research that ranges from basic research on decision making to highly applied work to help communities make wise policy choices on resource management.

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: We continue to debate the merits of creating two programs under Goal 5. The strength of the Sustainable Communities theme continues to be entirely on the research front. Where as the Children Youth and Families component continues to be solely Cooperative As resources become tighter, it is critical that we not lose critical mass as it relates to program delivery and it's direct tie to the land grant research base.

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 FY03: 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 may be 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 which includes the 4-H Youth Development Program. It is the wish of this administration that the review be an inclusive process that brings together 4-H stakeholders, university faculty and potential partners in and review and planning process that will result in new vision for the 4-H program and more importantly the youth of 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 Govenor 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.
- Four-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, Dept of Fisheries, Animal and Veterinary Sciences and 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: State specific and 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 2004: 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 funds: 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 funds: 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 funds: CE

Scope of impact: state specific.

Key Theme – Financial Literacy

Overview:
An integrated program of research and outreach on family and consumer economic issues will improve the financial knowledge and practices of families in Rhode Island and nationwide. Research on-going in this area is the USDA-funded Hatch project RI00711 "Impact of Workplace Financial Education on Employee Personal Financial Behavior and Productivity." Two other initiatives impact the financial literacy of college students and school-age youth.

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 and employee productivity is being conducted. In FY 03, the third year of the grant, the educational programming, research methodology and assessment instruments were implemented. The State of Rhode Island Department of Administration coordinated marketing of the outreach programming to 10 state government departments. In preparation for the implementation phase, four educational modules were selected for presentation, edited for application to a state employee audience, and updated. Twenty four seminars on financial planning and planning for retirement were delivered to 211 state employees. Data was collected on the participants' pre-program financial behaviors, their post-program intention to change their financial behaviors, and the actual changes they made two months after the programming. Data analysis and reporting of program impact will be completed during FY 04.
- High school teachers from several disciplines, including Math, Economics, Family and consumer Sciences and Business Education, were trained to deliver the NEFE High School Financial Planning Program to their students at four professional association conferences. An electronic newsletter, *Focus on Youth, Money Matters*, was developed and distributed to over 300 subscribers in the region. 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. The newsletter is also posted on the center's website where it is available to the general public via the internet.
- During fall semester 2003, an online credit education program taught 91 first-year college students to compare contract terms and clauses in credit card agreements, to recognize the warning signs of credit abuse, to implement a resolution process when credit problems arise, to periodically review their own credit reports, to set financial goals, and to develop and monitor a personal financial plan. Data about the students' pre-program knowledge and post-program knowledge was collected and analyzed for a control group who did not receive

programming and for an experimental group who were assigned the tutorial as part of their course requirements. Findings of the research and outreach project concluded that working through the module did indeed lead a student to a positive and significant increased knowledge level.

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 funds: 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 continue extensive input collaboration with many water quality and conservation groups including RI Partners for Resource Protection, RI Grow Smart, the RI Chapter of the American Planning Committee, RI Department of Health, Source Water Assessment Committee, RI Natural History Survey, Natural Resource Conservation Service, Rhode Island Builders Association, Soil Scientists of Southern New England, Rhode Island Independent Contractors Association, and the RI Chapter of the American Water Works Association.

Similarly, our water quality program coordinates closely with a host of state agencies, committees and commissions including the RI Departments of Administration, Environmental Management, Transportation and Health and the RI Coastal Resources Management Council, and the Water Resources Board. Other programs communicate and coordinate with the RI Department of Health – Food Protection, Department of Health and Human Services, the RI State Conservation Commission, RI Rural Development Council, RI Farm Service Agency, RI Natural Resource Conservation Commission, RI Food and Agriculture Council, RI DEM-Division of Agriculture, Providence Head Start, and Providence Community Health Centers.

At the Federal level we work closely with EPA Region I, the Department of the Interior and USGS.

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 Chapter of Nature Conservancy, Audubon Society of RI, local land trusts, Save the Bay, the Environment Council of Rhode Island and the RI Council for Agriculture Promotion and Education.

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 and the RI Apple Growers Association.

In 2003, the Director and Associate Director continued a rebuilding process with the three former RI Cooperative District Boards. (These are boards that are similar to the county boards from other states.) We have identified leaders from each of the three district boards and a formed a collaborative committee that we call the "Triboard." As the TriBoard represents great 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 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 agricultural operations as well as partial support for other research associates and assistants.

We have included the request for proposals used in FY 2003 (Appendix A) for projects to be funded in FY 2004 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 by 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 2003, 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 communities 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. 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, 2000, URI was awarded a regional "406" multi-state, 4-year project. URI is lead institution on the 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 FY02 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

A management team consisting of seven program-area advisors and the Director was organized in September 1999, to guide overall changes required by AREERA. It refined guidelines for AES projects, incorporating all aspects of the new AREERA requirements, and issued a formal revision in January 2000.

Six Program Leaders replaced the transitional team in September 2000 and remain in place currently. Given the distribution of research and outreach activities, the Program Leaders were assigned responsibilities as follows:

- **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.

A joint publication with RI Sea Grant has continued success, with both a print and a web version (see www.uri.edu/41N). The RIAES web site was updated to include an on-line description of current research programs and projects (see www.riaes.org).

With the entrance of the new Director and Associate Director in late 2001, 2002 was a year of introspection for RI AES and CE; 2003 was a year of implementation. We diversified our Land Grant funding portfolio and advanced our endeavors to integrate research and extension activities.

In 2002, CE programs completed strategic plans. We have started to shift resources in RI CE, but face significant personnel challenges as we indicated in the 2002 Annual Report. However, progress continues to be slow 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 are currently planning for a federal review of our programs in Children, Youth and Families and look forward to a comprehensive evaluation.

APPENDICES

Appendix A - RI AES Call for Proposals FY2004
Appendix B - RIAES Portfolio of Current Projects
Appendix C - CSREES-REPT (2/00) Forms