UNIVERSITY OF CALIFORNIA
DIVISION OF AGRICULTURE AND NATURAL RESOURCES

2010 Combined Research and Extension Federal Annual Plan of Work

Agricultural Experiment Station
and Cooperative Extension

2010 University of California
Combined Research and Extension Federal Plan of Work

I. Plan Overview

The 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, ten Research and Extension Centers (RECs) located in different ecosystems across the state, and faculty on three campuses with multiple field stations. Sixteen Statewide Programs focused on specific issues such as water, food, pests and diseases, wildland fire, and energy 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 finding 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 will look beyond ANR and will focus on integrating ANR 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 VP Dooley and UC Regent Fred Ruiz. Members include the AES Deans Neal Van Alfen (UCD CAES), Bennie Osburn (UCD SVM), J. Keith Gilless (UCB CNR), and Tom Baldwin (UCR CNAS); Jeanette Sutherlin, UCCE Fresno County Director; Steve Beckwith, UC Vice President for Research and Graduate Studies; Bob Grey, UC Interim Provost; Rich Rominger, Yolo County grower, former UC Regent, former USDA Deputy Secretary and former Director of CDFA; and Stuart Woolf, Fresno County grower and chair of the President's Advisory Commission.

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.

The ANR Program Council, comprised of Berkeley, Davis, and Riverside campus associate deans, ANR regional directors and program leaders, and other ANR leaders, synthesized the five reports and survey data into a draft Strategic Vision The draft Strategic Vision will be further refined with Steering Committee, ANR academic and staff, and external stakeholder reviews with edits responding to received comments in preparation of a final document to be delivered to the UC Regents in May 2009.

Following the presentation of the report to the Regents, ANR members will develop a process to position our cutting edge science and education programs to meet the state's most pressing challenges in 2025. This process will begin at the ANR statewide conference in April 2009 where all ANR members will be asked for their ideas on how ANR may address the challenges identified in the strategic plan and the mechanisms to implement the strategic plan vision.

California 2025

The 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.*

In 2025, California will be a more diverse society. This society will have differing demands for goods, services, and resources related to differences in lifestyle, culture, age, and economic status. The University of California, and its Division of Agriculture and Natural Resources (ANR), are key players in improving California's future by providing leadership and innovation through research, education, and service.

To meet the growing demands of the state, 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 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.

Increasing global and domestic populations require increased food production
The state's increasing population will result in an expanding urban footprint and a decrease in the most fertile lands available for agricultural production. This will create an even greater need for increasing crop production per unit area, requiring research and educational programs to address such issues as crop improvement, nutrient management, sustainable management systems, and pest and disease management strategies.

One in four Americans reports an experience with food borne illness annually. This is even higher in California, partially due to the state's rich diversity of cultures. With increasingly more of our food and food ingredients imported from countries with different production practices, we can anticipate more food recalls and food allergies. Older Californians, young children, pregnant women, and those with chronic illnesses will continue to be at heightened risk for food borne illness.

The ANR system and its unique research and education programs offers the opportunity to respond to local needs for increased food products and value, as well as the opportunity to test varieties which will respond to global food and marketing needs. The network of Research and Extension Centers offers opportunities for testing and evaluation of plant and animal varieties as well as systems of production. Opportunities abound for field testing of biotechnology developed in campus labs, and evaluation of methods for reducing the impact of invasive species, including biological, new pesticides, and cultural practices through a continuum of county and campus based academics. Industry needs and requirements can be discussed, applied and tested in soil, water, and weather conditions throughout the state.

Increased population results in 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's 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, already 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 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
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, proteonomics 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 underrepresented 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.

Estimated Number of Professional FTEs/SYs for the State

Year	Extension	Research
	1862	1862
2010	285.0	340.6
2011	285.0	340.6
2012	285.0	340.6
2013	285.0	340.6
2014	285.0	340.6

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 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 CSREES.

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.

Workgroups are the focal point and primary mechanism for accomplishing ANR's high priority research and extension goals. They provide grass-roots leadership for program development and evaluation at the statewide level. Structured to bring together CE and AES personnel along with non-ANR partners 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. The workgroups are also responsible for evaluating and reporting the program results of the efforts they have supported.

At the statewide level, the UC ANR Program Council is charged with coordinating statewide planning and program policies and providing statewide leadership for coordination of resource allocation. Chaired by the Associate Vice President, it is composed of the Associate Deans for Research and Extension at the three colleges and the school of Veterinary Medicine at the Berkeley, Davis, and Riverside campuses, three CE Regional Directors, and four Program Leaders. The Assistant Vice President-Administrative Services serves as an ex ofico member.

The Program Council will review all ANR budget proposals, program area budget proposals, and position proposals from a statewide perspective and develop recommendations for a comprehensive ANR program budget. These recommendations will then be considered by the Associate Vice President and Vice President for final decisions on allocations.

The Program Council is also charged with providing leadership for five year program reviews of statewide programs and other units. Each of the Division's 20 statewide programs undergoes a program review initiated by the appropriate Program Leader every five years. A review panel of ANR members and external stakeholder representatives is appointed and conducts the review. The review results are presented and discussed by Program Council members who make recommendations to the Associate Vice President for possible actions.

