

**UNIVERSITY OF CALIFORNIA
DIVISION OF AGRICULTURE AND NATURAL RESOURCES**

**2013-2017 Combined Research and Extension
Federal Annual Plan of Work**

Agricultural Experiment Station
and Cooperative Extension

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Approved

University of California
Agriculture and Natural Resources



**2013 - 2017 University of California Combined Research and Extension
Federal Annual Plan of Work**

Table of Contents

I.	Plan Overview	1
II.	Merit Review Process	6
III.	Evaluation of Multi & Joint Activities	7
IV.	Stakeholder Input	8
V.	Planned Program	12
	A. Healthy Families and Communities	13
	B. Childhood Obesity	22
	C. Food Safety	27
	D. Global Food Security and Hunger	34
	E. Sustainable Natural Ecosystems	43
	F. Endemic and Invasive Pests and Diseases	51
	G. Sustainable Energy	60
	H. Climate Change	65
	I. Water Quality, Quantity and Security	70

2013-2017 University of California Combined Research and Extension Federal Plan of Work

I. Plan Overview

The University of California's Division of Agriculture and Natural Resources (ANR) and its two primary units, the Agricultural Experiment Station (AES) and Cooperative Extension (CE), represent the true land grant component of the University of California. The UC ANR system currently has offices, programs, and academics in every county in California, nine Research and Extension Centers (RECs) located in different ecosystems across the state, and faculty on three campuses with multiple field stations. Six Statewide Programs focus on specific issues, such as youth and community development, pests and diseases, and agricultural sustainability, provide a means to connect faculty from ANR campuses and counties with UC faculty from all the other campuses, allowing for integrated teams to work on complex issues, which need multidisciplinary approaches to find solutions. ANR connections also include faculty from the State University system, private colleges and universities, and stakeholders representing federal and state governmental agencies, organizations representing agricultural and natural resource production, NGO's, and other interest areas including the environment, youth, and nutrition.

ANR Strategic Planning

In order to prepare for the future, the University of California, Division of Agriculture and Natural Resources (ANR) embarked on the development of a *Strategic Vision* during 2008. The objective of this process was to anticipate the research and extension priorities of California in 20 years, analyze ANR's current capacity to address them and to focus on the future demand for services. This effort looks beyond ANR and integrates ANR's programs more fully with other parts of UC.

Projecting the future is a difficult task, and ANR drew on some of the best minds across the breadth of the University of California, as well as leaders in agriculture, nutrition, human and community development and natural resource fields. A steering committee was co-chaired by ANR's VP and a UC Regent. Members included the AES Deans; a UCCE County Director; UC's Vice President for Research and Graduate Studies; UC's Provost; a grower who was also a former UC Regent, former USDA Deputy Secretary and former Director of CDFA; and another grower who was also chair of the President's Advisory Commission on Agriculture and Natural Resources.

Under the general guidance of the Steering Committee, five teams were recruited and charged to identify general themes and issues anticipated for California in the year 2025 and ANR's capacity to address future trends and issues. The Vice President charged the five working groups with answering this question: *How do we position ANR to respond to the needs of the state in keeping California competitive globally in providing safe, nutritious and healthy food and conserving natural and human resources?*

The five areas were:

- The Future Structure of California
- The Future of Agricultural and Food Systems
- The Future of Natural Resource Systems
- The Future of Health and Nutrition Systems
- The Future of Human Development Systems

These teams drew on scientific literature and surveyed leaders and thinkers in their respective areas to document the issues and challenges facing California in 2025. They reported their findings into their White Papers. In addition, an independent consultant surveyed key external stakeholders to determine their opinions about the major challenges and issues. Then the ANR Program Council, comprised of associate deans, then regional directors and program leaders, and other ANR leaders, synthesized the five reports and survey data into a draft Strategic Vision. The draft was further refined with edits responding to received comments from the Steering Committee, ANR academic and staff, and external stakeholder reviews. The final Strategic Vision was delivered to the UC Regents in May 2009.

Our Vision

UC's Division of Agriculture and Natural Resources has a bold vision for California:

ANR envisions a thriving California in 2025 with sustainable and productive food, fiber, and natural resource systems strengthened by a close partnership between the University of California and the people of the state. By actively connecting the public with the University's research and educational resources, ANR serves as a catalyst for science-based innovations that enable the state to adapt to ever-changing physical, social and economic conditions. Mutually sustained by this strong alliance, the University remains relevant, and the people of California enjoy a high quality of life, a healthy environment, and economic success in a global economy.

ANR's role in fulfilling our bold vision for California is to: Utilize our vital, statewide network of highly innovative and productive academics to conduct cutting edge research, education and delivery of programs that Californians rely on to produce a safe and secure food supply, advance environmental quality, improve human nutrition, and help agriculture and natural resource producers stay competitive in local and global markets.

California's Future Challenges and ANR's Response

The challenges facing California are numerous and will require multiple strategies to ensure ANR's vision for California becomes reality. UC and its partners can strategically focus ANR's efforts on some of these challenges.

Increased population leads to intensified competition for water resources among urban, environmental and agricultural uses:

The state's expanding population and increased water allocations for environmental purposes will result in a decrease in water available for agricultural production. Urban development on prime agricultural land pushes production to more marginal land which requires more water to produce the same quantity of product. Together these trends create a need for production processes that utilize less water and lower quality water. The ANR system works with a broad spectrum of stakeholders to identify local and regional water policy issues and can be the catalyst for initiating research and educational programs that develop solutions.

Many of ANR's RECs and campus field stations have the infrastructure to investigate approaches to water conservation. For example, many field stations have sophisticated irrigation systems that allow for precise water applications. These systems enable research in water use efficiency, deficit irrigation, and management strategies to reduce water needs. The field stations also have the capacity to support alternative crops research that may identify new varieties or crops that require less water.

California faces diminishing and more costly energy supplies:

The demand and cost for energy continues to rise as a result of population growth, urban development, and global competition. Innovative strategies for management and use of the state's natural and agricultural resources will help create a more sustainable energy future. In particular, ANR's research and extension network can provide California agriculture with new production technologies and practices which minimize energy consumption and utilize renewable energy sources. ANR innovations with partners can provide technology, marketing and policy advancements to enable expanded use of forest, range, and agricultural resources for renewable energy production.

Environmental constraints will continue to increase in California:

California's environmental regulations, arguably the most intense in the country, will affect agriculture and natural resource production. Research, extension, and education programs offer the potential for multiple stakeholders to compare the impacts of regulatory programs, and recommend new and creative methods for protecting the environment, while simultaneously producing goods and services. Links between campus and county programs allow for collaboration in both research and outreach programs.

The mixture of regional crops and animal products grown in California will change:

A combination of factors, including climate change, population growth, water availability, technological change, and global demand, will accelerate changes in the type and distribution of crops grown in California. Projected changes in temperature, rainfall and snowpack will result in geographical shifts in crop locations. Population growth will continue to occupy what is currently prime agricultural land forcing production onto other more marginal lands. Associated with population growth is the increasing municipal demand for water which will change water allocation in many areas, resulting in inadequate supplies available for current crop production and requiring relocation of agricultural operations. Global demand for products will also have

a significant influence on the types and amounts of crops grown throughout the state.

ANR is uniquely positioned to address the shifts in crop production that will have to occur. ANR has the capacity to investigate the suitability of areas for growing crops not previously produced in similar climates and to alter or develop production systems to create sustainable systems in these new environments. Both short and long-term research can be conducted under controlled situations not available when utilizing cooperators' operations.

The capacity to use nutrition to positively impact human health will be a reality:

Obesity, diabetes, heart disease, stroke, hypertension, cancer and bone diseases are just some of the human health threats related to poor nutrition and lifestyle choices. UC discoveries and educational outreach will help understand, evolve solutions, and inform the public about diseases associated with nutrient deficits, excesses, and imbalances and food sensitivities. Current and future technologies based on genetics, genomics, proteomics and other methods will contribute to the creation of designer foods to enhance nutrition and reduce health risk.

California's youth will need more complementary education programs:

A major challenge for California is the development of California youth into positive, engaged citizens. ANR's system of research-based non-formal education can be used to develop new approaches to science literacy and school readiness (pre-K) especially among low income and under-represented populations. ANR can provide, through its 4-H Youth Development programs, alternative academic pathways and promote leadership development and citizenship opportunities that keep youth engaged in their educational pursuits and development. With UC and other partners, ANR programs will complement the K-12 school system and reinforce development of skill sets to prepare youth for higher education, future career opportunities and informed participation in civic affairs and public policy.

California's future depends on:

- A sustainable, nutritious, and safe food supply that improves the health and well-being of its population.
- A clean, healthy, sustainable environment including comprehensive strategies to prevent and control California wildfires.
- Clean and secure supplies of water to meet the needs of people, agriculture, and the environment.
- Secure supplies of energy with increased energy efficiency in agriculture and natural resource systems, and improved use of biofuels and other by-products.
- A science literate population capable of making informed choices.
- Enlightened and prepared leadership capable of making strategic decisions.
- Choices and solutions that come from innovation.
- Economic opportunities and jobs

The Vision identified the following nine multidisciplinary, integrated strategic initiatives, which represent the best opportunities for ANR's considerable infrastructure and talent to seek new resources and new ways of partnering, within and outside the University, to find solutions to the issues that will be facing California in 2025:

- Initiative to Improve Water Quality, Quantity, and Security
- Initiative to Enhance Competitive, Sustainable Food Systems
- Initiative to Increase Science Literacy in Natural Resources, Agriculture, and Nutrition
- Initiative for Sustainable Natural Ecosystems
- Initiative to Enhance the Health of Californians and California's Agricultural Economy
- Initiative for Healthy Families and Communities
- Initiative to Ensure Safe and Secure Food Supplies
- Initiative for Managing Endemic and Invasive Pests and Diseases
- Initiative to Improve Energy Security and Green Technologies through Innovative Science Linking Engineering, Agricultural, Biological, and Environmental Sciences

ANR's Strategic Initiatives

To meet the state's most pressing challenges in 2025, ANR members have worked to position our cutting-edge science and education programs to focus on identified priority areas. Due to budget constraints ANR is moving forward on the following five strategic initiatives: 1) Healthy Families and Communities; 2) Endemic and Invasive Pests and Diseases; 3) Sustainable Natural Ecosystems; 4) Sustainable Food Systems; and 5) Water Quality, Quantity, and Security. The strategic initiative leaders and advisory panel members develop five-year plans of action for implementing each initiative. As part of this process, they identify the 'areas of inquiry' where ANR has the opportunity to make a significant visible difference to the people of California, which provide the basis for the new targeted, internal, competitive grants program. As such, ANR will invest in research, education and outreach projects aimed to support high priority issues, encourage collaboration among academics, support short-term high-impact projects, strengthen the research-extension continuum, and contribute policy-relevant outcomes addressing significant statewide economic, environmental and social issues in California.

Aligning with NIFA's Five Priorities

To comply with NIFA's requirement, ANR realigned its four previously state-defined, federal planned programs with NIFA's five program priorities, as well as with ANR's Strategic Initiative areas, into nine federal planned programs.

Estimated Number of Professional FTEs/SYs for the State

Year	Extension	Research
2013	267.6	398.6
2014	267.6	398.6
2015	267.6	398.6
2016	267.6	398.6
2017	267.6	398.6

II. Merit Review Process

The Merit Review Process that will be Employed during the 5-year Plan of Work Cycle

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

Brief Explanation

Scientific Peer Review

Each project funded under the Hatch Act is peer reviewed at the department level in the colleges/school at Berkeley, Davis, and Riverside. A peer review committee is appointed by the department chair. The committee evaluates the relevance, quality and scientific value of the proposed research. Upon completion of the peer review, the project is also reviewed at the dean's office for USDA compliance and forwarded to the Vice President's office for final review and submission to NIFA.

