100 Years of Cooperative Extension
1914–2014

New Jersey Agricultural Experiment Station

2014 Annual Report
OUR MISSION

To enhance the vitality, health, sustainability, and overall quality of life in New Jersey by developing and delivering practical, effective solutions to current and emerging challenges relating to agriculture; fisheries; food; natural resources; the environment; public health; as well as economic, community, and youth development.

This year, we celebrate the centennial anniversary of the federal Smith-Lever Act, which was codified into federal law in 1914. This act provided funding for outreach endeavors at the land-grant universities as established by the 1862 Morrill Act and expanded vocational, agricultural, and home demonstration programs in rural America. Specifically, the Smith-Lever Act stated as its purpose, “Cooperative agricultural extension work shall consist of the development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices or technologies…”

Current projects funded under this authority include the Expanded Food and Nutrition Education Program; Farm Safety; Integrated Pest Management; and Children, Youth and Families at Risk. Today, Rutgers Cooperative Extension proudly continues to build upon our 100 years of success and partnerships with the State of New Jersey in delivering relevant and meaningful outreach to residents in all 21 counties.

- Larry Katz, Director, Rutgers Cooperative Extension

Celebrating 100 Years of Cooperative Extension

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NJAES receives core funding from the State of New Jersey and from the U.S. Department of Agriculture (USDA); these funds support the infrastructure needed to develop and implement research and extension programs. The overall funding declined in FY14 compared to the prior fiscal year, but NJAES researchers have continued to generate substantial royalty income, mainly from plant breeding programs.

In FY14, NJAES invested a total of $92.9 million to support research and extension activities; this represents a 2.5% reduction in spending compared to FY13. State appropriations remain a consistent source of NJAES funding and remained level at $22 million. Continuing a five-year trend of a declining role of state support for NJAES, state appropriations showed a decline of 13%. Meanwhile, federal funding from the Hatch and Smith-Lever programs continue to average approximately 9% of total NJAES funding, in the amount of $8.5 million for FY14.

Overall grant funding declined by $2.2 million compared to the prior fiscal year, largely due to the substantial across-the-board benefit reduction in the national Supplemental Nutrition Assistance Program Education (SNAP-Ed). In an effort to reduce spending, federal legislation was passed in FY14 that increased restrictions and tightened eligibility requirements for SNAP households. This has primarily affected Rutgers Cooperative Extension’s SNAP-Ed program, which plays a vital role in helping to educate and improve nutrition among New Jersey’s low-income individuals. Outside of the SNAP-Ed program, grant income in FY14 represents 43% of NJAES total funding and continues to support plant biology and pathology research, IR-4’s national program to facilitate regulatory approval of sustainable pest management technology, and continuing professional education programs for New Jersey’s farmers, businesses, and residents.

**FY14 Sponsored Program Highlights**

In FY14, of the 412 new grant proposals submitted, 211 proposals totaling $34,490,174 were awarded for a success rate of 51%.

Of the 211 awards issued in FY14, the major sponsors include:

**Federal**
- National Science Foundation $5,516,466
- U.S. Department of Commerce – NOAA $3,368,482
- National Institutes of Health $2,224,626
- U.S. Department of Agriculture – NIFA $2,358,934
- U.S. Department of Homeland Security $407,606
- U.S. Department of Housing and Urban Development $342,905
- U.S. Department of Agriculture – APHIS $234,250

**State of New Jersey**
- N.J. Department of Human Services $7,338,139 (SNAP-Ed Program as a Federal Pass-through)
- N.J. Department of Labor and Workforce Development $2,006,691
- N.J. Department of Environmental Protection $1,936,062
- N.J. Sea Grant $466,731

**Other sponsors**
- Universities and Institutes $2,567,215
- Foundation and Non-profit Organizations $1,578,831
- Corporations $1,346,895
- New Jersey Municipalities and Counties $624,314

2014 Annual Report
COMMERCIAL AGRICULTURE

A Glimpse into the Past 150 Years of Rutgers as the land-grant university and 100 years of Cooperative Extension reveals that the New Jersey Agricultural Experiment Station (NJAES) and Rutgers Cooperative Extension (RCE) have sustained a steady and upward trajectory of serving the needs of Garden State agriculture. The breadth of research and outreach emerging from New Jersey’s land-grant institution help fuel the transformation of the state’s shrinking base of independent farms to today’s complex and high-profitability enterprises that rank in the top 10 in several key commodities. Over the last century, New Jersey agriculture has shifted largely from animal production to fruit and vegetable production, and developed new markets for nursery and turf to meet the needs of a more urbanized state. NJAES and RCE have kept pace with and, at times, led statewide efforts, in partnership with the New Jersey Department of Agriculture and others, to keep agriculture relevant and profitable in the Garden State.
Rutgers NJAES has historically played a critical role in supporting and sustaining agriculture in a highly urbanized landscape like New Jersey, including leading efforts to preserve farmland and helping to develop programs that expand farm income for Garden State farmers through value-added activities like agritourism.

Over the past several decades, 28 states have created programs to permanently protect nearly 2.4 million acres of farmland for future generations. Among them is New Jersey, which has preserved more than 207,000 acres of farmland, or 29% of the state’s farmland base, through agricultural conservation easements since forming its program in 1983.

Brian Schilling, assistant extension specialist in agricultural policy, co-organized a national conference of 120 farmland reservation practitioners and experts to reflect on program successes, as well as lessons learned that will be vital to the nation’s farmland reservation efforts.

The two-day conference was the first time in seven years that state, county, local, non-profit, and academic farmland preservation practitioners and experts had the chance to share information, experiences, and successes; to learn from well-established and well-subscribed programs; and to network with like-minded professionals.

Roughly 30 million people, or 10 percent of the nation’s population, live within a day’s trip of a New Jersey farm. The density and affluence of nearby population centers present significant market opportunities to farmers interested in offering customers farm-based educational or recreational experiences. From corn mazes and farm tours to wine tastings and pumpkin picking, agritourism has become a popular way to increase farm income and diversify agricultural businesses. Recognizing the importance of agritourism to New Jersey farms, a team of Rutgers Cooperative Extension faculty developed programming to help farmers manage farm safety risks and liability, and improve marketing strategies.

With funding by Northeast Sustainable Agriculture Research & Education, a multi-state team including Rutgers have developed and delivered educational programming to agricultural educators and service providers who work with regional farmers interested in agritourism.

The training includes workshops, webinars, and web-based resources. Supplemental educational resources include farm assessment tools, a series of educational videos on “Managing Risk on Your Agritourism Farm,” agritourism fact sheets, and an online enterprise budget tool.
Improving and Expanding Specialty Crops

Since 2008, sweet basil has been under attack in the U.S. by the recently introduced downy mildew oomycete, a fungus-like pathogen unique to this crop. This destructive disease was first reported in Uganda in 1933, but was not observed for another seventy years when basil downy mildew first emerged in Europe and later spread to the U.S. Commercial growers and home gardeners now find basil production to be an increasingly challenging task in the summer months due to unappetizing yellowing and dense sporulation of the leaf underside, which accompany basil downy mildew. With no resistant varieties available, Professors Jim Simon and Andy Wyenandt along with doctoral student Robert Pyne are working with a team of scientists from Cornell, the University of Florida, and the University of Massachusetts to develop strategies to reduce the impact of this devastating disease. Rutgers is responsible for genetics and breeding, and has made hundreds of crosses in an effort to generate marketable sweet basil varieties with downy mildew resistance. The successful production of stable downy mildew-resistant breeding lines has been followed by evaluations across locations in Florida, New York, and New Jersey. The team is currently focused on ensuring that the disease-resistant sweet basils exhibit robust flavors and aromas before being unveiled to the public.

New Jersey’s diverse population opens niche markets for ethnic crops. Atlantic County agricultural Agent Rick VanVranken worked with New Jersey farmer and Liberian immigrant Morris Gbolo to obtain funding for a three-year Partnership Grant from the Northeast Sustainable Agriculture Research and Education program to investigate production practices for growing roselle in New Jersey. Roselle is an edible species of Hibiscus (H. sabdariffa L.), also known as sour-sour and Burmese sour spinach in their native tropics. Gbolo wanted to know how best to produce roselle and other African vegetables, which he cultivates on his farm in Atlantic County. He sells Pick-Your-Own to friends from Liberia and other West African countries who have settled in the region. Traveling from locations as distant as northern Virginia and Massachusetts, Gbolo’s customers pick roselle, jute, Malabar spinach, and sweet potato leaves; habanero peppers; and bitter ball and Kiteley eggplants, often leaving with cars packed full to resell these African favorites to fellow immigrants in their neighborhoods. Gbolo has found that roselle grows better on plastic mulch with drip irrigation. And with early planting, in late August the flower calyx—even more popular than the sour leaves—is ready to harvest. VanVranken now has another ethnic crop to add to the worldcrops.org website he helped to established with colleagues from the University of Massachusetts and Cornell.
New Jersey Center for Wine Research and Education

Over the last decade, the New Jersey wine industry has expanded dramatically, more than doubling in size. With three distinct regions designated as official American Viticultural Areas (AVA), the Garden State possesses a large amount of farmland ideal for wine grape cultivation. In support of the growing New Jersey wine industry, the New Jersey Center for Wine Research and Education (NJCWRE), a new partnership between industry and academia being developed by Rutgers NJAES, was launched in 2014.

By generating and relaying current science-based information, and unifying industry members and those who serve the wine trade from throughout the region, NJCWRE is providing timely support for the educational and research needs of the wine grape industry.