III. Evaluation of Multis & Joint Activities

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

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 ANR workgroup participation, listening sessions, focus groups and advisory groups. Critical issues identified by external stakeholders include:

- Prevention/eradication of invasive species/exotic pests
- Increased economic competition from globalization
- Decreasing availability of labor and rising cost of labor
- Increased regulations impacting agricultural practices and their impact on water, air quality.
- Need for sound scientific data for decision makers who make policy/regulations

- Increased costs and competition for energy, water etc.
- Human nutrition and increase in obesity rates among adults and youth
- Changing land use and agriculture/natural resource/urban interface
- Opportunities for bioenergy development from agricultural systems

To address these issues, ANR research and extension programs will focus on:

- Increased use of genomic technologies for development of crops with higher yields, more water efficient, and more pest/disease resistant.
- Increased research and solutions to environmental issues (water and air quality) that are impacted by agricultural practices.
- Nutrition research, a priority to address the increase in obesity rates.
- Increased use of technology for information dissemination.
- Continue role as "honest broker" of information; provide science based information for policy makers as they create and implement regulations.
- Provide youth development activities that demonstrate careers in agriculture.

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 four 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?

Following the logic model format, each planned program has descriptions of the anticipated outcomes for FY 2009. There are also descriptions of the activities that will lead to achieving the anticipated outcomes.

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

The planned programs will result in improved program effectiveness as collaborative teams of AES faculty, CE specialists, and CE advisors address critical issues facing California's agricultural, natural and human resources. ANR workgroups are formed around statewide issues and the membership is composed of research and extension professionals from the three campuses and 50 county offices as well as the affected stakeholders. This prevents duplication of effort and ensures 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

- Targeted invitation to non traditional stakeholder individuals
- Use of media to announce public meetings and listening sessions
- Survey of traditional stakeholder groups
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Survey of selected individuals from the general public
- Targeted invitation to non-traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Targeted invitation to selected individuals from 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 57 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.

UC ANR Workgroups/Coordinating Conferences

Division program workgroups and coordinating conferences are the primary mechanism for accomplishing ANR's high priority research and extension goals through grassroots leadership. They bring together AES and CE personnel and non ANR partners to work on emerging and continuing priority issues in Division program areas. There are 76 Division-wide workgroups and 8 Coordinating Conferences with a total membership of over 3,200. Last year ANR workgroups involved 1,217 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 the education needs of 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 Executive Council, the Division's administrative group charged with Division-wide strategic planning.

Each of the three colleges at Berkeley, Davis and Riverside and the School of Veterinary Medicine at Davis, has 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 Special Projects and 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.

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.It is anticipated that stakeholders will also be involved in the development of ANR's implementation plan in the coming year.

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

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 system-wide 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.

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

A statement of how the input will be considered

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

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 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. California Families, Youth and Community Development (HR)

B. California Pest Management (Pest)

C. Sustainability and Viability of California Agriculture (Ag)

D. Sustaining California's Natural Resources (NR)

A) California Families, Youth and Community Development (HR)

1) Brief Summary about Planned Program

UC ANR's integrated research and extension activities will focus on the following:

Human resource issues including nutritional concerns on composition of food, farm to fork factors affecting nutritional quality of food and bioavailability of nutrients and disease protective agents, food choices and food consumption patterns in different ethnic and socio economic subpopulations, breastfeeding and infant and child feeding practices, and lifestyle correlates of healthy nutritional status.

Youth development issues such as understanding positive youth development, promoting citizenship, leadership, and life skills development, and improving agricultural, science, and environmental literacy.

Family well-being issues including developing and extending management solutions to improve literacy in resource management and community development issues including the effects of economic changes and decisions on communities and households.

Research will include studies in biochemistry, molecular and cellular biology, genetics, human physiology, psychology, and epidemiology, employing a wide range of experimental, quasi experimental and clinical methodologies (clinical and feeding trials with human subjects, experimental animal model systems, in vitro analyses using cell culture models, attitude surveys, household food inventories and behavior journals and will focus on the impact of diet and individual nutrients and phytochemicals on development, metabolism and disease prevention), and will be aimed at determining ADME of specific nutrients and protective agents in foods. Research utilizing recombinant DNA technology will be aimed at improving the quantity/availability of nutrients and protective agents in foods and the appeal of health promoting foods. Research will also be directed to improving methodologies for identifying nutrients and their actions. Research will be conducted to develop and evaluate educational programs and other interventions aimed at promoting adoption of lifestyle changes for improved nutritional status. Research will also focus on providing knowledge in non-formal and out-of-school positive youth development activities in citizenship, leadership and life skill development with broad expertise in agricultural and natural resources sciences. We will focus on behavioral change in all areas of human resources and will look at extending management solutions to improve literacy in agriculture, environmental science, and resource management.

Extension activities will focus on achieving lifestyle changes by delivering research based knowledge to the general population, with special concentration on high-risk groups and youth. Curricula on nutrition, diet and exercise and food buying, storage and preparation, family resource management, parenting, and experiential learning will be developed (fact sheets, pamphlets, DVDs and videos, newsletters, and articles and announcements for broadcast and print media) and will be adapted to specific needs of at risk groups. Extension efforts will reach individuals and youth directly in one-on-one, family and group settings, and indirectly through nutrition, health, education and childcare professionals trained by UC ANR.

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) HR Planned Program Knowledge Areas

Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1862 Research
305	Animal Physiological Processes	0%	8%
311	Animal Diseases	1%	3%
501	New and Improved Food Processing Technologies	3%	5%
502	New and Improved Food Products	1%	3%
503	Quality Maintenance in Storing and Marketing Food Products	2%	1%
608	Community Resource Planning and Development	2%	4%
701	Nutrient Composition of Food	1%	3%
702	Requirements and Function of Nutrients and Other Food Components	0%	31%
703	Nutrition Education and Behavior	19%	20%
704	Nutrition and Hunger in the Population	3%	0%
711	Ensure Food Products Free of Harmful Chemicals, including Residues from Agricultural and Other Sources	4%	1%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	6%	2%
721	Insects and Other Pests Affecting Humans	0%	2%
724	Healthy Lifestyle	8%	2%
801	Individual and Family Resource Management	3%	0%
802	Human Development and Family Well-being	4%	6%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	1%	4%

805	Community Institutions, Health, and Social Services	3%	3%
806	Youth Development	34%	1%
903	Communication, Education, and Information Delivery	5%	1%
	Total	100%	100%

3) HR Planned Program Situation and Scope

Situation and priorities

The changing economic, political and social environments in CA have major impacts on the use of human resources and contribute to unique challenges for CA youth and families. The human resource issues cross demographic and socioeconomic lines, affecting all ages, from children to the elderly to diverse cultural groups. The Human Resource Program focuses on the following four program 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. Childhood obesity is a critical health risk with the number of overweight children in CA almost tripling since 1970. 30% of children and adolescents are overweight or at risk of becoming overweight.