Merit Review

The Division's organizational structure emphasizes that resource allocation decisions will be driven by programmatic considerations and developed through a broad participatory process. This process will include review of the quality and relevance to program goals for all of the Division's programs.

At the statewide level, the UC ANR Program Council meets almost monthly. It is chaired by the Associate Director of Cooperative Extension and the Agricultural Experiment Station, and includes four Associate Deans, five strategic initiative leaders, and two county-based CE representatives. The Associate Vice President - Business Services and the Director of Communication Services serve as ex officio members. This group coordinates Divisionwide planning and delivery of programs and develops recommendations for allocation of Division resources. The Program Council reviews all ANR budget proposals, program area budget proposals, and position proposals from a statewide perspective to make specific recommendations

on budget expenditures and resource allocation principles. These recommendations are then considered by the Vice President and his Executive Working Group for final allocation decisions.

ANR's strategic initiative leaders and advisory panels are key players in helping the Division meet its goals, by organizing division-wide conferences, developing five-year, statewide strategic plans, and coordinating the internal competitive grants program.

ANR's newly formed Program Teams provide an umbrella structure for the Division's many workgroups to meet. The Program Teams meet as part of the strategic initiative conferences, as well as having their own Program Team meetings. These Program Teams carry out their essential leadership functions and enhance inter-workgroup communication and collaboration. In this way, CE and AES personnel along with non-ANR partners are brought together to work on emerging and continuing issues. They look at the Division's program priorities and determine the programs that will best address these needs.

ANR's competitive grant program proposals are reviewed by ad hoc, technical committees recruited by the Strategic Initiative leaders. The membership of these committees depends on the proposals received and includes external experts. After the technical committees, Program Council reviews the proposals and makes recommendations for funding. The Vice President and Executive Working Group make the final decisions on allocations.

III. Evaluation of Multi & Joint Activities

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

The University of California's Division of Agriculture and Natural Resources (ANR) is a key player in improving California's future by providing leadership and innovation through research, education, and service. ANR research and extension professionals will plan and deliver programs that address the critical issues facing California in the areas of agriculture, natural resources and human resources by pooling the expertise of California AES and CE academics, by collaborating with colleagues in other institutions, agencies, and states, and by consulting with the external stakeholders. The ANR program planning processes involve stakeholder input through the strategic initiatives, ANR workgroups and program teams, advisory groups, and other listening sessions and focus groups. The annual strategic initiative meetings bring AES and CE together to discuss the critical issues in the respective program areas.

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

The needs of under-served or under-represented groups will be addressed through research and extension programs in all planned programs. Nutrition

programs will focus on adults and children at risk, including individuals living in poverty, recent immigrants and African American, Native American, and Hispanic populations. Agricultural programs will include those focusing on limited resource farmers, including recent immigrants from Southeast Asia. Youth development programs will work with at-risk youth in both urban and rural settings. Curricula and educational materials will be developed for and adapted to specific needs of underserved and underrepresented groups, including translation of materials into the appropriate languages. In addition, programs, demonstrations and field days are often provided in a variety of languages to meet the needs of different groups.

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

We use our internal reporting system, which follows the logic model format, to capture and provide descriptions of the anticipated outcomes for FY 2013. The inputs, outputs and activities that will lead to achieving the anticipated outcomes are included in the plan.

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

Aligning the planned programs with our strategic vision will result in improved program effectiveness. ANR will continue to work to foster collaborative teams of AES faculty, CE specialists and CE advisors addressing the critical issues facing California's agricultural, natural and human resources. This includes integrating the efforts of ANR workgroups and their respective program teams, statewide programs, the strategic initiative advisory panels, and, of course, individual innovators. In this way, ANR will work to prevent duplication of effort and to ensure that the most complete body of knowledge and expertise is available to address the issues by including all those with expertise in relevant areas.

ANR faculty, specialists and advisors also collaborate with their colleagues in other states on topics that cross state boundaries such as invasive pests, youth development issues, and varietal development. This draws together a wider spectrum of expertise and allows for a greater number of stakeholders to be served.

IV. Stakeholder Input

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 specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation

The Division will continue to use a variety of mechanisms to seek stakeholder input on the development of Division program priorities and use of its research, extension and education funds. In addition, CE advisors delivering programs in 58 California counties receive input on local needs from their local clientele on a daily basis. All of the input received from stakeholders is used by ANR members in program planning and implementation at the local, regional, and statewide level.

Strategic Initiatives Process

As noted in the Plan Overview, ANR embarked on a strategic planning effort in 2008. In developing the Strategic Vision, external stakeholders were consulted about the trends and issues of the next twenty years and were invited to comment on the draft Strategic Vision document in early 2009. Stakeholders continue to be involved in the development of ANR's implementation plan.

UC ANR Workgroups and Program Team Meetings

The Division's workgroups and program team meetings are the primary mechanism for accomplishing ANR's high priority research and extension goals through grassroots leadership. The 79 Divisionwide workgroups are aligned into 18 program teams. The total ANR workgroup membership is 2,180 and the total external stakeholder membership is 1,000. The workgroups bring together AES and CE personnel and non-ANR partners to work on emerging and continuing priority issues in Division program areas. ANR workgroups involve external stakeholders in their program planning process and workgroup activities and projects. The involvement of external stakeholders in the workgroups ensures that real world needs are brought to the attention of the Division as programs are planned and implemented. External stakeholders on the workgroups include individual producers, representatives from local community groups, state and federal agencies, industry groups, consumer groups, and colleagues from other higher education institutions.

Formal advisory groups

The President's Advisory Commission on Agriculture and Natural Resources identifies informational needs for California's agricultural, natural and human resources interests and advises the President on how the University can best meet these needs through its science-based research, classroom instruction and educational outreach. The members represent 28 business, consumer, youth and government leaders from throughout California and meet twice a year to provide input. The Vice President - Agriculture and Natural Resources participates as a member of this Commission and brings the Commission's advice to the ANR Executive Working group, the Division's administrative group charged with Divisionwide strategic planning and decision-making.

Each of the three colleges at Berkeley, Davis and Riverside and the School of Veterinary Medicine at Davis, have external stakeholder advisory councils that meet at least annually to provide feedback on their research, extension, and teaching programs. In addition, departments may have advisory boards.

Several of the Statewide Programs have external Advisory Councils that meet at least annually to review progress and offer recommendations for future program direction.

Commodity Organizations/Marketing Order Boards

Members of these organizations provide annual input on research and extension needs for their commodities to UC ANR members through regular meetings and discussion of funding for research projects. These individual groups also come together on an annual basis to form the California Commodity Commission that meets with the Vice President and offers specific recommendations on program planning and funding issues.

Statewide Program Reviews

Each of the Division's six statewide programs undergoes a routine program review. A review committee, including ANR members and external stakeholder representatives, is appointed. As part of the review process, the committee solicits input from key stakeholder groups, through interviews and/or surveys.

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

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

ANR will use a variety of formal and informal methods to identify stakeholders. As described earlier, ANR units have some formal advisory groups such as the President's Advisory Commission on Agriculture and Natural Resources that operates on a systemwide basis while there are also advisory groups at the campus and county level. In addition, internal workgroups have external stakeholder members who have been recommended by the workgroup members. The Division also convenes focus groups, listening sessions and other groups to provide input to its program planning process. County-based programs do needs assessments as part of their program development activities. Surveys may be used by both local units and statewide units to solicit recommendations for individuals and groups that

may be appropriate to give input on ANR programs and/or critical issues facing the state

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

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)
- 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

Brief explanation

The Division will continue to meet with and survey both traditional and non-traditional stakeholder groups and individuals to collect their input on the development of Division program priorities and use of its research, extension and education funds

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 Action Plans
- To Set Priorities

Brief explanation

External stakeholder input is used to identify current critical issues, emerging issues and program priorities for the short, medium and long-term planning periods. By considering the external stakeholder needs and identification of issues, the Division can assess how best to deploy its resources to address the needs. Division administrators consider the external stakeholder input along with internal stakeholder input as they make decisions in the annual budget process and in their strategic planning efforts.

V. Planned Program

Program Names:

- A. Healthy Families and Communities
- B. Childhood Obesity
- C. Food Safety
- D. Global Food Security and Hunger
- E. Sustainable Natural Ecosystems
- F. Endemic and Invasive Pests and Diseases
- G. Sustainable Energy
- H. Climate Change
- I. Water Quality, Quantity and Security

A) Healthy Families and Communities

1) Brief Summary about Planned Program

Projecting into the future, the major challenge for human development systems - our families, school and communities - will be to remain or become resilient settings for promoting positive development of the children, youth, and adults within them, given the unprecedented changes in the world. How we tap into and nurture resilience, the human capacity for transformation and change, will be vital knowledge as we move forward into the future of transformational change. ANR is positioned to address this issue through its statewide network of researchers and educators dedicated to the creation, development, and application of knowledge in agricultural, natural and human resources.

To promote healthy families and communities ANR's role will be to:

- conduct research on identifying the factors that contribute to resilient communities.
- coordinate active collaborations among UC faculty, specialists, food and agricultural industries, school site personnel, and state and county agency representatives to deliver programs that promote health.
- identify effective strategies for prevention of health issues such as focusing on high-risk populations and aging population's nutritional status, including food choices, food handling, and use of supplements.
- deliver effective education to individuals and families, who, with improved management skills, would have the resources to make informed decisions.
- equip consumers with the tools to make informed decisions regarding food choices, nutrition, health agriculture and environmental issues.
- work with community leaders in developing key social and economic information on the economic viability of communities, and develop strategies to enhance community economic development.
- deliver education programs at the community level, including serving a wide range of audiences from youth (4-H); volunteers (Master Gardener Canners, 4-H); low-income families (EFNEP; and food stamp eligible populations (UC CalFresh program) and culturally diverse groups.
- develop youth programs that use active learning strategies, including formal and non-formal education, to increase civic engagement, healthy living, and self-directed learning, while incorporating a range of approaches that engage youth with community service and service learning.
- strengthen science and math skills to prepare youth for jobs and opportunities in higher education.
- expand the science education and literacy programs through nutrition and physical activity programs.
- develop, test, edit, and validate effective education tools, materials, and curricula for use in UC ANR programs and in the general education setting.
- create, validate, and disseminate innovative methods of evaluating the effectiveness of programs.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Healthy Families and Communities Planned Program Knowledge Areas

Program Knowledge Areas and Percentage

KA Code	Knowledge Area	Extension	Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	2%
302	Nutrient Utilization in Animals	0%	2%
305	Animal Physiological Processes	0%	13%
501	New and Improved Food Processing Technologies	0%	1%
606	International Trade and Development	0%	2%
608	Community Resource Planning and Development	3%	1%
610	Domestic Policy Analysis	0%	2%
611	Foreign Policy and Programs	0%	2%
701	Nutrient Composition of Food	1%	3%
702	Requirements and Function of Nutrients and Other Food Components	1%	36%
703	Nutrition Education and Behavior	11%	12%
704	Nutrition and Hunger in the Population	1%	1%
724	Healthy Lifestyle	6%	2%
801	Individual and Family Resource Management	4%	0%
802	Human Development and Family Well-Being	9%	9%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	3%	5%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%	1%

805	Community Institutions, Health, and Social Services	4%	3%
806	Youth Development	50%	3%
903	Communication, Education, and Information Delivery	7%	0%
	Total	100%	100%

3) **Healthy Families and Communities Planned Program Situation and Scope**

Situation and priorities

The changing economic, political and social environments in California have major impacts on our youth and families. The human resource issues cross demographic and socioeconomic lines, affecting all ages, from children to the elderly to diverse cultural groups. California's Healthy Families and Communities program will focus on the following four areas:

Human Health and Nutrition

Nutritional status of Californians is a critical issue with 5 of the top 10 fatal diseases (heart disease, cancer, stroke, diabetes and liver disease) directly related to poor diet, inactivity and obesity. Poor food choices and feeding practices negatively impact maternal/child health and contribute to undesirable birth outcomes, nutritional deficiencies, failure to thrive, increased infections, and childhood anemia and obesity. Research demonstrates that poor nutrition during pregnancy predisposes the infant to chronic health problems later. Many children and adults do not eat enough healthy foods while over consuming high-fat, high-sugar foods and beverages.

