

2017 Rutgers Combined Research and Extension Plan of Work

Status: Accepted

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I. Plan Overview

1. Brief Summary about Plan Of Work

Brief Summary of Plan of Work 2017-2021 Update

The 2017-2021 update of the Rutgers Combined Research and Extension Plan of Work builds upon the approved 2016-2012 Plan of Work. The Rutgers New Jersey Agricultural Experiment Station (NJAES) fulfills the land-grant commitment to teaching, research and outreach improving the lives of all New Jerseyans. This is carried out through two units: Cooperative Research and Cooperative Extension. The leadership team, faculty, staff and stakeholders are continuously engaged in strategic planning and assessment of NJAES's achievement of its vision and mission to address the critical needs and challenges of the diverse audiences served through research and extension educational programs.

Vision Statement

"To be the leading public research and service based institution for the development and delivery of practical science-based solutions that contribute to the vitality, health and sustainability of agriculture, environments, people and communities of New Jersey."

Mission Statement

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

The seven NJAES theme areas identified through the strategic planning and assessment process are:

Production Agriculture, Horticulture and Allied Industries

- Integrated pest management
- Plant and animal improvement and protection
- Sustainable farming

Public Health

- Vector biology
- Awareness and reduction of toxic exposures
- Health literacy

Marine Fisheries and Aquaculture

- Shellfish and finfish stock assessments
- Aquaculture production

- Policy development

Economic and Community Development

- Industry development, technology transfer, marketing
- Community planning and economic development
- Workforce development and training

Food and Nutrition

- Food safety
- Access to healthy foods
- Packaging and engineering
- Proper nutrition and exercise

Youth Development

- 4-H
- Workforce preparation
- K-12 programs
- Science, Engineering and Technology
- Urban Under-served youth

Environmental and Natural Resources

- Alternative fuels
- Water quality and quantity
- Climate and weather
- Wildlife Biology and Management
- Landscape Architecture

These focused program areas encompass the planned programs identified in the 2008-2013 Plan of Work, and subsequent updates, and are consistent with the USDA National Institute of Food and Agriculture (NIFA) science funds priorities of global food security and hunger, climate change, sustainable energy, childhood obesity and food safety. Each of these NIFA priorities are included as planned programs in the 2016-2020 Plan of Work update.

The food, nutrition and health initiative combines the study of agriculture, food science and nutritional sciences with a strong social sciences component. The goals of this initiative are to provide:

- Community-based education about nutrition and health
- Research on how behavior and genetics influence diet and well being
- Practical efforts to create environments at home and in the workplace where exercise can be an integral part of everyday life.
- Food safety research and educational programs to improve food safety and reduction of food-borne illness.

The climate and energy initiative is a broadly based effort built around land use, climate change, and consumption patterns. Experts within the entire University community have begun to develop a strategic vision focusing on climate and its impact on New Jersey relative to economic development, tourism, education, sustainable alternative energy, the environment, public safety, agriculture and transportation. NJAES researchers are studying potential impacts to our shorelines, water quality and quantity, ecosystems, watersheds and more.

The sustainable marine ecosystems initiative engages research and extension in all aspects of the marine ecosystem from fish stock assessments to aquaculture and shoreline maintenance and restoration.

The approved New Jersey five-year Plan of Work FY 2008-2013 and subsequent updates including this 2016-2020 are integrated plans reflecting Cooperative Research and Cooperative Extension programs. These plans address all requirements set by the Agricultural Research, Extension and Education Reform Act of 1998 (AREERA) regarding the use of Hatch Funds, Smith-Lever 3(b) and 3(c) and required non-federal matching funds.

The plan reflects the work of the New Jersey Agricultural Experiment Station (NJAES) that addresses the diverse needs of a highly urbanized state. NJAES through station supported Cooperative Research and Cooperative Extension focuses on innovative approaches to applying the land grant model in support of an agricultural and food system at the urban/suburban fringe; sustaining natural resources; the development of human and community capital; and nutrition, health and wellness concerns. Addressing the most pressing problems of our time requires multidisciplinary, collaborative innovative approaches to generating and transferring knowledge and technology. Research development technologies and findings delivered via educational programs and training, technology transfer, policy recommendations, publications and the formation of spin off companies. This is achieved throughout the state through 19 centers, institutes and off-campus research stations and Cooperative Extension offices in all 21 counties. All programmatic efforts will result in social, economic and environmental impacts.

Stakeholders are actively engaged in the process of program planning and budget development. Our process for the generation and transfer of knowledge and technologies is best viewed as a continuum in an integrated system that conducts research and delivers Cooperative Extension educational programs to benefit communities, individuals, and industries always mindful of our commitment to reach under-served and under-represented audiences. One of the primary goals of this effort has been educational programming that is culturally sensitive to address the needs of urban youth and clientele. To address the needs of our multilingual state, programs of NJAES are available on our website in Spanish by simply clicking on the Espanol tab on our home page. In addition to what is available within New Jersey links are available to USDA in Espanol, Extension in Espanol and other resources in Spanish language to meet clientele needs.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2017	130.0	0.0	60.0	0.0
2018	130.0	0.0	60.0	0.0
2019	130.0	0.0	60.0	0.0
2020	130.0	0.0	60.0	0.0
2021	130.0	0.0	60.0	0.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

Evaluation of the FY2016-2020 Plan of Work and subsequent updates through both merit and scientific peer review will be conducted to ensure the quality and relevance of the Cooperative Extension Program and to assess the technical quality and relevance of scientific research conducted through the New Jersey Agricultural Experiment Station.

Merit Review

Appropriate stakeholders will continue to play a role in the review process as they assess programs for relevance in addressing local needs. Key reviewers in this process will be established advisory committees at the county, state level as well as program/center specific advisory committees.

Scientific Peer Review

A formal internal review process will assess the technical merits of NJAES programs as well as the appropriateness of the proposed research to the research mission, goals, and programs of the NJAES.

Scientists external to NJAES will be asked to rate and comment on various aspects of the technical and scientific merit of the proposed research. The external review process is an established formal process that has proved effective in past reviews of Hatch projects within NJAES.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

Stakeholders are viewed as equal partners in the planning of programs and identification of critical issues. Stakeholder meetings are held in all counties throughout the state to gain their input. Through this process priority educational program initiatives are identified which meet local needs. Departments have advisory groups which help to identify needs. NJAES has a Board of Managers which provides stakeholders an opportunity to be actively engaged in processes that identify critical issues and priority research needs.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

Rutgers Cooperative Extension has an organizational commitment to diversity and pluralism. Program planning and implementation is done with this as a coordinating theme and priority. Many programs are specifically designed to serve the needs of traditionally under-served diverse and urban participants.

Stakeholder meetings are representative of the diversity of each of the counties and issues affecting the needs of the under-served and under-represented are an integral component of the program planning process.

3. How will the planned programs describe the expected outcomes and impacts?

Outcomes and impacts will be uniquely described based on the specific educational objectives or research questions.

The focus of all of our Extension/research efforts is to result in significant solutions to issues which have economic, social and/or environmental outcomes and impacts.

4. How will the planned programs result in improved program effectiveness and/or

Response will be unique to each program. A component part of all program planning is the end evaluation of the program's effectiveness in achieving the set educational objectives. Additionally attention has been given to assessing the cost effectiveness of programs to maximize available resources.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (focus group sessions)

Brief explanation.