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 next 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 extra curricular 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

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

4) HR 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 California adults and children.
- Lower maternal and infant morbidity and mortality in California.
- Lower incidence of obesity among children and adults 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. Improved citizenship, leadership and life skills in youth.
- 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.

- Increased adoption of improved resource management practices and improved utilization of the food dollar by low income and underserved populations.
- 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) HR Planned Program Inputs

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

Year	Extension	Research
	1862	1862
2010	55.8	45.2
2011	55.8	45.2
2012	55.8	45.2
2013	55.8	45.2
2014	55.8	45.2

6) HR 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
• Group Discussion • Education Class • Demonstrations • One on One Intervention • Workshop	• Public Service Announcement • Billboards • Web sites • Newsletters • Other 1 (Collabs w/other agencies/orgs) • TV Media Programs

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) HR Planned Program CSREES Defined Standard Output Measures

Year	Target Direct Contacts Adults	Target Direct Contacts Youth	Expected Patent Applications	Expected Extension Peer Reviewed Publications	Expected Research Peer Reviewed Publications	Expected Total Publications
2010	109,100	210,000	3	40	180	220
2011	109,100	210,000	3	40	180	220
2012	109,100	210,000	3	40	180	220
2013	109,100	210,000	3	40	180	220
2014	109,100	210,000	3	40	180	220

8) HR Planned Program State Defined Outputs

Year	Target Classes/ Short Courses	Target Work-shops	Target Demonstra-tions/ Field Days	Target News-letters	Target Web Sites	Target Research projects	Target Videos, slide sets, other A/V or Digital Media	Target Manuals, other print materials
2010	1,920	1,080	220	290	60	170	90	500
2011	1,920	1,080	220	290	60	170	90	500
2012	1,920	1,080	220	290	60	170	90	500
2013	1,920	1,080	220	290	60	170	90	500
2014	1,920	1,080	220	290	60	170	90	500

9) HR Planned Program State Defined Outcomes

a) Change in Knowledge Outcome Measures

- 55 percent of youth and adults in the general population participating in nutrition education programs will gain knowledge of nutrition.

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

- 60 percent of individuals and families participating in healthy lifestyle education programs will gain knowledge of healthy lifestyle practices.

  Associated Knowledge Area(s): 724 - Healthy Lifestyle

- 55 percent of 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

- 70 percent of 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

- 75 percent of children and youth participating in 4-H club, community, in-school and after-school educational programs will increase their level of science, agricultural and environmental literacy.

  Associated Knowledge Area(s): 806 - Youth Development

- 70 percent of 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

- 60 percent of low-income children and youth participating in nutrition education programs will gain knowledge of nutrition.

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

- 60 percent of parents participating in parent education programs will gain knowledge of parenting techniques to promote child development and learning.

  Associated Knowledge Area(s): 802 - Human Development and Family Well Being

- 50 percent of low-income adults and families participating in nutrition education programs will gain knowledge of nutrition.

  Associated Knowledge Area(s): 703 - Nutrition Education and Behavior, 802 - Human Development and Family Well Being

b) Change in Attitude Outcome Measures

- 40 percent of individuals and families participating in nutrition and health education programs will intend to adopt healthier dietary and lifestyle practices.

    Associated Knowledge Area(s): 703 - Nutrition Education and Behavior, 724 - Healthy Lifestyle

c) Change in Skills Outcome Measures

- 40 percent of youth participating in 4H clubs will acquire leadership and civic skills.

    Associated Knowledge Area(s): 806 - Youth Development

- 75 percent of youth participating in 4-H club, community, in-school and after-school 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

- 60 percent of low-income adults and families participating in nutrition education programs will adopt recommended dietary practices.

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

- 40 percent of low-income children and youth participating in nutrition education programs will adopt recommended dietary practices.

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

- 70 percent of 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

- 50 percent of 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

- 50 percent of youth participating in 4-H clubs will assume leadership roles in organizations or taking part in community affairs.

e) Change in Condition Outcome Measures

- None Planned

10) HR Planned Program External Factors

External Factors which may affect Outcomes

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

Description

Natural Disasters
Californians are constantly vulnerable to catastrophic economic loss, widespread displacement of human populations, and loss of physical and social infrastructure as a result of a major earthquake. Such circumstances could constrain UC ANR's ability to carry out the research and extension activities planned for this program and to achieve the expected outcomes, because resources would likely be diverted to more acute health and safety issues, and UC ANR's own infrastructure may require rebuilding before programs can be resumed.

Economy
Downturns in the macro economy can affect program outcomes in two ways: (1) Reduced income levels in the population increase the number of individuals at risk for poor nutritional status, related health problems, and financial insufficiency and the severity of their risk, making successful intervention more difficult; (2) Economic recession leads to reductions in public and private support for research and extension activities necessary for achievement of the expected outcomes.