NJCWRE is developing information resources including grape growing and wine making recommendations and technical tools; an exchange platform for commercial grape and wine producers; a blog to share current findings and wine industry happenings and job opportunities; and educational resources for students and educators.

The founding director of the center is Extension Specialist in Pomology Dan Ward, who is based at the Rutgers Agricultural Research and Extension Center (RAREC) in Upper Deerfield. RAREC is located deep in the Outer Coastal Plain, New Jersey’s largest AVA. The mission of the center is to facilitate the growth and development of the New Jersey wine industry, through coordinating the increasing volume of broadly based research and educational programs for the wine industry. The NJCWRE website will be a valuable resource for growers, winemakers, enthusiasts, and wine connoisseurs alike and will provide a wide range of information on educational opportunities, industry events, and research findings.

With the support of the Wine Industry Advisory Council and NJAES, the center is able to support the state’s wine industry by educating prospective winegrowers and providing valuable information for those in allied industries.

The center offers new learning opportunities, including a full-day workshop for beginning grape growers as part of the annual New Jersey Agricultural Convention and Tradeshow, and two in-depth schools in Spring 2015 on wine quality assurance and integrated pest management.

In addition, the NJCWRE is enhancing its educational offerings at the annual wine and grape symposium, Grape Expectations, with concurrent sessions for grape growers and wine makers.
Advances for the Cranberry Industry

One of only three commercially grown fruits that is native to North America, the cranberry is a signature fruit of New Jersey. Since the early days of cultivation cranberries have had a seasonal role in the American diet, but with expanded product development they have become a year-round staple. Furthering their popularity is growing evidence that supports the positive nutritional benefits of cranberries’ components such as vitamin C, dietary fiber, and polyphenols such as proanthocyanidins, flavanols, and quercitin.

Cranberries are grown in beds that have an effective lifespan of roughly 30 years, after which their production drops low enough that it usually makes economic sense to replant the fields. Replanting cranberry beds costs roughly $30,000 per acre, so it is essential to select the most appropriate variety for particular growing conditions. A web-based profitability model developed by Rutgers economics and analytics researchers allows growers to predict return on investment for renovating a cranberry field on a per-acre and per-variety basis.

Nick Vorsa, director of the Rutgers Philip E. Marucci Center for Blueberry and Cranberry Research and Extension in Chatsworth, N.J., initiated a cranberry breeding and improvement program in the 1980s that resulted in the first release of Rutgers varieties in 2006. For growers, this has been a significant step forward: the first three varieties released, Crimson Queen®, Mullica Queen®, and Demoranville®, yielded berries at much higher levels than previously available varieties. In turn, the licensing of these varieties to growers throughout the U.S. and worldwide has resulted in royalty returns to the university in excess of $5M since the initial variety release.

Vorsa and his team of research scientists and integrated pest management specialists at the Marucci Center have continued to develop new and improved cranberry varieties. The variety Scarlet Knight®, which was released in 2012, was officially dedicated in 2014. Scarlet Knight® has a uniformly deep red color and is naturally less astringent and therefore better for the fresh market than other varieties currently available. The newest variety, Haines®, named for third-generation cranberry farmer William S. Haines, Sr., one of Rutgers’ greatest supporters from the cranberry industry, was released this year and promises to have equally high impact.

Expansion of the industry to other parts of the world including Chile, Canada, and Europe has allowed for growth of the market for Rutgers cranberry varieties. Continued development of new varieties for these new markets and for properties such as heat tolerance and reduced pesticide use guarantee Rutgers’ central position in the future of the cranberry industry in New Jersey and globally.

Robert M. Goodman
Executive Director of NJAES

A century ago, Cooperative Extension came into being, bringing the research based knowledge of the land grant universities and the Agricultural Experiment Station system to people where they lived and worked. Its hands on approach to education and outreach for farmers and ranchers helped to establish the U.S. as a leading agriculture producing nation. Today, Rutgers Cooperative Extension and NJAES will need to respond with innovative and meaningful research and education to promote climate smart agriculture in this new millennium.

njaes.rutgers.edu/ag
ENVIRONMENT AND NATURAL RESOURCES

IN 1917, DR. THOMAS J. HEADLEE of the Department of Entomology at NJAES investigated an infestation of drain flies in a sewage treatment plant in Plainfield, N.J. The solution, flooding the filter periodically to prevent fly maturation, brought recognition to the importance of this work and led to a state legislative act in 1920. The act helped establish the Department of Water Supplies and Sewage Disposal at NJAES, signaling the start of student teaching and research, and the founding of the first multidisciplinary academic/research department dedicated to environmental sciences in a land-grant institution in the U.S. In 1954, one of the first full-semester courses on air pollution in the U.S. was offered at Rutgers, with a laboratory course on air sampling and analysis added a year later. The research conducted by the department reflected the environmental changes that were taking place elsewhere in the U.S. but with particular intensity in the emerging high-density state of New Jersey. The robust growth and diversity of environmental work continues today, with Cooperative Extension establishing county environmental and resource management agents to locally address issues of environmental quality.
Rutgers EcoPreserve Dedicates New Trailhead and Gateway Kiosk

In the midst of the bustling Rutgers–New Brunswick campus is 400 acres of open space known as the Rutgers EcoPreserve, which is located on lands formerly owned by the Johnson family and is adjacent to the grounds of the former World War II Camp Kilmer.

The core of the EcoPreserve is a mature forest of 150+ year-old oaks and features over 7.5 miles of multi-use trails, serving as an outdoor recreational resource for the Rutgers community. It also serves the university as an immediate and accessible natural laboratory for science and humanities education, research, and outreach. To foster greater connections between the EcoPreserve and the adjacent Livingston Campus, a new set of trails and a gateway kiosk linking to the Rockafeller Road/Avenue E Roundabout were built over the past year.

On November 16, the gateway kiosk was dedicated in a ribbon-cutting ceremony in memory of Charlie Kontos, Jr, who at the time of his death in 2010, was in the process of completing the doctoral program at Rutgers in the Department of Ecology, Evolution, and Natural Resources. A lover of wild places and all forms of wildlife, Charlie had a special passion for carnivores and was the first person to document and verify the return of the fisher (Martes pennanti) part of the weasel family, to the woods of New Jersey after its extirpation in the 1900s.

The Kontos memorial kiosk was designed and constructed by Brian Curry, a Rutgers Landscape Architecture graduate, Class of 2012, with the assistance of EcoPreserve Faculty Director Rick Lathrop, professor of environmental monitoring in the Department of Ecology, Evolution, and Natural Resources. Lathrop is also the director of the Grant F. Walton Center for Remote Sensing and Spatial Analysis on the Rutgers George H. Cook Campus.

The kiosk is built with locally sourced, sustainably harvested black locust lumber, which is a native hardwood that can be installed without any chemical sealing or pressure treating. The kiosk features acrylic panels whose colored filters interact with the colors of the landscape differently, allowing visitors to the EcoPreserve to see the environment in a different light.

The kiosk, whose construction was funded by the Kontos family, stands as a monument to Charlie’s commitment and vision in protecting wildlife and the environment.

Designer Brian Curry is pictured with the newly dedicated kiosk at the Rutgers EcoPreserve in memory of Rutgers Ph.D. candidate Charlie Kontos, Jr.
Serving NJ for over 100 years

A History of Groundbreaking Mosquito Control

The Golden Age of mosquito control began in 1896 when Rutgers professor John B. Smith opened the door for managing mosquitoes through his pioneering studies on larvicides, spray technology, biological control, and identification. His early outreach programs encouraged the public to eliminate mosquito habitat. Smith’s landmark 1912 mosquito laws were a direct consequence of his studies showing that mosquitoes were not just a local nuisance, but a statewide problem. Smith, who became known as the “Father of the American Mosquito Control Movement,” put New Jersey on the map as a model for effective mosquito control programs.

Smith was followed by other Rutgers innovators in mosquito insecticide development, source reduction, open marsh management, surveillance, repellents, public education, and other advances, making Rutgers the world’s toolbox for mosquito control. The Golden Age may have passed but mosquito control in New Jersey remains strong and resilient. Today, the Center for Vector Biology, working in partnership with county and state mosquito control professionals, continues to provide meaningful research and information for New Jersey citizens about insects and the diseases they transmit.

This year, the Area-wide Asian Tiger Mosquito Team was awarded the Plant-Insect Ecosystem Section Integrated Pest Management Team Award from the Entomological Society of America. The team is a multidisciplinary group of entomologists, educators, and economists from Rutgers, Brandeis University, the Agricultural Research Service of the USDA, and mosquito control professionals in Mercer and Monmouth counties. Work began in 2008 with funding from two USDA-ARS cooperative agreements to Rutgers and Brandeis and aimed to develop better ways to manage the aggressive invasive Asian tiger mosquito (Aedes albopictus) in the urban and suburban landscapes of the northeastern U.S. The team leveraged support from several industry groups and funding from the National Institutes of Health, the U.S. Department of Defense, and the Robert Wood Johnson Foundation.

The team’s success derived from careful operational research in biology, economics, and education tested in intervention campaigns led by professionals that directly engaged homeowners in high-density residential areas. The team developed multiple surveillance and control strategies that are now being tested at the county, state, federal, and international levels. The economic analyses, the first to assess the cost to public health of mosquitoes as nuisance, have generated important debate and are being used by epidemiologists and administrators.

The invasive Asian tiger mosquito first appeared in New Jersey in 1995. This opportunistic feeder bites during broad daylight as well as at dusk.
Evidence for climate change and sea level rise is coming in from many sources. The future impacts of these changes on New Jersey and the region will be enormous. Many faculty have directed their research work to find solutions to these new threats.