Youth Development

Youth need support systems and opportunities to be prepared for college, science-related careers and to provide leadership and participate effectively in an increasingly complex society. CA has a large stake in the healthy development, productivity, and leadership capacity of its future generation to build strong communities and address the many challenges facing the state. Skills needed by youth to take advantage of opportunities for success include leadership, planning, decision making, problem solving, critical thinking, and valuing diversity. Research indicates that youth learn from formal and non-formal forms of education and that peers and environments have a great influence on the educational and extracurricular activities they choose. Youth learn best through "hands on" activities. Youth need opportunities to discover and expand the range of their assets and capacities, and to practice and demonstrate their value to the community.

Family and Consumer Well Being

California has the largest total and welfare population of any state in the nation. The overall well being of many individuals is of concern as support

programs are reduced/eliminated. More than half of Americans report living paycheck to paycheck. There is a need for additional knowledge, skills, and motivation to build financial security and to strengthen the capacity of families and individuals to create and maintain self sufficiency.

Community Development

Communities, large and small, are struggling to remain solvent and maintain the quality of life for their residents. The ability of communities to respond to critical economic and social issues is complicated by growing populations, greater demands on schools, limited resources, lack of health services, utility systems, a shortage of affordable housing, and concerns for resource use and allocation.

Scope of the Program

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

4) Healthy Families and Communities Planned Program Assumptions and Goals

Assumptions made for the Program

- Continuation of public and private funding, in-kind support, and volunteer efforts for programs at current or higher levels, adjusted for inflation.
- Continuation of collaborative relationships with statewide and local governmental and non-governmental agencies addressing youth, nutrition and health, and community issues, and with other states' CE and AES programs.
- Availability of qualified research and extension professionals and technical and paraprofessional personnel in the workforce who will accept appointment to vacated and newly created positions.
- Continuation of public policy and regulatory environment permitting use of recombinant DNA research techniques for the development of nutritionally improved foods and allowing consumers access to foods and food products of transgenic origin.

Ultimate goal(s) of this Program

- Improved overall health and wellness of Californians.
- Lower maternal and infant morbidity and mortality in California.
- Reduced health disparities among ethnic groups in California.
- Lower health care costs for Californians.
- Lower costs for public assistance and food assistance programs serving mothers of infants.

- Increased engagement in community activities and assumption of leadership responsibilities by youth.
- Increased understanding of a wide variety of scientific, technological and agricultural topics by youth.
- Increased numbers of youth engaged in healthy non-formal and/or out-of-school activities that result in positive youth development.
- New contributions in the field of youth development regarding effective practices.
- Improved attitudes, understanding and skills in financial self-sufficiency.
- Strengthened links between community engagement and academic learning as demonstrated by service learning efforts.
- Greater importance placed on the value of civic engagement.
- Increased involvement by the public in public policy decisions such as use of agricultural, natural and personal resources.
- Increased number and quality of collaborations among community members, schools, community organizations and agencies.
- Increased formal and informal education.

5) **Healthy Families and Communities Planned Program Inputs**

Estimated Number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	31.9	52.3
2014	31.9	52.3
2015	31.9	52.3
2016	31.9	52.3
2017	31.9	52.3

6) **Healthy Families and Communities Planned Program Activity**

Activity for the Program

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

Type(s) of methods to be used to reach direct 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"> • Public Service Announcement • Billboards • Newsletters • TV Media Programs • Web sites other than eXtension • Other 1 (Collabs w/other agencies/orgs)

Description of targeted audience:

- Adults, children, youth and families in general
- Children in general
- Low and moderate income adults, children, youth and families
- Adults and children at-risk for nutrition-related health problems, including individuals living in poverty, recent immigrants, and African-American, Native American, and Hispanic populations
- Nutrition and healthcare professionals
- Preschool, primary and secondary school teachers and administrators
- Professional childcare providers
- Public agencies and private organizations concerned with food, nutrition and health

7) Healthy Families and Communities Planned Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted
- Newsletters Produced
- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created

- Manuals and Other Printed Instructional Materials

8) Healthy Families and Communities Planned Program State Defined Outcomes

a) Change in Knowledge Outcome Measures 2013-2017

- Low-income individuals and families, participating in nutrition and consumer education programs, will gain knowledge of food resource management techniques.

Associated Knowledge Area(s): 703 - Nutrition Education and Behavior, 801 - Individual and Family Resource Management

- Children and youth, participating in 4H club, community, in-school and afterschool educational programs, will increase their level of science, agricultural and environmental literacy.

Associated Knowledge Area(s): 806 – Youth Development

- Youth educators and child resource specialists, participating in youth development education programs, will gain knowledge of youth development practices.

Associated Knowledge Area(s): 806 – Youth Development

- Individuals, including youth, participating in family and consumer well-being programs will gain knowledge about money management.

Associated Knowledge Area(s): 607 - Consumer Economics

- Low-income families with children, participating in CalFresh or EFNEP, programs will gain knowledge of nutrition.

Associated Knowledge Area(s): 703 - Nutrition Education and Behavior

- Youth educators and program extenders, participating in the programs, including 4-H and SET, will gain knowledge of best practices to extend science, engineering, and technology education and opportunities.

Associated Knowledge Area(s): 806 - Youth Development

b) Change in Attitude Outcome Measures 2013-2017

- None Planned

c) Change in Skills Outcome Measures 2013-2017

- Youth, participating in 4H clubs, will acquire leadership and civic skills.

Associated Knowledge Area(s): 806 - Youth Development

- Youth, participating in 4H club, community, in-school and afterschool educational programs, will acquire planning, problem solving, teamwork and other life skills.

Associated Knowledge Area(s): 806 - Youth Development

d) Change in Behavior Outcome Measures 2013-2017

- Low-moderate income individuals and families, participating in nutrition and consumer education programs, will adopt recommended food resource management techniques.

Associated Knowledge Area(s): 703 - Nutrition Education and Behavior, 801 - Individual and Family Resource Management

- Low-income families, participating in CalFresh or EFNEP programs, will adopt recommended dietary practices.

Associated Knowledge Area(s): 703 - Nutrition Education and Behavior

- Individuals, participating in CalFresh or EFNEP, will adopt safe food handling and preparation techniques.

Associated Knowledge Area(s): 724 - Healthy Lifestyle

- Youth educators and child resource specialists, participating in youth development education programs, will adopt recommended youth development practices.

Associated Knowledge Area(s): 806 - Youth Development

- Individuals, including youth, participating in resource management education programs, will adopt recommended money management techniques.

Associated Knowledge Area(s): 801 - Individual and Family Resource Management

- Youth, participating in 4-H clubs, will assume leadership roles in organizations or take part in community affairs.

Associated Knowledge Area(s): 801 - Individual and Family Resource Management

- Low-income children and youth, participating in UC CalFresh or EFNEP, will adopt recommended dietary practices.

Associated Knowledge Area(s): 703 - Nutrition Education and Behavior, 806 – Youth Development

e) Change in Condition Outcome Measures 2013-2017

- None Planned

9) Healthy Families and Communities Planned Program External Factors

External Factors which may affect Outcomes

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

10) Healthy Families and Communities Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Journal
- Portfolio review
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

B) Childhood Obesity

1) Brief Summary about Planned Program

Improving the health of California's children, enhancing their quality of life and reducing their health care costs are critical to the future of California. As obesity rates rise, more children will develop type 2 diabetes, heart disease, and risk factors related to chronic disease due to poor nutrition and lack of physical activity. Coordinated, comprehensive school health, nutrition, and physical activity programs, created through partnerships with school site personnel and regional growers, can help families and communities thrive.

To reduce childhood obesity and improve health ANR's role is to:

- Identify effective strategies for preventing childhood obesity and chronic diseases related to food.
- Form collaborations among ANR faculty, industry, school personnel, and state and county agencies to deliver nutrition education programs to California's population.
- Equip families with the tools to make informed decisions about food/nutrition and healthy lifestyle choices.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Childhood Obesity Planned Program Knowledge Areas

KA Code	Knowledge Area	Extension	Research
205	Plant Management Systems	1%	0%
504	Home and Commercial Food Service	4%	0%
604	Marketing and Distribution Practices	4%	0%
703	Nutrition Education and Behavior	72%	45%

704	Nutrition and Hunger in the Population	2%	0%
724	Healthy Lifestyle	19%	18%
802	Human Development and Family Well-Being	0%	18%
806	Youth Development	2%	18%
	Total	100%	100%

3) Childhood Obesity Planned Program Situation and Scope

Situation and priorities

Childhood obesity is a critical health risk with the number of overweight children in California almost tripling since 1970. Thirty percent of children and adolescents are overweight or at risk of becoming overweight. ANR campus and county researchers are making inroads into developing science-based strategies to prevent childhood obesity and diabetes and to promote wellness.

California's Childhood Obesity program will focus on prevention. Childhood obesity can best be prevented with a multifaceted approach: a coordinated, comprehensive school health, nutrition, and physical activity program, created through partnerships with school site personnel, regional growers, and ANR.

Scope of the Program

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

4) Childhood Obesity Planned Program Assumptions and Goals

Assumptions made for the Program

- Continuation of public and private funding, in-kind support, and volunteer efforts for programs at current or higher levels, adjusted for inflation.
- Continuation of collaborative relationships with school site personnel, food and agricultural industries, and state, county and non-governmental agencies addressing childhood obesity, and with other states' CE and AES programs.
- Availability of qualified research and extension professionals and technical and paraprofessional personnel in the workforce who will accept appointments to vacated and newly created positions.

Ultimate goal(s) of this Program

- Lower incidence of obesity among children and adults in California
- Improved overall health and wellness of California adults and children
- Reduced health disparities among ethnic groups in California
- Lower health care costs for Californians

5) Childhood Obesity Planned Program Inputs

Estimated Number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	8.7	2.9
2014	8.7	2.9
2015	8.7	2.9
2016	8.7	2.9
2017	8.7	2.9

6) Childhood Obesity Planned Program Activity

Activity for the Program

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

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"> • Public Service Announcement • Billboards • Newsletters • TV Media Programs • Web sites other than eXtension • Other 1 (Collabs w/other agencies)

Description of targeted audience

- Children, youth and families in general
- Low and moderate income children, youth and families
- Children at-risk for nutrition-related health problems, including individuals living in poverty, recent immigrants, and African-American, Native American, and Hispanic populations

- Nutrition and healthcare professionals
- Preschool, primary and secondary school teachers and administrators
- Professional childcare providers
- Public agencies and private organizations concerned with food, nutrition and health

7) **Childhood Obesity Planned Program Output Measures**

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted
- Newsletters Produced
- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created
- Manuals and Other Printed Instructional Materials

8) **Childhood Obesity State Defined Outcomes**

a) **Change in Knowledge Outcome Measures 2013-2017**

- Families with children and youth, participating in childhood obesity and other nutrition education programs, will gain knowledge of nutrition.

Associated Knowledge Area(s): 205 - Plant Management Systems, 504 - Home and Commercial Food Service, 703 - Nutrition Education and Behavior, 704 - Nutrition and Hunger in the Population, 724 - Healthy Lifestyle, 806 - Youth Development

- Nutrition educators working with youth and families with children, participating in the programs, will gain knowledge of childhood obesity prevention strategies.