Appropriations Changes
Reductions in state and federal appropriations for UC ANR programs will jeopardize the organization's ability to conduct the research and extension activities planned for this program and thus put the expected outcomes at risk.

Public Policy Changes and Governmental Regulations
Achievement of expected outcomes would be jeopardized by policies and regulations that inhibit recombinant DNA research techniques for the development of nutritionally improved foods and restricting consumers' access to safe foods and food products of transgenic origin that could improve their nutritional status.

Competing Public Priorities
Changes in public priorities could result in reduced governmental and private support for science and education programs in general, and for human resources research and extension in particular, thus constraining UC ANR's ability to conduct activities

necessary for achieving the expected outcomes.

Population Changes
In recent years many new ethnic groups have immigrated to California in large numbers, creating even greater cultural diversity in an already heterogeneous society. Any further magnifying of this diversity of values and lifestyles, either by increased numbers of immigrants or introduction of new ethnic groups, would add to the challenges of successful intervention and achievement of expected outcomes.

11) HR Planned Program Evaluation Studies and Data Collection

Evaluation Studies Planned

- Before-After (before and after program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- After Only (post program)
- Retrospective (post program)
- During (during program)
- Comparisons between program participants (individuals, group, organizations) and non participants
- Case Study
- Time series (multiple points before and after program)

Data Collection Methods Planned

- Mail
- Journals
- Structured
- Case Study
- Other (Web Surveys)
- Sampling
- Whole population
- Unstructured
- Telephone
- Observation
- On Site
- Tests

B) California Pest Management (Pest)

1) Brief Summary about Planned Program

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. 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.

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) Pest Planned Program Knowledge Areas

Program knowledge areas and percentages

KA Code	Knowledge Area	%1862 Extension	%1862 Research
102	Soil, Plant, Water, Nutrient Relationships	2%	1%
123	Management and Sustainability of Forest Resources	1%	2%
135	Aquatic and Terrestrial Wildlife	1%	2%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	2%
202	Plant Genetic Resources	0%	2%
206	Basic Plant Biology	0%	2%
211	Insects, Mites, and Other Arthropods Affecting Plants	14%	17%
212	Pathogens and Nematodes Affecting Plants	20%	28%
213	Weeds Affecting Plants	14%	0%
215	Biological Control of Pests Affecting Plants	3%	11%
216	Integrated Pest Management Systems	37%	13%
305	Animal Physiological Processes	0%	2%

311	Animal Diseases	1%	1%
312	External Parasites and Pests of Animals	1%	2%
601	Economics of Agricultural Production and Farm Management	1%	0%
603	Market Economics	0%	2%
721	Insects and other pests affecting humans	3%	9%
722	Zoonotic Diseases and Parasites Affecting Humans	0%	2%
723	Hazards to Human Health and Safety	0%	2%
903	Communication, Education, and Information Delivery	2%	0%
	Total	100%	100%

3) Pest Planned Program Situation and Scope

Situation and priorities

The management of key pests in California's diverse agricultural, natural, and urban ecosystems is an on going effort. The same environment that allows a tremendous plant, crop, and animal diversity also provides limitless niches for various pest organisms, including weeds, insects, plant diseases, nematodes, mites, and vertebrate pest and disease causing organisms. Pest management is an important production concern to California farmers because it affects profitability from two sides: costs of production and loss of yield/income. Pest organisms, including invasive species, have had tremendous impact on e functions in the wide diversity of California's natural marine, aquatic, and terrestrial ecosystems. Similarly, pests damage structures and landscapes, as well as vector pathogens to the residents of California urban environments. Integrated pest management 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. 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.).

The research and extension programs within the University of California have established a long record of developing research based solutions to pest problems in the state. Investigations into the management of invasive weed species have provided new tools for the agricultural, livestock range, and natural resource communities to remediate areas that had become significantly degraded because of weed invasions. Studies of the basic biology of pest species have resulted in the development of alternatives to chemical pesticides, establishment, conservation, and augmentation of natural enemies for biological control, implementation of new approaches for cultural controls of pest species, and discovery of new tools for the prediction, early detection, and prevention of invasion by arthropods, weed, and pathogens causing plant and animal diseases. More fundamental research efforts

have provided information on the genetics and systematics (origin, diversity) of invasive pests. These studies are supported by computer modeling efforts that provide a more detailed understanding of the epidemiology of invasion biology. Research continues on prediction of the social/economic consequences of pests in the state and the benefits that accrue from integrated pest management solutions.

The guiding principle for setting priorities is that ANR research and extension programs serve the public good of California through the creation, development and application of knowledge addressing critical issues in agricultural, natural and related human resources, through a system of community driven research and outreach programs with CE advisors supported by CE specialists and AES scientists. External private and government agency clientele are formally and informally consulted in the process of identifying the critical pest management issues as well as developing and delivering science based information to quantify pest situations and help guide pest control decision making. A similar model guides research and education related to increasing the understanding of invasive species, modes of entry into the state, assisting in the eradication or reducing the spread of newly introduced pest species, and developing methods of effectively dealing with recent introductions.

Scope of the Program

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

4) Pest Planned Program Assumptions and Goals

Assumptions made for the Program

The UC ANR Core Values provide the fundamental assumptions for guiding action and decisions at all levels of the Division and, specifically, for programming in pest management. These core values include the highest standards of ethical behavior, honesty and integrity, with the recognition that the trust and confidence of the public are absolutely essential to success.

- Academic excellence and credibility as an objective source of knowledge are critical to effective communication with clientele.
- Scientifically valid research is a foundation for anticipating problems and developing practical solutions.
- Responsiveness to state and local needs in California, and consideration of the global context that shapes these needs, are fundamental to the contributions of the research and extension mission.
- Diversity within the organization, equal access to knowledge by all people, and equal opportunity for self reliance through education are critical for implementation of research based solutions.
- Collaboration, teamwork and mutual respect, in partnership with other organizations, and in interaction with our clientele are vital for developing programs that are inclusive and relevant.