Rutgers-NJAES has several mechanisms for stakeholder input which are used on a regular basis to inform decision-making. We have put into place processes that feed input directly into the Plan of Work from our existing and diverse stakeholder input mechanisms.

2(A). A brief statement of the process that will be used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Rutgers-NJAES Cooperative Research and Cooperative Extension will continue to employ strategies to engage residents of New Jersey in the identification of critical issues that will benefit from educational and research solutions provided by Rutgers-NJAES faculty and staff. A variety of methods will be employed to reach out to under-served and under-represented audience to reduce any real or perceived barrier to participation in NJAES programs.

2(B). A brief statement of the process that will be used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

Annually Cooperative Extension county units and state specialists provide multi-level opportunities to collect information from stakeholders. A variety of methodologies are used to ensure that every facet of our diverse state can identify critical issues and researchable topics which can be addressed through Extension programs and /or NJAES research.

For example, on an annual basis stakeholders are invited to participate in an open

forum at which time they can discuss critical issues effecting the county. The groups are diverse; they include elected officials, clientele, partners, both public and private, adults, youth and any other interested parties. Extension faculty and staff also conduct periodic focus groups to gather feedback as appropriate. A variety of methods are used to notify the public of these opportunities to participate in the program planning process. The NJAES Board of Managers surveys stakeholders across the state to assess public priorities and to offer recommendations for programming and staffing.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

As indicated earlier, stakeholders are viewed as equal partners in the planning, budget and program implementation processes. They are active participants on search committees in the hiring process for faculty positions, both at the agent and specialist level. Their opinions are welcomed and valued as emerging issues are identified and plans are developed to address critical needs related to educational programming and research initiatives.

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Climate Change - Water Quality & Quantity
2	Childhood Obesity - Youth/Adult Obesity
3	Youth Development
4	Global Food Security and Hunger - Agricultural Viability
5	Climate Change - Home, Garden and Environment
6	Global Food Security and Hunger - Integrated Pest Management
7	Global Food Security and Hunger - Aquaculture
8	Food Safety
9	Sustainable Energy

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Climate Change - Water Quality & Quantity

2. Brief summary about Planned Program

Through an integrated Cooperative Research and Cooperative Extension programmatic effort water quality and quantity issues affecting New Jerseyans will be addressed. We coordinate an effective and efficient nutrient management and education program that helps stakeholders meet industry and state regulatory standards. Water quantity and quality issues will be addressed through effective stormwater management, agricultural best management practices, and watershed restoration. Water quality and quantity are encompassed in a signature initiative of NJAES addressing climate and energy that requires a multidisciplinary, collaborative approach to addressing research and outreach goals. The ultimate result of this programmatic effort will be a safe and secure water supply for all.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds :Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%		10%	
111	Conservation and Efficient Use of Water	20%		20%	
112	Watershed Protection and Management	40%		40%	
133	Pollution Prevention and Mitigation	20%		20%	
605	Natural Resource and Environmental Economics	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

New Jersey is the nation's most urbanized state, with tremendous demands on the water supply and challenges for water quality due to industrial and wastewater impacts, ageing infrastructure, and new municipal stormwater regulations. If New Jersey plans to successfully meet its goals, nutrient trading, wastewater treatment, and watershed restoration will have significant roles in preserving the water quality and quantity for the state. Among the research programs, determining the proper methods to create

scientifically sound total maximum daily loads for nutrients in water is essential to making decisions about nutrient management and trading.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- Extension will help meet the needs of communities and the public in understanding the new water quality standards and ways they can help their municipality meet those standards.
- Water quality and quantity will become increasingly important as the demands by industry and communities intensifies with a growing population, increased urbanization, and an ageing infrastructure.

2. Ultimate goal(s) of this Program

- A safe and secure water supply for all communities and industries in the state
- An effective and efficient nutrient management program that meets the needs of the public meets the standards set by the state regulatory bodies.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	15.0	0.0	6.0	0.0
2018	15.0	0.0	6.0	0.0
2019	15.0	0.0	6.0	0.0
2020	15.0	0.0	6.0	0.0
2021	15.0	0.0	6.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Work with municipalities to help them meet their regulatory responsibilities on stormwater management and watershed restoration
- Perform experiments to investigate what the current nutrient loads are in NJ water
- Determine the best methodologies for developing Total Maximum Daily Load (TMDL) values for NJ waterways
- Examine the effectiveness of alternative onsite wastewater treatment systems
- Provide scientifically sound advice to state regulatory bodies on water quality issues
- Math modeling of contamination transport in surface and groundwaters
- Create a program comprising of faculty, staff, volunteers, industry partners and government officials

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • TV Media Programs • eXtension web sites • Web sites other than eXtension

3. Description of targeted audience

- Municipalities
- State Department of Environmental Protection
- Staff and students who gain valuable scientific experience
- Industry partners who learn ways to meet water quality standards
- Communities who learn watershed restoration methods
- NJAES Faculty and Staff involved in water research/outreach
- School age youth
- Residents

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
 - Number of patents submitted
 - Number of peer reviewed publications
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications, and publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Short term - Knowledge of nutrient loads in various NJ waterways. Find the best methodologies for determining TDMLs
2	Medium term - To identify representative pollutants and aquifer systems in New Jersey. To develop equilibrium isotherms to quantify the adsorption/desorption kinetics for the pollutant/soil/water systems. To develop breakthrough and leaching data for the pollutant/soil/water systems.
3	Long Term - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

Outcome # 1

1. Outcome Target

Short term -

Knowledge of nutrient loads in various NJ waterways.
Find the best methodologies for determining TDMLs

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics
- 133 - Pollution Prevention and Mitigation
- 112 - Watershed Protection and Management
- 111 - Conservation and Efficient Use of Water
- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium term -

To identify representative pollutants and aquifer systems in New Jersey. To develop equilibrium isotherms to quantify the adsorption/desorption kinetics for the pollutant/soil/water systems. To develop breakthrough and leaching data for the pollutant/soil/water systems.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics
- 112 - Watershed Protection and Management
- 111 - Conservation and Efficient Use of Water
- 133 - Pollution Prevention and Mitigation
- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -

A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 133 - Pollution Prevention and Mitigation
- 605 - Natural Resource and Environmental Economics
- 112 - Watershed Protection and Management

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

- Increasingly strict regulatory water quality standards for phosphorus and other nutrients will affect the water nutrient trading program and affect the municipalities' ability to meet those standards.
- State and local investment and support, including funds and manpower in these research activities are necessary for this program to be effective.
- Partnerships with industry, government and communities will affect the ability to change or meet the regulatory standards.
- Public education and involvement in helping to address water quality and quantity issues.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Childhood Obesity - Youth/Adult Obesity

2. Brief summary about Planned Program

Through an integrated Cooperative Research and Cooperative Extension programmatic effort youth/adult obesity will be decreased in New Jersey resulting in a decrease in health problems and chronic diseases. Attitudes about healthy eating and physical activity will improve resulting in reduced health care costs and increase in life span. The food nutrition and health initiative is multidisciplinary combining the study of agriculture, food science and nutritional sciences with strong social science components to solutions to youth/adult obesity.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
701	Nutrient Composition of Food	10%		10%	
702	Requirements and Function of Nutrients and Other Food Components	10%		10%	
703	Nutrition Education and Behavior	25%		25%	
704	Nutrition and Hunger in the Population	15%		15%	
724	Healthy Lifestyle	40%		40%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Obesity is at epidemic levels in the US. The causes of obesity are complex and multifactorial. Many lifestyle factors affect an individual's ability to address weight issues. Digital device screen time has the strongest evidence of increasing the risk of obesity of any factor, coupled with overall sedentary lifestyle, large portion sizes, food marketing geared to youth, low consumption of fruits, vegetables, whole grains and dairy contribute to obesity for youth and adults.