Associated Knowledge Area(s): 703 - Nutrition Education and Behavior, 806 - Youth Development

b) Change in Attitude Outcome Measures 2013-2017

- None Planned

c) Change in Skill Outcome Measures 2013-2017

- None Planned

d) Change in Behavior Outcome Measures 2013-2017

- Children and youth, participating in childhood obesity prevention and other nutrition education programs, will adopt recommended dietary and healthier lifestyle practices.

Associated Knowledge Area(s): 205 - Plant Management Systems, 504 - Home and Commercial Food Service, 703 - Nutrition Education and Behavior, 704 - Nutrition and Hunger in the Population, 724 - Healthy Lifestyle, 806 - Youth Development

- Families with children, participating in childhood obesity prevention and other nutrition education programs, will adopt recommended dietary practices.

Associated Knowledge Area(s): 205 - Plant Management Systems, 504 - Home and Commercial Food Service, 703 - Nutrition Education and Behavior, 704 - Nutrition and Hunger in the Population, 724 - Healthy Lifestyle, 806 - Youth Development

e) Change in Condition Outcome Measures 2013-2017

- None Planned

9) Childhood Obesity Planned Program External Factors

External Factors which may affect Outcomes

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

10) Childhood Obesity Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Journal
- Portfolio review
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

C) Food Safety

1) Brief Summary about Planned Program

Californians expect a safe food supply. Foodborne illness affects one in four Americans annually, with higher rates in California. These foodborne illnesses place a burden on the health care systems and reduce the productivity of our workforce. Globalization of the food supply, combined with the lack international food inspection, increase the risk.

To ensure food safety ANR's role will be to:

- Direct effort at the development of farm production practices to control contamination of foods from microbes, toxins, and chemicals and to understand the biology of food contamination.
- Develop methods to prevent, detect, respond, and recover from outbreaks of foodborne illness, including trace-back and trace-forward labeling to identify contaminated food products.

- Develop methods to identify contaminated products.
- Create and apply technologies to eliminate contamination from the farm to the processor, handler, and consumer.
- Develop strategies for food producers and handlers to respond and recover from outbreaks.
- Educate community organizations and consumers on safe food handling practices.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Food Safety Planned Program Knowledge Areas

KA Code	Knowledge Area	Extension	Research
104	Protect Soil from Harmful Effects of Natural Elements	3%	0%
212	Pathogens and Nematodes Affecting Plants	0%	8%
302	Nutrient Utilization in Animals	0%	8%
303	Genetic Improvement of Animals	0%	7%
307	Animal Management Systems	1%	0%
308	Improved Animal Products (Before Harvest)	6%	1%
311	Animal Diseases	7%	6%
315	Animal Welfare/Well-Being and Protection	2%	1%
404	Instrumentation and Control Systems	0%	1%
501	New and Improved Food Processing Technologies	18%	11%
502	New and Improved Food Products	6%	1%
503	Quality Maintenance in Storing and Marketing Food Products	6%	5%
504	Home and Commercial Food Service	0%	1%
606	International Trade and Development	0%	7%
702	Requirements and Function of Nutrients and Other Food Components	0%	2%

703	Nutrition Education and Behavior	1%	0%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	16%	4%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	33%	33%
723	Hazards to Human Health and Safety	0%	4%
903	Communication, Education, and Information Delivery	1%	0%
	Total	100%	100%

3) Food Safety Planned Program Situation and Scope

Situation and priorities

Consumer health and agricultural sustainability require a food supply that is produced, processed, distributed, and prepared in a manner that prevents or minimizes contaminants. The health of livestock and poultry, and the control of pathogens and contaminants in fresh and processed food products are pivotal control points in assuring food safety for consumers, and begins with agricultural production systems. Loss of prime farmland through urbanization and parcelization will gradually increase America's dependence on foreign sources of certain foods, which often have food safety concerns. The global food supply provides consumers with products originating from plant and animal sources around the world, increasing the risk of food borne illnesses. Older Californians, young children, pregnant women, and those with illnesses will continue to be at heightened risk for foodborne illnesses.

. California's Food Safety program will focus on these areas of concern:

- Inadvertent microbial contamination of food products, such as with E. coli or Salmonella
- Chemical contamination, such as recent tainting of imported products with melamine
- Concern about the impacts of potential terrorist attacks on our vulnerable food system
- Potential transfer of diseases from animals to humans

Scope of the Program

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

- Integrated Research and Extension
- Multistate Integrated Research and Extension

4) Food Safety Planned Program Assumptions and Goals

Assumptions made for the Program

- New microbial and chemical threats (natural, accidental or intentional) on an ongoing basis.
- Loss of farmlands and the globalization of the world market place will gradually increase our dependence on foreign sources for certain components of our food system. This dependence will present additional venues of vulnerability for food contamination. Foreign sources will also provide additional opportunities for intentional tampering and the introduction of substances and organisms. These substances will either cause injury to humans or simply cause alarm among consumers. This will, in turn, disrupt the domestic market place. It may also make the US market place more sensitive to disruptions because of global transportation issues, energy shortages or political unrest.

Ultimate goal(s) of this Program

- Improved food safety knowledge and practices for food suppliers, processors, retailers and consumers
- Improved food handling techniques throughout the food production, processing, storage and consumption system
- Adoption of new detection techniques and countermeasure practices for food contaminants
- Increased producer, handler and consumer knowledge and improved skills in appropriate use and management of new food technologies, additives and contaminants
- Decrease in the number of Californians who suffer from foodborne illness each year
- Reduction in the cost of medical care, lost work hours and deaths due to food borne illness

5) Food Safety Planned Program Inputs

Estimated Number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	9.0	6.5
2014	9.0	6.5
2015	9.0	6.5
2016	9.0	6.5
2017	9.0	6.5

6) Food Safety Planned Program Activity

Activity for the Program

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

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"> • Public Service Announcement • Newsletters • TV Media Programs • Web sites other than eXtension • Other (Collabs w/other agencies)

Description of targeted audience

- Food producers (e.g. farmers/ranchers and rangeland owners/operators/managers, including conventional, organic, small and large producers)
- Agricultural advising professionals
- Allied industry companies
- Food processors, handlers, retailers and suppliers
- Public regulatory agencies and private non-profit advocacy groups
- Food consumers, members of the general public

7) Food Safety Planned Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted
- Newsletters Produced

- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created
- Manuals and Other Printed Instructional Materials

8) Food Safety State Defined Outcomes

a) Change in Knowledge Outcome Measures 2013-2017

- Individuals, participating in food safety education programs, will gain knowledge of safe food handling and preparation techniques.

Associated Knowledge Area(s): 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

- Farm and ranch owner/operators and allied industry professionals, participating in food safety programs, will gain knowledge on on-farm control of food contaminants and quality assurance programs

Associated Knowledge Area(s): 307 - Animal Management Systems, 311 - Animal Diseases, 501 - New and Improved Food Processing Technologies, 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources, 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

b) Change in Attitude Outcome Measures 2013-2017

- None Planned

c) Change in Skill Outcome Measures 2013-2017

- None Planned

d) Change in Behavior Outcome Measures 2013-2017

- Individuals, participating in food safety education programs, will adopt safe food handling and preparation techniques.

Associated Knowledge Area(s): 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

e) Change in Condition Outcome Measures 2013-2017

- None Planned

9) Food Safety Planned Program External Factors

External Factors which may affect Outcomes

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

10) Food Safety Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- Experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Journal
- Portfolio review
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

D) Global Food Security and Hunger

1) Brief Summary about Planned Program

California has been an innovative leader in food production for more than a century. California is the nation's major producer of vegetables, fruits, and nuts, which are healthy but under consumed sources of nutrition for Californians and people nationwide. To maintain California's strong food production system, UC's research and extension activities will address critical issues pertaining to the economic viability and sustainability of agriculture.

Lack of food security affects and will continue to challenge communities and the entire state. Currently 1 in 10 California households are affected by food insecurity. The populations proven the most vulnerable to food insecurity are projected to grow much faster than those who are not. Only an interdisciplinary approach can effectively address the severe challenges that food insecurity presents to social and environmental justice.

To enhance the food production system and ensure food security ANR's role will be to:

- Develop and encourage innovations in genetic, genomics, biotechnology, and traditional breeding approaches, producing crops tolerant to drought and suboptimal soils, new crops to enhance nutrition and reduce chronic diseases and specific health conditions, plants with unique applications, and plants that produce value-added products.
- Encourage innovation in a wide range of new technologies that impact California agriculture and food, including mechanization in agricultural production, irrigation water management, and postharvest quality and value-added products.
- Explore the potential of new commodities, expand the uses and markets for existing commodities, and extend information on production and marketing practices.
- Develop and disseminate science-based practices for production, including organics, for local marketing to ensure continuation of California's competitive advantage.
- Generate science-based information on marketing strategies to develop international markets for existing and new California agricultural commodities in developing countries, where population increases will be largest and where world income growth is likely to be concentrated over the next 20 years.
- Develop and disseminate knowledge on the role of consuming products associated with healthy diets.
- Identify agricultural crops and systems that share mutually beneficial uses for wildlife and recreation.
- Foster direct marketing options such as farmers markets in low-income communities.
- Teach people better ways to manage resources to maximize their food purchasing power.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) **Global Food Security and Hunger Planned Program Knowledge Areas**

Program knowledge areas and percentages

KA Code	Knowledge Area	Extension	Research
102	Soil, Plant, Water, Nutrient Relationships	15%	2%
111	Conservation and Efficient Use of Water	2%	2%
201	Plant Genome, Genetics, and Genetic Mechanisms	2%	20%
202	Plant Genetic Resources	4%	7%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	4%	10%
204	Plant Product Quality and Utility (Preharvest)	8%	5%
205	Plant Management Systems	31%	5%
206	Basic Plant Biology	0%	17%
211	Insects, Mites, and Other Arthropods Affecting Plants	2%	3%
212	Pathogens and Nematodes Affecting Plants	1%	3%
301	Reproductive Performance of Animals	0%	3%
302	Nutrient Utilization in Animals	4%	2%
303	Genetic Improvement of Animals	1%	3%
305	Animal Physiological Processes	0%	3%
307	Animal Management Systems	10%	1%
501	New and Improved Food Processing Technologies	0%	4%
502	New and Improved Food Products	2%	4%
601	Economics of Agricultural Production and Farm Management	9%	2%
604	Marketing and Distribution Practices	3%	1%

723	Hazards to Human Health and Safety	2%	3%
	Total	100%	100%

3) Global Food Security and Hunger Planned Program Situation and Scope

Situation and priorities

In order to maintain California's strong food production system, we need to adapt to ever changing conditions such as unprecedented challenges from world competition, increased input costs, environmental constraints, severe water limitations, high regulatory pressures and labor limitations.

An exploding population in the West has caused significant competition for land and water. Prime farmland is being lost at increasing rates, particularly in southern California, coastal regions, and the Central Valley. Local and state governments will need assistance from the land grant system in dealing with land use issues aimed at slowing the loss of critical farmlands and loss of agricultural jobs.

California producers are being called upon to greatly reduce their negative impacts on air and water quality. California's Central Valley is heavily impacted by increasing population and concomitant air degradation. Farmers and other businesses are being asked to reduce both dust and combustion emissions. Federal and state regulations aimed at improving the quality of both ground and surface waters will significantly change many farming and ranching practices. The dairy industry has instituted Comprehensive Nutrient Management Plants required by the Central Valley Water Quality Control Board. These will drastically change the way they manage nitrogen, water and waste. New technologies and monitoring systems will be needed to manage the nitrogen and nutrient cycles on dairies and cropping systems.