- Academic freedom, with the recognition that individual freedom goes hand in hand with a high standard of professional responsibility and personal accountability to ANR's land grant mission.
- Pest management research and extension activities integrate fundamental and applied science to develop solutions to problems.
- Identification of key issues comes from a blend of investigator experience, expertise in specific disciplines, collaborative interdisciplinary investigations with other scientists, consultations with clientele, and cooperation with cooperative extension academics. These collaborations are effective in addressing scientific issues and providing information that can be adapted by end user clientele.
- Availability of sources of competitive as well as basic institutional support focuses efforts on critical issues and facilitates development of effective collaborations.
- The UC Statewide IPM program, the Exotic/ Invasive Pests and Diseases Research Program, and the UC Mosquito Research Program administer competitive grants programs with review panels representing both the scientific and clientele communities that prioritize research and extension efforts in critical areas. All of these programs require a plan for outreach or implementation of the results. The investigative team considers how the information will be adopted based on what has been successful, identifies the clientele and works with them to motivate adoption of new approaches. For example, ANR AES scientists, CE Specialists and Advisors, supported by internal and external competitive funds worked together to identify/synthesize semiochemicals used by insect pests, developed the formulations and deployment approaches, generated data on efficacy of insect suppression, and worked with clientele in field demonstrations. Development and implementation of this new pest management approach has resulted in drastic reductions in pesticide use on fruit crops in California.

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 pests.
- Increased professionalism of crop and pest consultants through improved certification programs.
- 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 consequences of invasive species for both past and potential introductions.
- 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) Pest Planned Program Inputs

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

Year	Extension	Research
	1862	1862
2010	65.5	65.7
2011	65.5	65.7
2012	65.5	65.7
2013	65.5	65.7
2014	65.5	65.7

6) Pest 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
• Education Class • Workshop • Demonstrations • One-on-One Intervention • Group Discussion	• Web sites • Newsletters • Billboards • Other 1 (Collabs w/other agencies/orgs) • Public Service Announcement • TV Media Programs

Description of targeted audience

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

7) Pest Planned Program CSREES Defined Standard Output Measures

Year	Target Direct Contacts Adults	Target Direct Contacts Youth	Expected Patent Applications	Expected Extension Peer Reviewed Publications	Expected Research Peer Reviewed Publications	Expected Total Publications
2010	25,100	0	0	130	280	410
2011	25,100	0	0	130	280	410
2012	25,100	0	0	130	280	410
2013	25,100	0	0	130	280	410
2014	25,100	0	0	130	280	410

8) Pest Planned Program State Defined Outputs

Year	Target Classes/ Short Courses	Target Work-shops	Target Demonstra-tions/ Field Days	Target News-letters	Target Web Sites	Target Research Projects	Target Videos, Slide sets, other A/V or Digital Media	Target Manuals, other print materials
2010	130	60	110	170	60	490	20	70
2011	130	60	110	170	60	490	20	70
2012	130	60	110	170	60	490	20	70
2013	130	60	110	170	60	490	20	70
2014	130	60	110	170	60	490	20	70

9) Pest Planned Program State Defined Outcomes

a) Change in Knowledge Outcome Measures 2010-2014

- 40 percent of 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, 311 - Animal Diseases, 312 - External Parasites and Pests of Animals

- 55 percent of 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

- 45 percent of farm, ranch, rangeland, and landscaping owner/operators and managers, allied industry professionals, and members of the public participating in the program 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

- 70 percent of farm owner/operators and mangers, Pest Control Advisors, and other allied industry professionals participating in the program gaining knowledge on how to recognize and identify 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

b) Change in Attitude Outcome Measures 2010-2014

- None Planned

c) Change in Skill Outcome Measures 2010-2014

- None Planned

d) Change in Behavior Outcome Measures 2010-2014

- 35 percent of 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

- 50 percent of 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

e) Change in Condition Outcome Measures 2010-2014

- 10 percent of 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): 601 - Economics of Agricultural Production and Farm Management

10) Pest Planned Program External Factors

External Factors which may affect Outcomes

- Economy
- Public Policy Changes
- Appropriations changes
- Natural Disasters (drought, weather extremes, etc.)
- Populations Changes (immigration, new cultural groupings, etc.)
- Government Regulations
- Other (availability of graduate students/others)

Description

Natural Disasters

Natural disasters make it difficult to implement some pest management options. For example, water management may be a critical factor in maintaining plant vigor and resistance to insect and disease activities. Severe drought and reduced water applications may have significant detrimental impacts on plants and animals, making them more susceptible to pests. Reduced moisture availability may also have significant negative impacts on biological control efforts. Severe weather may spread pest species into previously uninfested areas, having a significant negative impact on risk assessments and implementation of sustained pest management approaches.

Economy

A downturn in the economy may have significant negative consequences on the adoption of pest management approaches. If the value of a commodity goes down, the more costly or higher risk pest management tactics have reduced appeal for adoption.

Appropriations Changes

Appropriations changes can have a direct impact on the availability of funds for research and implementation projects. Reduced appropriations to units responsible for protection of natural environments can reduce implementation of management strategies. If funds are unavailable, pest and disease problems can quickly shift from moderate to severe conditions. State and federal agencies have responsibilities to respond to invasive species in detection and eradication programs. Reductions in

budgets can result in slower detection rates and inability to provide adequate responses as new pests and diseases are discovered. The reduced response increases the likelihood of establishment of invasive species and negative impacts on agricultural, natural, and urban environments.