In 2012, President Obama launched the Hurricane Sandy Rebuilding Task Force to help badly damaged communities. About $1 billion was earmarked to develop creative solutions, and Rutgers faculty have played significant roles in these plans. A “Rebuild By Design” international competition was launched by the U.S. Department of Housing and Urban Development. From 148 applicants, 10 teams were picked, three of which included Rutgers faculty. One team, which included Senior Ecologist Christina Kaunzinger of the Rutgers Center for Urban Restoration Ecology, studied protection measures for Manhattan. A second team, with Professor Kate John-Alder of the Department of Landscape Architecture, studied protection measures for Manhattan. A second team, with Professor Kate John-Alder of the Department of Landscape Architecture, studied offshore barriers to curtail wave energy. A third team, which included Professors Steven Handel, Karen O’Neill, and Joanna Burger, dealt directly with the severely damaged Jersey Shore.

The Jersey Shore team, working with Sasaki Associates and ARUP Engineering, defined resiliency of the shore as needing ecological, economic, and social improvements. Addressing all three components can ensure the future securing of shore communities.

For the Natco Lake area in Monmouth County, the team recommended enlarging the lake to allow coastal habitats and natural resources to migrate inland as Raritan Bay rises. Protections from new berms for the surrounding communities will be coupled to new ecological marine resources in the renewed lake. This is a model for many other coastal towns.

At Asbury Park, the team recommended a suite of landscape improvements: more beautiful and ecologically functioning boardwalks, improved edges and drainage of the coastal lakes, such as Deal Lake, and replacing old streetscapes with modern ecological engineering ideas including bioswales, porous paving, and native plantings. Together these remedies add beauty and function to secure community life.

At Toms River and the nearby barrier island, the team developed plans to allow migration of natural resources and civic life to the mainland, as the barrier island and many of the marshlands in Barnegat Bay disappear under the rising waters. In this way, the character and economic drivers of the Jersey Shore continue, although business and residential life moves to be safe from future flooding events.

In this rendering, Natco Lake near Keansburg can be improved by making it larger and better habitat for marine species. As the sea level rises, plants and animals will enter the channel to the newly productive Natco lake, sustaining our coastal resources.
Protecting Our Lakes and Ponds

Excessive plant growth, algal blooms, oxygen depletion, sediment build-up, bank erosion, and pests are the most common issues faced today in the management of lakes and ponds in New Jersey. Rutgers Cooperative Extension is working to improve, protect, and manage our water resources throughout the state.

Nutrients enter water bodies in storm runoff from nonpoint sources such as fertilized lawns, soil erosion, recreation fields, and plant material. Excess nutrients stimulate the rapid growth of aquatic algae that use up oxygen in the water and block sunlight from reaching beneficial aquatic plants. To improve lake and pond water quality, Mike Haberland, environmental and resource management agent for Camden and Burlington counties, has been using underwater aeration to create artificial circulation to enhance oxygen levels within lakes and ponds that experience algal blooms due to excessive nutrients—nitrogen and phosphorus—in the water. In addition, he has created do-it-yourself artificial floating wetlands that use plants and microbial “biofilms” to absorb excess nutrients. Haberland is also testing the use of beneficial bacteria to reduce the levels of nutrients in water bodies.

In rural areas of the state, we rely on farms and other agricultural operations to conserve water and prevent water pollution. One method of water conservation used by plant nurseries in New Jersey is to collect runoff water in an impoundment, or constructed pond, where it is then treated and reused for irrigation. County Extension Agents Sal Mangiafico (Salem and Cumberland) and Jim Johnson (Cumberland) work with nursery operators to help them manage their operations, keep their ponds functioning, and protect the environment. Their outreach to the agricultural community includes educating operators on best practices to prevent soil erosion in production areas, manage stormwater, improve irrigation, and promote sustainable fertilizer practices.

Patricia Rector, environmental and resource management agent for Morris and Somerset counties, and Peter Nitzsche, agricultural agent for Morris County, are involved in research, education, and outreach to address aquatic invasive species, in particular water chestnut (Trapa natans). Aquatic invasive species impact water uses such as boating, swimming, drinking water quality, wildlife habitat, fishing, irrigation, aesthetics, real estate values, and human health. The Lake Musconetcong Regional Planning Board estimates the economic impacts from water chestnut in the watershed at $2.5 million annually. For this project, Rutgers Cooperative Extension research provides information on the germination of seeds, technical assistance for lake management, as well as education and outreach.

njaes.rutgers.edu/environment
RESEARCH IN SHELLFISHERIES at Rutgers began in 1888 when biologist Julius Nelson was hired by the newly established NJAES. In 1901, the New Jersey Legislature recognized the value of Nelson’s work on biological problems of clams and oysters by passing legislation, which led NJAES to establish research stations dedicated to the mission of scientific assistance to the oyster industry. NJAES research, which first began at a small laboratory built near Tuckerton, N.J., has expanded to investigating a vast array of challenges facing New Jersey’s fishing industry as a whole. Award-winning research at Rutgers NJAES is coupled to outstanding extension efforts in areas like aquaculture, recreational and commercial fisheries management, bacteriology, ecology and habitat restoration, genetics and breeding, numerical modeling, pathobiology, and shellfish restoration to promote and strengthen the economic viability of New Jersey’s fishing industry.
Birds do it, bees do it, and oysters do it too, but in a very different way. Sex in oysters is complicated and interesting. Oysters mature mostly as males first, and change to females in subsequent years. Females can change to males also, and occasionally some oysters develop as hermaphrodites. Such a complex sexual system is probably beneficial to hermaphrodite oysters, which cannot move around, but how it is controlled molecularly remains unknown.

New research, conducted by Haskin Shellfish Research Laboratory (HSRL) shellfish geneticist Ximing Guo and his team, has provided some insight. Guo’s team searched the oyster genome for all known sex-determining genes from worms, flies, and mammals. Surprisingly, they found that sex determination in oysters is apparently more similar to that of humans than to that of worms and flies. This finding suggests that the basic mechanisms of vertebrate sex determination are deeply conserved and oysters may use the same machineries, albeit with different regulators, including environmental cues.

Oyster grounds located along the extensive intertidal sand flats of the Delaware Bay support an emerging and productive oyster aquaculture industry. Here, oysters are exposed to air twice daily during low tide. Previous studies from the Pacific Northwest have shown that intertidal exposure can accelerate the proliferation of vibrios, common estuarine bacteria responsible for sporadic cases of illness associated with the consumption of raw or undercooked shellfish. To evaluate whether this result applies to the Mid-Atlantic as well, Aquaculture Program Coordinator Lisa Calvo and HSRL scientists Tal Ben-Horin and Dave Bushek studied whether levels of total and pathogenic *Vibrio parahaemolyticus* (Vp) differ between oysters cultivated intertidally and subtidally along the Delaware Bay Cape Shore.

The project, supported by NESARE-USDA, found no significant differences in levels of Vp between subtidal and intertidal oysters. However, initial results suggest that the relationship between intertidal environmental conditions and vibrio levels in harvested oysters is not as straightforward as previously thought.

Researchers have received a grant from NOAA Sea Grant to continue this work, which will provide important scientific information for the development of locally relevant harvest and management practices to minimize the risk of vibrio illness.
Developing and Managing Offshore Fisheries

Helping New Jersey fisheries remain sustainable is a primary mission of the Haskin Shellfish Research Laboratory (HSRL). A new fishery that targets the common whelk is emerging off the coast of New Jersey. To succeed, more information on the biology and sustainability of the stock is needed. HSRL researchers Daphne Munroe and Eleanor Bochenek are working with industry and federal fishery scientists to gather information with funding from the NOAA Saltonstall-Kennedy Grant program. By collecting information on whelk abundance using new underwater imaging survey techniques (HabCam), and gathering baseline data on whelk biology and population demographics, they will help establish a foundation for sustainable management to ensure responsible fishery development.

This past summer, five undergraduate interns joined the HSRL team to help tackle these and other pressing research questions about sustainability and dynamics in various shellfish fisheries and farms. From assessment of whelk abundance on the continental shelf, to transmission of disease among oyster stocks, to lessons in ancient food sustainability from west coast clam gardens, the interns all contributed in developing new information to help sustain important coastal food production systems.

In addition, HSRL researchers Bochenek and Sean Martin have undertaken an electronic vessel trip reporting program (eVTR), a joint venture with the commercial fishing industry, academia, and the federal government. The goal is to demonstrate the effectiveness of eVTR using Fisheries Logbook and Data Recording Software (FLDRS) developed by the National Marine Fisheries Service to provide commercial fishermen a method to electronically report catch and bycatch in near real time. Electronic reporting will greatly increase the amount and quality of data, permitting managers to see the length and track of the tow, the gear used, and even how many fishermen were on the vessel.

To date, 25 New Jersey commercial fishing vessels, primarily scallopers and draggers, are using FLDRS. The Rutgers Fisheries Cooperative Center helps train the fishermen in the use of the software and troubleshoots issues as they arise at the dock and on the fishing vessel. Partners in the eVTR program include the Garden State Seafood Association, Lunds Fisheries, Atlantic Capes Fisheries, Viking Village, the North Atlantic Clam Association, the Coonamessett Farm Foundation, and the National Marine Fisheries Service. Plans are to expand the program to about 50 surfclam-ocean quahog vessels from Massachusetts to New Jersey.
Science-Based Approach to Manage Shellfish Diseases

Aquaculture is the fastest growing segment of agriculture in the U.S. Shellfish aquaculture is growing rapidly along the East Coast of the U.S. and regulators are struggling to keep up with interstate transfers of shellfish seed and stock. Shellfish provide many ecological benefits but are susceptible to a number of pathogens that can have a devastating impact on production.