California's Global Food Security and Hunger program will focus on economic viability and sustainability:

Economically, the cost-price squeeze has been intensive for many of our producers. Most of California's crops are not federal program crops and must follow the dictates of markets, which can be quite volatile with high risk. The globalization of markets has resulted in significant competition from overseas producers that have lower labor, energy or regulatory costs. Economic innovation and cost control is needed to address economic viability issues.

Agriculture is a large and highly valued component of California's economy, and it's economic sustainability needs to be balanced with environmental sustainability. The profitability of California farms is challenged by sharply rising production costs, depressed value of some crops due to overproduction, increased competition for water, increased diversity and availability of imported

crops, and trade restrictions that limit export markets. Organic production of plants and animals, and other consumer-oriented sustainability definitions (e.g. range-fed beef, humane animals, sustainability indexes) are a dynamic sector of agriculture that will help shape economically and environmentally sustainable agricultural systems for the future. To remain economically viable, California producers must continue to improve the efficiency and quality of agricultural production in an ecologically and environmentally sound manner.

Maintaining or improving soil quality is important to long term agricultural productivity, to water quality, and to the sustainability of agricultural, natural and urban systems in California. Soil quality plays a role in the complex interactions of microbial communities, which influence nutrient cycling and disease suppression, but these interactions, and their relationships to plant establishment need to be better understood. Maintaining an environmentally and economically sustainable system for production of food, fiber, and ornamentals is an important priority.

Scope of the Program

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

4) Global Food Security and Hunger Planned Program Assumptions and Goals

Assumptions made for the Program

- The sustainability of our agricultural systems will be challenged by decreased resource availability and increased costs all levels of the production and delivery system. California will be especially challenged by water availability and drought. All forms of energy inputs (electricity, diesel, gasoline, natural gas and propane) will substantially increase in cost over the long-term. Since agriculture is energy intensive in its present form, it will be especially vulnerable.
- It must be assumed that labor intensive crops will have significant problems obtaining and holding labor forces during peak demand periods. Disruptions to the flow of labor from Latin America and also to competition from other industries will be a major factor for many of the high-value agricultural enterprises.
- New regulatory initiatives on the part of state and federal regulatory agencies will create new costs that are unique to the US and to California that other global competitors will not have.
- Environmental concerns among consumers will create a market demand for products that are produced with more "environmentally friendly" systems.

- The global market place will favor low cost producers of most commodities. This will result in the decline of certain sectors of American agriculture. Production of these products will shift to those countries that can deliver the product to the world market place most competitively. US foreign policy aimed at assisting lesser developed nations and at stabilizing relations with countries such as China will result in products from these countries entering the US market place at prices that are significantly lower than domestic sources.

Ultimate goal(s) of this Program

- Development and adoption of new crop species and crop varieties that improve the nutrition, access, and affordability to California consumers and improve the competitive position of California producers.
- Adoption of new technologies and improved cultural, water, and nutritional systems by California producers that lead to more efficient and less costly production, with less detrimental impacts on the environment.
- Adoption of improved management information, forecasting and decision making systems by California producers that improve competitive advantage and profitability.
- Enabling California agriculture to remain economically viable, maximizing its opportunities in markets where it has a competitive advantage.
- Production of California commodities with minimal or no detrimental impact on the state's natural resources and environment.
- Implementation and coordination of dairy producer manure and nutrient management plans.
- Adoption and use of models for cooperative agreements and relationships all along the waste stream to improve waste management practices and systems.
- Improved communication between regulators and producers leading to development and utilization of environmental quality assurance programs.
- Increased adoption of improved resource management practices and improved utilization of the food dollar by low-income and underserved populations.

5) Global Food Security and Hunger Planned Program Inputs

Estimated Number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	96.2	131.2
2014	96.2	131.2
2015	96.2	131.2
2016	96.2	131.2
2017	96.2	131.2

6) Global Food Security and Hunger Planned Program Activity

Activity for the Program

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

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"> • Public Service Announcement • Newsletters • TV Media Programs • Web sites other than eXtension • Other 1 (Collabs w/other agencies/orgs)

Description of targeted audience

- Food producers (e.g. farmers/ranchers and rangeland owners/operators/managers, including conventional, organic, small and large producers)
- Agricultural advising professionals (e.g. Pest Control Advisors, crop advisors, landscape professionals)
- Allied industry companies including seed and supply companies
- Food processors, handlers, retailers and suppliers
- Public regulatory agencies and private non-profit advocacy groups
- Food consumers, members of the general public

7) Global Food Security and Hunger Planned Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted

- Newsletters Produced
- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created
- Manuals and Other Printed Instructional Materials

8) **Global Food Security and Hunger Planned Program State Defined Outcomes**

a) **Change in Knowledge Outcome Measures 2013-2017**

- Farm and ranch owners/managers and allied industry professionals, participating in the programs, will gain knowledge of crop and varietal selection factors and research-based performance data.

Associated Knowledge Area(s): 202 - Plant Genetic Resources, 204 - Plant Product Quality and Utility (Preharvest)

- Farm, ranch, landscaping owners/managers and allied industry professionals, participating in the programs, will gain knowledge of aspects of comprehensive management systems for plant and animal production.

Associated Knowledge Area(s): 102 - Soil, Plant, Water, Nutrient Relationships, 204 - Plant Product Quality and Utility (Preharvest), 205 - Plant Management Systems, 206 - Basic Plant Biology, 302 - Nutrient Utilization in Animals, 307 - Animal Management Systems, 601 - Economics of Agricultural Production and Farm Management

- Farm and ranch owners/managers, participating in the programs, will gain knowledge of business management practices and marketing strategies, including the costs and risks associated with producing specialty crops.

Associated Knowledge Area(s): 601 - Economics of Agricultural Production and Farm Management, 604 - Marketing and Distribution Practices

- Members of public, participating in the programs, including the Master Gardener Program, will gain knowledge of sustainable gardening practices.

Associated Knowledge Area(s): 205 - Plant Management Systems

- Farm, ranch and landscaping owners/managers and allied industry professionals, participating in the programs, will gain knowledge of pest and disease management for plant and animal production.

Associated Knowledge Area(s): 211 - Insects, Mites, and Other

Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants

- Farm, ranch and landscaping owners/managers and allied industry professionals, participating in the programs, will gain knowledge of cultural practices.

Associated Knowledge Area(s): 205 - Plant Management Systems

- Farm, ranch and landscaping owners/managers and allied industry professionals, participating in the programs, will gain knowledge of irrigation management and drainage.

Associated Knowledge Area(s): 102 – Soil, Plant, Water, Nutrient Relationships, 111 – Conservation and Efficient Use of Water

b) Change in Attitude Outcome Measures 2013-2017

- Farm and ranch owners/managers and allied industry professionals, participating in the programs, will be more likely to try out or adopt recommended cultural practices, pest and disease management, or other aspects of comprehensive management systems for animal and plant production.

Associated Knowledge Area(s): 102 – Soil, Plant, Water, Nutrient Relationships, 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants, 204 - Plant Product Quality and Utility (Preharvest), 205 - Plant Management Systems, 212 - Pathogens and Nematodes Affecting Plants, 307 - Animal Management Systems

c) Change in Skill Outcome Measures 2013-2017

- Farm and ranch owner/operators, participating in the programs, will gain skills in business management practices.

Associated Knowledge Area(s): 601 - Economics of Agricultural Production and Farm Management, 604 - Marketing and Distribution Practices

d) Change in Behavior Outcome Measures 2013-2017

- Farm, ranch, and landscaping owners/managers and allied industry professionals, participating in the programs, will adopt improvements in aspects of comprehensive management systems for plant and animal production.

Associated Knowledge Area(s): 102 - Soil, Plant, Water, Nutrient Relationships, 203 - Plant Biological Efficiency and Abiotic Stresses

Affecting Plants, 204 - Plant Product Quality and Utility (Preharvest), 205 - Plant Management Systems, 211 – Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 307 - Animal Management Systems

- Farm, ranch and landscaping owners/managers and allied industry professionals, participating in the programs, will adopt superior varieties of crops.

Associated Knowledge Area(s): 202 - Plant Genetic Resources, 204 - Plant Product Quality and Utility (Preharvest)

- Tree fruit and nut owners/managers and allied industry professionals, participating in the programs, will adopt recommended pruning techniques or other orchard management practices.

Associated Knowledge Area(s): 204 - Plant Product Quality and Utility (Preharvest), 205 - Plant Management Systems

- Farm, ranch, and landscaping owners/managers and allied industry professionals, participating in the programs, will adopt improvements in cultural practices.

Associated Knowledge Area(s): 205 - Plant Management Systems

e) Change in Condition Outcome Measures 2013-2017

- Farm and ranch owner/operators, participating in the programs, will realize increased profitability due to lower production costs or diversification of income.

Associated Knowledge Area(s): 604 - Marketing and Distribution Practices

9) Global Food Security and Hunger Planned Program External Factors

External Factors which may affect Outcomes

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

10) Global Food Security and Hunger Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- Experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

E) Sustainable Natural Ecosystems

1) Brief Summary about Planned Program

Population growth is one of the most important issues that will affect California's natural resources. Future urban and suburban growth is projected to shift more toward rangelands and forests. The wildland-urban interface will expand highlighting trade-offs between urban growth and natural lands. The impact will include habitat loss/fragmentation and degraded water quality.

To maintain and enhance sustainable natural ecosystems ANR's role is to develop research and educational information on:

- Ecosystem management systems to ensure that they provide clean air, carbon sequestration, water, and wildlife and plant habitat to guide land use planning
- Ecosystem restoration methods for degraded natural ecosystems
- Fire-resilient ecosystems
- New production and harvest technologies and practices that provide for sustainable supplies of products while preserving environmental quality

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Sustainable Natural Ecosystems Program Knowledge Areas

KA Code	Knowledge Area	Extension	Research
101	Appraisal of Soil Resources	3%	7%
102	Soil, Plant, Water, Nutrient Relationships	8%	14%
103	Management of Saline and Sodic Soils and Salinity	3%	2%
111	Conservation and Efficient Use of Water	8%	4%
112	Watershed Protection and Management	3%	2%
121	Management of Range Resources	17%	4%
122	Management and Control of Forest and Range Fires	6%	1%
123	Management and Sustainability of Forest Resources	15%	1%
131	Alternative Uses of Land	4%	4%
132	Weather and Climate	1%	4%
133	Pollution Prevention and Mitigation	1%	10%
135	Aquatic and Terrestrial Wildlife	14%	5%
136	Conservation of Biological Diversity	7%	12%
141	Air Resource Protection and Management	6%	5%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	1%	3%
206	Basic Plant Biology	0%	3%
212	Pathogens and Nematodes Affecting Plants	0%	6%
605	Natural Resource and Environmental Economics	3%	6%
610	Domestic Policy Analysis	0%	4%
702	Requirements and Function of Nutrients and Other Food Components	0%	3%
	Total	100%	100%

3) Sustainable Natural Ecosystems Planned Program Situation and Scope

Situation and priorities

California leads the nation in the value of agricultural and ecosystem diversity. The state's population is also the most diverse, populous and rapidly growing, which continues to increase demands on California's natural resources. Issues involving natural resources are far ranging, from urban areas to wildlands, and from aquatic to terrestrial ecosystems.

Land use conflicts are frequent throughout the state. Land use decisions can, and have, resulted in loss of plant and animal species, open space and wildlife, deterioration of water quality, increased dispersal of invasive species, and habitat fragmentation. Incorporation of approaches that maintain critical ecosystem conditions on a landscape scale over the long term, while providing products, recreation and habitat, is critical for California. Sustaining diverse ecosystems while meeting societal needs and desires is at the core of this area.