Public Policy Changes
Public policy can provide the impetus for adoption of new pest management approaches. Changes in those policies can determine whether new technologies are implemented and the rate of integration of new approaches into established pest management programs aimed at solving problems.

Government Regulations
Government regulations can affect licensing requirements of pest management professionals and the availability of tools. For example, a changing regulatory environment around application of behaviorally active natural products has limited their availability because there is uncertainty whether or not they are classified as pesticides. Similarly, the use of genetically engineered crop plants and the classification of biological control agents have been subject to shifting governmental regulations. A changing regulatory environment has a significant detrimental impact on development and adoption of pest management tactics.

Populations Changes
California is blessed with a rich and diverse cultural environment. However, there is a significant educational challenge to reach out to new residents and effectively communicate the economic/sociological consequences of invasive species.

Other
Availability of graduate students and qualified candidates to fill emerging vacancies in academic positions in applied pest management presents a significant challenge with fewer students being trained in these fields. There is an increasing need for public and private professionals in the research, education, extension, and consultant communities. However, fewer students are being trained to replace the individuals who are retiring.

11) Pest Planned Program Evaluation Studies and Data Collection

Evaluation Studies Planned

- Case Study
- Comparisons between program participants (individuals, group, organizations) and non participants
- Retrospective (post program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- During (during program)
- Time series (multiple points before and after program)
- After Only (post program)
- Comparison between locales where the program operates and sites without program intervention
- Before-After (before and after program)

Data Collection Methods Planned

- Tests
- On-Site
- Mail
- Other (Web Surveys)
- Whole population
- Unstructured
- Observation
- Sampling
- Case Study
- Telephone

C) Sustainability and Viability of California Agriculture

1) Brief Summary of Planned Program

UC's research and extension activities will address critical issues pertaining to the economic viability and sustainability of agriculture. This includes the environmental, resource-use, and social issues that interact with agricultural production systems. ANR programs will develop and transfer technologies that will contribute to the long term sustainability of agriculture and food systems. Priority components include introduction of new crops and improved crop varieties; applications of biotechnology; development of biofuels and biofuel conversion technology, food safety, evaluation and development of organic and sustainable production strategies; economic and market analysis; social/biological impacts of agriculture and agricultural land use; waste management strategies, including recycling of dairy manure and waste water; and the potential re-use of waste materials. Irrigation management, development of deficit irrigation techniques, and water policy analysis, improvement of water use efficiency, and water quality are high priorities. Soil analysis, nutrient management and protection of soil quality, crop rotation benefits, and the development of sustainable soil management practices are important aspects of our programs. Efforts will also be directed 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.

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) Ag Program Knowledge areas

Program knowledge areas and percentages

KA Code	Knowledge Area	%1862 Extension	%1862 Research
102	Soil, Plant, Water, Nutrient Relationships	17%	3%
111	Conservation and Efficient Water Use	2%	2%
201	Plant Genome, Genetics, and Genetic Mechanisms	2%	18%
202	Plant Genetic Resources	4%	7%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	3%	6%
204	Plant Product Quality and Utility (Preharvest)	8%	4%
205	Plant Management Systems	33%	5%
206	Basic Plant Biology	0%	17%
211	Insects, mites, and other arthropods	2%	3%

	affecting plants.		
212	Pathogens and Nematodes Affecting Plants	2%	16%
213	Weeds Affecting Plants	0%	3%
301	Reproductive Performance of Animals	1%	2%
302	Nutrient Utilization in Animals	4%	1%
304	Animal Genome	0%	2%
305	Animal Physiological Processes	0%	3%
307	Animal Management Systems	9%	0%
501	New and Improved Food Processing Technologies	0%	3%
601	Economics of Agricultural Production and Farm Management	9%	1%
603	Market Economics	2%	2%
723	Hazards to Human Health and Safety	2%	2%
	Total	100%	100%

3) **Ag Planned Program Situation and Scope**

Situation and priorities

California agriculture is the most important economically in the US, and faces unprecedented challenges from world competition, increased input costs, environmental constraints, severe water limitations, high regulatory pressures and labor limitations.

Population

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 as slowing the loss of critical farmlands and loss of agricultural jobs.

Environmental Issues

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 to couple waste management with will be needed to manage the nitrogen and nutrient cycles on diaries and cropping systems. Urban systems have been identified as major sources of nutrient and pesticide pollution to surface waters. Developers, homeowners, water districts, school districts, cities and commercial nurseries need new management tools to reduce this negative impact. Global climate change is a major public issue which needs addressing by agriculture.

Economic Viability
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.

Food Safety
Ensuring the safety of the food supply, as food borne illnesses can result in lost productivity, increased medical expenses and death. Consumer health and agricultural sustainability require a food supply that is produced, processed, distributed, and prepared in a manner that prevents or minimizes contaminants. 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. The health of livestock and poultry and the control of pathogens and contaminants in fresh and processed food products is a pivotal control point in assuring food safety for consumers, and begins with agricultural production systems.

Sustainability
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. Agriculture is a large and highly valued component of California's economy, and economic sustainability needs to be balanced with environmental sustainability. The profitability of California farms has been diminished 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.

Scope of the Program
- In-State Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension
- In-State Extension
- Multistate Research
- Multistate Extension

4) **Ag Planned Program Assumptions and Goals**

Assumptions made for the Program

The sustainability of our agricultural systems will be challenged by increased resource availability and 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 project from these countries entering the US market place at prices that are significantly lower than domestic sources.