As shellfish movement increases to support the growing industry, many regulations are harming the industry due to a lack of information or understanding about actual risks of spreading disease. In the absence of information about risk levels, regulators can take overly cautious stances. If industry members perceive regulations as unnecessarily cautious, they may potentially bypass biosecurity measures assuming they will do no harm.

Haskin Shellfish Research Laboratory Director Dave Bushek and Aquaculture Program Coordinator Lisa Calvo are working with Research Associate Professor Ryan Carnegie and colleagues at the Virginia Institute of Marine Science (VIMS) and the USDA Animal and Plant Health Inspection Service Veterinary Services to develop better regulations based on biology and ecology rather than political jurisdictions, and to develop better diagnostics for shellfish pathogens. Bushek and Carnegie direct shellfish pathology labs that perform dozens of health evaluations for industry each year. Health risks to shellfish include oyster diseases such as MSx, SSO, and Dermo, and the clam disease QPX. While these diseases do not affect humans, they do threaten the health of infected shellfish (both farmed and wild), and the operations and profitability of shellfish growers.

With support from USDA as well as New Jersey and Virginia Sea Grants, an initial two-day workshop that included scientific colleagues, shellfish farmers, and government officials was held at the VIMS Gloucester Point campus in October. Its purpose was to identify strategies for a regional, science-based approach to shellfish management, especially options for improving management of oyster and clam diseases in light of the region’s rapidly growing aquaculture industry.

Following the success of this initial workshop, NOAA’s Aquaculture program is supporting a larger workshop to include regulators, shellfish pathologists, and industry members from throughout the Atlantic Coast at the Northeast Aquaculture Convention and Exposition in January 2015. The goal is to develop information and guidelines that can support regulatory decisions and control while minimizing impacts to this developing industry.

Oyster farmer washing aquaculture racks along the Cape Shore region of Delaware Bay adjacent to the Rutgers Cape Shore Laboratory. One of the greenest industries developing in New Jersey, shellfish aquaculture has no food, fertilizer, or pesticide inputs, helps filter water, and provides structures that add habitat complexity.

From left, Rutgers colleagues Byoung-Ju Choi, Elizabeth Drenkard, Raphael Dussin, and Enrique Curchitser, named U.S. Academic Delegate to PICES by the U.S. Department of State.
Oceanographer Recognized as U.S. Academic Delegate

Research has shown that increased ocean temperatures and sea level rise will impact ecosystems, especially in coastal regions. Rutgers scientists have been engaged in a range of research related to climate—from the more focused research on the ways in which marine fish and other animals are adapting to warming oceans and other climate impacts to the broader regional focus of evaluating how climate affects coastal regions and, in turn, the ecosystem’s response.

Enrique Curchitser, associate professor of physical oceanography and modeling in the Department of Environmental Sciences develops and uses numerical models to address questions relating to the impacts of climate change on coastal environments, with an emphasis on marine ecosystems. His work on modeling the Atlantic Ocean is being used to inform fisheries management on butterfish habitat. In the Pacific Ocean his work on modeling sardine and anchovy population cycles is addressing long-standing questions of what drives natural cycles of fish populations, the effects of fishing, and how these might evolve in a changing environment.

The impact of his work and his 10-year association with the North Pacific Marine Science Organization garnered Curchitser the appointment as United States Academic Delegate to the Pacific International Consortium for the Exploration of the Seas (PICES). This international, inter-governmental organization promotes and coordinates marine scientific research and scientific information, and data exchange among its members. PICES advances scientific knowledge of the temperate and sub-Arctic region of the North Pacific Ocean and its adjacent seas.

Curchitser is the first person from Rutgers and the first faculty member of any academic institution on the East Coast to hold this position since the inception of the organization in 1992. The appointment, made on June 3 by the U.S. Department of State, expressly authorizes the U.S. Academic Delegate “to carry out the Secretary’s functions relating to oceans, environmental, scientific, fisheries, wildlife, and conservation affairs.” Among the responsibilities of the Academic Delegate is to advise the U.S. State Department as well as help steer the scientific direction of the organization.

The contracting parties of PICES include Canada, Japan, the Peoples’ Republic of China, the Republic of Korea, the Russian Federation, and the U.S. Curchitser is one of two U.S. delegates to the Governing Council of PICES. One is a federal employee, usually someone from the National Oceanic and Atmospheric Administration, and the other a representative from the academic community.

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Doug Fisher
New Jersey Secretary of Agriculture

New Jersey is an agricultural powerhouse, ranking in the top 10 in the nation in the production of blueberries, peaches, cranberries, spinach, sweet corn, tomatoes, and peppers. With our mission to grow and strengthen the agricultural industry, we appreciate partners like NJAES that provide critical services for our farmers. As an example, we work closely with NJAES to assist aquatic farmers in exploring opportunities to grow the aquaculture industry.

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2014 Annual Report
FOOD, NUTRITION, AND HEALTH

THE SIGNING OF THE FEDERAL SMITH-LEVER ACT OF 1914 established Cooperative Extension, the nationwide transformational education system operating through land-grant universities across the U.S. Widely recognized as having a transformative role in U.S. agriculture, less well known is the impact of the Smith-Lever Act on Cooperative Extension’s efforts in home economics. Early extension programs helped women and their families stretch their food dollar, eat healthier foods, design more efficient kitchens, work more efficiently in the home, sew clothing, reupholster and refinish furniture, improve school meals, and manage family finances. The introduction of modern appliances and prepared foods into homes launched research on frozen foods and the transition to easy meal preparation. Today, robust extension efforts broadly cover food, nutrition, and health, promoting family and community wellness programs and using the best scientific research to combat society’s pressing challenges like obesity, food security and access, and food safety, including home food preservation.
Institute for Food, Nutrition, and Health

With the New Jersey Institute for Food, Nutrition, and Health (IFNH) opening the doors of its new facility on the George H. Cook Campus in the fall of 2015, children and parents in New Jersey will have a new and exciting opportunity to engage in innovative programs in nutrition and health.

The epicenter for these activities will be the IFNH Center for Childhood Nutrition Education and Research (CCNER) led by Professor Daniel Hoffman of the Department of Nutritional Sciences. The mission of CCNER is to improve the health trajectory of children by promoting a “culture of health” underpinned by integrated research and evidence-based education programs.

As CCNER accelerates and expands its programs, it will become a model for the state and nation, and a unique resource for the community. To deliver on its promise, CCNER is building a network of strategic alliances. For example, CCNER recently entered into a partnership with ChopChop Kids, a high-profile non-profit organization whose mission is to inspire and teach kids to cook and eat real food with their families. The CCNER-ChopChop Kids relationship affords students the opportunity to experience first-hand what it takes to produce a fun, educational, multilingual, international publication.

Schools and families will soon be able to visit CCNER for cooking and nutrition classes taught by celebrity chefs, IFNH nutrition ambassadors, food scientists, and local farmers. Notably, these classes will include food and produce sourced from farmer’s markets to reflect both the agricultural and cultural diversity of New Jersey.

In this regard, CCNER will work closely with the family of IFNH centers that include the Centers for Health and Human Performance; Digestive Health; and Food Policy, Law, and Ethics.

Finally, recognizing that proper childhood nutrition is a global need, CCNER offers Rutgers students international travel internships to countries like Brazil where they can experience first-hand the challenges of caring for and educating children and families in developing countries about nutrition and health.
Parents of young children act as the gatekeepers of the home environment and serve as powerful role models. Consequently, parents instilling healthy behaviors during these formative years is key to guiding children to healthy choices. Spurred by the 17.3 percent obesity rate in New Jersey among children under five, nutritional science professors Carol Byrd-Bredbenner and John Worobey, and research associate Jennifer Martin-Biggers created HomeStyles, an 18-month online program that offers quick, fun tips to educate parents of preschoolers on how to shape their homes and lifestyles. This program is based on the premise that every parent—even those with busy lives and tight budgets—can create health-minded homes and lifestyles. The key is to implement simple changes over time.

The educational program aims to help New Jersey parents reshape home environments and lifestyle practices to raise happier, healthier kids. HomeStyles is a series of self-guided sessions that parents can access online on their own. The Rutgers team is recruiting 900 families with children 24 to 48 months old to participate in the program, which is provided in English or Spanish. These families will be part of a study to assess the effectiveness of online intervention on home environments and lifestyle practices in preventing excessive weight gain and improving home safety with preschoolers.

Participants must have access to the internet and a printer to participate. Families can choose the area they want to focus on and then select the guide that provides tips for making small but significant changes. Topics include eating together as a family, rethinking beverage choices, dealing with picky eaters, chemical and pesticide safety, washing hands correctly, promoting adequate sleep, and trading TV time for active play. Families receive gifts to help them make their homes and lifestyles healthier, and can earn money by completing surveys.

While working on a guide, parents receive helpful assistance from motivating messages tailored to the guide they selected through phone, email, or text, encouraging them to make small adjustments, which add up over time. When a family finishes the program, changes in both the family’s behavior and their home environment are measured. The project, a collaboration with the University of Arizona and Prevent Child Abuse New Jersey, is funded by a USDA grant. The goal is to implement this program nationwide. Visit HealthyHomeStyles.com to learn more!
Advancing the Availability of Beneficial Compounds

As research sheds light on the ability of bioactive compounds in foods to enhance health and prevent disease, there is interest in increasing the functionality of foods by boosting beneficial compounds in existing products. In addition to benefiting consumers, these developments can offer new opportunities for local growers.