Dietary fat is the major calorie generating nutrient in our diets. However, little is known about the genetic and physiological processes of how obesity occurs or how it contributes to other diseases. By understanding how the intestines and body uptake and process dietary fat, how external and dietary factors contribute to childhood and consequently adult obesity/diabetes, how weight loss affects bone mass and how certain hormones and genes affect fat absorption and breakdown, this program of research will contribute to a greater understanding of mechanisms that contribute to obesity.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- When individuals adopt healthy eating habits and regular physical activity, overweight, obesity, related risk factors and disease risk will decrease. Individuals will have improved health outcomes and quality of life.
- Obesity and in particular, childhood obesity and related chronic diseases are becoming increasingly prevalent in our societies, including immigrant populations not familiar with nutrition labeling.

2. Ultimate goal(s) of this Program

- Decreased overweight and obesity for youth/adults
- Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults
 - A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases
 - Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	10.0	0.0	5.0	0.0
2018	10.0	0.0	5.0	0.0
2019	10.0	0.0	5.0	0.0

2020	10.0	0.0	5.0	0.0
2021	10.0	0.0	5.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- To identify the factors that promote excessive weight gain as well as protect against childhood obesity
- Measure how children born small for age are different with respect to body composition and risk for diabetes prior to developing diabetes or obesity.
- Investigate how perilipin A works in adipocytes to control fat storage and fat breakdown.
- Collect and analyze data on obesity-related measures (i.e., BMI) in adults and children
- Examine how weight loss affects calcium absorption and bone mass
- Create a multidisciplinary program comprising of faculty, staff, the medical community, industry partners and government officials
- Conduct adult/youth education and deliver targeted messages on healthy food choices and increased physical activity education using the following strategies:

Direct Methods:

- Educate Youth
- Educate Parents
- Educate Volunteers
- Food and Fitness Ambassadors
- Educate Child Health Summit Professionals
- Educate Teachers/School Nurses
- Educate Communities

Indirect Methods:

- Website
- Social Marketing

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Demonstrations • Other 1 (professional seminar) 	<ul style="list-style-type: none"> • Public Service Announcement • Newsletters • TV Media Programs • eXtension web sites • Web sites other than eXtension • Other 1 (Fact Sheets)

3. Description of targeted audience

- Clinicians, Physicians and Nurses
- Health Care Professionals

- Hospitals (including teaching hospitals)
- Staff and students who gain valuable scientific experience
- Industry partners that benefit from fundamental and applied research in obesity and related chronic diseases
- Communities that benefit from increased knowledge about the mechanisms involved in obesity
- Other faculty and staff working on similar research
- Health-related organizations and foundations interested in obesity/nutrition issues
- School Age Youth
- Teens
- Teachers
- After School Providers
- Parents
- Volunteers
- Extension Professionals
- State and County Agencies and Organizations
- Schools

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications, publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	<p>Short Term - Individuals gain awareness, knowledge, skills related to:</p> <ul style="list-style-type: none"> Attitudes about healthy eating for adults/youth. Healthy food choices for adults/youth. Selection of healthy foods for adults/youth. Benefits of physical activity (reduced overweight and obesity, reduced risk of diabetes, heart disease and cancer.) Physical activity recommendations for health for adults/youth. Identify factors that promote excessive weight gain and protect against childhood obesity.
2	<p>Medium Term - Individuals incorporate skills/change behaviors related to:</p> <ul style="list-style-type: none"> Increased adoption of healthy food practices. Increased consumption of fruits, vegetables, whole grains and low-fat dairy. Increased participation in family meals. Increased participation in physical activity. Increased participation in family-related physical activity. Increased use of new 'campaign' website. Improved understanding of the relationship between early nutrition and later risk for chronic disease. Understanding the process by which perilipins at the surface of lipid droplets control how much energy is released from the adipocyte at times of need. Understanding how the intestines and body uptake and process dairy fat. Identify genes, their protein product and how the proteins influence the way the body processes fat.
3	<p>Long Term - Individuals experience:</p> <ul style="list-style-type: none"> Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

Outcome # 1

1. Outcome Target

Short Term -

Individuals gain awareness, knowledge, skills related to:

- Attitudes about healthy eating for adults/youth.
- Healthy food choices for adults/youth.
- Selection of healthy foods for adults/youth.
- Benefits of physical activity (reduced overweight and obesity, reduced risk of diabetes, heart disease and cancer.)
- Physical activity recommendations for health for adults/youth.
- Identify factors that promote excessive weight gain and protect against childhood obesity.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle
- 704 - Nutrition and Hunger in the Population
- 703 - Nutrition Education and Behavior
- 702 - Requirements and Function of Nutrients and Other Food Components
- 701 - Nutrient Composition of Food

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium Term -

Individuals incorporate skills/change behaviors related to:

- Increased adoption of healthy food practices.
- Increased consumption of fruits, vegetables, whole grains and low-fat dairy.
- Increased participation in family meals.
- Increased participation in physical activity.
- Increased participation in family-related physical activity.
- Increased use of new 'campaign' website.
- Improved understanding of the relationship between early nutrition and later risk for chronic disease.
- Understanding the process by which perilipins at the surface of lipid droplets control how much energy is released from the adipocyte at times of need.
- Understanding how the intestines and body uptake and process dairy fat.
- Identify genes, their protein product and how the proteins influence the way the body processes fat.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 701 - Nutrient Composition of Food
- 724 - Healthy Lifestyle
- 704 - Nutrition and Hunger in the Population
- 702 - Requirements and Function of Nutrients and Other Food Components

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -
Individuals experience:

Decreased overweight and obesity for youth/adults.

Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults.

A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases.

Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle
- 704 - Nutrition and Hunger in the Population
- 703 - Nutrition Education and Behavior
- 702 - Requirements and Function of Nutrients and Other Food Components
- 701 - Nutrient Composition of Food

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

- State and local investment and support, including funds and manpower in research activities related to nutrition and later risk for chronic disease are necessary for this program to be effective.
- Partnerships with industry, government and communities will affect the ability to change healthy eating habits and physical activity.
- Public education and involvement in helping to address obesity, diet related diseases and other issues.

•

Internal and external funding sources are necessary to accomplish these outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Youth Development

2. Brief summary about Planned Program

Youth Development programming provides youth with an opportunity to gain a strong sense of self, master skills and become contributing members of society. The program encourages adult youth partnerships and community engagement.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
806	Youth Development	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

A significant portion of New Jersey youth are at substantial risk for negative outcomes: poor health, substance abuse, teenage pregnancy, school failure, abuse, neglect, crime, violence. Poverty multiplies risk factors. Youth need to be in environments where they have opportunities to acquire the basic skills they need to become responsible family members, participants in the work force and contributing citizens. Youth need knowledge, skills, and behaviors to lead fulfilling lives.