California's prosperity is tied to effective management of available water for the values and benefits held by its citizenry. Proposed development, population growth, agricultural production, and ecosystem sustainability in California are dependent upon reliable sources of high quality water. California had over 600 water bodies listed as impaired under the federal Clean Water Act of 1972 based on the 2002 Section 303(d) list. Identified contaminants that impair water quality, affect ecosystem health and potentially threaten human health include nutrients, pesticides, sediment, and bacteria. Temperature and sediment threaten spawning and rearing habitat for aquatic species, such as salmon, and degradation of riparian habitat compound these impairments to beneficial uses derived from clean water.

The negative impacts of air pollution include crop injury, global warming, plant and animal biodiversity shifts, human health impairment and others. Generation of particulate matter (PM) and photooxidant gases from farming and livestock operations can be significant contributors to air pollution, including ozone generation, reducing crop yields, impairing human health and contributing to other environmental impacts.

Wildland fire management systems require many approaches based upon a greater understanding of fire behavior, the ecological role of fire in natural systems, ecosystem health, and fire suppression strategies. Fire and fuels management directly affect water and air quality, and have impacts on habitat, invasive species spread, and other ecosystem functions.

Accurate science-based information is the cornerstone of making sound personal decisions and public policy. California needs a public with greater understanding of science, so that they can make informed personal choices and public policies regarding food production, diet and health, and the natural and human-made environment.

UC ANR's integrated research and extension activities will address issues related to sustaining California's natural resources over the long-term while continuing to provide products, recreation and habitat for the state.

California's Sustainable Natural Ecosystems program will focus on the following areas:

- Land Use: biological, economic, social, and physical aspects of land use, including urban and rural uses and trends, characteristics of land use planning and policy approaches and issues, mitigation or prevention of land use related problems.
- Water Quality: biological and physical aspects of water quality, the economic and social activities that affect water quality and solutions to prevent or mitigate water quality problems.
- Air Quality: biological and physical aspects of air quality, including sources, characteristics, movement and mitigation or prevention of air quality problems.
- Sustainable Use of Natural Resources: biological, economic, social and physical aspects of the sustainability of natural resources in California, including management practices that promote ecological sustainability along with economic opportunity on a landscape scale, characteristics of natural resources-use planning policy approaches and issues, mitigation or prevention of natural resource use related problems.

Scope of the Program

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

4) Sustainable Natural Ecosystems Planned Program Assumptions and Goals

Assumptions made for the Program

- Continuation of funding (public and private) at current or higher levels.
- Continuation of agency and organization collaboration at current or higher levels.
- Availability of personnel to be appointed to new and/or vacated Agricultural Experiment Station and Cooperative Extension positions.
- Natural resource related policies and regulations (local, state, federal) which allow for management of natural resources based upon scientific information, concepts and knowledge.

Ultimate goal(s) of this Program

- Utilizing science-based research and educational approaches to address environmental issues in partnership with others, including agricultural groups, environmental groups, and regulatory bodies.
- Assisting in the development of flexible and effective water policies and strategies using its econometric, hydrological, and policy expertise.
- Encouraging innovation in a wide range of new technologies which impact the California natural resource economy, including development of new forest products and utilization of forest byproducts.
- Significant and measurable improvement in air quality in California.
- Improved agricultural productivity linked to improved air quality.
- Reduced incursions of invasive species in urban and rural settings.
- Improvement in native biodiversity.
- Cleaner air, soil and water associated with improved land use and natural resource use practices.
- Increased area of sustainable open space and natural habitats for the environment, recreation and wildlife.
- Developing new production technologies and practices for California agriculture that conserve natural resources and preserve environmental quality.
- Producing technology, marketing and policy advancements to enable expanded use of agricultural resources for the production of ecosystem services such as carbon sequestration, waste recycling, wildlife habitat, and renewable energy generation.
- Providing science-based information to regulators to inform the development of policies and regulations that protect environmental quality while sustaining the economic viability of agricultural production.
- Reduced natural resource system failure and related economic, environmental and social losses.
- Decrease in the number of acres burned by wild fires.
- Providing accessible science information to enable people to adapt to ever-changing physical, social and economic conditions.

5) Sustainable Natural Ecosystems Planned Program Inputs

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

Year	Extension	Research
2013	29.4	73.5
2014	29.4	73.5
2015	29.4	73.5
2016	29.4	73.5
2017	29.4	73.5

6) Sustainable Natural Ecosystems Planned Program Activity

Activity for the Program

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

Type(s) of methods to be used to reach direct 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"> • Public Service Announcement • Newsletters • TV Media Programs • Web sites other than eXtension • Other 1 (Collabs w/other agencies/orgs)

Brief description of the target audience

- Farmers
- Ranchers
- Inland fishery owners/operators
- Governmental agencies
- Agricultural and fishing organizations
- Owners/managers of private and public rangeland, forest and wildlands
- Community organizations
- Resource managers

7) Sustainable Natural Ecosystems Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted

- Newsletters Produced
- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created
- Manuals and Other Printed Instructional Materials

8) Sustainable Natural Ecosystems Planned Program State Defined Outcomes

a) Change in Knowledge Outcome Measures 2013-2017

- Governmental agencies, agricultural and fishing organizations, resource managers and other stakeholders in inland fishery management issues, participating in the programs, will gain knowledge of strategies and techniques for sustainable use of inland fishery resources.

Associated Knowledge Area(s): 135 - Aquatic and Terrestrial Wildlife

- Farm and ranch owner/operators and owners/managers of private and public forest and wildlands, participating in natural resource management programs, will gain knowledge of strategies and techniques for sustainable use of natural resources.

Associated Knowledge Area(s): 123 - Management and Sustainability of Forest Resources, 135 - Aquatic and Terrestrial Wildlife, 136 - Conservation of Biological Diversity

- Fire protection and land management agencies, land and home owners, community organizations, and landscape professionals, participating in wildland fire education programs, will gain knowledge on how to increase fire resistance of homes and landscaping.

Associated Knowledge Area(s): 122 - Management and Control of Forest and Range Fires

- Farm, ranch, and landscape owners/managers and allied industry professionals and governmental agency representatives, participating in air quality education programs, will gain knowledge of the atmospheric system and/or how policies, products, plants, and practices can help improve air quality.

Associated Knowledge Area(s): 141 - Air Resource Protection and Management

- Ranch and private and public rangeland owners/managers, participating in rangeland management programs, will gain knowledge of recommended

techniques for rangeland monitoring and management, and grazing and browsing.

Associated Knowledge Area(s): 121 - Management of Range Resources

b) Change in Attitude Outcome Measures 2013-2017

- None Planned

c) Change in Skills Outcome Measures 2013-2017

- None Planned

d) Change in Behavior Outcome Measures 2013-2017

- Ranch and private and public rangeland owners/managers, participating in the programs, will adopt recommended techniques for rangeland monitoring and management, and grazing and browsing.

Associated Knowledge Area(s): 121 - Management of Range Resources

e) Change in Condition Outcome Measures 2013-2017

- None Planned

9) Sustainable Natural Ecosystems Planned Program External Factors

External factors which may affect outcomes

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

10) Sustainable Natural Ecosystems Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- Experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

F) Endemic and Invasive Pests and Diseases**1) Brief Summary about Planned Program**

Economic impacts from endemic and invasive pests and diseases can include direct and indirect costs to agriculture and livestock industry, as well as to fisheries and water delivery systems. Human health threats associated with pest and disease organisms are also of serious concern. To ensure the sustainability of the state's food and agricultural production and its natural resources, as well as the health of the economy, California and the world must constantly update the exclusion, detection, eradication, and control of invasive pests and diseases. Using integrated pest management as a systems-based approach, ANR focuses on long-term prevention of pests and their damage.

To manage endemic and invasive pests ANR's role is to:

- Provide science-based information to support exclusion strategies and policy, including knowledge of invasive biology to better assess risk, prediction, and intervention.
- Develop innovative technologies for rapid identification through surveillance and detection systems..
- Develop effective and economic technologies and tactics for use in diverse agricultural, natural, and urban systems to mitigate or control organisms for reduced environmental impact.
- Develop economical control or management strategies to maintain price competitiveness in the global economy.
- Increase the knowledge of invasion biology to better assess risk, prediction, and intervention.

- Increase our understanding of how changing environments influence emergence of endemic pests and diseases and the introduction of new species and vectors.
- Build a spectrum of interdisciplinary expertise from field to bench, whole-organism to molecular, ensuring effective translation of scientific advances into practical applications.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Endemic and Invasive Pests and Diseases Planned Program Knowledge Areas

Program knowledge areas and percentages

KA Code	Knowledge Area	Extension	Research
123	Management and Sustainability of Forest Resources	1%	0%
135	Aquatic and Terrestrial Wildlife	1%	4%
136	Conservation of Biological Diversity	1%	1%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	5%
206	Basic Plant Biology	1%	1%
211	Insects, Mites, and Other Arthropods Affecting Plants	15%	13%
212	Pathogens and Nematodes Affecting Plants	22%	37%
213	Weeds Affecting Plants	14%	2%
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	1%	0%
215	Biological Control of Pests Affecting Plants	3%	10%
216	Integrated Pest Management Systems	36%	9%
304	Animal Genome	0%	1%
305	Animal Physiological Processes	0%	2%

311	Animal Diseases	1%	2%
312	External Parasites and Pests of Animals	1%	2%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	1%
721	Insects and Other Pests Affecting Humans	2%	6%
722	Zoonotic Diseases and Parasites Affecting Humans	0%	2%
723	Hazards to Human Health and Safety	0%	2%
903	Communication, Education, and Information Delivery	1%	0%
	Total	100%	100%

3) Endemic and Invasive Pests and Diseases Planned Program Situation and Scope

Situation and priorities

The management of key pests in California's diverse agricultural, natural, and urban ecosystems is an ongoing effort. The same environment that allows a tremendous plant, crop, and animal diversity also provides numerous niches for various pest organisms, including weeds, insects, plant diseases, nematodes, mites, and vertebrate pest and disease causing organisms. In addition, the speed and frequency of international travel today, combined with the volume of imported food, commodities, and materials, has increased the introduction of invasive species and diseases into the state. Programs developed to manage pests require constant maintenance and adjustment as new pests are introduced, new crops are brought into production, new crop protection products are introduced or removed, and new technologies are introduced (advances in weather monitoring, pest modeling, site specific agriculture, GIS applications, etc.). UC ANR's integrated research and extension activities will address the issue of the negative impact of key pest species on plant and animal systems in agricultural, natural, and urban environments.

California's Endemic and Invasive Pests and Diseases program will focus on the following areas:

ANR scientists focus on long-term prevention of pests or their damage through the ecosystem-based strategy they developed called Integrated Pest Management. This systems-based approach utilizes a wide range of biological, cultural and physical controls with chemical control restricted to an as-needed basis when monitoring indicates economic thresholds have been exceeded.

This will include a specific focus on understanding of invasive species and their modes of entry into the state, assisting in the eradication or reducing the spread of newly introduced species, and developing methods of effectively dealing with recent introductions.

The priority components of pest management that ANR research and extension programs will address include the basic biology of pest species; genetics and systematics (origin, diversity); epidemiology and modeling invasion biology; prediction of social/economic consequences; biological control; cultural control; prediction, early detection, and prevention of invasion; management of weeds; and alternatives to chemical pesticides.