Consumer interest in nutraceuticals from natural marine-derived sources of bioactive compounds has been growing, along with attention from the animal feed industry wanting to add high-quality marine protein to their products. Researchers at the Rutgers Aquaculture Innovation Center (AIC) and the New Use Agriculture and Natural Plant Products Program (NUANPP), in partnership with the private sector, are assessing the nutritional value of microalgae and developing techniques to optimize their culture. The program features a novel, membrane-based technology that uses minimal energy and water to culture microalgae. Advantages of this design include high growth rates and minimal space requirements leading to large-scale production of high-value natural products. Farms with greenhouse capacity are particularly well-suited to incorporate this technology into their operation.

To date, the investigation has focused on optimizing the technology with well-known microalgal species used to feed oysters at the AIC. Investigators have recently began focusing on algal species that possess valuable bioactive compounds (such as carotenoids, xanthophylls, and proteins) that are ideally suited to grow and adhere to the culture membranes.

Foods high in polyphenols have been shown to protect against diabetes, cardiovascular disease, memory loss, inflammation, and cancer.

Rutgers Distinguished Professor in Plant Biology Ilya Raskin has boosted the polyphenol content of lettuce, a widely consumed and affordable vegetable. The Raskin lab research team started with red leaf lettuce, and using a non-transgenic process of tissue culture, replicated plant cells in a petri dish, propagated them in growth chambers, and analyzed them for levels of polyphenols, anthocyanins, and other antioxidants. The result was a deep burgundy red lettuce that has elevated levels of polyphenols, two to three times that of blueberries, considered the gold standard of antioxidant foods.

Given the name Rutgers Scarlet Lettuce (RSL), this high-polyphenol lettuce also has a low glycemic index, which helps prevent spikes in blood sugar that foods high in carbohydrates or sugars, such as fruits and berries, can cause. The Rutgers lettuce is also high in chlorogenic acid, a compound found in elevated amounts in green coffee beans and known for its beneficial properties in combating diabetes, metabolic syndrome, and obesity. RSL, which is available in supermarkets in the U.S. under the trade name Nutraleaf™, has been patented and licensed to Nutrasorb LLC, a Rutgers spin-off company that specializes in enhancing phytoactive compounds in foods. A license has been granted to Shamrock Seeds for commercial marketing of the seeds.
Expanding Nutrition Education Partnerships

FoodCorps is a nationwide program dedicated to teaching children about healthy food, how it grows, and where it comes from, in addition to ensuring they have access to these foods every day. Part of the AmeriCorps Service Network, and serving under the direction of state and community partners, FoodCorps members across the country dedicate a year of public service to help children grow up in healthy school food environments. In New Jersey, FoodCorps is hosted by the Rutgers Cooperative Extension Department of Family and Community Health Sciences (FCHS) and the New Jersey Farm to School Network.

FoodCorps expanded into New Jersey in September of 2013 and added a network of eight service sites delivering farm-to-school programming to high-need communities to combat childhood obesity. FoodCorps service members are placed with partnering service sites throughout the state to participate in three main activities, which are also known as the “three pillars” of FoodCorps: engaging kids and school staff in school gardens; teaching kids about healthy food; and improving farm-to-school access. New Jersey members are serving at schools in Newark, New Brunswick, Trenton, Paterson, Camden, Salem, Clayton, and Woodstown.

In April, FoodCorps New Jersey service member Alexis Sangalang joined First Lady Michelle Obama and five other FoodCorps leaders to plant the sixth season of the White House Kitchen Garden with students from Washington, D.C. Sangalang serves with the New Jersey Partnership for Healthy Kids in Camden, N.J., and works closely with Campbell’s Healthy Communities to serve six schools and community partners in Camden.

Steepled in Cooperative Extension’s tradition of providing practical, hands-on, research-based information to the public, two New Jersey programs work through community partnerships to assist low-income residents in improving their families’ nutrition. These programs are the Expanded Food and Nutrition Program (EFNEP) and the Supplemental Nutrition Assistance Program – Education (SNAP-Ed). New Jersey SNAP-Ed, which was established in 1997, will be offered statewide for the first time in 2015, while EFNEP has served the neediest New Jersey residents for nearly half a century. The success of these programs can be directly attributed to the synergy resulting from the programs’ collaborations with more than 500 partnering agencies and organizations. For example, children in low-income schools participating in the federal Fresh Fruit and Vegetable Snack Program now enjoy nutrition education activities that make eating these healthy foods “the thing to do” and fun! In March, when awareness about colon cancer is heightened, screenings are done by the New Jersey Department of Health while EFNEP and SNAP-Ed staff provide practical nutrition tips to those screened in food pantries and churches across the state.

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Bradley I. Hillman
Director, Research

Research for the New Jersey Agricultural Experiment Station is carried out on the George H. Cook Campus by members of every academic department at the School of Environmental and Biological Sciences, as well as at research farms throughout the state, and marine stations on the Delaware Bay and the Atlantic Coast. Our partnerships with federal, state, and local agencies; industry stakeholders; and frontline personnel of Rutgers Cooperative Extension ensure that our impact is broad and deep.
HOME, LAWN, AND GARDEN

IN THE EARLY YEARS of NJAES and Rutgers Cooperative Extension, New Jersey’s landscape was largely rural, but there was an emerging interest in gardening and beautifying home grounds. During the 1920s, a Cooperative Extension news service brought up-to-date information on gardening to thousands of residents through local newspapers. The World War II era saw extension personnel assisting in the development of “Victory Gardens” to aid the war effort. The post-war boom of suburban New Jersey ushered in an expanding need for information for homeowners to care for their lawns and gardens. As turfgrass became a vital feature of residential properties, sports fields, and golf courses, the need for turfgrass maintenance information and improved varieties ushered in unprecedented research and outreach opportunities. Supporting the growing demand for research-based horticultural information, the Rutgers Master Gardener program trained a citizen corps of home gardeners to provide outreach and community service. The proliferation of community gardens in urban centers has added new impetus and focus to the mission of NJAES, further strengthening its role as New Jersey’s valued resource for horticultural information and services.
Girl Scout Troop’s Lesson in Healthy Eating Begins with Children’s Garden

The New Brunswick Community Farmers Market (NBCFM) is a partnership among Rutgers Cooperative Extension, Johnson & Johnson, and the City of New Brunswick that began in 2009. In addition to providing residents with local, fresh foods from June to October through three locations in New Brunswick, the market features the Esperanza Community Garden and the Children’s Garden at its Jones Avenue NBCFM location.

This year Junior Girl Scout Troop 82010 from Roosevelt School and the NBCFM worked together to build the Children’s Garden. The girls worked on the garden as part of their “Take Action Project” assignment, the last step needed to complete the Agent of Change Leadership Journey they worked on throughout the year.

NBCFM’s Nutrition Outreach Coordinator Carolina Mueller visited the troop early in spring and spoke about the importance of the Children’s Garden for the community of New Brunswick. She discussed with the girls the different flowers and vegetables they could plant and worked with the girls to create “Garden Guardians,” including a tin man out of recycled cans and a clay pot man. At that first meeting the girls requested strawberries for planting in the garden. With a donation from Pop’s Farm and Garden Center, the local vendor at the NBCFM, the girls planted 16 ever-bearing strawberry plants, ensuring a steady supply of fruit throughout early summer.

In May, the troop visited the garden and enthusiastically prepared it for planting; they weeded, tilled the soil, and planted vegetables and flowers, transforming the plot of earth into a garden. Later in the growing season, the troop visited the garden for educational activities, and to taste the fruits of their labor and learn about healthy eating habits.

Esperanza community gardeners and volunteers at the NBCFM pitched in to keep the Children’s Garden weeded and watered throughout the season.

Roosevelt School is the largest elementary school in New Brunswick and is a port-of-entry school for new immigrants, with the majority of students of Hispanic origin. The troop is part of Girl Scouts of Central and Southern New Jersey whose mission is to build girls of courage, confidence, and character to make the world a better place.

Members of Girl Scout Troop 82010 planting strawberries in the Children’s Garden at the Jones Avenue location of the New Brunswick Community Farmers Market.
Serving NJ for over 100 years

Fine-Tuning Turfgrass Through Breeding Enhancements

The Rutgers University turfgrass breeding program was initiated in the 1960s and rapidly gained international recognition as one of the best and largest turfgrass breeding programs in the world. The breeding program has produced the world’s largest collection of cool-season turfgrass germplasm as well as the top-performing commercial cool-season turfgrass cultivars from more than ten turfgrass species.

The development of improved turfgrass cultivars with genetic resistance to important turfgrass pests and environmental stresses has been a priority at the New Jersey Agricultural Experiment Station for more than 50 years. New improved cultivars become available to clientele such as sod growers, athletic field managers, golf course superintendents, and homeowners through licensing to various grass seed companies.

Research Associate Josh Honig, in collaboration with turfgrass breeders Stacy Bonos and William Meyer, is helping to expand the scope of the program by developing molecular genetic DNA markers for use in the turfgrass breeding program. These can be thought of as DNA fingerprints that ensure clientele receive the correctly named cultivar when purchasing seed or sod, help protect university intellectual property, and help associate stretches of DNA (turfgrass genes) with important agronomic traits. DNA research has already been completed for Kentucky bluegrass (used for athletic fields and landscape turf) and multiple species of bentgrasses (used for golf course turf). Research on tall fescue, perennial ryegrass, and multiple species of fine fescues is underway.