2. Scope of the Program

- In-State Extension
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

When environments include sustained opportunities for young people to gain a sense of belonging, independence, mastery and generosity, youth can: master skills to make positive life choices; effectively contribute to decision-making and act responsibly; and positively influence their communities and beyond. On going and caring relationships with adults are essential to positive development. Extension will meet local needs through County Extension faculty and staff, while participating in regional and state-wide programs focusing on positive youth development in the mission mandate areas, as well as universal issues including Essential Elements (life skill development), Experiential Education, Youth /Adult Partnerships, and Volunteer Development and Leadership. Extension specialists and NJAES researchers will provide leadership and support to county faculty and staff in related programming.

2. Ultimate goal(s) of this Program

Youth demonstrate mastery and competencies needed to become engaged citizens by:

- Assuming leadership positions in communities
- Developing and implementing action plans to address community needs
- Becoming productive members of the workforce.

Youth are active and engaged partners in 4-H youth development programming and decision-making regarding RCE programming, including but not limited to 4-H youth development programming.

4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities.

Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.

Youth will increase knowledge, skills, and competencies in science engineering and technology.

Youth and professionals will collaborate with Family and Community Health Sciences Educators to implement the Get Moving-Get Healthy educational program.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	30.0	0.0	0.0	0.0
2018	30.0	0.0	0.0	0.0
2019	30.0	0.0	0.0	0.0
2020	30.0	0.0	0.0	0.0
2021	30.0	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Positive Youth Development:

- Employ Essential Elements (belonging, independence, mastery and generosity) as the basis for life skill development and related workforce development skills.
- Utilize Experiential Education Model (Experience, Share, Process, Generalize, Apply).

Provide opportunities for youth to:

- Feel and believe that they are cared about by others (Attachment, Belonging, Connection)
- Feel and believe they are capable and successful (Achievement, Mastery, Competence)
- Know they are able to influence people and events (Autonomy, Power, Confidence)
- Practice helping others through youth's own generosity (Altruism, Purpose, Contribution)

Subject matter:

(USDA/NIFA Mission Mandates)
Science, Engineering, Technology (includes: science literacy, animal science, plant science, environmental science, life sciences, etc) Citizenship (includes youth engagement, community youth development, community service, character development, civic engagement, etc) Healthy Lifestyles (includes chemical health, mental and emotional health, foods & nutrition, physical health and safety, etc).

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Demonstrations • Other 1 (4-H Delivery Modes) 	<ul style="list-style-type: none"> • Public Service Announcement • Newsletters • eXtension web sites • Web sites other than eXtension

3. Description of targeted audience

- School Age Youth (K - 13, one year out of high school) and their Parents
- 4-H Volunteers (adult and youth)
- Teachers/Educators/other Youth Development Educators
- School Age Child Care Providers
- College Students (interns, collegiate 4-H)
- Other Extension Professionals and University Partners
- Communities: Stakeholders and Non-Profit, Social Service, Government Agencies
- Under-served and Under-represented Audiences

Delivery modes:

- 4-H Clubs and Related Activities

- 4-H Afterschool (clubs and short-term programs)
- School Enrichment
- Special Interest
- 4-H Camping (day camps and overnight camping)
- Mentoring and Individual Study

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications, and publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	<p>Short Term - Youth increase awareness, knowledge, attitudes, and skills related to essential elements, workforce development, life skill development, and relevant subject matter. Volunteers increase knowledge and awareness of practices fostering positive youth development, including youth/adult partnerships. Youth development professionals and stakeholders increase awareness and knowledge of problems and solutions supporting positive youth development, including: policies that need to be addressed, community resources and support.</p>
2	<p>Medium Term - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.</p>
3	<p>Long Term - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.</p>

Outcome # 1

1. Outcome Target

Short Term -

Youth increase awareness, knowledge, attitudes, and skills related to essential elements, workforce development, life skill development, and relevant subject matter. Volunteers increase knowledge and awareness of practices fostering positive youth development, including youth/adult partnerships. Youth development professionals and stakeholders increase awareness and knowledge of problems and solutions supporting positive youth development, including: policies that need to be addressed, community resources and support.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Medium Term -

Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Long Term -

Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making

regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Youth risk factors)

Description

- Long term, highly focused programmatic areas are expected by us and our clientele.
- Budgets will continue to shrink or traditional funding sources will no longer be an expectation; new and competitive funds must be sought.
- Internal funding priorities must be developed in order to determine the program areas of focus and the resources (personnel, operating) that will be provided by Extension and NJAES administration.
- Collaborative partnerships, both internal and external, are necessary to accomplish these outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure

increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Global Food Security and Hunger - Agricultural Viability

2. Brief summary about Planned Program

The program will aid agricultural producers and assist them in addressing some of the most pressing issues as they remain viable and sustainable in a rapidly changing environment and market place. Emphasis will be placed on agriculture and horticulture for environmental, community and human health.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	20%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		20%	
215	Biological Control of Pests Affecting Plants	20%		20%	
601	Economics of Agricultural Production and Farm Management	20%		20%	
604	Marketing and Distribution Practices	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

New Jersey's agricultural and related industries remain a vital sector of the state's economy (9,100 farms generating 1.14 billion dollars in cash receipts from farm marketings in 2015) and environmental well-being. New Jersey's agriculture is diverse, encompassing a range of commodities, production methods, marketing techniques, processors and sales outlets. In addition, New Jersey's agriculture is changing; evolving market needs, economic and other production constraints, an aging and changing (immigration, diversity) agricultural work force, as well as mounting environmental issues and social constraints that can provide significant challenges and opportunities exist. In addition, non-food agricultural production (turf, equine, nursery, floriculture, etc.), a large and growing segment of the agricultural economy must be addressed. Cooperative Extension is the premier educational resource for the state's agricultural producers and natural resource managers. Cooperative Extension must continue to remain relevant,

timely, proactive and forward thinking, and must determine or reconfirm its current strengths, weaknesses and capacity before we can develop effective future efforts that meet the needs of the agricultural sector. Cooperative Research through 20 centers, institutes, and off campus station must continue to provide solutions that support the states rich and diverse agricultural tradition. Help farmers, fisheries, nurseries, food processors, and agribusinesses cope with complex technical and regulatory issues. Sustain and preserve the state's unique ecosystems and natural resources while at the same time enhance the quality of life for New Jersey's diverse population.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- The viability of NJ's agriculture depends on innovative and relevant methods to help solve problems and develop solutions in the areas of production, processing, markets, human and natural resources, environment and policy.
 - Extension will meet local needs through County Extension faculty and staff, while participating in regional and state-wide programs focusing on commodity production (turf, nursery, equine, fruit and vegetables) and marketing (processing, value added, economics), as well as universal issues including water, environmental degradation, policy, land use and availability.
 - Extension specialists and NJAES researchers will provide leadership and support to county faculty and staff in commodity and issue related programming.
 - Researchers will provide theoretical frameworks and empirical findings to help state and local municipalities create policies that address the interplay among agricultural viability, environmental protection, open space and quality of life issues.