Scope of the Program

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

4) Endemic and Invasive Pests and Diseases Planned Program Assumptions and Goals

Assumptions made for the Program

- Continuation of funding (public and private) at current or higher levels.
- Continuation of agency and organization collaboration at current or higher levels.
- Availability of personnel to be appointed to new and/or vacated Agricultural Experiment Station and Cooperative Extension positions.
- Pest and disease related policies and regulations (local, state, federal) which allow for management based upon scientific information, concepts and knowledge.
- New regulatory initiatives on the part of state and federal regulatory agencies will create new costs that are unique to the US and to California that other global competitors will not have.
- Environmental concerns among consumers will create a market demand for products that are produced with more "environmentally friendly" systems.
- Increased international travel and volume of imported goods will continue to introduce new invasive pests and diseases into California.
- As global climate patterns shift, the distribution of endemic pests will change, and many habitats will become more susceptible.

Ultimate goal(s) of this Program

- Increased utilization of effective pest monitoring and use of economic thresholds to make treatment decisions.

- Increased awareness, broad adoption and use of new and improved pest management practices and products, including greater use of pesticide resistance management practices, increased use of less toxic and more environmentally safe pesticides and greater reliance on alternative methods of control such as resistant varieties, biological controls, and/or cultural controls.
- Improved understanding of the complexity of pest management through demonstration of knowledge of systems and interaction of biological, climatological, ecological and other factors in managing.
- Increased professionalism of crop and pest consultants through improved certification.
- Development or refinement of risk assessments for various invasive species and their impacts and action plans to include applied research and extension components.
- Development of a more proactive California approach to deal with potential invasive species including the development and implementation of methods of preventing entry of such species into the state.
- Cooperation among California Department of Food and Agriculture, U.S. Department of Agriculture Agricultural Research Service, UC ANR, and other agencies when newly invasive species are detected to deal with these species through coordinated local eradication, expanded monitoring, suppression, and/or management and by focusing and coordinating research and extension efforts.
- Better and more accurate quantification and communication of the economic and sociological.
- A coordinated and integrated approach by UC to deal with invasive species negatively impacting the state.
- More reliable, effective and economic management of important pest species by pest control advisors, growers and other horticulturalists.
- Reduced use of environmentally significant or toxic pesticides.
- Sustained profitability of California agriculture through more effective and reliable pest management practices.

5) Endemic and Invasive Pests and Diseases Program Inputs

Estimated Number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	67.9	103.2
2014	67.9	103.2
2015	67.9	103.2
2016	67.9	103.2
2017	67.9	103.2

6) Endemic and Invasive Pests and Diseases Planned Program Activity

Activity for the Program

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

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"> • Public Service Announcement • Billboards • Newsletters • TV Media Programs • Web sites other than eXtension • Other 1 (Collabs w/other agencies/orgs)

Description of targeted audience

- Farmers
- Ranchers
- Rangeland owners/managers
- Landscaping professionals
- Owners/operators of allied agricultural industries
- General public
- Crop and pest consultants

7) Endemic and Invasive Pests and Diseases Planned Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted
- Newsletters Produced

- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created
- Manuals and Other Printed Instructional Materials

8) Endemic and Invasive Pests and Diseases Planned Program State Defined Outcomes

a) Change in Knowledge Outcome Measures 2013-2017

- Farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, will gain knowledge of integrated pest management strategies and techniques.

Associated Knowledge Area(s): 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants, 216 - Integrated Pest Management Systems, 312 - External Parasites and Pests of Animals

- Farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, will gain knowledge of pesticide and pharmaceutical efficacy and optimal use.

Associated Knowledge Area(s): 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants

- Farm, ranch, rangeland, landscaping, and boat owner/operators and managers, allied industry professionals, and members of the public participating in the programs, will gain knowledge of prevention, detection, and treatment strategies and techniques for management of invasive species.

Associated Knowledge Area(s): 135 - Aquatic and Terrestrial Wildlife, 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants, 216 - Integrated Pest Management Systems, 312 - External Parasites and Pests of Animals

- Farm owner/operators and managers, Pest Control Advisers, and other allied industry professionals, participating in the programs, will gain knowledge on how to recognize and identify pests and diseases, and about detection and monitoring systems.

Associated Knowledge Area(s): 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants

b) Change in Attitude Outcome Measures 2013-2017

- Farm, ranch, rangeland, and boat owner/operators, pest control advisers, and other allied industry professionals, participating in the pest and disease management programs, will be more willing to adopt recommended strategies and techniques to control endemic and invasive pests and diseases.

Associated Knowledge Area(s): 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants, 214 - Vertebrates, Mollusks, and Other Pests Affecting Plants, 215 - Biological Control of Pests Affecting Plants, 216 - Integrated Pest Management Systems, 311 – Animal Diseases, 312 - External Parasites and Pests of Animals

c) Change in Skill Outcome Measures 2013-2017

- None Planned

d) Change in Behavior Outcome Measures 2013-2017

- Farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, will adopt recommended prevention, detection and monitoring, and treatment practices for integrated pest management.

Associated Knowledge Area(s): 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants, 216 - Integrated Pest Management Systems, 312 - External Parasites and Pests of Animals

- Farm, ranch, rangeland, and landscaping owner/operators and managers, and allied industry professionals, participating in the programs, will adopt treatment practices for invasive species.

Associated Knowledge Area(s): 135 - Aquatic and Terrestrial Wildlife, 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants, 216 - Integrated Pest Management Systems, 312 - External Parasites and Pests of Animals

- Farm owner/operators and pest control advisers, participating in the pest management programs, will adopt pesticide and pharmaceutical efficacy and optimal use.

Associated Knowledge Area(s): 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 - Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants

e) Change in Economic Condition Outcome Measures 2013-2017

- Farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, will realize lower costs for pest prevention and management.

Associated Knowledge Area(s): 216 – Integrated Pest Management Systems, 601 - Economics of Agricultural Production and Farm Management

9) Endemic and Invasive Pests and Diseases Planned Program External Factors

External Factors which may affect Outcomes

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

10) Endemic and Invasive Pests and Diseases Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- Experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

G) Sustainable Energy

1) Brief Summary of Planned Program

California faces diminishing and more costly supplies of energy even as the demand for energy continues to rise as a result of population growth and increased world consumption. Demands from the public for renewable sources of energy and more energy-efficient agriculture and food production will have a major impact on our food production and transportation.

To improve energy security and green technologies ANR's role is to:

- Research and support innovative new production technologies that minimize fossil fuel energy consumption and use renewable energy sources throughout the California food production system.
- Develop innovative new technologies and marketing, genetic, genomic, engineering, and agronomic techniques to produce sustainable biofuels from forest, waste, and agricultural resources for renewable energy production, including genetic and biotech innovations from UC scientists.
- Form highly interdisciplinary teams across UC, agency, and private-sector partners to generate energy savings in food and waste systems and create innovations in biofuel production.
- Develop science-based policy-relevant research and information to guide lawmakers on issues related to energy.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Sustainable Energy Program Knowledge areas

Program knowledge areas and percentages

KA Code	Knowledge Area	Extension	Research
104	Protect Soil from Harmful Effects of Natural Elements	0%	1%

111	Conservation and Efficient Use of Water	0%	2%
123	Management and Sustainability of Forest Resources	22%	1%
131	Alternative Uses of Land	0%	1%
133	Pollution Prevention and Mitigation	0%	5%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	31%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	4%
204	Plant Product Quality and Utility (Preharvest)	0%	4%
205	Plant Management Systems	0%	2%
206	Basic Plant Biology	0%	10%
211	Insects, Mites, and Other Arthropods Affecting Plants	0%	2%
212	Pathogens and Nematodes Affecting Plants	0%	3%
305	Animal Physiological Processes	0%	3%
402	Engineering Systems and Equipment	22%	4%
403	Waste Disposal, Recycling, and Reuse	0%	1%
404	Instrumentation and Control Systems	0%	1%
503	Quality Maintenance in Storing and Marketing Food Products	0%	1%
511	New and Improved Non-Food Products and Processes	0%	21%
605	Natural Resource and Environmental Economics	22%	3%
608	Community Resource Planning and Development	34%	0%
	Total	100%	100%

3) Sustainable Energy Planned Program Situation and Scope

Situation and priorities

Innovation is needed to efficiently manage energy resources in agricultural and food systems and to explore and develop environmentally sustainable conversion of biofuels.

Scope of the Program

- In-State Extension
- In-State Research

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

4) Sustainable Energy Planned Program Assumptions and Goals

Assumptions made for the Program

- Continuation of funding (public and private) at current or higher levels.
- Continuation of agency and organization collaboration at current or higher levels.
- Availability of personnel to be appointed to new and/or vacated Agricultural Experiment Station and Cooperative Extension positions.
- Energy related policies and regulations (local, state, federal) which support the development of sustainable energy technologies.

Ultimate goal(s) of this Program

- Improved energy security and green technologies through innovative science linking engineering, agricultural, biological, and environmental sciences.
- Utilizing innovative new technologies, marketing, genetic, genomic, engineering and agronomic techniques to produce sustainable biofuels from forest, waste, and agricultural resources for renewable energy production.
- Forming highly interdisciplinary teams across UC, agency, and private sector partners to accomplish energy savings in food systems, water systems, and innovations in biofuel production.
- Developing science-based policy-relevant research and information that will guide lawmakers in the important areas related to energy.

5) Sustainable Energy Planned Program Inputs

Estimated number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	0.4	7.0
2014	0.4	7.0
2015	0.4	7.0
2016	0.4	7.0
2017	0.4	7.0

6) Sustainable Energy Planned Program Activity

Description of the activity

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

Type(s) of methods to be used to reach direct 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"> • Public Service Announcement • Newsletters • TV Media Programs • Web sites other than eXtension • Other 1 (Collabs w/ other agencies)

Description of targeted audience

- Relevant agency and private-sector partners
- Lawmakers working on issues related to energy
- Members of the public in general
- Agricultural producers of crops for use as biofuels

7) Sustainable Energy Planned Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted
- Newsletters Produced
- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created

- Manuals and Other Printed Instructional Materials

8) Sustainable Energy Planned Program State Defined Outcomes

None Planned

9) Sustainable Energy Planned Program External Factors

External factors which may affect outcomes

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

10) Sustainable Energy Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- Experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

H) Climate Change

1) Brief Summary of Planned Program

The earth's temperature has risen 1 degree Fahrenheit in the last 100 years, and is projected to continue to heat up at an accelerated rate in the future. Consistent with trends worldwide, California is likely to have warmer winters and springs leading to reduced snow-pack, increasing the seasonality of water flows and directly affecting our ability to grow plants, produce food, support growing populations, and conserve natural resources. In addition, wildfires will likely increase, and other "natural disasters" will be more frequent and severe.

To learn how to adapt, manage, and mitigate the effects of climate change ANR's role is to:

- Develop and encourage innovations in genetic, genomics, biotechnology, and traditional breeding approaches, producing new varieties of crops, animals and forest species that thrive in California as the climate changes.
- Develop methods for determining the impacts of climate change on natural ecosystems and resulting changes in the provisions of services and products.
- Develop educational programs for growers and dairies farmers and ranchers to reduce their greenhouse-gas emissions, including using less fertilizer and more cover cropping.
- Develop and disseminate science-based knowledge to inform policy makers on climate change.
- Develop innovative green technologies.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Climate Change Program Knowledge areas

Program knowledge areas and percentages

KA Code	Knowledge Area	Extension	Research
101	Appraisal of Soil Resources	11%	12%
102	Soil, Plant, Water, Nutrient Relationships	5%	7%
104	Protect Soil from Harmful Effects of Natural Elements	0%	2%

122	Management and Control of Forest and Range Fires	0%	2%
123	Management and Sustainability of Forest Resources	11%	0%
131	Alternative Uses of Land	0%	1%
132	Weather and Climate	0%	24%
135	Aquatic and Terrestrial Wildlife	0%	1%
136	Conservation of Biological Diversity	0%	6%
141	Air Resource Protection and Management	21%	1%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	1%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	9%	0%
213	Weeds Affecting Plants	0%	1%
306	Environmental Stress in Animals	0%	6%
307	Animal Management Systems	21%	0%
605	Natural Resource and Environmental Economics	0%	20%
608	Community Resource Planning and Development	22%	0%
609	Economic Theory and Methods	0%	4%
610	Domestic Policy Analysis	0%	2%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%	10%
	Total	100%	100%

3) Climate Change Planned Program Situation and Scope

Situation and priorities

Climate change will greatly affect California's \$37 billion agricultural industry, natural ecosystems and communities. Recent and predicted increases in temperature will have major impacts on where and what kinds of plants can be grown. The numbers and kinds of invasive pests and diseases are increasing because of rising temperatures overall and the lack of winter chill periods allows many pests to breed throughout the year. The impacts of climate change on natural ecosystems will result in changes to the provision of products and services. The effects of unprecedented changes in the world, such as global warming, exploding population levels, and the transition from a carbon economy

to renewable, reliable sources of energy, will be felt in California and will create challenges for our families and communities.