In the area of food safety and security, it is assumed that we will be presented with new microbial and chemical threats on an ongoing basis. It is also presumed that these threats can be natural, accidental or intentional. The 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. This dependence 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

- Development and adoption of new crops and breeds that 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.
- To enable California agriculture to remain economically viable, maximizing its opportunities in markets where it has a competitive advantage
- California commodities are produced with minimal or no detrimental impact on the state's natural resources and environment.
- Improved food safety knowledge and practices for food suppliers, processors,

retailers and consumers.

- Improved food handling behaviors 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 food borne illness each year.
- Reduction in the cost of medical care, lost work hours and deaths due to food borne illness.
- 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.

5) **Ag Planned Program Inputs**

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

Year	Extension	Research
	1862	**1862**
2010	100.0	145.0
2011	100.0	145.0
2012	100.0	145.0
2013	100.0	145.0
2014	100.0	145.0

6) **Ag 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**
• Education Class • Workshop • Demonstrations • One-on-One Intervention • Group Discussion	• Web sites • Newsletters • Other 1 (Collabs w/ other agencies/orgs • Public Service Announcement • TV Media Programs

Description of targeted audience

- Food producers: 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) Ag Planned Program CSREES Defined Standard Output Measures

Year	Target Direct Contacts Adults	Target Direct Contacts Youth	Expected Patent Applica-tions	Expected Extension Peer Reviewed Publications	Expected Research Peer Reviewed Publications	Expected Total Publications
2010	69,000	9,000	10	90	580	670
2011	69,000	9,000	10	90	580	670
2012	69,000	9,000	10	90	580	670
2013	69,000	9,000	10	90	580	670
2014	69,000	9,000	10	90	580	670

8) Ag Planned Program State Defined Outputs

Year	Target Classes/ Short Courses	Target Work-shops	Target Demonstra-tions/ Field Days	Target News-letters	Target Web Sites	Target Research projects	Target Videos, slide sets, other A/V or Digital Media	Target Manuals, other print materials
2010	210	210	170	280	120	580	20	90
2011	210	210	170	280	120	580	20	90
2012	210	210	170	280	120	580	20	90
2013	210	210	170	280	120	580	20	90
2014	210	210	170	280	120	580	20	90

9) Ag State Defined Outcomes

a) Change in Knowledge Outcome Measures 2010-2014

- 55 percent of farm and ranch owner/operators and 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)

- 40 percent of farm/ranch/landscaping owner/operators and managers and allied industry professionals participating in the programs will gain knowledge of cultural practices, pest and disease management, irrigation and drainage or other aspects of comprehensive management systems for plant and animal production.

  Associated Knowledge Area(s): 102 - Soil, Plant, Water, Nutrient Relationships, 111 - Conservation and Efficient Use of Water, 204 - Plant Product Quality and Utility (Preharvest), 205 - Plant Management Systems, 206 - Basic Plant Biology, 211 - Insects, Mites, and Other Arthropods Affecting Plants, 212 – Pathogens and Nematodes Affecting Plants, 213 - Weeds Affecting Plants, 302 - Nutrient Utilization in Animals, 307- Animal Management Systems, 601 - Economics of Agricultural Production and Farm Management

- 55 percent of farm and ranch owner/operator/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

- 40 percent of members of public participating in the programs will gain knowledge of sustainable gardening practices.

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

b) Change in Attitude Outcome Measures 2010-2014

- 35 percent of farm and ranch owner/operators and managers and allied industry professionals participating in the program 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): 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, 213 - Weeds Affecting Plants, 307- Animal Management Systems

c) Change in Skills Outcome Measures 2010-2014

- 40 percent of farm and ranch owner/operators participating in programs will gain skills in business management practices.

  Associated Knowledge Area(s): 601 - Economics of Agricultural Production and Farm Management

d) Change in Behavior Outcome Measures 2010-2014

- 20 percent of farm, ranch, and landscaping owner/operators and managers and allied industry professionals participating in the programs will adopt improvements in cultural practices, pest and disease management, irrigation and drainage or other aspects of comprehensive management systems for plant and animal production.

  Associated Knowledge Area(s): 102 - Soil, Plant, Water, Nutrient Relationships, 111 - Conservation and Efficient Use of Water, 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, 213 - Weeds Affecting Plants, 307 - Animal Management Systems

- 45 percent of farm, ranch and landscaping owner/operators and managers and allied industry professionals participating in the programs will adopt superior varieties of crops.

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

- 25 percent of tree fruit and nut owner/operators and 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

e) Change in Condition Outcome Measures 2010-2014

- None Planned

10) **Ag 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.)

11) **Ag Planned Program Evaluation Studies and Data Collection**

Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Data Collection Methods Planned

- Sampling
- Whole population
- Mail
- Telephone
- On-Site
- Structured
- Unstructured
- Case Study
- Observation
- Tests
- Journals
- Other (Web Surveys)

D) Sustaining California's Natural Resources (NR)

1) **Brief Summary about Planned Program**

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.ANR programs will focus on water and air quality, land use, water supply and allocation, wildland fire, and the sustainable use of California's natural resources. Priority areas for research and extension include:

- 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.
- 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.
- 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.
- Water Supply and Allocation: biological and physical aspects of water supply and allocation and the economic, political and social activities that affect water supply and allocation and solutions to water supply and allocation problems.
- Wildland Fire: biological, ecological and physical aspects of wildland fire and the economic, political and social activities that affect wildland fire and solutions to wildland fire problems.