2. Ultimate goal(s) of this Program

New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	65.0	0.0	36.0	0.0

2018	65.0	0.0	36.0	0.0
2019	65.0	0.0	36.0	0.0
2020	65.0	0.0	36.0	0.0
2021	65.0	0.0	36.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Identify critical programmatic foci/needs based on Extension and stakeholder assessment. These can be broadly defined under three areas:

- Production BMPs (nutrient, pest, waste/by-products management, water quality and quantity, energy)
- Financial BMPs (marketing, labor, risk management, policy e.g. farmland preservation)
- Ag Systems (sustainable ag, organic ag, new crops and use/alternative)

Develop an inventory of local (county based), regional and statewide programs designed to meet these needs; identify team members and their roles.

Create a multi-task effort to generate and share research-based information with clientele through demonstrations, educational meetings and workshops, certification programs, trainings, development of recommendation and decision making guides, etc.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Demonstrations 	<ul style="list-style-type: none"> • Public Service Announcement • Newsletters • TV Media Programs • eXtension web sites • Web sites other than eXtension

3. Description of targeted audience

Stakeholders (broadly defined to include producers, processors, marketers, end-users, policymakers, legislators).

Commercial agriculture producers and end-users (such as marketers, processors, consumers, etc.).

Municipalities and other governmental and non-governmental agencies, etc.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications, and publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	<p>Short Term -</p> <p>Increases in knowledge and skills of agricultural and horticultural industry professionals will occur relating to:</p> <ul style="list-style-type: none"> Nutrient management Pest management Waste/by-products management and utilization Improving water quality and conserving water Conserving energy Marketing skills Labor management Risk management Policy e.g. farmland preservation Sustainable ag and organic ag production methods <u>New crops and use/alternative crops</u>
2	<p>Medium Term -</p> <p>Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.</p>
3	<p>Long Term -</p> <p>New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.</p>

Outcome # 1

1. Outcome Target

Short Term -

Increases in knowledge and skills of agricultural and horticultural industry professionals will occur relating to:

Nutrient management
Pest management
Waste/by-products management and utilization
Improving water quality and conserving water
Conserving energy
Marketing skills
Labor management
Risk management
Policy e.g. farmland preservation
Sustainable ag and organic ag production methods
New crops and use/alternative crops

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 205 - Plant Management Systems
- 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium Term -

Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 604 - Marketing and Distribution Practices
- 205 - Plant Management Systems
- 215 - Biological Control of Pests Affecting Plants

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -

New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 601 - Economics of Agricultural Production and Farm Management
- 215 - Biological Control of Pests Affecting Plants
- 604 - Marketing and Distribution Practices
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

- Long term, highly focused programmatic areas are expected.
- Budgets will continue to shrink or traditional funding sources will no longer be an expectation; new and competitive funds must be sought.
- Internal funding priorities must be developed in order to determine the program areas of focus and the resources (personnel, operating) that will be provided by Extension and NJAES administration.
- Collaborative partnerships (both internal and external) are necessary to accomplish these outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change - Home, Garden and Environment

2. Brief summary about Planned Program

Clientele will learn about and make better choices to enhance the health, safety and well being of their homes, gardens, schools, parks and workplaces.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	20%		20%	
111	Conservation and Efficient Use of Water	20%		20%	
131	Alternative Uses of Land	20%		20%	
205	Plant Management Systems	20%		20%	
721	Insects and Other Pests Affecting Humans	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

New Jersey's rural, urban and suburban populations requires accurate and sound management information on issues related to home horticulture (lawn and garden care, pest control, nutrient use, sound cultural methods), and household, structural and human-health pest management (termites, carpenter ants, ticks, bed bugs, mosquitoes, etc.). This audience purchases and utilizes the products of our agricultural sector (nursery, floriculture, etc.) as well as the services provided by lawn care companies, landscapers, pest control operators, etc. In addition to residential clientele, municipalities and other managers of public lands, including schools, parks and recreation areas, require information on maintenance of these purchased commodities and public lands. Extension is the premier educational resource to assist this clientele. Extension must continue to remain relevant, timely, proactive and forward thinking, and must determine or reconfirm its current strengths, weaknesses and capacity before we can develop effective future efforts that meet the needs of this large segment of our public.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- The needs of this large audience will continue to increase over time as NJ reaches complete build-out in the next 25 years.
 - This audience has traditionally been viewed as a second tier program by Extension. They will be recognized as important as the agriculture industry. The numbers of clientele and the value they bring through purchase of products and use of services from the agricultural and horticulture industry should be more appreciated, as should their potential role in advocacy for Extension.
 - Extension will meet local needs through county faculty and staff, while participating in regional and state-wide programs.
 - Extension specialists and NJAES researchers will provide leadership and support to county faculty and staff in programming.
 - Additional hires must be made to expand the range of expertise NJAES currently has in several of these areas.
 - Reorganization and prioritization of Extension programs, personnel and commitment to this area will occur.

2. Ultimate goal(s) of this Program

New Jersey's residents will reside, work and play in a healthy, safe, and sound environment -- in their homes, gardens, schools, parks and workplaces.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	15.0	0.0	10.0	0.0
2018	15.0	0.0	10.0	0.0
2019	15.0	0.0	10.0	0.0
2020	15.0	0.0	10.0	0.0
2021	15.0	0.0	10.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Identify critical programmatic foci/needs based on Extension and stakeholder assessment broadly defined under two areas:

- Environmentally sound gardening/lawn care
- Home horticulture-lawn, garden and grounds management
- Commercial horticulture - professional management and maintenance
- Environmentally sound household, structural pest control
- Home pest control-termites, carpenter ants,, etc.
- Human-health related pest control-bed bugs, mosquitoes, ticks, etc.
- A school IPM program will be developed to train end-users sound management techniques,

Develop an inventory of local (county based) and regional and statewide programs designed to meet these needs. Identify team members and their roles. Create a multi-task effort to generate and share research-based information with clientele, including research, demonstrations, educational meetings and workshops, certification programs, trainings, etc. Research on plant cultivars that exhibit increased disease and insect resistance , as well as reduced need for fertilizer and irrigation water, will lead to reduced dependence on chemical control of pests and disease, lessening the impact on the environment.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Demonstrations 	<ul style="list-style-type: none"> • Public Service Announcement • Newsletters • TV Media Programs • eXtension web sites • Web sites other than eXtension

3. Description of targeted audience

Stakeholders:

- Homeowners and residential clientele
- Commercial horticulture professionals (management and maintenance)
- Commercial pest control operators
- Public health officials
- Local environmental commissions or others that have interest in these areas
- Municipalities and other governmental and non-governmental agencies, including Parks

Commission, Public Health, Mosquito Commission, schools, etc.

- Volunteers (trained via Master Gardener Program, Environmental Stewards Program), youth and others who can support and benefit from these efforts
- Underserved and underrepresented audiences

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications, publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation data will be collected.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	<p>Short Term -</p> <p>Increased knowledge and improved decision making skills of professionals and volunteers (Master Gardeners and Environmental Stewards) working in commercial horticulture professions (management and maintenance), commercial pest control operators, public health officials, municipalities and other governmental and non-governmental agencies.</p> <p>Increased number of trained youth and adult volunteers, and measurable impact of their assistance on clientele.</p> <p>Increased number of certified pest control operators.</p> <p>Increased number of youth and adult clientele utilizing Extension information and service to improve their own and others knowledge and decision making skills.</p>
2	<p>Medium Term -</p> <p>Educated youth and adult clientele, both professional and residential, utilize their newly gained knowledge and skills to implement and make changes such as:</p> <ul style="list-style-type: none"> Efficient and effective pest control techniques. Proper utilization of fertilizers and other soil amendments as needed based on soil testing. Proper selection of plant materials to reduce need for chemical inputs. Reduction in the damage caused by structural pests. Reduction in health related incidents and costs association with human health vectors (ticks, mosquitoes). Protect health and safety of school children. Enhance or maintain environmental quality.
3	<p>Long Term -</p> <p>New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.</p>

Outcome # 1

1. Outcome Target

Short Term -

Increased knowledge and improved decision making skills of professionals and volunteers (Master Gardeners and Environmental Stewards) working in commercial horticulture professions (management and maintenance), commercial pest control operators, public health officials, municipalities and other governmental and non-governmental agencies.