Scope of the Program

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

4) Climate Change Planned Program Assumptions and Goals

Assumptions made for the Program

- Continuation of funding (public and private) at current or higher levels.
- Continuation of agency and organization collaboration at current or higher levels.
- Availability of personnel to be appointed to new and/or vacated Agricultural Experiment Station and Cooperative Extension positions.
- Climate change related policies and regulations (local, state, federal) which support the reduction of greenhouse gas emissions.

Ultimate goal(s) of this Program

- Learning how to adapt, manage, and mitigate the effects of climate change

5) Climate Change Planned Program Inputs

Estimated number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	0.9	9.0
2014	0.9	9.0
2015	0.9	9.0
2016	0.9	9.0
2017	0.9	9.0

6) Climate Change Planned Program Activity

Description of the activity

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

Type(s) of methods to be used to reach direct 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 • Web sites other than eXtension • Other 1 (Collabs w/ other agencies)

Description of targeted audience

- Members of the public in general
- Lawmakers working on issues relating to climate change
- Agricultural producers
- Natural resource managers
- Relevant agency and private-sector partners (including city-county and regional planners, nonprofits, government, and business people)
- Interdisciplinary teams of scientists and technologists

7) Climate Change Planned Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted
- Newsletters Produced
- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created
- Manuals and Other Printed Instructional Materials

8) Climate Change State Defined Outcomes

a) Change in Knowledge Outcome Measures 2013-2017

- Vineyard and rangeland owners/managers, and pest control advisers, participating in the programs, will gain knowledge on carbon sequestration.

Associated Knowledge Area(s): 132 - Weather and Climate, 141 - Air Resource Protection and Management

- Members of the public and policy makers, participating in the programs, will gain knowledge of contributing factors to ozone and particulate matter formation affecting air quality and climate change.

Associated Knowledge Area(s): 141 - Air Resource Protection and Management

b) Change in Attitude Outcome Measures 2013-2017

- None Planned

c) Change in Skills Outcome Measures 2013-2017

- None Planned

d) Change in Behavior Outcome Measures 2013-2017

- None Planned

e) Change in Condition Outcome Measures 2013-2017

- None Planned

9) Climate Change Planned Program External Factors

External factors which may affect outcomes

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

10) Climate Change Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment

- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- Experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective

I) Water Quality, Quantity and Security

1) Brief Summary of Planned Program

The Water Quality, Quantity and Security program will be coordinated by the new UC ANR California Water Resources Research Institute. The institute will provide leadership to engage with state entities to help identify water priorities in California and help engage existing UC campus-based Water Centers to implement statewide water planning, research and outreach. The focus is on planning, policy, and problem solving. The institute will serve as a vehicle for bringing teams of people together to work on projects of statewide priority.

ANR's role in improving watershed and water management practices and policies:

- Develop innovative scientific techniques, products, and processes to improve water use efficiency and water conservation management practices.
- Develop and encourage the adoption of management practices that prevent degradation of watersheds and water resources caused by pesticides, salinity, chemicals, animals wastes, nutrients, sediment, and pathogens, such as:
 - Techniques to improve irrigation efficiency and management so that irrigation more precisely matches crop requirements to water supply (both quantity and quality), including monitoring, delivery, uniformity and scheduling.

- Genetically improved crops to increase yields, introduce novel traits, and adapt plants to water-limited conditions.
- Methods to use degraded water sources(e.g. , salinity water, urban and agricultural wastes)
- Assist in the development of flexible and effective water policies and strategies using UC's econometric, hydrological, and policy expertise.
- Take science-based research and educational approaches to address these issues in partnership with others, including agricultural groups, environmental groups, and regulatory entities.

Program Existence: Mature (More than five years)

Program Duration: Long-Term (More than five years)

Expending formula funds or state-matching funds: Yes

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

2) Water Quality, Quantity and Security Program Knowledge areas

Program knowledge areas and percentages

KA Code	Knowledge Area	Extension	Research
102	Soil, Plant, Water, Nutrient Relationships	3%	21%
103	Management of Saline and Sodic Soils and Salinity	3%	1%
111	Conservation and Efficient Use of Water	32%	18%
112	Watershed Protection and Management	27%	19%
121	Management of Range Resources	1%	0%
131	Alternative Uses of Land	0%	2%
132	Weather and Climate	2%	2%
133	Pollution Prevention and Mitigation	22%	14%
135	Aquatic and Terrestrial Wildlife	0%	7%
141	Air Resource Protection and Management	1%	0%
206	Basic Plant Biology	0%	1%
305	Animal Physiological Processes	0%	1%
307	Animal Management Systems	0%	1%
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	3%	0%

403	Waste Disposal, Recycling, and Reuse	2%	2%
405	Drainage and Irrigation Systems and Facilities	2%	2%
601	Economics of Agricultural Production and Farm Management	0%	4%
605	Natural Resource and Environmental Economics	1%	4%
609	Economic Theory and Methods	0%	1%
610	Domestic Policy Analysis	1%	0%
	Total	100%	100%

3) Water Quality, Quantity and Security Planned Program Situation and Scope

Situation and priorities

Water is the life blood of California's economy. As such water supply and quality for agricultural, urban, and environmental systems are critical issues facing the state over the next twenty years and beyond. Several issues are paramount:

- The supply of water will be limited for all users.
- Competition for water will intensify among agricultural, urban, and environmental users, with water being transferred from agriculture to the latter two groups.
- Short- and long-term climate trends will exacerbate the problems associated with water availability.
- Degradation of water quality will become more important as a major public issue.
- Legal and regulatory decisions will have significant impacts on water use and quality among all sectors.

The availability of traditionally-relied upon sources of water is expected to decrease. For example, California will have to reduce its use of Colorado River water by 0.8 million acre-feet, a reduction of about 20 percent. The current drought has severely decreased reserves, and climate change is expected to reduce the Sierra snowpack. Coupled with the aging of the infrastructure for water delivery (e.g., the 1,100 miles of levees on the Sacramento-San Joaquin Delta), it will take a coordinated effort at the state, regional, and local levels to meet the projected increases in water demand.

California's Water Quality, Quantity, and Security program will focus on the three areas included in the program title.

Scope of the Program

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

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

4) Water Quality, Quantity and Security Planned Program Assumptions and Goals

Assumptions made for the Program

- Continuation of funding (public and private) at current or higher levels.
- Continuation of agency and organization collaboration at current or higher levels.
- Availability of personnel to be appointed to new and/or vacated Agricultural Experiment Station and Cooperative Extension positions.
- Water resource related policies and regulations (local, state, federal) which allow for management of water resources based upon scientific information, concepts and knowledge.

Ultimate goal(s) of this Program

- Increased clean water, environmental health and high functioning aquatic, coastal, and riparian habitats.
- Developing innovative scientific techniques, products, and/or processes to improve water-use efficiency and water management practices to conserve water.
- Reduction in the number of impaired water bodies throughout California.

5) Water Quality, Quantity and Security Planned Program Inputs

Estimated number of professional FTE/SYs to be budgeted for this program

Year	Extension	Research
2013	23.3	13.0
2014	23.3	13.0
2015	23.3	13.0
2016	23.3	13.0
2017	23.3	13.0

6) Water Quality, Quantity and Security Planned Program Activity

Description of the activity

UC ANR's integrated research and extension activities will conduct research projects, workshops, education classes and demonstrations, as well as one-on-one interventions. In addition, the programs will use PSAs, newsletters, mass media, web sites and collaborations with other agencies and organizations to create and deliver programs.

Type(s) of methods to be used to reach direct 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"> • Public Service Announcement • Newsletters • TV Media Programs • Web sites other than eXtension • Other 1 (Collabs w/ other agencies/ orgs)

Description of targeted audience

- Governmental agencies
- Water managers
- UC campus-based water centers
- The general public
- Farmers
- Ranchers
- Agricultural organizations
- Owners/managers of private and public rangeland, forest and wildlands

7) Water Quality, Quantity and Security Planned Program Output Measures

NIFA no longer requires reporting on 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.

a) ANR will measure the following standard outputs which are required by NIFA:

- Number of contacts (adults and youth)
- Number of patents
- Number of peer-reviewed publications

b) ANR plans to measure the following state-defined outputs:

- Classes/Short Courses Conducted
- Workshops Conducted
- Demonstrations and Field Days Conducted
- Newsletters Produced
- Web Sites Created or Updated
- Research Projects Conducted
- Videos, Slide Sets, and other AV or Digital Media Educational Products Created
- Manuals and Other Printed Instructional Materials

8) Water Quality, Quantity and Security Planned Program State Defined Outcomes

a) Change in Knowledge Outcome Measures 2013-2017

- Farm, ranch, and rangeland owners/managers and allied industry professionals, participating in water quality education programs, will gain knowledge of best management practices for improving water quality.

Associated Knowledge Area(s): 111 - Conservation and Efficient Use of Water, 112 - Watershed Protection and Management, 133 - Pollution Prevention and Mitigation

- Farm owner/operators, allied industry professionals, and members of the public, participating in water conservation education programs, will gain knowledge of water use and conservation practices.

Associated Knowledge Area(s): 111 - Conservation and Efficient Use of Water

b) Change in Attitude Outcome Measures 2013-2017

- None Planned

c) Change in Skills Outcome Measures 2013-2017

- Farm, ranch, and landscape owners/managers, and allied industry professionals and governmental agency representatives, participating in the programs, will gain water conservation skills.

Associated Knowledge Area(s): 111 - Conservation and Efficient Use of Water, 112 – Watershed Protection and Management

d) Change in Behavior Outcome Measures 2013-2017

- Farm, ranch, and rangeland owner/operators and managers and allied industry professionals participating in water quality education programs will adopt best management practices for improving water quality.

Associated Knowledge Area(s): 111 - Conservation and Efficient Use of Water, 112 - Watershed Protection and Management, 133 - Pollution Prevention and Mitigation

- Farm owners/managers, allied industry and natural resource professionals, and members of the public, participating in the programs, will adopt of water conservation practices.

Associated Knowledge Area(s): 111 - Conservation and Efficient Use of Water, 112 - Watershed Protection and Management

e) Change in Condition Outcome Measures 2013-2017

- None Planned

9) Water Quality, Quantity and Security Planned Program External Factors

External factors which may affect outcomes

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

10) Water Quality, Quantity and Security Planned Program Evaluation Studies and Data Collection

Types of Evaluation Planned:

- Needs assessment
- Process evaluation
- Outcomes evaluation

Types of Evaluation Studies Planned:

- Case study
- Single group, nonexperimental
- Quasi-experimental
- Experimental

Data Collection Methods Planned:

- Survey
- Interview
- Focus group
- Observation
- Document review
- Expert or peer review

Timing of Evaluation Studies Planned:

- Pre/post
- Time series
- Retrospective