The U.S. Department of Agriculture awarded a $2.1 million grant to Rutgers and the University of Minnesota to develop fine fescue, a highly drought-tolerant grass native to Europe. This grass is used throughout the world in grazing pastures, ornamental landscaping, and home lawns and has proved to be less susceptible to disease and wear. Fine fescues maintain density and stay green with almost no water or fertilizer, as opposed to the tall fescues more commonly used in lawns.

Part of the painstaking process of developing this fine fescue requires conducting tests of homeowners and groundskeepers to determine their preferences in a lawn as well as getting feedback on how best to market this grass to consumers. To this end, researchers at both Rutgers and the University of Minnesota surveyed homeowners and invited them to visit research plots to examine varieties of turfgrass. Since fine fescue is not often among the various grasses sold in garden centers and is typically more expensive, determining what people are willing to pay upfront to avoid later maintenance costs for fertilizer and water is a key consideration of the field surveys.

Participants in “Rutgers Turfgrass Research Field Days” listen to a Rutgers researcher discuss new varieties of turfgrass during the annual event.
Rutgers V.E.T.S. Program Grows Green Opportunities

New Jersey has the highest veteran unemployment rate in the nation, higher than 10 percent. These unemployed veterans are often an underserved, vulnerable population that can benefit from job training.

Through a partnership coordinated by Rutgers Cooperative Extension (RCE) of Essex County, unemployed New Jersey veterans have been trained through a green job skills program focused on sustainable landscaping and stormwater management.

At the East Orange Veterans Affairs Hospital, veterans were able to learn green job skills as they served as an important workforce for preventing stormwater damage and beautifying hospital grounds. The success of this effort provided a fertile ground for growing a broader program, the Rutgers Veterans Environmental Technology and Solutions Program (Rutgers V.E.T.S.) that encompasses developing these skills within an entrepreneurial framework.

In May, RCE of Essex County launched the Rutgers V.E.T.S. program to train veterans in sustainable landscaping, stormwater management, and urban agriculture. By including the key component of training in entrepreneurship, the veterans are being provided needed training and support to become small business owners by the end of the program.

The program is led by Jan Zientek, senior program coordinator for RCE of Essex County, and Amy Rowe, environmental and resource management agent, RCE Essex and Passaic counties.

So far, 15 veterans have been working hard to make the Rutgers V.E.T.S. program a success. In addition to installing an irrigation system in Presby Memorial Iris Gardens in Montclair, they have planted new dogwoods in Essex County’s Brookdale Park and have pruned, weeded, and mulched in Newark’s Branch Brook Park. The hands-on fieldwork reinforces the concepts learned in the classroom and gives the vets valuable landscaping experience. The veterans have also created a new community garden in Newark that will provide fresh vegetables for the members as well as supply a local food bank during the season.

Upon finishing the program, the V.E.T.S. participants will have earned state licenses in pesticide and fertilizer application. Rutgers V.E.T.S. is funded by the Lower Passaic River Cooperating Parties Group, which provides an educational stipend to the veterans. This stipend enables the participants to focus full-time on mastering the knowledge and skills to begin a new career in horticulture or agriculture.
Rutgers Master Gardeners Serve Communities In Need

Rutgers Master Gardeners are trained volunteers who assist Rutgers New Jersey Agricultural Experiment Station and Cooperative Extension in its mission to deliver horticultural programs and information to the general public. In addition to the rigorous training requirement of the Rutgers Master Gardeners program, a key component is volunteering. Throughout the state, Rutgers Master Gardener volunteers are helping “green” New Jersey communities in diverse ways.

In Atlantic City, a community garden is flourishing through the involvement of Rutgers Master Gardener volunteers in Atlantic County. The Hope Community Garden is utilized by Atlantic City Housing Authority residents, and starting in 2011 the volunteers built raised beds at the 4,500 square-foot site. With help from AtlantiCare Growing Green, the master gardener volunteers organize monthly activities at the Hope Community Garden, like teaching organic gardening techniques and healthy food preparation skills. The master gardeners continue to develop the site by adding a perennial flower garden to attract beneficial insects and pollinators, and building raised garden beds that provide barrier-free access for residents with wheelchairs, scooters, and canes to easily maneuver and fully enjoy the horticultural and therapeutic benefits of the garden space.

For three years, a team of master gardeners from Hunterdon County has been volunteering at Anderson House, a transitional residence program serving women recovering from alcohol and drug addiction. Rutgers Master Gardeners work side by side with residents to plan, establish, maintain, and harvest a bountiful vegetable garden. The residents benefit from the fresh produce as well as the knowledge and experience in horticulture that can be applied to other areas of their lives.

Somerset County Rutgers Master Gardeners have partnered with a special needs camp and two assisted-living homes to prepare, plant, and maintain in-ground, potted, and raised vegetable gardens in the camp and one of the assisted-living facilities. In the other facility, Rutgers Master Gardeners provide indoor sessions on houseplants, sensory programs with herbs, tomato tastings, nature programs, and holiday flower arrangements.

Four years ago, Rutgers Master Gardeners in Cumberland County started a Children’s Learning Table to use at various fairs and programs in the county. Learning activities include: Importance of Soil and Composting; My Plate and Healthy Eating; Salad Greens Tastings and Plantings; The Importance of Birds to Our Environment; and Identifying Animals of the Farms and Forest by Their Tracks and Scat. These master gardeners have undertaken a variety of tasks including making track molds, providing support at teaching stations, and general logistics.
YOUTH AND COMMUNITY DEVELOPMENT

IN THE LATE 1800s, researchers found that young people who were new to agriculture were often open-minded and eager to experiment with novel ideas and share their experiences with adults. This became the basis of rural youth programs, which essentially began as a way to introduce new agricultural technology to farming communities. While these early youth club members mostly lived on farms, that is largely no longer the case. In New Jersey, Rutgers 4-H continues to offer a variety of clubs for youth that involve raising animals, but today only 1 percent of its 4-H participants actually live on a farm. Rutgers 4-H statistics show that 22 percent are from the suburbs while 77 percent are from towns and cities. Today’s NJAES youth development programs continue to engage youth to “learn by doing,” but with a diversified offering of both traditional and novel programs that engage youth across New Jersey.
Project Rise Engages Disconnected Youth in New Jersey

Project Rise is a young adult internship program administered by the Mayor’s Fund to Advance New York City and the Center for Economic Opportunity. It is primarily funded by the Corporation for National and Community Service’s Social Innovation Fund, a public-private partnership created to replicate successful programs and build evidence for ways to reduce poverty and improve communities.

Project Rise helps unemployed 18–24 year-olds who are currently out of school and lack a high school diploma to reengage in productive activities via a combination of educational opportunities, paid internships, and case management as a pathway to long-term economic self-sufficiency. The program has been implemented at five sites in the U.S. by various organizations, including Rutgers University’s Transitional Education and Employment Management (T.E.E.M.) Gateway in Newark. Local partnerships include the Newark Mentoring Movement, Garden Savings Federal Credit Union, and Urban Renewal Corporation. Local funding is provided by the Victoria Foundation and JPMorgan Chase.

A rigorous curriculum is designed to prepare students not just for mastery of the skills assessed on a test but also for an increased academic competence that will help them transition from high school graduation or GED to higher education and employment. Project Rise’s education component features challenging content in all subject areas, individualized and small-group instruction, and regular progress assessments. In addition, the program incorporates incentives to reinforce the value of education and commitment among participants. Educational programming is paired with paid internships.

To ensure that Project Rise serves its target audience and that intervention strategies are sustainable, in-depth and ongoing evaluations are conducted by MDRC, a nonprofit, nonpartisan education and social policy research organization dedicated to improving programs and policies that affect underserved communities.

To date, 80 Newark participants have obtained their high school diploma or GED, a leading educational achievement among the five funded cities in the program’s three-year history. Project Rise–Newark increases its internship and employment placements each year. Currently, more than 35 community and local businesses partner with Project Rise to meet the diverse interests and needs of participants. Also, 26 youths have attained post-secondary or technical school training while 45 have gained unsubsidized employment.

Nydira Henson, 2014 Project Rise graduate, proudly poses with her daughter. Henson received her high school diploma and credits her child as the inspiration to return to school.
Serving NJ for over 100 years

**Student “Cranbassadors” Become Cranberry Experts**

What happens when you have an engaged scientist and an agriculturally-minded teacher and you put them together in a parent-teacher conference? You get the Cranbassadors program, which educates students who are experts in all things cranberry. The program is the brainchild of NJAES Extension Specialist in Plant Pathology Peter Oudemans and Mullica Township teacher Barbara Rheault who wanted to connect students to the local agriculture of the New Jersey Pinelands. These students are well versed in the science and culture behind growing this signature fruit of the Garden State, and serving as young ambassadors of the industry.

The Cranbassadors program was initiated in 2009 as a collaboration between the Mullica Township School District, Rutgers’ Philip E. Marucci Center for Blueberry and Cranberry Research and Extension, and the American Cranberry Growers Association. The program was developed in part to provide an experiential learning program for middle- and high-school students while broadly educating them on farming practices. The students learn about the cranberry industry and what it takes to grow and harvest cranberries. They experience this traditional New Jersey industry from the perspective of past, present, and future by meeting the people involved in the industry, including growers, specialists, scientists, and naturalists. At the Marucci Center, the students are exposed to faculty experts in cranberry pathology, entomology, breeding, and molecular biology.