Increased number of trained youth and adult volunteers, and measurable impact of their assistance on clientele.

Increased number of certified pest control operators.

Increased number of youth and adult clientele utilizing Extension information and service to improve their own and others knowledge and decision making skills.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 131 - Alternative Uses of Land
- 102 - Soil, Plant, Water, Nutrient Relationships
- 721 - Insects and Other Pests Affecting Humans
- 111 - Conservation and Efficient Use of Water

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium Term -

Educated youth and adult clientele, both professional and residential, utilize their newly gained knowledge and skills to implement and make changes such as:

Efficient and effective pest control techniques.

Proper utilization of fertilizers and other soil amendments as needed based on soil testing.

Proper selection of plant materials to reduce need for chemical inputs.

Reduction in the damage caused by structural pests.

Reduction in health related incidents and costs association with human health vectors (ticks, mosquitoes).

Protect health and safety of school children.

Enhance or maintain environmental quality.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 721 - Insects and Other Pests Affecting Humans
- 131 - Alternative Uses of Land
- 102 - Soil, Plant, Water, Nutrient Relationships
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -

New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land
- 111 - Conservation and Efficient Use of Water
- 205 - Plant Management Systems
- 721 - Insects and Other Pests Affecting Humans
- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy

- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

- Long term, highly focused programmatic areas are expected by us and our clientele.
- Budgets will continue to shrink or traditional funding sources will no longer be an expectation; new and competitive funds must be sought.
- Internal funding priorities must be developed in order to determine the program areas of focus and the resources (personnel, operating) that will be provided by Extension and NJAES administration.
- Collaborative partnerships (both internal and external) are necessary to accomplish these outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Global Food Security and Hunger - Integrated Pest Management

2. Brief summary about Planned Program

As the most densely populated state in the United States, New Jersey is experiencing environmental problems sooner and more severely than other states. We are challenged with land, water and air issues and attaining an efficient balance between production activities, the environment, and human health. New Jersey is a microcosm of both the challenges faced at the agricultural/environmental interface and the mutually beneficial solutions that are possible. As such, it has the potential to serve as a model of how to achieve greater harmony between agriculture and the environment.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
216	Integrated Pest Management Systems	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

There is increasing need to develop new pest management techniques, maintain existing IPM delivery programs and expand into new program and commodity areas. This need is in direct response to increasing internal and external forces from IPM stakeholders. Specifically, we need to: 1) continue to develop better techniques for delivery of IPM related information, and document the actual rate of IPM adoption, 2) address the public concerns regarding traditional pest management techniques in food and the environment, and 3) work with Federal and State legislators regarding implementation of new IPM methods and registration of new and useful pesticides.

IPM employs a variety of management techniques into comprehensive strategies to manage pest populations below economically and aesthetically damaging levels. IPM includes many general aspects of crop management such as environmental control and cultural practices (e.g. irrigation, fertilization, growth regulation) and may also be called integrated crop management or ICM. The program is designed to help commercial growers to produce top quality plants in the most economical means possible.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- IPM through protection of commodities, homes and communities with environmentally and economically sound practices will result in more sustainable production systems, promote abundant, high quality supplies of food & fiber products and an healthy quality of life.
 - Extension will help meet the needs of communities and industry by helping them learn new and standard IPM methods
 - Demand for decreased pesticide use will become more important as the demands by industry and consumers increase

2. Ultimate goal(s) of this Program

- Protect commodities, homes and communities from pests
- Increased abundance of high quality food and fiber products
- Increased acreage in New Jersey grown under IPM practices
- Reduced environmental problems associated with current pest management practices
- A comprehensive understanding of best management practices for IPM that are economically viable and environmentally safe

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	20.0	0.0	10.0	0.0
2018	20.0	0.0	10.0	0.0
2019	20.0	0.0	10.0	0.0
2020	20.0	0.0	10.0	0.0
2021	20.0	0.0	10.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research

- Develop new and novel techniques for pest management and pest detection

Delivery

- Provide IPM information to a wide variety of stakeholders
- Employ new methods for delivery IPM information

Education

- Conduct IPM educational programs for stakeholders
- Conduct IPM educational training for university students
- Conduct IPM educational training for Vo-Ag and FFA students
- Conduct IPM public awareness campaign

Extension

• Work with communities, schools, businesses to help them meet their regulatory responsibilities on pesticide application

• Help growers develop scouting programs to identify pest populations before significant plant damage occurs.

• Develop pest management options to be used in an integrated or rotational program.

• Identify indicators to help growers anticipate pest problems.

• Develop monitoring techniques and population damage thresholds for selected pests.

• Provide scientifically sound advice to state regulatory bodies on pest management and pesticide

issues

• Create a multidisciplinary program comprising of faculty, staff, volunteers, industry partners and government officials

• Investigate IPM methods to help growers produce top quality crops, limiting or reducing production costs.

• Evaluate all pest and crop management practices into a set of commercially used methods. These include the use of: pesticides, economic/aesthetic threshold levels, resistant cultivars, optimum horticultural practices, environmental monitoring, pest scouting, and fertility monitoring and recommendations.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • One-on-One Intervention • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • eXtension web sites • Web sites other than eXtension

3. Description of targeted audience

- Municipalities
- Pesticide applicators and their employers
- Commercial pesticide applicators
- State Dept. of Environmental Protection
- Staff and students who gain valuable scientific experience
- Industry partners in agriculture and related commodities
- Consumers

- NJAES Faculty and Staff involved in pest management research/outreach
- Farmers
- Commodity groups
- New Jersey residents
- School faculty, staff and children
- NJAES researchers
- Secondary and university students
- Governmental agencies
- Environmental organizations
- Agricultural, landscape, fine turf and other related industries

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
 - Number of patents submitted
 - Number of peer reviewed publications
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications, publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Short Term - Develop improved IPM delivery methods. Develop detection, monitoring and sampling methods that reliably predict pest levels. Develop novel management methods for a wide variety of pests. Develop IPM training for secondary and university students. Improve public awareness about IPM Determine the effectiveness of pheromones for mating disruption of pests. Greater understanding of entomopathogenic nematode species'effects on pests. Evaluation of the effectiveness of natural pesticides and crop management to reduce pests. Determine which types of plants attract pests to be used as a pest control method.
2	Medium Term - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.
3	Long Term - Protect commodities, homes and communities from pests. Increased abundance of high quality food and fiber products. Increased acreage in New Jersey grown under IPM practices. Reduced environmental problems associated with current pest management practices. A comprehensive understanding of best management practices for IPM that are economically viable and environmentally safe.