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) **NR Program Knowledge Areas**

Program knowledge areas and percentages

KA Code	Knowledge Area	%1862 Extension	%1862 Research
101	Appraisal of Soil Resources	1%	11%
102	Soil, Plant, Water, Nutrient Relationships	5%	15%
103	Management of Saline and Sodic Soils and Salinity	2%	1%
111	Conservation and Efficient Use of Water	16%	1%
112	Watershed Protection and Management	14%	5%
121	Management of Range Resources	10%	2%
122	Management and Control of Forest and Range Fires	4%	0%
123	Management and Sustainability of Forest Resources	8%	1%
131	Alternative Uses of Land	2%	1%
132	Weather and Climate	1%	7%
133	Pollution Prevention and Mitigation	14%	10%
135	Aquatic and Terrestrial Wildlife	11%	12%
136	Conservation of Biological Diversity	5%	1%
141	Air Resource Protection and Management	3%	1%
206	Basic Plant Biology	0%	6%
212	Pathogens and Nematodes Affecting Plants	0%	6%
305	Animal Physiological Processes	0%	5%
311	Animal Diseases	0%	3%
604	Marketing and Distribution Practices	0%	4%
605	Natural Resource and Environmental Economics	4%	8%
	Total	100%	100%

3) **NR Planned Program Situation and Scope**

Situation and priorities

Population growth 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. The Natural Resource Program focuses

on several areas that are key to the sustainable use of natural resources in California.

Water Quality
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.

Air Quality
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 photoxidant 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.

Land Use
California is the most diverse, populous and rapidly growing state. It leads the nation in the value of diversity of agriculture and the diversity of ecosystems. As a result, land us 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.

Sustainable Use of Natural Resources
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.

Water Supply and Allocation
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.

Wildland Fire
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

Science Literacy around Natural Resources
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.

Scope of the Program

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

4) **NR 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

- Developing innovative scientific techniques, products, and/or processes to improve water use efficiency and water management practices to conserve water.
- Increased clean water, environmental health and high functioning aquatic, coastal, marine and riparian habitats.
- Reduction in the number of impaired water bodies throughout California.
- 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.
- Increased 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.
- 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.
- Providing accessible science information to enable people to adapt to ever changing physical, social and economic conditions

5) **NR Planned Program Inputs**

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

Year	Extension	Research
	1862	1862
2010	63.6	84.6
2011	63.6	84.6
2012	63.6	84.6
2013	63.6	84.6
2014	63.6	84.6

6) **NR 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**
• Education Class • Workshop • Demonstrations • One on One Intervention • Group Discussion	• Web sites • Newsletters • Other 1 (Collabs w/other agencies/orgs) • Public Service Announcement • TV Media Programs

Brief description of the target audience

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

7) **NR Planned Program CSREES Defined Standard Output Measures**

Year	Target Direct Contacts Adults	Target Direct Contacts Youth	Expected Patent Applications	Expected Extension Peer Reviewed Publications	Expected Research Peer Reviewed Publications	Expected Total Publications
2010	30,700	0	0	40	340	380
2011	30,700	0	0	40	340	380
2012	30,700	0	0	40	340	380
2013	30,700	0	0	40	340	380
2014	30,700	0	0	40	340	380

8) **NR Planned Program State Defined Outputs**

Year	Target Classes/ Short Courses	Target Work-shops	Target Demonstra-tions/ Field Days	Target News-letters	Target Web Sites	Target Research Projects	Target Videos, Slide sets, other A/V or Digital Media	Target Manuals, other print materials
2010	100	140	120	70	40	240	20	90
2011	100	140	120	70	40	240	20	90
2012	100	140	120	70	40	240	20	90
2013	100	140	120	70	40	240	20	90
2014	100	140	120	70	40	240	20	90

9) **NR Planned Program State Defined Outcomes**

a) Change in Knowledge Outcome Measures 2009-2013

- 50 percent of farm, ranch, rangeland and marine industry owner/operators and managers and allied industry professionals participating in water quality education programs will gain knowledge of best management practices for preserving water quality.

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

- 1500 governmental agencies, agricultural and fishing organizations, resource managers and other stakeholders in marine and inland fishery management issues will gain knowledge of strategies and techniques for sustainable use of marine and inland fishery resources.

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

- 50 percent of owners/managers of private and public rangeland, forest and wildlands participating in range, forest and wildland education programs will gain knowledge of strategies and techniques for sustainable use of range, forest and wildland resources.

  Associated Knowledge Area(s): 121 - Management of Range Resources, 123 - Management and Sustainability of Forest Resources, 135 - Aquatic and Terrestrial Wildlife, 136 - Conservation of Biological Diversity

- 650 governmental agencies, community organizations and other stakeholders in land use policy issues will gain an increased understanding of land use planning strategies, methodologies and data.

  Associated Knowledge Area(s): 131 - Alternative Uses of Land

- 50 percent of 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

- 50 percent of farm, ranch, and landscape owners/operators and 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

- 50 percent of 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 2009-2013

- None Planned

c) Change in Skills Outcome Measures 2009-2013

- None Planned

d) Change in Behavior Outcome Measures 2009-2013

- 45 percent of farm, ranch, rangeland and marine industry owner/operators and managers and allied industry professionals participating in water quality education programs will adopt best management practices for preserving water quality.

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

- 40 percent of owners/managers of private and public rangeland, forest and wildlands participating in range, forest and wildland education programs will adopt recommended strategies and techniques for sustainable use of range, forest and wildland resources.

  Associated Knowledge Area(s): 121- Management of Range Resources, 123 - Management and Sustainability of Forest Resources, 135 - Aquatic and Terrestrial Wildlife, 136 - Conservation of Biological Diversity

e) Change in Condition Outcome Measures 2009-2013

- None Planned

10) **NR Planned Program External Factors**

External factors which affected outcomes

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

11) **NR Planned Program Evaluation Studies and Data Collection**

Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)

- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

Data Collection Methods Planned

- Sampling
- Whole population
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- Telephone
- On-Site
- Structured
- Unstructured
- Case Study
- Observation
- Tests
- Journals