After completing the summer training program the Cranbassadors are equipped to teach others about the cranberry industry. They do this across a variety of venues and they demonstrate their accumulated knowledge by conducting interpretive harvest tours during the annual Chatsworth Cranberry Festival in October. They also staff an information booth at the New Jersey Cranberry Harvest Kickoff Festival at historic Whitesbog Village, as well as provide exhibits and information for the annual Cook Community Alumni Fall Festival. Cranbassadors have also hosted tours for private groups including church groups, scientific societies, and parochial school classes.

At the end of each harvest season the Cranbassadors are rewarded for their hard work with the opportunity to wade in the cranberry bogs among the floating berries waiting to be corralled and gathered for processing—just like the Justin and Henry characters from the Ocean Spray® commercials. These students are literally and figuratively immersed in learning and appreciating the farmers and agricultural industry of the Garden State.
Youth and Community

Fostering Stewardship and Sustainability for Communities

In 2009, residents of the City of Trenton identified abandoned properties as their highest priority concern in an environmental health assessment. The Trenton Neighborhood Restoration Campaign, a group of regional stakeholders chaired by Isles, Inc., a Trenton-based non-profit organization, joined with the City of Trenton to develop cost effective and creative strategies to address its vacant and abandoned properties. Isles, Inc. is also seeking strategies to integrate these properties into an expansion of Trenton’s food network, which requires an accurate survey of problem properties across the city.

The Rutgers Center for Urban Environmental Sustainability (CUES), which combines the university’s best science, engineering, and design expertise to address urban environmental issues, was engaged in a large-scale project that included conducting a citywide field survey using GPS to verify abandoned property. In summer 2014, the condition of over 31,000 parcels of land—occupied, vacant, or abandoned—was recorded by CUES student interns with support from community volunteers. CUES co-director Beth Ravit, CUES faculty Luke Drake, research associate in the Department of Landscape Architecture, and Laura Lawson, chair of the Department of Landscape Architecture, oversaw the project that involved geospatial research, database development, mapping, and community surveys.

The baseline data generated by the CUES research will ultimately help in the development of a Food System Master Plan Element for consideration in the City of Trenton’s 2015 Master Plan update.

The Rutgers Environmental Stewards program, an innovative collaboration between Rutgers Cooperative Extension and more than 40 other state environmental organizations, provides training and experience that equip participants to contribute effectively to the process of finding solutions for environmental problems in communities across New Jersey. The program teaches community members, mostly adults, about land and water stewardship, environmental public advocacy, best management practices, and leadership.

In 2014, renowned environmentalist, conservationist, and former New Jersey Assemblywoman Maureen Ogden made a $50,000 charitable gift annuity to the program. Ogden’s gift will be used to create the Rutgers Environmental Stewards Enrichment Fund to help expand the program’s reach, including providing mini-grants to program participants to improve the impact of their intern projects. The fund will also serve the next generation of environmental stewards by expanding on resources, utilizing technology like webinars, and creating national models that can be duplicated at other land-grant universities.

Ogden, who received an honorary certificate and gave keynote remarks at the commencement ceremony this year, also announced an additional $200,000 estate gift to support the Rutgers Environmental Stewards program.
STEM Enrichment for Urban Youth

The Department of 4-H Youth Development hosts an annual Rutgers Summer Science Program in which urban youths in New Jersey gain pre-college experience in a campus setting and are trained to serve as ambassadors for 4-H programs for younger children in after-school and summer camp settings in their home communities.

The annual Rutgers Summer Science Program, which has been sponsored by Samsung over the past two years, wrapped up on the George H. Cook Campus in New Brunswick. It featured a week-long campus enrichment experience for over 60 high school students, grades 9 to 12, from Essex, Mercer, Middlesex, Passaic, and Union counties. Although established six years ago, the program received a significant boost through the partnership with Samsung in 2013, in which the company provided scholarships to the program attendees and donated technology, like the Galaxy Note 10.1 tablets that the students used to record data from their experiments.

The Rutgers Summer Science Program was founded by Chad Ripberger, Rutgers 4-H agent from Mercer County, and Janice McDonnell, 4-H statewide science education agent. The program is structured as an active, hands-on science, technology, engineering, and math (STEM) environment for youth. Following a week of activities taught by Rutgers faculty and graduate students on a range of topics, the teens return to their local communities as newly minted Ambassadors, armed with a number of skills that they will pass on to other youths in their home communities. This year, the students participated in activities that included cooking with bacteria, developing mobile apps, and mapping the effects of storm damage from Superstorm Sandy on local trees and wildlife.

The youths who participate in the annual program have agreed to a minimum of 50 hours of service to their local 4-H program, working with 4-H staff in their community to provide science-focused after-school and summer programming to younger youth and children based on the important skills they learned while working side by side with Rutgers scientists and engineers.

The program also incorporates a series of “teach-back” sessions that come towards the end of one week of instruction in which educators get to see what the students have learned. These teach-backs serve to extend what the students have learned to their communities and help them to teach others about STEM fields and underscore the important role 4-H plays as a pathway to learning about science and technology.
ECONOMIC DEVELOPMENT

**NJAES HAS BEEN AN ENGINE OF ECONOMIC GROWTH** and job creation for the New Jersey economy since it was established in 1880. NJAES units develop programs and services that impact many sectors in the Garden State, from food to bioenergy to aquaculture. These include the internationally recognized Food Innovation Centers, which provide business and technology expertise to small and mid-sized food and agricultural businesses in New Jersey and nationwide. The EcoComplex, an Alternative Energy Innovation Center, is a business incubator dedicated to growing green business in New Jersey by offering unique clean energy services and resources not available elsewhere. The new Office of Research Analytics provides economic analysis and impact assessment expertise to industry sectors and government agencies in New Jersey. Through these units and more, NJAES remains committed to bringing the diversity of expertise from across Rutgers, The State University of New Jersey to bear on the economic issues and concerns of the state.
Food Innovation Center

The Rutgers Food Innovation Center (FIC) is a unique business incubation and economic development accelerator program, with operations in southern (Bridgeton) and northern (Piscataway) New Jersey. These facilities provide business and technology expertise to startup and established food companies in New Jersey and the surrounding region, and have the capacity to reach food and agribusinesses throughout the world.

Rutgers FIC has been recognized for its impact, being named Incubator of the Year by the National Business Incubation Association (NBIA) and an Agricultural Innovation Center Demonstration Program by the USDA.

FIC–North has been operating at capacity, thanks in part to the formalized partnership in 2014 with New Jersey-based Pinnacle Foods, which established its first university-affiliated pilot plant at the Piscataway facility. This partnership will enable the company to increase its research and development capabilities, test scale-up options for commercialization, and enable experimental designs across their brands.

Pinnacle will also be able to leverage Rutgers technologies, partner with faculty, and have the opportunity to sponsor graduate research work to benefit both student learning and their company.

In 2014, FIC–South developed a food business acceleration program, which will result in a unique, effective, and efficient model for venture investments to food entrepreneurs. A highly selective process will be created to choose fast-growing food companies to receive intense mentorship, culminating in presentations to the venture capital community.

FIC–South has also taken a leadership role in New Jersey with regards to international business attraction. As a result, it was designated a Soft Landings site by the NBIA and is the only Soft Landings food incubation program in the world. It’s forming cooperative agreements with government agencies and universities globally and working together with Choose New Jersey and the New Jersey Business Action Center in attracting food companies to the state.

In 2014, the U.S. Small Business Administration (SBA) recognized Rutgers FIC as a national awardee of its first-ever SBA Growth Accelerator Fund Competition.

In November, Rutgers FIC and other awardees were honored at the White House and had an opportunity to meet with leaders of federal government agencies focused on technology transfer, small business development, and business innovation.
Office of Research Analytics

In 2014, the NJAES Office of Research established the Office of Research Analytics (ORA) to provide advanced statistical, spatial, economic, and technological expertise and resources to projects and programs throughout the university. The office also serves as a central repository for large, time-series, and spatial datasets that are critical to many research areas. Cutting-edge and cost-effective, these resources will greatly strengthen research, teaching, and outreach efforts.

ORA also conducts economic impact analysis to estimate the effects of businesses/industries, institutions, and public policies on national, state, regional, and local economies. The ORA team is currently leading an economic impact assessment of Rutgers University and NJAES, and is working with the Committee on Institutional Cooperation to collect key metrics data that will contribute information on job creation, purchasing expenditures, and tax revenues to the overall impact assessment.

Only in its first year of operation, ORA has already worked on a wide range of projects. The staff received a grant from the Northeast Organic Farming Association of New Jersey to develop an interactive web portal for the state’s Farm Link Program, which helps match new and beginning farmers with available farmland. The website will allow users to manage their own profiles and listings, and provide an easy-to-use search interface for finding farming opportunities throughout the state.

Also, the office has partnered with Malin Pinsky, fisheries biologist in the Department of Ecology, Evolution, and Natural Resources, to develop OceanAdapt, an interactive website that allows users to visualize impacts of climate change and other factors on the distribution North American marine life. The website hosts an annually updated database of scientific surveys in the U.S. and provides tools for exploring changes in marine fish and invertebrate distributions.