Outcome # 1

1. Outcome Target

Short Term -

- Develop improved IPM delivery methods.
- Develop detection, monitoring and sampling methods that reliably predict pest levels.
- Develop novel management methods for a wide variety of pests.
- Develop IPM training for secondary and university students.
- Improve public awareness about IPM
- Determine the effectiveness of pheromones for mating disruption of pests.
- Greater understanding of entomopathogenic nematode species'effects on pests.
- Evaluation of the effectiveness of natural pesticides and crop management to reduce pests.
- Determine which types of plants attract pests to be used as a pest control method.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium Term -

- Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems.
- Research findings used to develop new projects.
- IPM training of students creates new IPM interns, professionals and researchers.
- Knowledge of various natural insecticides and their effectiveness on pests.
- Determining the best time and application method for IPM products.
- Greater understanding of pest biology and ecology.
- Greater understanding of entomopathogenic species biology and ecology.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -

- Protect commodities, homes and communities from pests.
- Increased abundance of high quality food and fiber products.
- Increased acreage in New Jersey grown under IPM practices.
- Reduced environmental problems associated with current pest management practices.
- A comprehensive understanding of best management practices for IPM that are economically viable and environmentally safe.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

- Develop assessment and evaluation tools that can measure our success of achieving these outcomes, the impact of our efforts on our clientele and program efficiencies and effectiveness.
- Federal, State and local investment and support, including funds and manpower, in these research activities, are necessary for this program to achieve its goals.
- Partnerships with industry, government and communities will affect the ability to change or meet regulatory standards and consumer demand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Global Food Security and Hunger - Aquaculture

2. Brief summary about Planned Program

NJAES through Cooperative Research and Cooperative Extension will explore how researchers can best support sustainable marine ecosystems. This initiative will look at the breadth of the system from fish stock assessments, aquaculture, shoreline maintenance and restoration. The aquaculture program will help clientele become more informed about, and have access to, scientifically-sound aquaculture management practices and high quality, disease resistant aquaculture products (especially shellfish).

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

New Jersey's aquaculture resources are finite and can sustain only fixed harvests while the demand for quality fish and seafood continues to climb. Also, threats from disease and environmental contaminants and conditions provide additional challenges to producers to meet the demand for quality aquaculture products. In particular, shellfish resources along much of the Atlantic coast have been devastated by diseases. To meet this increased demand, commercial fishermen and others in the seafood industry must develop new sources of seafood products that are high quality and disease resistant.

The US Commercial Landing show that in 2014 the NJ commercial fishermen landed 124 million pounds, valued at almost \$152 million. As aquaculture products are becoming increasingly popular, the value of this industry will rise. The impact of aquaculture on the industry and the communities that are involved in aquaculture is not well known and needs further study.

2. Scope of the Program

- In-State Extension

- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- Extension will help meet the needs of communities and the public in understanding the new water quality standards and ways they can help their municipality meet those standards.
- Water quality and quantity will become increasingly important as the demands by industry and homeowners increase.

2. Ultimate goal(s) of this Program

- Clear and comprehensive understanding of community, environmental, genetic and physical regulators of aquaculture quality and quantity
- A safe and secure aquaculture industry that can meet consumer demands for high-quality products and also be environmentally friendly and economically viable.
- Creation of superior aquaculture products that will be of high demand outside NJ.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	3.0	0.0	5.0	0.0
2018	3.0	0.0	5.0	0.0
2019	3.0	0.0	5.0	0.0
2020	3.0	0.0	5.0	0.0
2021	3.0	0.0	5.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Investigate the genetic mechanisms for disease resistance and improved quality in economically important shellfish
- Create a dynamic and cooperative partnership with faculty, staff, businesses, regulatory/advisory councils and the government to research best management practices and discover effective solutions and management practices to address threats to NJ aquaculture as well as investigate opportunities to increase the quality and quantity of the aquaculture harvest.

- Collect and analyze data on how communities and businesses are affected by the aquaculture industry management practices.
- Examine the presence of unhealthy levels of contaminants in aquaculture products.
- Determine best techniques for shellfish hatcheries on and off shore.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • One-on-One Intervention • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • TV Media Programs • Web sites other than eXtension

3. Description of targeted audience

- Aquaculture related businesses and employees
- State Department of Environmental Protection
- State Department of Agriculture
- Industry partners who learn ways to improve or protect their harvests
- Communities who depend on aquaculture-related revenue
- NJAES faculty and staff involved in water research/outreach
- Consumers of aquaculture products, including recreational fishing

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications, publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Short Term - Knowledge of seasonal variations for shellfish diseases. Create census data on communities involved in aquaculture. Determine the level of pollutants in economically important fish species. Develop markers and maps of important genetic traits. Knowledge of shellfish hatchery techniques that decrease time for growth to market size.
2	Medium Term - Identify spatial and temporal relationships between patterns of shellfish diseases in NJ and environmental correlates. To develop disease-resistant strains of shellfish. Develop superior disease-resistant and larger genetic lines of shellfish. Measure the impact of communities on the aquaculture industry. Knowledge of the feasibility of off-shore shellfish farming.
3	Long Term - Clear and comprehensive understanding of community, environmental, genetic and physical regulators of aquaculture quality and quantity. A safe and secure aquaculture industry that can meet consumer demands for high-quality products and also be environment friendly and economically viable. Creation of superior aquaculture products that will be of high demand outside NJ.

Outcome # 1

1. Outcome Target

Short Term -

Knowledge of seasonal variations for shellfish diseases. Create census data on communities involved in aquaculture. Determine the level of pollutants in economically important fish species. Develop markers and maps of important genetic traits. Knowledge of shellfish hatchery techniques that decrease time for growth to market size.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium Term -

Identify spatial and temporal relationships between patterns of shellfish diseases in NJ and environmental correlates. To develop disease-resistant strains of shellfish. Develop superior disease-resistant and larger genetic lines of shellfish. Measure the impact of communities on the aquaculture industry. Knowledge of the feasibility of off-shore shellfish farming.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -

Clear and comprehensive understanding of community, environmental, genetic and physical regulators of aquaculture quality and quantity. A safe and secure aquaculture industry that can meet consumer demands for high-quality products and also be environment friendly and economically viable. Creation of superior aquaculture products that will be of high demand outside NJ.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

- Develop assessment and evaluative tools that can measure our success of achieving these outcomes, the impact of our efforts on our clientele, and program efficiencies and effectiveness.
- Environmental and weather conditions can dramatically affect the health and viability of shellfish beds and seedlings.
- Generate significant business support
- Partnerships with industry, government and communities will affect the ability to change or meet the regulatory standards
- Dynamic and collaborative relationships with the various aquaculture advisory councils to review current, and create new regulations for the industry
- Public education in understanding the factors that affect aquaculture and public awareness of health advisories related to shellfish/fish
- Importation of diseases from other areas may affect the health of the state's aquaculture products

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

Safe food handling is critical to the health of the public. Though an integrated Cooperative Research and Cooperative Extension programmatic effort, food safety issues affecting New Jersey residents and beyond will be addressed. Effective and efficient food handling strategies will be implemented to ensure safety during production, transportation, preservation/processing, packaging and preparation/handling of food. The ultimate result of this programmatic effort will be adoption of recommended practices by individuals, families, communities, producers, processors, and those at retail levels (restaurants and other vendors).