ORA staff also developed an interactive Rutgers web application to demonstrate the economic benefits of growing Rutgers cranberry varieties. The web app is based on an economic model that estimates the costs and returns of growing cranberries, and is an interactive tool that allows cranberry growers to perform analysis around the decision of whether or not to invest in Rutgers cranberry varieties when replanting their cranberry bogs. Higher yields and increased disease/pest resistance make Rutgers cranberry varieties a good economic choice. The web app, located at cranberry.rutgers.edu, is a service to cranberry growers and should ultimately result in increased licensing revenues to Rutgers.

njaes.rutgers.edu/economic-development

Margaret Brennan-Tonetta
Director, Economic Development

NJAES fosters university, industry, and government collaborations through its world class research and outreach programs. Our goal is to create an engaged university that is a catalyst for the regional economy, local communities, and industry attraction/retention efforts. Thus, NJAES programs are designed to spur interdisciplinary partnerships, retain and strengthen New Jersey’s industrial base, attract new companies to the state, develop sustainable and vibrant communities, and increase workforce preparation and retention.
SUPPORTING NJAES

PRIVATE SUPPORT OF NJAES helps to expand the reach of our state-supported university investment in research and outreach programs that benefit the residents of New Jersey. Donor gifts sustain the infrastructure of the experiment station, grow its programs, and help us serve state residents, especially as financial resources available from other sources are declining. A range of options including outright gifts, multi-year pledges, endowed funds, and planned gifts from individuals, corporations, and foundations provide critical funds to our faculty and students. Whether supporting aspiring farmers enrolled in the Rutgers agricultural and food systems major or the frontline faculty, agents, and specialists researching novel solutions, donor support enables NJAES to continue its important and transformative work across the state.
Ecopioneer’s Legacy Supports Ecoentrepreneur Interns

What does one have to achieve to earn the reputation of “ecopioneer?” In the case of Jerome “Jerry” Goldstein, you could say he moved mountains. Mountains of compost, that is.

A Rutgers Class of 1952 alumnus, Goldstein was the editor and publisher of BioCycle and In Business magazines, and the founder of JG Press, Inc. Goldstein’s enterprise and family business served as the foundation to grow the organics recycling industry in the U.S. and abroad.

Goldstein is best described by his daughter, Nora. “Above all, Jerry was a tireless advocate, an ecopioneer who used the tools of communication and networking to advance concepts that today fall into the catch-all category of sustainability. His style was to tell other people’s stories, to profile their projects and programs. He gave voice to their innovations and advances. And in the process, through his encouragement, promotion, and support, Jerry worked to forge an industry around composting, organics recycling, and anaerobic digestion that is very much alive and thriving today.”

Jerry Goldstein’s reconnection to Rutgers came through the Rutgers EcoComplex, a Clean Energy Innovation Center that promotes economic development in the environmental and alternative energy innovation arenas. At the EcoComplex, university and business incubator researchers help develop new technologies to address pressing alternative energy, environmental, solid waste, and resource-recovery issues. JG Press published a series of articles on the EcoComplex and its incubator businesses in both BioCycle and In Business. The Rutgers EcoComplex was also included as a tour facility for attendees at one of BioCycle’s national conferences, which are held each year for industry professionals.

It was only fitting that upon Goldstein’s passing in 2012, his family saw an opportunity to continue to grow his legacy by funding a scholarship at the Rutgers EcoComplex in his name. Named the Jerome Goldstein Scholarship for EcoEntrepreneuring, it supports student research interns at the EcoComplex.

This year, three students carried out climate change, sustainability-related, and clean energy research projects and were invited to present their projects at BioCycle’s national conference. The internship program provides Rutgers students with hands-on research opportunities as well as exposure to business meetings, conferences, and overall career training. Perhaps the next generation’s ecopioneer may emerge from this legacy gift.
Sustaining the Future of the Statewide 4-H Camp

The Lindley G. Cook 4-H Youth Center for Outdoor Education in Branchville, N.J., offers a residential camp that promotes 4-H and its “learn-by-doing” curriculum. The camp, which is administered by Rutgers Cooperative Extension, a unit of NJAES, has been hard at work rehabilitating some of its facilities following the destruction of Superstorm Sandy more than two years ago. Several groups have participated in fundraising efforts to help the statewide 4-H camp to not only rebuild two demolished cabins but also improve its existing facilities.

Renovating existing buildings, creating brand-new spaces for new classes and programs, and acquiring materials and equipment to offer even more great activities at camp all require resources. Fortunately, there are many donors to Rutgers and the New Jersey Agricultural Experiment Station who hold 4-H Cam near and dear to their hearts. For example, the sixth grade class at the Brass Castle School in Washington, N.J., organized a garage sale fundraiser, while the Sussex County Bunnies and Buddies 4-H Club held a fundraising dinner. Each year, the Sussex County 4-H Teen Council donates to the 4-H Camp.

A future goal is to provide every child the opportunity to go to 4-H Summer Camp—an experience that provides independence, growth, freedom, and fun that only a week-long, sleep-away camp can offer—regardless of the financial constraints of the camper’s family. To this end, offering camperships has become a priority. 4-H Camp staffer Jaclyn Bealer went above and beyond the call of duty this year to raise funds to increase the Thomas Murphy Endowed 4-H Campership so that more children could attend 4-H Camp.

This past summer, families associated with 4-H were invited to the camp for a first-ever “Homecoming” event to celebrate the centennial of Rutgers Cooperative Extension. Guests toured the cabins and camp grounds, and enjoyed some of the activities that the campers do during their summer sessions. Most attendees reminisced about their 4-H experiences, and their camp memories were often the most enthusiastic. Not only does 4-H camp bring back wonderful memories, but to have the opportunity to help improve camp for the next generation seems to be inspiring some former 4-H participants.

One camp alumnus and former 4-H Camp counselor, Kevin McCormick, made a generous gift of $22,000 to the 4-H Camp. This donation alone will double the number of renovated cabins since the damage sustained from Superstorm Sandy. The hope is that his gift inspires more 4-H Camp alumni to give back and help us, as the 4-H club motto exhorts, “to make the best better.”
NEW JERSEY AGRICULTURAL EXPERIMENT STATION

1914-2014 Cooperative Extension

BOARD OF MANAGERS

The New Jersey Agricultural Experiment Station Board of Managers, appointed by the Rutgers Board of Governors, is an advisory group to the Executive Dean of Agriculture and Natural Resources and Executive Director of NJAES. The board consists of a representative from each county nominated by the County Board of Agriculture or Board of Chosen Freeholders, and a six-member statewide advisory committee. The President of Rutgers, the Executive Director of NJAES, and the State Secretary of Agriculture serve as ex officio members.

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Burlington .......................................Raymond Hubik
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Cape May ..........................................Allen D. Carter, Jr.
Cumberland ..................Harold Keith MacIndoe, Jr.
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Mercer .........................................Louis Makrancy
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Passaic ....................................973-305-5742
Salem ............................... 856-769-0090
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Union ......... 908-654-9854
Warren ............................. 908-475-6505

njaes.rutgers.edu/ag
OFF-CAMPUS STATIONS

Clifford E. and Melda C. Snyder Research and Extension Farm (Rutgers Center for Sustainable Agriculture), Pittstown
snyderfarm.rutgers.edu

Haskin Shellfish Research Laboratory, Bivalve
hsrl.rutgers.edu

Lindley G. Cook 4-H Youth Center for Outdoor Education, Branchville
nj4hcamp.rutgers.edu

New Jersey Aquaculture Innovation Center
aic.rutgers.edu

Philip E. Marucci Center for Blueberry and Cranberry Research and Extension, Chatsworth
pemaruccicenter.rutgers.edu

CENTERS AND INSTITUTES

Center for Controlled-Environment Agriculture
aesop.rutgers.edu/~horteng

Center for Endocrine Studies
endocrine.rutgers.edu

Center for Turfgrass Science
turf.rutgers.edu

Center for Urban Environmental Sustainability
cues.rutgers.edu

Rutgers Agricultural Research and Extension Center, Upper Deerfield
njaes.rutgers.edu/rarec

Rutgers EcoComplex (Clean Energy Innovation Center), Bordentown
eccomplex.rutgers.edu

Rutgers Food Innovation Center–North, Piscataway
njaes.rutgers.edu/ficn

Rutgers Food Innovation Center–South, Bridgeton
foodinnovation.rutgers.edu

Rutgers Fruit and Ornamental Research Extension Center, Cream Ridge
njaes.rutgers.edu/creamridge

Rutgers Plant Science Research and Extension Farm, Adelphia
njaes.rutgers.edu/plantscience

Rutgers University Marine Field Station, Tuckerton
marine.rutgers.edu/rumfs

YE2S Center–Camden
teenmgateway.rutgers.edu/yescenter-camden.html

YE2S Center–Newark
teenmgateway.rutgers.edu/yescenter-newark.html

YE2S Center–Trenton
teenmgateway.rutgers.edu/yescenter-trenton.html

New Jersey Institute for Food, Nutrition, and Health
fnh.rutgers.edu

Rutgers Energy Institute
rei.rutgers.edu

Water Resources Research Institute
njwrr.rutgers.edu

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Our Commitment to Sustainability

3 trees preserved for the future
146 lbs. of solid waste not generated
9 lbs. of waterborne waste not created
1,320 gal. of wastewater not generated
288 lbs. of net green house gases (GHG) saved
2,201,500 gal. of wastewater saved
windpower savings
1,669 lbs. GHG emissions were not generated
1.8 barrels of fuel unused

the equivalent to not driving 1,651 mi.
the equivalent to planting 114 trees

The savings above are achieved when post-consumer recycled fiber is used in place of virgin fiber. This project, based on a production run of 3,500 pieces, used 3,700 lbs. of paper, which has a post-consumer recycled percentage of 10%.