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		5%	
311	Animal Diseases	0%		15%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%		15%	
404	Instrumentation and Control Systems	0%		10%	
501	New and Improved Food Processing Technologies	15%		15%	
502	New and Improved Food Products	10%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	10%		0%	
504	Home and Commercial Food Service	20%		5%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		10%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		10%	
723	Hazards to Human Health and Safety	15%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Food-borne illness is a major public health threat. Adoption of safe food handling practices at the individual, family, production, and food supply system is essential. Land-grant researchers and Extension faculty and professionals need to employ effective strategies to engage individuals in safe food handling practices.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research

- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Cooperative Research and Cooperative Extension can discover solutions and design educational interventions to decrease the number of food-borne threats all along the food chain.

2. Ultimate goal(s) of this Program

A safer food supply resulting from a reduction in the incidences of food-borne illnesses; elimination of microbial contamination and antimicrobial resistance; developments of food processing technologies to improve food safety; educating consumers, growers, producers, food workers and others about safe food handling and sanitation practices.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	3.0	0.0	4.0	0.0
2018	3.0	0.0	4.0	0.0
2019	3.0	0.0	4.0	0.0
2020	3.0	0.0	4.0	0.0
2021	0.0	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Conduct training and certificate programs for growers, producers, food workers, consumers and vendors to increase knowledge of food safety practices.
 - Design strategies, tools and processes to detect and eliminate pathogens, chemical and physical contaminants during production, transportation, processing and preparation of food.
 - Investigate the ecology of threats to the food supply from microbial and chemical sources
 - Develop technologies for the detection of food supply contaminants

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations 	<ul style="list-style-type: none"> ● Newsletters ● TV Media Programs ● eXtension web sites ● Web sites other than eXtension

3. Description of targeted audience

- Producers
- Processors
- Retail - restaurants/vendors/supermarkets
- Department of Health
- Consumers, families, youth communities
- NJAES - faculty - staff - students
- Food manufacturers
- Schools - child care providers - food service workers

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
 - Number of patents submitted
 - Number of peer reviewed publications
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- -New methods in technologies
 - Educational workshops
 - Newsletters
 - Scientific publications
 - Patents
 - Website development
 - Extension publications
 - Volunteers trained
 - Agricultural and Industry Certifications
 - Train the trainer programs
 - Audits conducted
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Short Term - Increase knowledge of viable technologies, detection prevention, intervention and control technologies and practices to ensure food safety. Increase understanding of the ecology of threats to food safety from microbial and chemical sources.
2	Medium Term - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
3	Long Term - A safe food supply resulting from reduced incidence of food-borne illnesses.

Outcome # 1

1. Outcome Target

Short Term -

Increase knowledge of viable technologies, detection prevention, intervention and control technologies and practices to ensure food safety. Increase understanding of the ecology of threats to food safety from microbial and chemical sources.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
- 102 - Soil, Plant, Water, Nutrient Relationships
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium Term -

Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 504 - Home and Commercial Food Service
- 723 - Hazards to Human Health and Safety
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -

A safe food supply resulting from reduced incidence of food-borne illnesses.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 502 - New and Improved Food Products
- 311 - Animal Diseases
- 102 - Soil, Plant, Water, Nutrient Relationships
- 723 - Hazards to Human Health and Safety
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
- 404 - Instrumentation and Control Systems
- 504 - Home and Commercial Food Service
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 501 - New and Improved Food Processing Technologies
- 722 - Zoonotic Diseases and Parasites Affecting Humans

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy

- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

- Public education
- Partnerships with industry, government, consumers and communities
- Funding to support research and outreach education
- State and federal food safety regulations

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

Through an integrated Cooperative Research and Cooperativ Extension programatic effort sustainable energy issues affecting New Jerseyans will be addressed. Effective and efficient scientific research and extension, delivery systems will be implemented to affect biomass for fuels, bio-energy production, value-added biobased peoducts, energy efficiency technologies and conservation practices related to energy use across all sections. The ultimate goal is energy independence.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
605	Natural Resource and Environmental Economics	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

The US populace is too reliant on fossil fuels. To ensure future sustainability it is essential that alternative energy sources be developed and implemented. Additionally individuals, families, communities and producers need to engage in conservation practices related to energy use.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- Cooperative Research and Cooperative Extension can discover solutions and design educational interventions to decrease dependence on fossil fuels

2. Ultimate goal(s) of this Program

- Improved environmental conditions through sustainable bio-fuel production and utilization.
- Enhance the economy as a result of bioenergy development.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	4.0	0.0	2.0	0.0
2018	4.0	0.0	2.0	0.0
2019	4.0	0.0	2.0	0.0
2020	4.0	0.0	2.0	0.0
2021	4.0	0.0	2.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Perform experiments to investigate renewable energy production.
- Develop methodologies and scientifically sound alternatives to fossil fuels
- Educate homeowners, business owners, farmers and agri-related businesses, youth and families about conservation and efficiency practices related to energy use.
 - Provide education and training to enhance bio energy related job development and careers.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods

- | | |
|--|--|
| <ul style="list-style-type: none">● Education Class● Workshop● Group Discussion● One-on-One Intervention● Demonstrations | <ul style="list-style-type: none">● Newsletters● TV Media Programs● eXtension web sites● Web sites other than eXtension |
|--|--|

3. Description of targeted audience

- University faculty, staff and students
- School aged youth
- Families
- Homeowners
- Farmers
- Agri-businesses
- State agencies and organizations
- Industry partners
- Small businesses
- Entrepreneurs
- Policy and decision makers

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- -Scientific publications and patents produced
- Participants reach through direct and indirect education
- New methodologies and technologies developed

- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Short Term - Increase knowledge, energy efficiency technologies and conservation practices related to energy use. <u>Explore research strategies to replace fossil fuel consumption.</u>
2	Medium Term - Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. <u>Newly developed plants and technologies will be adopted to enhance energy independence.</u>
3	Long Term - Fossil fuel consumption will be replaced with biofuels. Economic development will be enhanced through an increase of jobs and careers as a result of bioenergy development. <u>Environment quality enhanced as a result of sustainable biofuel production and utilization.</u>

Outcome # 1

1. Outcome Target

Short Term -

Increase knowledge, energy efficiency technologies and conservation practices related to energy use.

Explore research strategies to replace fossil fuel consumption.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Medium Term -

Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels.

Business owners will create and maintain green jobs/careers as a result of bioenergy development.

Newly developed plants and technologies will be adopted to enhance energy independence.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Long Term -

Fossil fuel consumption will be replaced with biofuels.

Economic development will be enhanced through an increase of jobs and careers as a result of bioenergy development.

Environment quality enhanced as a result of sustainable biofuel production and utilization.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Consumption Practices)

Description

- State and local investment and support including funds and manpower in related research activities are essential to programs effectiveness.
- Partnerships with industry, government and communities.
- Public education and involvement of individuals, youth families and communities in conservation practices.
- Job training and career development opportunities will effect work force and economic enhancement.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

NJAES research and extension outcomes related to this planned program will be evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we will include the measurement of knowledge gained as measured by pre/post Likert-scale assesments. Surveys will be used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we will focus on program delivery, participation, relevance and timeliness. Data will be collected at appropriate times for each initiative that support this planned program. IRB approved evaluation instruments will be used

to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstrations will be collected, analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions.